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FOREWORD

Addressing the intertwined challenge of meeting rising food demand and conserving ecosystems in a changing climate will not be easy. Agriculture is thus at a crossroads; it has to find ways to feed the world while being environmentally, socially and economically sustainable. Conventional intensive and industrial agriculture (including crop production and animal husbandry) allowed increasing food production but at a high environmental cost. In this context, sustainable agriculture and forestry practices aim to reduce environmental harm while conserving natural capital and preserving biodiversity. Organic agriculture promotes a holistic approach to plant and animal production. Sustainable agriculture is also crucial for fostering vibrant rural economies.

The International Scientific Agriculture Symposium AGROSYM has become an annual platform for international scientific discussion on agriculture, forestry, food, rural development and environment. AGROSYM represents, indeed, a good opportunity to exchange ideas, to develop academic and professional networks, and to foster dialogue between the academia, public institutions, the private sector and civil society organizations on the recent global and regional trends affecting the agro-food sector.

AGROSYM themes cover all branches of agriculture and are divided into seven sessions: 1) Plant production, 2) Plant protection and food safety, 3) Organic agriculture, 4) Environmental protection and natural resources management, 5) Animal husbandry, 6) Rural development and agro-economy, and 7) Forestry and agroforestry.

In your hands is the Book of Abstracts of AGROSYM 2016, which I hope you will find useful in your work and endeavors. This year's edition of Agrosym received 1103 contributions from 77 countries. The present Book includes abstracts of all accepted contributions; around 240 contributions have been accepted for oral and all other for poster presentations. Positively reviewed full papers of the submitted contributions will be included in the Proceedings of the symposium and published on the official website (http://www.agrosym.rs.ba/index.php/en/). A selection of papers will be published in International Journal "AgroFor" and International journal "Agriculture and Forestry".

I hope that the multidisciplinary contributions reported in this Book of Abstracts will contribute to the dissemination of knowledge and good practices to all actors of the agro-food chain (*e.g.* farmers, extension agents, researchers, policy makers) as well as the general public in Bosnia and Herzegovina, Balkans, Europe and worldwide. I hope also that AGROSYM 2016 will enable better collaboration of scientists, researchers and professionals from Balkan countries and abroad to address jointly pressing challenges.

AGROSYM 2016 has been made possible through the commitment and contributions of a wide range of partners and sponsors. Many thanks to authors, reviewers and all colleagues for their valuable help and unconditional devotion. Special thanks go also to all co-organizers, partners and sponsors for their kind collaboration and support.

East Sarajevo, 3 October 2016
Dušan Kovačević, PhD, Faculty of Agriculture, University of Belgrade
President of the Scientific Committee, AGROSYM 2016

KEYNOTE PAPERS

GLOBAL CLIMATE CHANGE AND FORESTRY

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Abstract

Forest ecosystems are composed mainly of trees, shrubs, plants and other autotrophic organisms. Thus, photosynthetic activity is a crucial and significant physiological process in this type of ecosystem. Photosynthetic activity is directly connected to carbon dioxide absorption. Thus, CO_2 in the atmosphere, which is regarded as the main source of carbon, is regarded as the "inorganic nutrient" for photosynthesis. Because CO_2 is the principal greenhouse gas, the photosynthesis could be regarded as the crucial "massive biological pump" of carbon from the atmosphere. It means that photosynthesis of plants is strongly related to global climate change, which is regarded as the crucial phenomenon of the current environment on the planet Earth. The ability of different ecosystems to be long-term carbon storages varies substantially. In particular, forests are of great importance. The long-term carbon storage in woody biomass and especially in the forest soil is significant. This carbon storage is strongly dependent on environmental impacts and anthropogenic activities. These sylvicultural activities substantially affect carbon storage. Thus, it is possible to formulate a special set of forest practises named "carbon forestry", which focuse on enhancing carbon storage and reducing carbon losses.

Keywords: *Carbon capture by forest, Carbon storage, Carbon forestry*

HIGH-TECH AND ORGANIC FARMING – VISION OR REALITY?

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Abstract

During the last two decades agro technology has significantly changed: Previously primarily engineering/technical improvements were in the centre of consideration whereas today e.g. sensors are indispensable components of complex agricultural high-tech systems. Organic farming is growing worldwide and plays an important role for sustainable land use. Mechanical weed control is one of the most important challenges for organic cropping systems. Practicable mechanical solutions for inter-row weed regulation are available; options, however, for intra-row techniques are more limited. In particular, there was no method for individual plant weed control for row crops such as maize or carrots. Available weeders needed ongoing further development by using high-tech technologies. Starting in the late 90s first scientific based attempts took place to integrate sensors in mechanical weeding systems successfully (transversal cycloid hoe in maize). In ongoing experiments the autonomous field-robot BoniRob was developed. BoniRob established the basis for future agricultural technology. Sensor fusion based solutions were developed for intra-row weeding in carrots. Starting once in the scientific lab, this high-tech weeder has been proven under real world conditions and is available on the market since 2015 (Deepfield Robotics – automated weed robot).

Keywords: *weed regulation, sensor, agro technology, sustainable land use, field robot*

ORGANIC MANAGEMENT OF SOIL FERTILITY UNDER ARID CONDITIONS

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Abstract

A considerable volume of organic food produced worldwide originates from arid and semi arid regions where farmers are facing multiple challenges related to water scarcity, heat stress and soil fertility. The management of soil fertility is however considered as the limiting factor since low yields are still reported for organic crops in rain fed as well as in irrigated land. In order to face theses challenges, farmers and searchers in several countries have been developing new ways and technologies to turn arid climate constraints into attributes using organic practices and technologies such as manuring, composting, bunding, strip cropping, mulching, inter-tillage cultivation, crop rotation, bio-fertilization, and banded cropping. Modern dry organic farming includes also climate-smart monitoring of soil humidity, soil nutritional status and soil carbon pool. Under rain-fed conditions soil fertility management strategies are based mainly on traditional practices aiming at optimizing water use efficiency and nutrient releases from organic matter. Under irrigation, the strategies include modern technologies such as plastic houses, drip irrigation, fertigation, foliar treatment, soil humidity monitoring kits etc. Thousands of hectares around the world are allocated to organic vegetables and fruits growing in arid areas under irrigation, thanks to the scientific and technological progress made in drip irrigation using liquid organic products, bio-fertilizers, organic fertilization and new scientific tools and concept for monitoring soil biochemical process leading to nutrient release from organic-based fertilizers (Soil enzymology, Equivalent Mineral Coefficient, Agronomic Efficiency Coefficient etc). The constraints and accomplishments in organic fertilization management using modern technologies such drip irrigation, fertigation, soil-plant-climate continuum monitoring probes and organic fertilizers will be discussed for vegetables crops.

Keywords: *Organic management, soil fertility, arid conditions*

INTERNATIONAL COOPERATION IN AGRICULTURAL AND RURAL DEVELOPMENT IN THE MEDITERRANEAN: ACHIEVEMENTS AND CHALLENGES

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Abstract

Created in 1962, CIHEAM is a Mediterranean intergovernmental organization which works for improving sustainable agriculture and fisheries, for ensuring food and nutrition security and for developing rural and coastal territories. The organization gathers 13 Member States from both shores of the Mediterranean. CIHEAM- Bari is one of the four CIHEAM Centres, for post-graduate training, applied scientific research and international cooperation programmes. Cooperation and research actions of CIHEAM Bari involve issues such as food security, poverty alleviation, capacity building, efficient use of natural resources, improvement of agricultural production, organic farming, sustainable food systems, climate change, integrated management of coastal areas, gender empowerment, fisheries and aquaculture, etc. In the last 8 years, CIHEAM Bari has implemented 69 Cooperation projects.The networking of CIHEAM-Bari involves hundreds of institutions. One of them is the Mediterranean Organic Agriculture, which plans to gather the Ministries of Agriculture of 24 Euro-Mediterranean countries, with the objective of furthering organic agriculture. In the South East Europe, CIHEAM Bari has implemented several actions, such as: Cooperation Projects, Capacity Building, Natural Resources Management & Conservation, Development of Rural Territory, improving of Food Quality and Safety. The CIHEAMs Strategic Agenda 2025 is structured around 4 Pillars and divided into 15 Thematic Priorities. This is contextualised with the United-Nations Agenda 2030. Pillars: Protecting the Planet; Food Security and Nutrition; Inclusive Development; Crises and Resilience. The potential areas of cooperation with CIHEAM Bari, involve Ministries, Extension services, Universities, in as follows sectors: a) Capacity building to better understand and implement EU policies; b) Sustain the development of national rural economy.

Keywords: *Protecting the Planet; Food Security and Nutrition; Inclusive Development; Crises and Resilience, Mediterranean Cooperation*

1. PLANT PRODUCTION

COMPARATIVE STUDY OF OVARIAN DEVELOPMENT AND FUNCTIONING OF CALLIPTAMUS BARBARUS (COSTA, 1839) AND C. WATTENWYLIANUS (PANTEL, 1836) (ORTHPTERA: ACRIDIDAE)

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Abstract

The study of the reproductive activity of the Orthoptera is important for the dynamics of population studies and evaluation of their biotic potential in Algeria, as the ovarian development is not well studied Therefore, we have adopted the practical method reported by Launois (1972) for state ovaries interpretation, which consists of the dissection of the Locust reproductive organ. Then, both ovaries are separated and cleaned of their impurities by means of fine crowbars and by means of entomological needles to reveal ovarioles. These were counted on both ovaries as well as for C. barbarus wattenwylianus C. and the results are expressed in total ovarioles. It is clear that female C. wattenwylianus, are mature early and produce more ovarioles compared with those of C. barbarus. The number of ovarioles between the right ovary and the left ovary is identical and the counting of one of them is amply enough. Generally, pares females lay a number eggs upper to the average. For example, in September, the egg numbers are 29.7 and 36.5 for C. barbarus and C. wattenwylianus, respectively. These, represent a yield of 59.1% and 67.4%. All females of both locust populations are nulliparous in July and August since they are still young. Increase of oocyte resorption or degeneration, can be explained by the aridity climate and fire forest in all Algerian territory.

Keywords: *Calliptamus, ovarioles, eggs, degenerations. Oocyte, retention*

STUDY OF THE EFFICIENCY OF BIOLOGICAL NITROGEN FIXATION AND RHIZOBIUM STRAIN IMPROVEMENT TARGETED TOWARDS AGRARIAN TRANSFORMATION AND FOOD SECURITY IN ALGERIA

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Abstract

In Algeria, soils are seriously degraded and nutrient exhausted from many years of neglect, continuous cultivation, and exposure to environmental elements, and from a lack of nutrient recycling. As a result, these soils are poor in fertility and cannot adequately support productive agriculture, decreasing agricultural output compromising food security and economic performance that presents a greater part of its GDP from agricultural activities. Rehabilitating soil fertility using fertilizers alone has also failed to be an effective solution for the majority of impoverished farmers who do not have sufficient purchasing power. Worse about chemical fertilizers is that they contribute to the pollution of soil and ground water resources. One of the most sustainable measures towards rehabilitating degraded land involves the introduction of legumes within cropping cycles or in fallow land. Under nitrogen-limiting conditions leguminous plants form root nodules in which special bacteria called rhizobia biologically reduce atmospheric nitrogen into ammonia, thus availing the critical nutrient, nitrogen for crop productivity. The leguminous plants utilized for biological nitrogen fixation are available as forage, industrial feedstock, or as food for humans and animals. The concept of biological nitrogen fixation in the rehabilitation of soil fertility for agricultural productivity is therefore a crucial aspect in the pursuit of food security, environmental conservation and improved economic output in Algeria.

The study aims to characterize the genetic and functional diversity of the nitrogen fixation in different agro-pedo-climatic zones of northern Algeria in a transect North East / North West. The goal is to encourage the use of the most effective rhizobia strains and most efficient nitrogen fixing material in order to restore the degraded agricultural land and finally promote the creation of small companies specialized in the production and marketing of biological inoculum for local farmers

Key words: *Food and forage legumes, Rhizobium strains, Nitrogen fixation, Soil fertility, Food security, Algeria*

DNA-MARKING OF PERENNIAL GRASS CROPS FOR SELECTION OF INTERSPECIFIC HYBRIDS

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Abstract

Themethod of distant hybridization is widely used in perennial grass breeding for improvement of such varieties as *Alopecurus protensis, Alopecurus ventricrus, Lolium perenne, Lolium miltiflorum, Festuca protensis, Festuca arundinacea, Agropýron cristatum.*

Interspecific hybrid is a perspective material for creating new varieties, which can combine high green mass productivity and seeds with a high content of protein and vitamins, perennial, hardy, drought-resistant, resistant to bacteria, fungal and viral diseases. Based on distant hybridization, authors created variety *Festuca protensis Tayamnitca.*They also developed 3 perspective variety *Alopecurus protensis,* and the creation of Intergeneric hybrid *Agropýron cristatum*is underway. Development of molecular methods of research allowed to create testing systems, with help of which, analyzing polymorphism of cell genetic material (polymorphism DNA)became possible.Assessment of molecular genetic diversity of parental forms of intergeneric and interspecific hybrids was conducted on the basis of ISSR- PCR method. Ten (10) primers IS1 (ag)8yg; IS2 (ga)8g; IS3 (ga)8c; IS4 (ca)8a; IS5 (ca)7rc; IS6 (ag)8(y)t; UBC810(ga)8t; U840 (ga)8yt; HB12 (cac)3gc; B4 (cac)6gg were worked out for molecular genetic analysis. All used markers provided the reveal of polymorphic fragments, 308 reproducible fragments were assessed for interspecific hybrid, from which 308 were polymorphic (34%). Based on the obtained data, molecular-genetic passports of researched samples were compiled. Results of this scientific research will be used further in the selection process. Method of DNA-certification of new varieties and hybrids is a main tool for thebreeders rights protection,andit also provides the possibility of testing accordance of created varieties of perennial grass crops by criteria of distinctness, uniformity and stability (DUS-criteria).

Key words: *Interspecific and intergenetic hybrids, DNA-marking*

YIELD AND YIELD STRUCTURE OF THE GRAIN CROPS VARIETIES DEPENDING ON SOWING RATE

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Abstract

In order to determine the influence of different sowing rates on yield and the important yield components of the varieties of grain crops of the Agricultural Institute of Republic of Srpska, Banja Luka (Bosnia and Herzegovina), wheat and barley used for the production of seed, the necessary studies were performed on the experimental field. The trial was performed with usual agricultural technology characteristic to seed production in our agro – ecological conditions, including three replications and three sowing rates as follows: for the varieties of winter barley (Oziris, Kosta) 300, 400 and 500 germinated grains per m^2, and for the varieties of wheat (Nova bosanka, Jelena) 500, 600 and 700 germinated grains per m^2. Optimal utilization of the genetic potential of mentioned varieties, over 11 t/ha, of the production capacity of soil with adequate agricultural technology largely depends on the number of plants per m^2, as the main component of yield. The optimum size of vegetation area is the area that provides the highest yield per unit area. The different sowing rates had different effects on the yield of wheat varieties, especially on the yield components. This can be explained by the fact that plant species have a great ability to compensating relationship between the components of yield and the yield. The highest average values of the number of productive ears were realized by the largest sowing rates. None of the sowing rates did not show significantly higher mean values for grain weight per spike, mass of 1000 grains, number of grain per spike and hectolitre of weight. The highest average yield over 7,5 t/ha for barley was achieved by sowing of 500 germinated grains, and wheat varieties over 8 t/ha with 600 germinated grains.

Key words: *Yield, Variety, Sowing rate, Yield components.*

PHYSIOLOGICAL RESPONSES OF POTATO EXPOSED TO DROUGHT STRESS: STOMATAL CONDUCTANCE, LEAF WATER POTENTIAL AND GROWTHPARAMETERS

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Abstract

The aim of this study was to investigate the mechanisms which are responsible for the growth inhibition of plants under drought conditions and it is carried out by measuring the plant growth parameters and water regime. The research was carried out under controlled conditions and potato (Solanum tuberosum L.) cultivar Liseta was used for investigation. During the vegetative period the plants were grown by the applied two different irrigation regimes:optimal irrigation - soil is watered every day until the optimum water capacity and soil water content in the substrate at field water capacity was 36% and water deficit -the drought caused by interruption of watering the substrate in the tuber initiation stage.

The results of this study show that drought caused the reduction of the leaf and stem growth (leaf area, dry weight of leaves and stem) and development. On the basis of the results of measured water regime parameters (water content in a substrate, leaf water potential and stomatal conductance) and their correlative relationships it was confirmed that the decrease of water content in a substrate caused induction and interaction of both types of signals (chemical and hydraulic signals).

Key words: *Water,drought, stomatal conductance, leaf, water potential*

EFFECTS OF FERTILIZATION ON COFFEE PRODUCTIVITY AND REDUCING COFFEE POTATO TASTE IN BURUNDI: CASE STUDY OF NGOZI PROVINCE

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Abstract

Coffee production in Burundi is the main resource of income for 589,950 farmers. But,coffee productivity of Burundi remains very low because producers have not been fully educated on improved practices and technologies for raising productivity and quality. Annual lossesamounting approximately to $16.5 million across Rwanda, Burundi, and DRCongo, due to Antestiabugs and associates damages have been estimated. The main bacteria inducing the potato taste defect in coffee is *Pantoea coffeiphila*.The main objectives of this study are to increase coffee productivity and reduce potato taste defect in coffee.The methodological approaches used in this study were the baseline survey (136 Households) completed by field-based applied research using fertilizers combined with integrated pest management. This study was carried out among coffee growers of Ngozi province. The main results from the first year of experimentshowed that the fertilizers allowed to increase coffee productivity from 1.42 kg (control plots) to 3.24 kg of coffee cherries per tree (test plots). We also found that the potato taste defect is reduced from 7.29 % (control plots) to 2.95 % (test plots). The conclusions of this study are the good application of technological packages combined with integrated pest management enhancecoffee productivity and quality.

Key words: *Coffee, Potato Taste Defect, Ngozi, Burundi*.

ROOT ARCHITECTURAL TRAITS FOR THE IMPROVEMENTSOF NUTRIENT ACQUISITION IN CROPS

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Abstract

Root system architecture (RSA) is critical for plant productivity under edaphic stress. In many countries, crop root systems are poorly adapted to soils, resulting in yields averaging only 50 percent of the potential, with the major limiting factors being poor soil water holding capacity and nutrient deficiencies. Changes in RSA may mediate plant adaptation to soils low in nutrient availability. Root morphological alterations associated with mineral nutrients deficiency include increased root to shoot ratios, increased length and number of lateral roots, changes in root gravitropism, and proliferation of root hairs. The relationship between root traits and nutrient uptake efficiency is complex. Understanding the molecular mechanisms by which crop plants alter their root architecture in response to deficit and heterogeneous nutrient supply in soil would help facilitate genetic improvements in nutrient efficiency through root architecture modifications. The identification of quantitative trait locus (QTL) with mapping of large numbers of molecular markers may allow the estimation of parameters of genetic architecture and improve root traits by marker assisted selection. This review provides a framework for understanding how mineral deficiency alters root architecture, with a focus on the recent advances in the current understanding of crop species control of root architecture alterations in response to nutrient availability.

Keywords: *Root system architecture, nutrient acquisition, crops*.

Acknowledgement

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WEATHER CONDITIONS IN THE 2013 -2015 GROWING SEASONS FOR MAIZE IN CROATIA AND BOSNIA AND HERZEGOVINA

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Abstract

Maize is main field crop on the arable lands in Croatia and Bosnia and Herzegovina (B&H). From 2001 to 2010 maize was grown on 333736 ha (average yield 6.50 t ha^{-1}) in Croatia and 195800 ha (4.42 t ha^{-1}) in B&H. Yield variations among years were from 3.86 to 7.98 t ha^{-1} and from 2.74 to 5.13 t ha^{-1}, respectively.Aim of this study was survey of maize yield and weather data (precipitation and mean air-temperature) in Croatia and B&H in 2013, 2014 and 2015 growing seasons.

Average yields of maize were 6.5, 8.1 and6.5t ha^{-1} (Croatia), 4.0,5.0 and4.1 t ha^{-1} (B&H), for 2013, 2014 and 2015, respectively.

In 2014 growing season weather conditions was favorable for maize growth. Precipitation and temperature from April to September were as follows: 520 mm and 18.2^{o}C (Osijek), 910 mm and 17.2^{o}C (Varazdin), 731 mm and 18.5^{o}C (Bijeljina), 1228 mm and 18.0^{o}C (Banja Luka). These precipitation values are higher for 41% (Osijek), 75% (Varazdin and Bijeljina), and 116% (Banja Luka) compared to averages from 1961 to 1990. In extremely unfavorable 2012 (yield 4.34 and 2.74 t ha^{-1}, in Croatia and B&H, respectively), precipitation and temperature at the same period were 293 mm and 20.0^{o}C (Osijek), 461 mm and 18.8^{o}C (Varazdin), 288 mm and 21.0^{o}C (Bijeljina),488 mm and 20.1^{o}C (Banja Luka).However, in 2013 and 2015, yields, precipitation and temperature regimes in both countries were more close to average values. Considerable variation of precipitation in the short period from 2012 to 2014 and higher temperatures are in accordance with climate change.

Key words: *Maize, yield, Croatia, Bosnia and Herzegovina, precipitation, temperature, climatic change*

HIGH-YIELD AND HIGH-EFFICIENT WHEAT PRODUCTION IN LOW FERTILITY SOIL USING DIFFERENT WATER REQUIREMENTS, COBALT AND WEED MANAGEMENT

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Abstract

Water scarcity is a major cause of crop yield reduction in many parts of the world. So, a more rational use of irrigation water should be adapted and deficit irrigation principles should be accepted with a certain level of reduction in yield level. To study the efficiency of three water requirements (100%, 75% and 50%), five weedcontrol treatments (three postemergence herbicides i.e., Pyroxsulam, Mesosulfuron-methyl, and Isoproturon+Diflufenican), hand weeding and unweeded check), five cobalt concentrations (0, 5, 10, 15 and 20 ppm) and their interactive effects were examined in new reclaimed sandy soil. Two field experiments on wheat crop were conducted in two successive seasons at the Agricultural Experimental Station of the National Research Centre, Nubaria, Beheira Governorate, Egypt. Pyroxsulam herbicidecame in the first order for controlling the weeds. Application of 100% water requirement recorded the highest values of flag-leaf area, chlorophyll content, plant height, number of spike/m^2, spike weight, grains number/spike, weight of 1,000 grains, yield and yield attributes of wheat, compared to all other irrigation water treatments. Isoproturon+Diflufenicanfollowed by Pyroxsulam and Mesosulfuron-methyltreatments gave the highest grain yield/ha. Using cobalt at the rate of 20 ppm resulted in increment of growth, grain yield and its quality of wheat. The highest grain yield, protein and carbohydrates percentages of wheat grains were obtained from addition of 100% water requirement with Isoproturon+Diflufenicantreatment with using 20 ppm cobalt, followed by 75% of water requirement combined with Isoproturon+Diflufenicantreatment with insignificant difference among these treatments. It could be concluded that application of cobalt resulted in recovery the negative effects of the deficient water requirement on wheat yield under low fertility soils.

Keywords: *Soil, Herbicides, Irrigation,Weeds, Cobalt*

THEORY OF IMPACT INTERACTION BETWEEN THE FEELER AND STANDING SUGAR BEET ROOT CROWNS DURING THEIR SCALPING

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Abstract

The removal of sugar beet haulm is a topical research-and-technology problem of the sugar beet growing industry. Solving it would facilitate a considerable increase in sugar yield per hectare of the harvested crop acreage. The use of haulm as a source in the biogas production further increases the priority of this problem. Therefore, finding an optimal design and kinematic parameters of a new feeling unit for the standing root scalper on the basis of a theory on the impact interaction between a passive feeler and standing beet root crowns during their scalping is a high-priority task for scientists. This paper presents new analytical research on the process of interaction between the passive feeler and the beet root crown. Thus, the impact momentum has been determined and the conditions needed for the effective feeling and scalping of the standing root's crown without dislodging the root from soil have been established. The numerical calculation of the derived analytical expression performed on a PC has facilitated the plotting of a curve, which shows the efficient root crown feeling to be at a travelling speed of $V = 2$ m $s^{-1}$and a comb feeler elevation angle of $\alpha = 0.3$ rad (or 17°).

Keywords: *Sugar beet root, harvesting, scalper, modelling, constructive and kinematic parameters.*

GROWTH AND PRODUCTIVITY OF LEMON VERBENA (*Aloysia triphylla* L.) AS AFFECTED BY IRRIGATION IN CENTRAL GREECE: FIRST YEAR (ESTABLISHMENT) RESULTS

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Abstract

Lemon verbena is an aromatic perennial shrub that is valued for its medicinal use as a digestive aid, antimicrobial, antispasmodic, analgesic, diuretic herb and it is also used as a treatment for cold, insomnia and anxiety. The first-year of a lemon verbena (Aloysia triphylla L.) crop's growth and productivity as affected by irrigation was investigated under field conditions in central Greece. During the spring of 2015, winter cuttings of lemon verbena were transplanted to an experimental field set up in Nea Aghialos, Magnesia, central Greece. The experimental design was a completely randomized design with three nitrogen dressings (0, 50, 100, kg N ha-1) in four replications. The growth and final productivity of the crop was measured in three destructive samplings of the crop during the summer of 2015. The results demonstrated that nitrogen fertilization played a significant role on lemon verbena productivity and the final yield of the crop in the first year of crop establishment.

Keywords: *Lemon verbena, irrigation, growth, evapotranspiration.*

GROWTH AND PRODUCTIVITY OF LEMON VERBENA (*Aloysia triphylla* L.) AS AFFECTED BY NITROGEN FERTILIZATION IN CENTRAL GREECE: FIRST YEAR (ESTABLISHMENT) RESULTS

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Abstract

Lemon verbena is an aromatic perennial shrub that is valued for its medicinal use as a digestive aid, antimicrobial, antispasmodic, analgesic, diuretic herb and it is also used as a treatment for cold, insomnia and anxiety.The first-year of a lemon verbena (*Aloysia triphylla* L.)crop's growth and productivity as affected by irrigation was investigated under field conditions in central Greece. During thespring of 2015, winter cuttings of lemon verbena were transplanted to an experimental field set up in NeaAghialos, Magnesia, central Greece. The experimental design was a completely randomized design with three nitrogen dressings (0, 50, 100, kg N ha^{-1}) in four replications. The growth and final productivity of the crop was measured in three destructive samplings of the crop during the summer of 2015. The results demonstrated thatnitrogen fertilizationplayed a significant role on lemon verbena productivity and the final yield of the crop in the first year of crop establishment.

Keywords: *Lemon verbena, fertilization, growth, nitrogen, evapotranspiration.*

GROWTH AND PRODUCTIVITY OF THYME AS AFFECTED BY NITROGEN FERTILIZATION IN CENTRAL GREECE: FIRST YEAR (ESTABLISHMENT) RESULTS

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Abstract

Thyme (*Thymus vulgaris* L.) is a medicinal and aromatic plant intensively used in pharmaceutical, food, and cosmetic industries. The first-year of a thyme (*Thymus vulgaris* L.)crop's growth and productivity as affected by nitrogen fertilization was investigated under field conditions in central Greece. In April 2015, winter cuttings of a native thyme cultivar were transplanted to an experimental field set up in NeaAghialos, Magnesia, central Greece. The experimental design was a completely randomized design with three nitrogen dressings (0, 50, 100, kg N ha^{-1}) in four replications. The growth and final productivity of the crop was measured in three destructive samplings of the crop during the summer of 2015. The results demonstrated thatnitrogen fertilizationhad a significant effect on thyme productivity and final yield in the first year of the crop.

Keywords: *Thyme, fertilization, growth, nitrogen, evapotranspiration.*

THE EFFECT OF IRRIGATION ON CHLOROPHYLL CONTENT OF ROSEMARY PLANTS (*Rosmarinus officinalis* L.)

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Abstract

Water is one of the important factors affecting plant growth and yield. In addition, water resources need to be used efficiently because of the increasing competition of the limited water resources between domestic, industrial and agricultural consumptions. Rosemary (*Rosmarinus officinalis* L.) is an evergreen plant endemic and typical ofthe Mediterranean region. The plant has been reported to possess several medicinal properties. The effect of irrigation on chlorophyll content was investigated in a rosemary (*Rosmarinus officinalis* L.) crop. In April 2015, winter cuttings of rosemary were transplanted to an experimental field set up in Nea Aghialos, Central Greece. The experiment was arranged in split blocks with four replicates. Three levels of water supply (0, 50, and 100% of potential evapotranspiration) were applied. The results showed that the ratio of leaf chlorophyll a over chlorophyll b significantly decreased as irrigation volume increased. Total chlorophyll content, and both of its components, chlorophylls a and b, only slightly declined as irrigation volume decreased.

Keywords: *Chlorophyll, irrigation, rosemary, evapotranspiration.*

GROWTH AND PRODUCTIVITY OF *Rosmarinus officinalis* L. AS AFFECTED BY IRRIGATION AND NITROGEN FERTILIZATION IN CENTRAL GREECE: FIRST YEAR (ESTABLISHMENT) RESULTS

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Abstract

Rosemary (*Rosmarinus officinalis* L.) is an evergreen plant endemic and typical ofthe Mediterranean region. Rosemary has longbeen considered an important plant for itsessential oil used vastly in the perfume and medicine industry. The plant has been reported to possess several medicinal properties. The first-year of a rosemary (*Rosmarinus officinalis*L.)crop's growth and productivity as affected by irrigation and N fertilization was investigated under field conditions in central Greece. In April 2015, winter cuttings of a native rosemarycultivar were transplanted to an experimental field installed in NeaAghialos, Magnesia, central Greece. The experimental design was a 2^3 factorial split plot design with three drip irrigation levels (0, 50, and 100% of potential evapotranspiration) comprising the main plots, and three nitrogen dressings (0, 50, 100, kg N ha^{-1}) comprising the subplots in four replications (blocks). The growth and final productivity of the crop was measured in four destructive samplings of the crop during the summer 2015. The results demonstrated the paramount effects of both irrigation and nitrogen fertilization on thyme productivity and final yield already in the first year of crop establishment.

Keywords: *Rosemary, irrigation, nitrogen, fertilization, evapotranspiration.*

GROWTH AND PRODUCTIVITY OF THYME AS AFFECTED BY IRRIGATION IN CENTRAL GREECE: FIRST YEAR (ESTABLISHMENT) RESULTS

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Abstract

Thyme, a native plant of the Mediterranean, is a crop which holds an increasing importance for the essential oil production in the industry of cosmetics and food additives. The first-year of a thyme (*Thymus vulgaris* L.)crop's growth and productivity as affected by irrigation volume was investigated under field conditions in central Greece. In April 2015, winter cuttings of a native thyme cultivar were transplanted to an experimental field set up in NeaAghialos, Magnesia, central Greece. The experimental design was a completely randomized design with three irrigation levels (0, 50, and 100% of potential evapotranspiration) in four replications. Irrigation was carried out via a drip system. The growth and final productivity of the crop in dry yield was measured in three destructive samplings of the crop during the summer of 2015. The results demonstrated the important effects of irrigation on thyme productivity and final yield in the crop's first year.

Keywords: *Thyme, fertilization, growth, nitrogen, evapotranspiration.*

EVALUATION OF THE TOLERANCE OF THE NINE WHEAT CULTIVARS TO THE SUNN PEST, *EURYGASTERINTEGRICEPS* PUT. IN NAGHADEH REGION, WEST AZARBAIJAN PROVINCE, IRAN

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Abstract

The Sunn pest, *Eurygasterintegriceps* Put. is the most important pest of wheat in Iran that can considerably reduce its yield. Identification and deployment of resistant cultivars is an effective integrated pest management (IPM) strategy of this pest. Field experiments were conducted to evaluate the tolerance resistance in 9 wheat cultivars to this pest. To study the level of tolerance of cultivars, the infested and non-infested plots were isolated and arranged based on a randomized complete block design in field. The plants of infested plots were infested naturally. Non-infested plots controlled with chemical method. At the end of the season, yield in infested plots was determined and compared to non-infested plots for each cultivar. The reduction in the treatment yield, when compared to control, was determined among all the cultivars, along with the extent of decline in 1000-kernels weight and the degree of drop in 50-kernels weight of Sunn-pest infected wheat that related to healthy 50-kernels. Also, density of 4^{th} and 5^{th} instars nymphs and kernel damage percent were determined in infested plots for each cultivar. Significant differences were observed in studied traits ($P<0.05$). Significant positive correlation was observed between yield loss and density of fourth and fifth instars nymphs traits, also between yield loss and kernel damage percent traits ($P<0.05$).

Key words: *Resistance cultivars, Sunn pest, tolerance, wheat.*

MAGNITUDE OF COMBINING ABILITY IN OILSEED RAPE (*BRASSICA NAPUS* L.) ACROSS ENVIRONMENTS

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Abstract

This study was conducted using ten lines of oilseed rape (*Brassica napus* L.) namely Zarfam, Talaye, SLM046, Geronimo, Modena, Symbol, KS7, KS11 and Colvert, and ten testers viz., Okapi, Licord, Orient (winter types) and RGS003, Sarigol, Option 500, 19-H, Shiralee, SAN-14 and SAN-12 (spring types) in a line×tester fashion at two conditions (normal and late planting). The pooled analysis of variance revealed highly significant differences among environments, treatments, parents and crosses. There were significant differences among treatments and environments only for number of branches per plant, 1000-grains weight and grain yield. The estimates of variance of specific combining ability effects, ratio of variance of general combining ability to specific combining ability and degree of dominance indicated preponderance of non-additive gene effects for each trait. Broad sense heritability and genetic advance were high only for number of siliques per plant (75.35 and 28.41%, respectively) in both environmental conditions. On over all bases, role of testers in the expression of number of siliques per plant (16.35%) and main stem length (13.83%) were more than lines. However, lineandtester interaction contributed more than lines and testers for all traits. Line KS7 and tester SAN-12 were identified as the best general combiners based on their mean performance and GCA effects for yield and some it's various traits in both environments. Crosses like Okapi×Colvert, Licord×KS7, Orient×Talaye, Orient×Modena, Orient×Colvert, Option 500×Geronimo, 19-H×Symbol, SAN-14×KS7 and SAN-12×SLM046 showed high mean performance, SCA effects and heterobeltiosis for grain yield and are proposed for heterosis breeding.

Key Words: *Combining ability, grain yield, heterosis, inheritance, oilseed rape.*

EVALUATION THE EFFECT OF SEED MOISTURE CONTENT AND DRYING TEMPERATURE ON GERMINATION AND VIGOUR OF SOYBEAN SEED

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Abstract

This experiment was conducted as factorial (2×3×2) based on Randomized Complete Block Design (RCBD) with three replications in two locations (Karaj and Moghan) of Iran. The factors were included cultivars (Williams and L17), moisture content at harvest time (15, 20 and 25 %) and drying temperature (30 and 45°C). Based on the results the germination percentage of produced seeds in Karaj (81.3%) was higher than Moghan area (77.4%). The difference of germination percentage of dried seeds at 30 and 45°C with 15% moisture content was about 5.5% while this rate for seed that was dried at 30 and 45°C with 25% moisture content was about 18.5% that shows the seed deterioration is increased by increment of temperature. From the aspect of seedling vigor index, there was no significant difference between two cultivars that produced in Karaj at 15% moisture content, but at 20% moisture content, the seedling vigor index in Williams (139.7) was higher than L_{17} (107.3). The higher (51.42 µsm cm^{-1} g^{-1}) electrical conductivity was obtained from L17 with 25% moisture content and 45°C and the lower (28.46 42 µsm cm^{-1} g^{-1}) electrical conductivity was observed in Williams with 20% moisture content and 30°C.

Keywords: *Electrical conductivity, Germination, Seed, Soybean and Vigor index.*

IN VITRO INDUCTION OF POLYPLOIDY IN *VALERIANAOFFICINALIS* BY COLCHICINE TREATMENT

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Abstract

Polyploidy is one of the most interesting and controversial areas of plant biology with numerous applications in plant breeding. In this study, induction of polyploidy in *Valeriana officinalis*was investigated using 0.05, 0.1 and 0.2% of colchicine concentrations at 8, 24 and 48 hours by treating seedling, callus and shoot tips under *invitro* conditionsas a factorial experiment based on completely randomized design with three replications.Polyploidy induction confirmed by chromosome counts, size and number of stomata and other morphological characters.With increasing colchicine concentration and its treatment duration, explants survival and their rooting considerably decreased.The results revealed that 0.2% concentration of colchicine with 24 h of treatment duration in treating seedling and 0.1% of colchicine with 24 h of treatment in treating callus and shoot tips established the maximum amount of the in vitro induced tetraploid plantlets. The derived tetraploid plantlets had bigger stomata with lower density. Also, seedling height, leaf length and width andnumber of leaveswere higher in these plants. On the other hands, Chlorophyll content in tetraploid plantlets was significantly higher than diploids and they showed the elevated level of antioxidant enzymes and total protein as compared with diploids. MS medium supplemented with 0.1 mg/l IBA and 0.1 mg/l BAP was used for shoot induction of explants at in vitro condition, and MS medium supplemented with 1 mg/l IBA and 1 mg/l NAA was used for rooting of explants.

Keywords: *Colchicine, In vitro, Polyploidy, Valeriana officinalis*

PRODUCTIVITY AND MORPHOLOGICAL FEATURES OF GARLIC (ALLIUM SATIVUM L.) GROWN IN LITHUANIA

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Abstract

Garlic (Allium sativum L.) is the second most popular vegetable in the genus Allium in Lithuania. The field collection of garlic in the LRCAF Institute of Horticulture was established in 1992. New accessions enter the collection continually.

The aim of the research was to determine the productivity and structure of yield, to assess the morpho-biological features of 24 hardneck and the 14 of softneck garlic clonal accessions. Colour of external scale of bulbs, number of cloves in a bulb, arrangement and skin colour were estimated according guidelines for DUS test. The data of yield was statistically processed by the ANOVA method and analysis of principle coordinates within SPSS.

Results showed the differences in productivity and morphological features between both of types, populations and cultivars. The yield of hardneck garlic bulbs reached 16.8 t·ha-1, and lower yield 12.1 t·ha-1 was found of softneck garlic. Local populations of hardneck garlic showed higher possibility of yield formation compared with the foreign cultivars. More cloves per bulb were observed from softneck garlic accessions, while hardneck garlic distinguished with the formation of heavier cloves.

Three garlic cultivars Žiemiai, Dangiai and Vasariai are included in the National List of Plant varieties and Common catalogue EU of vegetable species varieties.

Keywords: *Garlic bulb, morphobiological variation, yield, cultivar.*

EFFECT OF GROWTH REGULATORS AND THEIR MIXTURES ON WINTER WHEAT GROWTH, COLD RESISTANCE AND PRODUCTIVITY

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Abstract

This study was aimed to investigate the effect of growth regulators containing free amino acids, macro- and micro-elements on winter wheat freezing resistance, growth and productivity formation; and to test mixtures of regulators with compounds of retardant and herbicide activity on wheat growth and productivity. Effect of regulators was established in control cold conditions and natural field experiments in 2012–2015. The tested regulators applied to wheat 'Skagen' at BBCH 13–14 stage in controlled cold stress conditions actively restored wheat seedlings growth after freezing at −5°C and −7°C temperature. Under the impact of Ruter AA (1 ml/100 ml), Terra Sorb (1 ml/100 ml) and Razormin (0.1/100 ml) seedlings survival, compared with control, increased by 28, 14 and 10%, respectively.In natural field experiments tested regulators produced stimulating effect on wheat plants growth in autumn, plants overwintering, vegetation renewal and productivity elements formation. At full maturity stage, it was revealed that Ruter AA (2 l ha^{-1}), Terra Sorb (2 l ha^{-1}) and Razormin (200 ml ha^{-1}) increased the number of productive stems and grain number per ear as well as grain weight per plant. 1000 seed weight differed among the test variants and was significantly highest after treatment with Terra Sorb (2 l ha^{-1}). Investigation of Razormin, Terra Sorb in mixture with herbicide Sekator (200 ml ha^{-1}) and retardant Cykocel (1.5 l ha^{-1}) applied at BBCH 31-32 stage on wheat showed that herbicide and more retardant did not damage the activity of the tested regulators on plants growth and productivity.

Keywords: *Amino acids, Triticum aestivum L., overwintering*

RESULTS OF INVESTIGATIONS OF SOME BIO -MORPHOLOGICAL TRAITS OF BURLEY TOBACCO VARIETIES

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Abstract

During 2009, 2010 and 2011 field trials were carried out in Scientific Tobacco Institute – Prilep (Republic of Macedonia) with three varieties of Burley tobacco (American fertile variety B-21(used as a check) and domestic varieties B-2/93 and Pelagonec CMS F_1).Investigations were made on diluvial soil, using randomized block design with 8 replications at 90 x 50 cm spacing. The obtained results were statistically processed by the method of analysis of variance and tested with LSD test.

During the growing season, morphological measurements were made on 20 stalks of each variety. The following traits were included in the analyzes: time of flowering, length and width of the 5th , 10th and 15th leaf, stalk height and number of leaves. In most of these traits domestic varieties proved to be superior to the fertile variety B-21 Ø, with some advantage of the variety Pelagonec CMS F_1. Typical Burley characteristics make this variety attractive both for farmers and manufacturers. In present conditions, it can be used as initial variety for restarting the production of Burley tobacco in R. Macedonia, but it can be also interesting for neighboring countries and wider. The obtained results can help producers to make decision which genotype to use in the start of the production cycle.

Keywords: *Tobacco, variety, Burley tobacco, leaves, stalks.*

MORPHOLOGICAL CHARACTERIZATION AND ESTIMATION OF GxE OF INDIGENOUS BUCKWHEAT GERMPLASM FROM GILGIT BALTISTAN PAKISTAN

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Abstract

A two-year study (in 2011 and 2012) was conducted in Gilgit Baltistan at two locations (Skardu and Ghanche) to characterize and estimate GE interaction for 20 buckwheat genotypes collected from 18 locations of Gilgit Baltistan. Combined analysis of variance revealed significant differences among locations for these buckwheat traits while the years effect was nonsignificant for days to flowering, leaves plant^{-1} and grain inflorescence^{-1}. Years x locations interactions was also significant ($p \geq 0.05$) for all traits except branches plant^{-1}, grains plant^{-1} and grain yield ha^{-1}.Similarly, genotype × location × year interaction existed for most of the traits except leaves plant^{-1}, plant height, number of grains plant^{-1} and grain yield ha^{-1}.Maximum (10.62) grains inflorescence^{-1} were produced by buckwheat genotype Sh-914, followed by Rd-915 (10.12).The genotypes Sh-914 excelled in 1000-grain weight (29.91 g), followed by Rd-915 (27.04 g). The maximum grains plant^{-1} was produced by Sh-914 (323.62), followed by the genotype Gh-918 (229.16). The maximum (2010.27 kg ha^{-1}) grain yield was produced by genotype Sh-914, followed by the genotype Gh-918 (1910.40 kg ha^{-1}). Days to flowering, days to maturity, height of first node, branches plant^{-1}, inflorescence plant^{-1}, flowers inflorescence^{-1}, grains inflorescence^{-1}and 1000 grain weight were the major contributors towards genetic divergence among the buckwheat genotypes. The clustering pattern of genotypes based on Euclidean distance coefficients was explained by phenotypic similarity rather than geographical origin viz. genotypes collected from the same place did not form a single cluster. Based on morphological studies, genotypes collected from Thalay (Gh-911), Zill(Sh-913), Haricon (Gh-916) and Tallis (Gh-918) had more diversity than the remaining genotypes. The genotypes collected from other geographical locations had close relationship among these which showed the narrow genetic diversity.Considering diversity pattern and other agronomic performance, the genotypes Sh-914andGh-918 performed well at Skardu and Sh-914 and Rd-915 were better for Ghanche andmay be selected as promising genotypes for future hybridization program.

Key Words: *Buckwheat landraces, Common buckwheat (Fagopyrum esculentum L.), Tartary buckwheat (F. tataricum L.), GE interaction*

MOLECULAR EVALUATION OF RUST RESISTANCE GENES IN SPRING WHEAT (*TRITICUM AESTIVUM L.)* WITH SSR AND STS MARKERS

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Abstract

Rusts unconstructively affects the yield and quality of wheat grain as well as forage. There are three kinds of rust which include leaf (brown), stripe (yellow) and stem (black) rust. Leaf rust is caused by *Puccinia triticina* f.sp. *tritici*, stripe rust is caused by *Puccinia striiformis* f.sp. *tritici* (*Pst*), whereas stem rust is caused by *Puccinia graminis* f.sp. *tritici*. Leaf rust can cause up to 25% yield losses in optimum conditions. Stem rust causes 90% while stripe rust can cause 55% yield losses at 90% disease severity. Breeding of rust resistant varieties is an efficient and environment friendly method to minimize wheat losses. The present study was conducted to detect stripe(*Yr*), stem (*Sr*) and leaf *(Lr)* rust resistance genes using subsequently reported DNA markers in 40 Pakistani wheat lines included in National Wheat Disease Screening Nursery (NWDSN) and National Uniform Wheat Yield Trials (NUWYT) of 2014-15. Stripe rust resistance gene *Yr29* was found in 22 to 35, *Yr26* in 39 and *Yr*19 was found in 17 studied wheat lines. Stem rust resistance gene *Sr25* was found in 30 of 38 in wheat lines. Leaf rust resistance *Lr was* found in 6-36 wheat lines, *Lr14* was present in 12 and *Lr*60 was found in 37 wheat lines. Wheat breeders can be encouraged from the results of this study in pyramiding stripe, stem and leaf rust resistance genes to develop new wheat varieties. Phenotypic screening of advanced wheat lines may be supplemented with DNA marker based screening for augmentation of the genetic base of prospective wheat varieties in future.

Key words: *DNA markers, Rust resistance genes*.

THE INFLUENCE OF COLD STORAGE ON SOME QUALITY TRAITS OF CARROT CULTIVARS

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Abstract

The objective of the study was to determine quality changes for different carrot cultivars during 5-month cold storage. Seven popular carrot cultivars were investigated: 'Abledo' F_1, 'Bastia' F_1, 'Karotan', 'Kazan' F_1, Sirkana' F_1, 'Trafford' F_1 and 'Warmia'. The observations were performed in monthly regime, from mid-October (harvest time) till mid-March, i.e. in five terms. The roots were stored at the temperature of 0-1°C and RH 98%. The following items were determined: nitrate (NO_3), soluble solids (^{o}Brix) and β-carotene contents, juice colour in CIE L*a* b* system. The results showed that soluble solids content differed among the cultivars and the highest content was characteristic to 'Kazan', followed by 'Bastia'. Generally, an increase of soluble solids content during storage was observed. Nitrate content in the roots was generally on a low level and during the storage the content showed a decreasing tendency, but related to the cultivars. The lowest nitrate content showed 'Abledo', 'Bastia', 'Karotan' and 'Sirkana', and the highest content was found in 'Trafford'. The β-carotene content in the roots showed small decreasing tendency during storage, but after 3 months small increase was observed. The highest content was found in 'Abledo' and 'Kazan'. The L* (lightness) and a* (redness) decreased during storage, however at the end of storage small increase of a* parameter was observed. The highest a* was characteristic to 'Kazan' and 'Karotan'. The b* (yellowness) decreased during storage, however at the end of storage small increase of the b* was observed. The highest b* value was noted for 'Kazan'. The cultivar was characterized also by very high β-carotene and soluble solids contents, low content of nitrate and high a* and b* parameters. 'Karotan' was also very good in this respect.

Keywords: *Carrot, cultivars, cold storage, quality*

GENETIC DIVERSITY OF ORNAMENTAL PEACH FROM NIKITA BOTANICAL GARDENS COLLECTION STUDIED BY AFLP-ANALYSIS

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Abstract

Among the flowering trees, ornamental peaches are important as landscape dominants in early spring.The genetic similarity of 23 ornamental peach genotypes, originated from *Prunus mira*, *P. davidiana*, *P. persica* and *P. kansuensis* was studied by AFLP-analysis. Eight (8) combinations of primer/enzyme were used in the study. Totally, 162 fragments including 90 (56.2%) polymorphic ones were obtained. Primer combinations with three selective nucleotides (E41/M59, E36/M61, E45/M59) were the most informative.Jaccardsimilarity coefficientranged from 0.52 to 1.The analysis by the method of principal coordinates demonstrated that *P. persica* cultivars were quite similar and clustered in two compact groups on the graph. The first group included pink-flower cultivars'Yu Tao', 'Vesna', 'Yugoslavsky Decorativny' and 'Assol'. The second group combined 'Manific' and its seedlings, 'Iransky Decorativny', 'Iransky Pestrotsvetkovy', 'Bi Tao' and 'Sahong Tao', with red, pink and variegated colorings, similar in the shape of flowers. Wild species *P. mira* and its cultivar 'Lel', *P. davidiana* and its cultivars 'Alba' and 'Belosnezhka', hybrid of *P. kansuensis*'Malenky Prince' were at a significant distance from *P. persica*cultivars, on the graph. Hybrid cultivars 'Zhisele', 'Ruthenia', 'Decorativny Ryabova', 'Mily' and 'Lubava' were intermediate between wild species and *P. persica* cultivars but more similar to the group of wild peaches. Thus, AFLP-analysis demonstrated genetic remoteness of wild species from *P. persica* cultivars, the close relationships between wild peach and 8 hybrid cultivars originated from those species and also 2 groups of closely related *P. persica* cultivars obtained from different regions of introduction.

Key words: *Breeding, DNA, cultivar, hybrid, identification*

Acknowledgement

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THE CONTENT OF ESSENTIAL ELEMENTS IN THE FLOWERS AND FRUITS OF CHAENOMELES(*Chaenomeles* Lindl.)

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Abstract

Chaenomeles sp. (*C. cathayensis*, *C. japonica*, *C. spesiosa* and *C. x superba*) are characterized by rich chemical composition of all plant parts and the wide variability of the accumulation of separate components in different species and cultivars. For the expansion of ideas about the chaenomeles content nutritional value of 7 essential macro- and microelements in the flowers and fruit of 8 cultivars from the Nikita Botanical Gardens collection have been studied. Analysis of plant samples was carried out by dry ashing with subsequent determination of most elements on the atomic absorption spectrophotometer. Ca and Mg were determined by complex metric method. It was revealed that essential elements were accumulated in the flowers and fruits in different quantities. The maximum amount of K, Fe, Mg, Zn, Cu and Mn is contained in the flowers. The largest amount of Ca was detected in fruits, whereas Zn, Mn and Cu were most presented in seeds. The studied cultivars differ significantly in accumulation of essential elements. According to the studied complex components, the accession P-8-3 was allocated. Flowers were characterized by the highest content of Ca, Zn, Mn, Cu and high content – of K; fruits were rich in K, Ca, Zn, Mn and Cu. In the jam from the chaenomeles fruit, the high content of K (2087 mg 100 g^{-1}, i.e. more than 2%) was revealed. It is seven fold higher than daily rate for human. Thus, chaenomeles flowers, fruits and seeds are a valuable raw material, enriched with vital macro- and microelements.

Key words: *Nutritional value, breeding, macro- and microelements.*

Acknowledgement

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PROBLEMS OF PEACH WINTER HARDINESS IN THE STEPPE CRIMEA

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Abstract

Culture *Prunus persica (L.)* Batschcame to the Crimea and began to develop at the end of the 19th century.Since then, it has won high popularity among the amateur gardeners, and eventually has become a commercial fruit crop. Agro ecological conditions of the Crimean region, especially the southern coast are favorable for the cultivation of this crop. Unfortunately the areas suitable for the peach are limited. The steppe part of Crimea, with large spaces, suitable for horticulture, is often subjected to cold invasions from the north, damaging the generative buds of peach and destroying the potential yield.Extreme critical temperatures occur in winter period (20-30% years) and in the spring (25%). Theintensive peach breeding has been carried out from mid-20th century till nowadays. One of the main breeding in the NBG is to create resistant to cold samples. As parental forms were used Domestic and foreign winter-hardy cultivars: Veteran, Pushystiy Ranniy, Crimskiy Feyerverk etc. Over 100 created peach cultivars are included in the Register and regionalized.In the late 50's, the peach had spread in the steppe part of the Crimea, and then in the southern regions of Ukraine.Assessment of winter hardiness of hybrids was carried out by means of laboratory and field methods in test years.As a result of researches, winter-hardy peach cultivars and hybridshave been selected, and they have been recommended for commercial fruit growing and breeding. These included ‘Osvezhayuschiy’, ‘Demerdzhinskiy’ and‘Kandidatskiy’ etc.

Keywords: *Prunus persica,winter hardiness, cultivar, hybrids, breeding*.

Acknowledgements

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ANATOMY STUDIES OF LAVANDULA ANGUSTIFOLIA MILL. AND LAVANDULA HYBRIDA REV. PLANTS IN VITRO

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Abstract

Lavender and lavandin are widely used in food, pharmaceutical, cosmetic industries and ornamental gardening. Gene pool collection of *Lavandula angustifolia* and lavandin is presented in Nikita Botanical Gardens plots and the same collection is being created *in vitro*.

Initial explants of *L. angustifolia*, its cultivars 'Belyanka', 'Record' and *L. hybrida* – 'Rabat' and 'Snezhnyi Bars' were introduced *in vitro*. Plant regeneration occurred on MS medium supplemented with 0.3-0.5 mg l^{-1} kinetin, 0.025 mg l^{-1}NAA, 0.25 mg $l^{-1}GA_3$. Samples were analyzed after 2 and 8 months of culture.

Structural analysis of regenerated plants vegetative organs enabled assessment of their morphogenetic capacity. Under *in vitro* culture 2-5 microshoots/explants were produced with the height of 2.3 - 8.2 cm. Leaves were opposite, sessile linear or linear-lanceolate, with entire edges curved outward, densely pubescent, and 10-30 leaves/microshoot. Leaf lamina length was 0.9-1.5 cm. Leaves were bifacial, amphystomatic, lamina thickness – 132-215 µm, palisade rate was 0.38-0.41 after 2 months culture and 0.56-0.58 – after 8 months. Epidermal thickness was 8-19 µm, cells were relatively small with thin, cellulose walls covered with cuticle. Stomata are of anomocyte type, small, raised above the epiderm cells, 48-150 pcs/mm^2 on adaxial surface, 115-432 pcs/mm^2 – on abaxial one. Essential oils are produced in simple and glandular, unicellular and multicellular hairs of epidermal origin, located above the leaf chlorophyll tissue. Features of xeromorphic structure appeared at a long-term *in vitro* cultivation.

Keywords: *Lavender, lavandin, regenerant, leaf anatomy, xeromorphic structure*

Acknowledgements

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STUDY OF HONEY BEE VISITS TO THE FLOWERS OF DIFFERENT APPLE POLLINATOR CULTIVARS

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Abstract

The apple (*Malus* sp.) is entomophile, self-incompatible plant that need cross-pollination. The most important carrier of pollen is a honey bee. The honey bee visits to the flowers of the same plant species but different cultivar can be variable. The aim of our research was to study the intensity of honey bee visits to five different cultivars of the apple which are pollinators. Cultivars Granny Smith, Golden Delicious and Red Delicious are most widespread as an edible apple. Cultivars Golden Gem and Professor Sprenger are "crab apples" and their main task is pollination. The trial was conducted at an experimental field "Radmilovac" of the Faculty of Agricultural - Belgrade (Serbia). The cultivars were monitored in five terms per day and individual visits of bees were five minutes. The most abundant visit per tree was observed in cv. Golden Gem (20.65 bees), however the least abundant visit was counted in cv. Professor Sprenger (12.30 bees). The bees stayed longest time (4.96 seconds) on the flowers of the Red Delicious cultivar, while on the flowers of the Professor Sprenger cultivar they stayed only 3.48 seconds. The highest number of bees per tree (31.95) was observed at 13 hours and the lowest number of bee visits to flowers (2.35) at 19 hours. Using the apple cultivars that are attractive to honey bees can provide better pollination of apple commercial cultivars.

Keywords: *Apple, honey bee, pollination.*

THE EFFECT OF GENOTYPE ON THE MORPHO-PRODUCTIVE CHARACTERISTICS OF SOYBEAN [*Glycine max.* (L) Merr.] AS SECOND CROP

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Abstract

Soybean is one of the most important legumes. Due to the extremely favourable chemical composition of the grain, surfaces under soybean in the world and in Republic of Serbia are showing a tendency to increase. Soybean is cultivated for the production of grain or green fodder, whole plant silage, in regular or second cropping. When cultivated for green fodder and silage, it is grown alone or in a mixture with maize, sorghum, and other crops. As green fodder it retains high quality proteins, vitamins and is useful in feeding livestock.

In this study, two soybean varieties with different vegetation were examined in order to determine which one has higher biomass yieldswhen grown as a second crop in agro-ecological conditions of Serbia intended for conservation by ensiling.

Based on research results, it is evident that the variety had a statistically significant effect on plant height and dry matter yield. Average dry biomass yield was 5307.17 kg ha^{-1}. Higher dry biomass yield (6630.57 kg ha^{-1}), plant height (64.92 cm), the height of the first pod (7.76cm) and weight of the plants (130.00 cm) was recorded in the variety with a longer vegetation (Valjevka) while the variety with short vegetation (NS Kaća) had higher percentage of dry matter. The differences obtained were significant, and indicate the possibility of achieving higher plants and higher yields of dry biomass by planting varieties with longer vegetation period as second crop.

Key words: *Soybean, second crop, morphological characteristics, biomass yield*

EFFECT OF HEADING CUT POSITION AND DATE OF HEADING DURING EARLY SUMMER PRUNING ON THE OCCURRENCE AND PROPERTIES OF SYLLEPTIC SHOOTS IN APRICOT

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Abstract

This paper presents two-year results (2014 and 2015) of a trial on the effect of heading cut position and heading date on the occurrence and properties of sylleptic shoots in apricot. The research included cv. 'Hungarian Best' grafted on Myrobalan (*P. cerasifera*, Ehrh) seedling rootstock, and grown near Čačak (43°53'N latitude; 20°21'E longitude; 390 m a.s.l.), Western Serbia. Heading is aimed at reducing tree vigour and inducing the formation of sylleptic shoots that will develop into fruiting branches possibly by the end of the growing season. Shoots were cut back at three dates (D_1 - 5 June; D_2 - 20 June and D_3 - 5 July) and under two treatments i.e. treatment 1 (T_1) - just above the bud, and treatment 2 (T_2) - between buds. Inter alia, results showed a much greater % positive response in T_1 (82.21%) than in T_2 (52.88%), and the best performance at D_2. Number of sylleptic shoots was not significantly different across heading dates, but significant differences were found between the two heading cut positions. On average, T_1 and T_2 gave 2.12±0.24 and 1.17±0.13 sylleptic shoots, respectively. Significant differences were observed in sylleptic shoot length across heading dates; with the longest sylleptic shoots at D_1 - 9.39±0.91 cm, and the shortest at D_3 – 5.99±0.62 cm. Heading cut position had no significant effect on sylleptic shoot length. As regards the number of flower and vegetative buds per sylleptic shoot, results showed that early cutback dates (D_1 and D_2) mostly led to the formation of vegetative sylleptic shoots. A similar event was induced by heading treatment T_1.

Keywords*: Apricot, early summer pruning, sylleptic shoots*

THE EFFECT OF MINERAL NITROGEN NUTRITION ON THE PRODUCTIVE ELEMENTS OF SPRING MALTING BARLEY EARS

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Abstract

During the two-year period the studies were carried out on the effect of increasing doses of nitrogen on the productive elements of the ears with different varieties of spring malting barley. The experiment was set on a farm in the vicinity of Krusevac (village Globoder) in Serbia. The experiment involved the following factors: fertilizing with increasing nitrogen application rates N_0, N_{60}, N_{80}, N_{100}. On the variants with nitrogen rate also used were 90 kgha^{-1} P_2O_5 and K_2O and varieties Kraguj, Dunavac, Slavko i Uros. The experiment was set up in four replications according to a split-plot method with random assignment of treatments. The basic plot size was 5.0 m^2. The aim of this research was to determine the role of mineral nitrogen nutrition on productive elements of ears with different varieties of spring malting barley depending on the amount of nitrogen. All in order to contribute to increased yield with varieties of spring malting barley based on better understanding of importance of nitrogen in the production process. The obtained results showed that the use of nitrogen had a positive effect on the productive elements of the ears in all variants and in all varieties. By applying increasing doses of nitrogen the maximum weight of grains per ear and the number of grains per spike at the variant of fertilisation with 80 kgha^{-1}N were determined The ear length was achieved at the highest dose of nitrogen of 100 kgha^{-1}. The different reaction of the tested varieties to the use of mineral fertilizers is the result of their varietal characteristics.

Keywords: *Spring malting barley, Nitrogen, Fertilization, Variety, Productive characteristics.*

YIELD AND BIOMASS QUALITY OF VETCH (*VICIA VILLOSA ROTH*.) ACCORDING TO TIME OF CUTTING

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Abstract

The recommended time of vetch utilization for different purposes is the time of the full formation of the pods. Sometimes it is difficult because of losses due to uneven ripening pods and possible dropout. The Institute for Forage Crops (City of Krusevac, Serbia)started program of vetch selection from materials with different origin. Tenbest investigated genotypes of hairy and common vetch were planted at the optimum time in a randomized block design with three replications. Testing of the chemical characteristics of the biomass was conducted in three cutting periods: A_1 – a cutting of biomass at the start of flowering (10% of flowering), A_2 – a cutting of biomass at forming the first pods on 2/3 plants, and A_3 - cutting of biomass at forming green seeds in 2/3 pods. Yield per plant also measured in the same time (B_1, B_2 amd B_3). The aim of this study was to determine best yilding genotypes for further work and quantify the main CP fractions during the growing period of forage vetch in order to find the best time of utilization in ecological conditions of Serbia.

Key words: *Vetch, yield, biomass quality, protein, fractions*

PRODUCTIVITY HEXAPLOID WHEAT SPELT - *TRITICUM AESTIVUM SPP. SPELT*GROWN ON DEGRADED SOIL

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Abstract

The paper presents the results of threeyears research (2011-2012) productivity alternative grain Spelt grown on degraded land on two sites: at the mineStanari (ST) (Bosnia and Herzegovina) and at termalpower plant Nikola Tesla "TENT 2" in Obrenovac (OB) (Serbia).

We examined alternative cereals Spelt using standard agricultural practices of growing this grain.The harvest is carried out manually at the stage of full maturity and the yield determined by the method of measuring biomass yield.

The average yield of biomass spelt, of all investigated factors, for both growing localities and three years of investigation, was 1509 kg ha^{-1}. The obtained average yields of biomass at sites ranged from 1.792 kg ha^{-1} (OB-SR) to 1,225 kg ha^{-1} (ST-B & H). Among the locality of cultivation, there was a statistically significant difference in yields of biomass. The interaction locality x years had a statistically significant effect on the biomass yield of Spelt.

The obtained average yields of biomass at sites ranged from 1.792 kg ha^{-1} (OB) to 1,225 kg ha^{-1} (ST). Fluctuations in biomass yields were due to different soil conditions – different nutrient contents and the distribution of precipitation at initial stages of crop development.

Key words: *Alternative cereal, spelt, deposit of soil types, biomass yield, locality.*

ANALYSIS OFTOTAL POLYPHENOLS FROM POSTDESTILLATION WASTE MATERIAL OF DIFFERENT CORIANDER ACCESSIONS GROWN IN SERBIA

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Abstract

Coriander (*Coriandrum sativum* L.) is an aromatic plant grown for seed (*Coriandri fructus*) which contains essential oil (*Coriandri aetheroleum*) with a specific fragrance originating from the main component, limonene. Essential oil is obtained by steam distillation from the dried ripe seed. However, the content of essential oil in seed is low, between 0.1 and 1.8%, depending on variety, geographical origin, agroecological conditions, growing technology, etc. Still, the majority of the produced plant material remained unused. The aim of our investigation was to determine the total polyphenols content in postdistillation waste material which remains after coriander essential oil distillation. Evaluation of its antioxidative capacity was the other purpose of this study. Six coriander accessions of different origins were grown on an experimental field in Mošorin, Serbia, during 2014. According to the obtained results, postdistillation coriander seed waste material, as estimated by the Folin–Ciocalteu method, contained between 40.9 and 57.2 mg GAE/g dry extract of total polyphenols. However, according to DPPH method the antioxidative potential of coriander postdistillation seed waste was poor and it is ranged between 0.03 and 0.04 TE. Further research will be focused on agro-food implementation of postdistillation waste material of coriander and other plants which are used for essential oil production.

Keywords: *Coriandrum sativum, postdistillation waste material, total polyphenols, DPPH, antioxidative capacity.*

INFLUENCE OF TEMPERATURE, PRECIPITATION AND INSOLATION ON THE DEVELOPMENT RATE OF ANNUAL CARAWAY (*Carumcarvi* var. *annua*)

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Abstract

Caraway (*Carum carvi* L.) is plant from Apiaceae family (Umbelliferae). It has two forms: annual (*C. carvi* var. *annua*) which usually grows in warm climates and biannual (*C. carvi* var. *biennis*) which grows in cooler climates.In our region, it is usually grown the biannual caraway, because it has higher seed yield and essential oil content. However, introducing the annual caraway to agroecological conditions of Serbia has the purpose of shortening the production cycle of this plant since the biannual variety is not profitable during the first year, requires significant investment and takes up the space. The purpose of this research was to determine the duration of the vegetation period, the requirements for temperature, moisture and insolation of annual caraway during the phenological stages. The experiment was conducted during two years on three locations in Vojvodina Province. The sowing-harvest period of annual caraway lasts from 136-177 days, requires above 3000 degree days, whereas the amount of precipitation needs to be minimum 200 mm, and number of sunshine hours between 1250 and 1480. There is a strong relationship between temperature, precipitation and insolation that influences the development rate during caraway vegetation period. However, these parameters primarily affect harvest index, which further influences yield and quality of caraway fruits.

Keywords: *Caraway, production cycle, temperature, moisture, insolation.*

COMPARATIVE ANTIBACTERIAL ACTIVITY OF EXTRACTS OF DIFFERENT ALFALFA PLANT PARTS

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Abstract

In Serbia alfalfa (*Medicago sativa L.*) is the most important forage crop. One of the reasons she is recognised as mostvaluable crop is ability to accumulate significantly more nitrogen than other legumes and fix atmospheric N_2. This paper aimed to determine the antibacterial activity of methanol extract of root, stem and leaf of plant species *Medicago sativa L*. so that they find potential use in primary agricultural production. We used dry plant parts to make extracts by macerat, and as solvent we used methanol. In each cell we put Mueller-Hinton agar, extract, resazurin and bacteria spore suspension.We get spore suspension by heating the tube with bacteria strain between the hands, and measureabsorbance at A=0,045. All together we leave in thermostat at 30° for 24h.Determination of minimum inhibitory concentrations (MICs) was performed by a serial dilution technique using 96-well microtitar plates.Bacterial strains that we used were grown in thelaboratory for Microbiology, Faculty of Agronomy, Čačak. Antibacterial activity was assayed microdilution method where a minimum inhibitory concentration (MIC) of plant extracts was tested on 16 bacterial strains. The strongest antibacterial activity manifestedmethanol extract of root of alfalfa on the bacteria *Staphilococcusaureus* (MIC = 1,9531 µg/mL), and the lowest antimicrobial activity manifestedmethanol extract of leaves on bacteria *Salmonella enteritidas*(MIC = 62,5 µg/mL), *Salmonella typhimurium*(MIC = 62,5 µg/mL), *Enterobacteraerogenus*(MIC = 62,5 µg/mL) , *Citrobacterfreundi*(MIC = 62,5 µg/mL).

Key words: *Alfalfa, methanol extracts, antimicrobial activity*

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GRAIN YIELD AND YIELD COMPONENTS IN SPRING MALTING BARLEY

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Abstract

Malting barley thrives in temperate climates that exhibit small temperature fluctuations, especially during grain maturation, when the crop is particularly sensitive to heat stress. A field trial involving four two-rowed spring barley cultivars was conducted at the experimental field of the Secondary School of Agriculture and Chemistry, Kraljevo (Serbia) over a period of three years (2012-2014) to evaluate the variability of yield components (plant height, number of kernels per spike, kernel weight per spike and thousand-kernel weight) and grain yield in different growing seasons. The experiment was laid out in a randomized block design with three replications on a pseudogley soil acidic in reaction. Seeding rate was 450 germinable seeds m^{-2}. At tillering, 50 kg ha^{-1} nitrogen was applied. Calcium ammonium nitrate (CAN) with a nitrogen content of 27% was used for top dressing. The studied traits were significantly affected by weather conditions during the growing season. The effect of weather differed across cultivars. Grain yield, thousand-kernel weight, kernel weight per spike, number of kernels per spike and plant height were highest in all cultivars in the year characterized by moderate temperatures during grain filling and a high rainfall total in the second part of the growing season. The highest values for grain yield, number of kernels per spike and kernel weight per spike were obtained in 'Novosadski 448'.

Key words: *Malting barley, climate, grain yield, yield components.*

GENERATION MEAN ANALYSIS FOR FIVE YIELD TRAITS OF BREAD WHEAT (*Triticum aestivum L.*)

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Abstract

In order to estimate the gene effects in the inheritance of five important yield traits, two winter wheat genotypes were crossed. The gene effects were studied on five basic generations, involving two parents, their first and second filial generations (F_1, F_2) and first back crosses generations (BC_1). The estimation was done on the basis of Generation mean analysis, using an additive-dominant model with three and six-parameters. The adequacy of the additive-dominance model with three-parameters was tested using the Scaling-test and Chi-square ($\chi 2$) test. The significant Scaling tests and Joint-scaling test indicated the presence of digenic epistasis for the most of examined traits. The six-parameter model was fit to explain the genetic variation and confirmed the presence of significant epistatic effects for the traits: plant height, spike length, number of grains per spike and plant biomass of wheat. The significant role of dominance gene effects for many traits was also confirmed. Significant epistatic effects additive×additive were found to be present for the four traits, while significant epistatic effects dominance×dominance were found to be present for the three traits. Duplicate gene interactions were also seen functioning in controlling plant height, number of grains per spike and plant biomass of wheat, which suggested that improvement of these traits, could be much slower in a selection program.

Keywords: *Gene action, Wheat, Yields components.*

THE INFLUENCE OF MINERAL NUTRITION ON WINTER WHEAT YIELD

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Abstract

Investigations were carried out during the 2008/2009 and 2009/2010 year on stationary field trial, which was established in 1970 on the experimental field of the Center for Small Grains in Kragujevac. The objective of this study was to investigate the influence of mineral nutrition on the yield of winter wheat varieties Ana Morava. Trials were included control and seven fertilization variants with different combinations of NPK fertilizers.

Investigation where showed a considerable variation ofgrain yield which were in dependence from mineral nutrition.The highest grain yieldswere the highest with mineral fertilizer in the combined 80 kg/ha N and 100 kg/ha P_2O_5 (3.976 t/ha).Over the two-year period, all investigated treatments of wheat achieved the highest average 1000-grain weight in the combined 80 kg/ha N and 100 kg/ha P_2O_5 (41.64 g).

Analysis of variance was found highly significant effect of years on grain yield and 1000 grains weight. Different combinations of NPK fertilizers had the most highly significant influence on all characters, except for test weight. Analysis of variance for the impact of years and fertilization variants on investigated traits was found that doses of nitrogen in combination with NPK fertilizers significantly affected only on grain yield.

Positive correlations were observed between grain yield and test weight in all treatments. Grain yield were significantly positively correlated with 1000-grain weight only in the 2008/09 ($r=0.44^*$) and 2009/10 ($r=0.55^*$).

Key words: *Fertilization, yield, quality, wheat*

EFFECTS OF FERTILIZATION ON PRODUCTION TRAITS OF TRIJUMF CULTIVAR OF TRITICALE

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Abstract

Studies of fertilization effects were conducted in a stationary field trial on a degrading vertisol soil with low pH. Eight variants of mineral nutrition (N, P, K, NK1, NP1, NP2, NP1K1 and NP2K1) and untreated control (without nutrition) were tested in the experiment. The rates of nitrogen application were 80 kg N/ha, and they were applied either individually or in combination with two phosphorus rates and a potassium fertilizer. The wheat triticale cultivar used in the experiment was Trijumf.

The highest grain yields under mineral nutrition involving a combination of three mineral elements NP2K1 (4.755 t/ha), NP2 (4.519 t/ha), NP1 (4.143 t/ha) and treatment NP1K1 (4.028 t/ha) have achieved satisfactory results, while the poorest results were achieved by the control and N treatmnets.

Key words: *Fertilization, yield, quality, triticale.*

EFFECT OF IRRIGATION ON GRAIN YIELD AND QUALITY OF SOYBEAN IN ORGANIC CROPPING SYSTEM

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Abstract

Production of soybean (*Glycine Max.* (L.) Merr.) observed with agro-technical, nutritional, economical and industrial standpoint is very important. Soybean is the most important leguminous plant species suitable for organic production, especially due to crop rotation and technological quality of grain.

This study examines the yield and quality of soybean NS varieties Galina, in an organic cropping system, in two variants: 1. non irrigation - control variant and 2. variant with irrigation. The experiment was conducted on the chernozem soil, the plots of the Institute of Field and Vegetable Crops, in Bački Petrovac in Serbia (φN 45 ° 20 ', λE 19 ° 40', m.n.m. 89). Land was moderately alkaline, well provided with humus, carbonate, enough N and K_2O and with high content of P_2O_5.

Average yields of soybeans amounted to 4,031 kg ha^{-1}. The irrigation system achieved significantly higher grain yield compared without irrigation. Grain yield in the variant with irrigation were higher, 4,502 kg/ha, by 26.46% compared to the non irrigated farming.

The average protein content was 40.41%, oil content of 20.74%, while the protein nitrogen content was 6.45%. The oil content was significantly higher in non irrigated land farming in relation to variant with irrigation.

Irrigation is desirable corrective agro-technical measures in the production of soybeans in dry year and is a prerequisite for profitable soybean production in organic cropping system.

Key words: *Soybean yield, protein and oil content, N protein, organic cropping system, irrigation.*

THE INFLUENCE OF ZEOLITE ON THE MORPHO-PRODUCTIVE CHARACTERISTICS OF *GLYCINE MAX*. L. IN ORGANIC FARMING SYSTEM

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Abstract

Natural zeolites can perform adsorption of ammonium ions of manure and in the mixture the manure can be used as organic-nitrogen fertilizer. There are about 50 different types of natural zeolites (Analcime (analcite), clinoptilolite, chabazite, faujasite, phillipsite, mordenite, etc.). Clinoptilolite and chabazite are the most commonly used natural zeolites, which are increasingly used in agriculture. Clinoptilolite added to the soil improves its physical and chemical characteristics. Zeolite may retain the N, K, Ca, Mg and micronutrients in many plants and the root zone to allow their use when needed, thus allowing efficient use of N and K fertilizer. The application of zeolite, because of these qualities, applies small amounts of fertilizer, which reduces production costs and allows increased yields.

The aim was to determine the effect of zeolite on the morphologic and productivecharacteristics of soybean produced in the organic farming system. In this research three varieties*Glycine Max.*: NS Kaća, (000 MG), NS Pantera (00 MG) and Galina (0 MG) in two types of cultivation: the first control and the second variant with zeolite - Clinoptilolite. The average weight of plants, plant height, first pod height and weight of pods of soybean plants was higher in variants with zeolite compared to the control. Plant height was significantly higher in the variant with zeolite compared to the control.

The maximum mass of plants, the first pod height and weight of the pods had a variety Galina compared to the cultivars. Significantly higher average plant height had NS Pantera in relation to the variety tested. Variety Pantera had higher plants in variants with zeolite for 11.8 cm respectively for 9.27%, while the variety Galina had higher plants in the 2nd variant for 16.76 cm respectively for 19.20% compared to the first variant- control.

Application of zeolite prevents the leaching of nutrients, is of great importance both from the economic as well as the ecological aspect and also for achieve bigger productivity of soybeans.

Keywords: *Soybean, variety, zeolite, morpho-productive characteristics, organic farming system.*

USE OF EFFECTIVE MICRO-ORGANISMS TO ENHANCE THE PRODUCTIVITY AND QUALITY OF DRY BIOMASS OF THE BASIL CULTIVAR "SITNOLISNI AROMATIČNI"

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Abstract

The trials conducted during 2014 and 2015 on plots and at the seed laboratory at the Institute of Medicinal Plant Research ″Dr Josif Pančić″ from Belgrade, located in Pančevo, (Vojvodina province, Serbia) investigated the impact of pre-planting application and foliar application (pre-planting soil treatment and foliar treatment) of the product called EM-AKTIV on morphological, productive and qualitative properties of the basil (*Ocimum basilicum* L.) cultivar *″Sitnolisni aromatični″*, which is grown and propagated at the Institute. The plots on which the product was not applied were used as a control variant. The trail was set up in a complete randomised block design with four replications and the size of basic plots was 3.25 m^2 (5.0 m x 0.65 m). The research investigated the impact of the EM-AKTIV on plant height, root length, plant width, the number of inflorescences, above-ground fresh biomass yield, dry biomass yield, essential oil content and essential oil yield per hectare. The highest yield of dry biomass was obtained in the first year in the soil treatment variant (3,134 kg ha^{-1}). The same variant in the second year of research gave the highest content of essential oil (25.9 kg ha^{-1}). These years were quite different in terms of climatic conditions, and precipitation sums, distribution and average daily temperatures in the first year favoured the formation of higher values for most of the investigated parameters.

Key words: *Basil, above-ground biomass, plant height, yield, essential oil content, EM-AKTIV product*

CROP YIELD AND SELECTED SOIL PHYSICAL PROPERTIES UNDER DIFFERENT TILLAGE

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Abstract

The aim of the study was to investigate an influence of different soil tillage technologies on selected physical properties of soil and yield of winter wheat and spring barley grain. Field experiment was established in growing seasons 2013 – 2015 in Research Station Borovce (NAFC – RIPP Piešťany), Slovakia. Experiment was conducted in four different soil tillage technologies: conventional, minimization, mulch and no-till technology. The highest soil bulk density in the depth of 0, 0 to 0, 1 m was in conventional technology, 0, 10 – 0, 20 m in no-till, 0, 20 – 0, 30 m was in minimization technology (1.46 $t.m^{-3}$, 1.50 $t.m^{-3}$ and 1.54 $t.m^{-3}$ respectively). The highest porosity during the experimental period was observed in depth of 0 – 0, 10 m in no-till technology (51.69%). This was the highest value from the point of view of technology and sampling depth. The highest average value of soil moisture was in depth of 0 to 0, 10 m, the most favorable value was reached in no-till technology (18.15%) in this sampling depth. It was also the highest value throughout the whole soil profile (0 to 0, 80 m).

The highest grain yield of winter wheat and spring barley has reached in minimization technologies during growing season 2013 – 2015.

Key words: *Soil tillage technologies, physical properties of soil, yield of grain.*

ATTAINING CARAWAY SEED OIL FRACTIONS WITH DIFFERENT COMPOSITION

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Abstract

Caraway (*Carum carvi* L.)seeds (fruits) contain highly aromatic essential oils, which is traditionally extracted via steam or hydrodistillation. The hypothesis of this work was that by collecting caraway oil at different time points during the extraction process, we could obtain oil fractions with distinct chemical composition. A hydrodistillation time (HDT) study was conducted to test the hypothesis. The caraway seed oil fractions were collected at eight different HDT (at 0-2, 2-7, 7-15, 15-30, 30-45, 45-75, 75-105, and 105-135 min). Additionally, a non-stop HD for 135 min was conducted as a control. Most of the oil was eluted early in the HD process. The non-stop HDT treatment yielded 2.76 % oil by weight in dry caraway seed. Of the 24 essential oil constituents, limonene (77-19% of the oil) and carvone (20-79% of the oil in various oil fractions) were the major ones in the collected fractions. Caraway seed oil with higher concentration of limonene can be obtained by sampling oil fractions early in HD process; conversely, caraway oil with high concentration of carvone can be obtained by excluding the fractions eluted early in the HD process. We demonstrated an effective method of obtaining caraway seed oil fractions of various and unique composition from the same batch of seed, and significantly different from the oil composition resulting from non-stop HD process. These novel oil fractions with unique composition are not commercially available and could have much wider potential uses, and target different markets compared to the typical caraway essential oil.

Keywords: *Carum carvi, hydrodistillation, carvone, limonene; essential oil yield and composition.*

Acknowledgement

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FINGERPRINTING OF THE LOCAL GARLIC (*ALLIUM SATIVUM* L.) GERMPLASM IN TUNISIA BY MORPHOLOGICAL AND SSR MARKERS

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Abstract

Garlic (*Allium sativum*) is an old crop which has long been valued as a food and medicinal plant. This study was conducted to compare morphological and genetic data of the main local garlic germplasm in Tunisia. This work was conducted in the framework of the activities of the vegetable growing network in the Tunisian National Gene Bank. The phenotypic diversity of thirty-six accessions was conducted on the basis of nine quantitative characteristics relating to leaves, pseudo-stems and bulbs.DNA was extracted from fresh bulb and eight SSRs primer were used for the molecular study. The morphological study allowed a specific description of the characteristics for the tested accessionsand their repartition into different groups.Molecular data analysis demonstrated a high degree of polymorphism with an average of 91.31%. The analysis of SSR profiles showed a wide genetic diversity among Tunisian garlic germplasm. The Principal Coordinates Analysis (PCA) via covariance matrix with data standardization showedno agreement between clustering and agro-morphological traits.Moreover, the clustering does not correspond to the geographical origin. As molecular markers are a more reliable method of assessing genetic diversity than measuring agro-morphological traits, it would be useful to establish an accurate relationship between the two approaches in order to aid plant breeding. Ultimately, there was sufficient diversity detected to start a national collection of garlic germplasmwhich is crucial for the conservation of genetic diversity in the National Gene Bank of Tunisia. This work presents the first step towards an efficient management of the garlic germplasm in Tunisia and its valorization.

Key words: *Garlic,conservation, genetic diversity, phenotypic diversity, SSR markers.*

ADAPTIVEBEHAVIOROF TWO OLIVE TREE CULTIVARS (*Olea europaea* L. cv Koroneiki and Chemlali) UNDER THREE WATER TREATMENTS

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Abstract

Despite the immense potential for olive production, Tunisia is known as an underprivileged country in water resources and water scarcity is evident in certain regions. This work aims to assess the behavior of two young olive tree cultivars for oil-production Koroneiki, a promising Greek cultivar, and Chemlali, the best local cultivar, under water restriction conditions. Three water treatments were applied: T100% (control treatment: Daily irrigation at 100% of Available Water Content (AWC)), T50% (Daily irrigation at 50% of AWC) and T0% (Without watering). The results showed that the two olive tree cultivars possess important mechanisms to overtake limited water resources. Indeed, as water stress increased, Chemlali maintained longer high midday leaf water potential compared to Koroneiki. T50% treatment seems to be sufficient for both cultivars. Furthermore, detailed measurements of total Osmotic Adjustment (OA)showed that olive trees use this mechanism to create very negative leaf water potentials in order to be able to extract water from a dry root environment. Analysis of Passive Osmotic Adjustment and Active Osmotic Adjustment showed that Koroneiki tends to use a passive strategy to cope with drought stress, while Chemlali used an active strategy. The root/shoot ratio of Chemlali plants at T50% treatment was the highest comparatively with the other two treatments. This result shows that Chemlali plants valorize low quantities of water rather than high quantities and Koroneiki plants behave better when it is irrigated at T100% AWC.Chemlali plants irrigated at T50% AWC are the most suitable to tolerate water restriction conditions.

Keywords: *Olea europaea* L., *Leaf water status, Osmotic adjustment, Plant dry matter accumulation*

EFFECTS OF MODIFIED ATMOSPHERE PACKAGING ON QUALITY OF FRESH PROCESSED TUNISIAN POMEGRANATE ARILS CV. *GABSI*

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Abstract

Tunisia is a major producer of pomegranate fruit, Gabès governorate had large varieties which are cultivated under the oasis system. The valorization of this type of fruit as fresh cut produce could be an important alternative for many pomegranate varieties. The objective of the present work is to study the aptitude of *Gabsi* variety to be commercialized as fresh cut fruit and to determine the postharvest shelf life.

Fresh arils were hand extracted, chlorine disinfected, rinsed and dried then packed in polypropylene bags.Treatments were passive MAP, enriched MA and control, each one had three replicates. Quality evaluation was assessed on days 5 and 10. Weight loss, luminosity (L*), Redness (a*), Hue angle, firmness, titrable acidity (TA), Total soluble solids (TSS), pH and anthocyanins content were determined and a sensorial evaluation was done.

Active and passive MAP reduced significantlyarils weight loss, increased L*, a* and hue angle parameters compared to control. Arils firmness was not significantly affected by passive and active MAP. MAP Treatments had not significant decrease in TSS and pH, an increase of TAand total anthocyanins. Similarly, changes in sensory analysis were negligible and did not affect the eatingquality. For an acceptable quality attributes of ready to eat *Gabsi* pomegranate arils a storage conditions with MAP at 4°C and a postharvest shelf life for 10 days were achieved.

Keywords: *Pomegranate arils, MAP, quality, postharvest shelf life*

APPLICATION OF SATELLITE AND GROUND-BASED TECHNIQUES TO EVALUATE DURUM WHEAT BIOMETRIC AND PHYSIOLOGICAL PARAMETERS

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Abstract

Nowadays, an evaluation and standardization of the remote sensingtechniques is becoming a necessity after the increase of the sensors number and way of data acquisition for agricultural purposes. The aim of this study was to compare two remote sensing techniques (satellite and ground-based) as tools describing the variations of physiological and biometric parameters of durum wheat grown under different water regimes. The experimental layout was established in Policoro (Matera) located in Southern Italy about 3 km far from the Ionian coast. The growing season was from February to June with three distinguished water management practices (rainfed, 50% and 100% of irrigation requirements). The Landsat 8 images and ground-based remote sensing data were acquired regularly in April, May and June together with plant bio-physiological parameters. The overall results indicated no significant differences in terms of both biomass and yield among the irrigation regimes because of the abundant precipitation (355 mm) which limited the irrigation supply. Water Deficit Index (WDI) was strongly related to plant water status, compared to Crop Water Stress Index (CWSI). Soil Adjusted Vegetation Index (SAVI) showed slightly better performance than Normalized Difference Vegetation Index (NDVI) when plotted against the Leaf Area Index (LAI) with R^2= 0.90 and 0.84, respectively. The best performance was obtained for the Enhanced Vegetation Index (EVI) derived from satellite data with R^2=0.98. Therefore, the satellite data could provide reasonable indication about the crop growth especially if applied with higher resolution.

Keywords: *NDVI, SAVI, vegetative indices, LAI, stomatal conductance.*

PREVALENCE AND DETERMINATION OF DISEASES OF POMEGRANATE ORCHARDS IN AYDIN PROVINCE, TURKEY

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Abstract

This study was conducted to determine the presence and prevalence of fungal and bacterial diseases of pomegranate orchards in the counties of Aydın province (Turkey) between 2009 - 2011. For this purpose, surveys were performed in 96 pomegranate orchards from flowering period to the end of the harvest in 16 counties. Results indicate that 4,7 % of the total of trees examined (17125) showed wilting symptoms. Fruits, collected from four sides of a tree (total of 40 fruit, 10 from each side) showed rotting in 8,1 % of cases, while 8,8 % suffered loss of market value due to cracks developed prior to harvesting. Samples were collected and isolations were made from plant root and crowns displaying wilting symptoms. Among isolates, 64,4% were identified as Fusarium sp, while 13,6% were *Cytospora* spp., 3,4% were both *Cytospora* and *Fusarium*. *Trichothecium roseum* (1,7%). *R. solani, Phytophthora* sp., *Gliocladium* sp. and *Alternaria* sp. also had infected plants. However, 10,2% of the isolates were unidentified. Pathogen studies carried out with *Fusarium* and *Cytospora* species revealed that all *Cytospora* species were pathogenic and 69,5% of *Fusarium* species were found to be pathogenic as well. Isolates of infected fruits revealed that *Altenaria* spp. showed the highest incidence levels at 28,3 % followed by *Aspergillus* spp. at 19,6 %, *Penicillium* spp. at 13,1 %, *Coniella granati* at 8,7 % and *Cytospora* spp. at 8,7 %. Others were identified as *Gliocladiom* spp., *Trichoderma* spp. and *Fusarium* spp. Isolation studies did not reveal any bacterial pathogens.

Key Words: *Cytospora* spp., *Fusarium* spp., *Coniella graniti, Alternaria* spp., *pomegranate.*

VEGETABLE AND ORNAMENTAL PRODUCTION IN SOUTH-EASTERN ANATOLIA REGION (TURKEY)

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Abstract

Turkey has an important role in respect of vegetable production in the world with 809 000 ha production area and 30 million metric tons production both in field and greenhouse. The 66.4 thousand ha of the production area is in greenhouse. Vegetable production is made in almost every part of Turkey except for harsh winter areas. While greenhouse production is dens in the coast, the summer and winter vegetable cultivation is made in Central Anatolia, and greenhouse cultivation in the geothermal fields of the region. With the Southeast Anatolian Project (GAP), the Southeast Anatolia Region become an important position in the vegetable production after 1995 year. Tomatoes, peppers, eggplant, watermelon, cucumber and some winter vegetables such as lettuce and onion are grown in open field conditions. With the softening of this region's climate because of dams, besides open field vegetable cultivation, the greenhouse production has also developed. Especially in the geothermal energy area of GAP region, greenhouses started with 2 ha, and increase in other regions and reached 100 ha now. Since the beginning of 2000s,climate controlled modern greenhouses has started to make a soilless vegetable cultivation. Currently, in the 20% of the existing greenhouse area the soil cultivation is going on and the rest of greenhoses are hydroponic production. The production of tomatoes, cucumbers, peppers and eggplant vegetable species, and indoor ornamental plants and cut roses are grown in the greenhouses.

Key words: *Vegetables, Ornamentals, Yield, Greenhose growing, Hydroponicproduction, GAP region*

THE ROLE OF PACLOBUTRAZOL ON SEEDLING QUALITY OF CUCUMBER

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Abstract

Seedling height is an important quality factor for cucumber (*Cucumis sativus* L.). There are a few methods to control seedling height. The most effective methods to control seedling height use of plant growth retardants. Paclobutrazol is one of the most effective plant growth retardants. In this study, effect of paclobutrazol on seedling characteristics of cucumber was investigated. Different paclobutrazol doses were applied by three different methods. First, cucumber seeds were imbibed 50 – 100 - 200 and 500 ppm paclobutrazol solution during 2 - 4 and 6 hours. Second, the same doses were applied twice by foliar spray on cucumber plantlets in the cotiledonary and first true leafy stage. Third, 20 – 40 - 60 and 80 ppm paclobutrazol doses were applied twice by sprink irrigation on cucumber plantlets in the cotiledonary and first true leafy stage. Cucumber seedlings were grown in seedling trays in which the cells (45 x 45 x 60 mm) contained 70 % peat and 30 % perlite. In the study seedling height, hypocotile length, leaf number and seedling biomass were observed. All of the paclobutrazol doses decrease the seedling height according to control plants. Lower doses increase the seedling quality. High paclobutrazol doses resulted excessive shortened of the seedlings.

Key words: *Seedling height, plant growth retardant, cucumber, hypocotile length.*

PISTACHIO AND ALMOND PRODUCTION AT SOUTHEAST ANATOLIA REGION IN TURKEY: CHANGES OF LAST DECADES

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Abstract

Pistachio (*Pistacia vera*) and almond (*Amygdalus communis*) are very important crops for Southeast Anatolian region. Pistachio can be grown in only some part of the world due to special climatic requirements. The most important pistachio producer countries in the world are Iran, USA, Turkey and Syria, respectively. Growing and processing techniques after harvest in Iran and USA differ from those in other countries. Modern growing and processing techniques are performed in only USA In this presentation, the production values, growing problems and solutions, harvest and postharvest processing techniques are compared with pistachio producer countries. In Turkey, growing of pistachio is intensified to the Southeast of Anatolia region. It is expected to be important changes in new and old orchards, after irrigation facilities start to be used in this area with Southeast Anatolian Project (GAP), The farmers know the effect of water for pistachio trees. They are trying irrigation methods. An additional to this growing system, postharvest processing is started to modernize during last decades. The almond experiments had been started for twenty years. It was seen that almond is also one of the suitable fruit crops for his area. These two fruit species can be grown under unirrigated or irrigated conditions. But after applying of water the yield and qualityare increased. The new some problems are started because of amount of water. The excessive water application created some diseases and physiological problems. In this paper this subject will be discussed.

Key words: *Pistachio, Almond, Irrigation, Ecology*

EVALUATION OF DIFFERENT SWEET CORN (*Zea mays* L. var. *saccharata*) CULTIVARS AND EFFECT OF SOWING TIMES ON YIELD AND QUALITY

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Abstract

The objective of the present study was to try sweetcorn cultivars, of which production and consumption continuously increase worldwide, to determine suitablesowing times and to provide an alternative crop for Van region in Turkey. In this study, 4 hybrid sweet corn cultivars (Challenger, Overland, Jubilee and 8529) and 1 silage corn cultivar (3167) were evaluated. Yield and performances of sweetcorn cultivars were analyzed for 4 different sowing times (May27th, June10th, June 24th and July 8th). Two separate researches were conducted in 2014 and 2015 and the mean values were evaluated. Study findings showed that the highest husked ear weight with cv. 3167 (314.5 g), while the lowest husked ear weight with cv. Jubilee (219.4 g); the highest total husked ear yield with cv. Challenger (29 828 kg ha^{-1}), while the lowest value with Overland cv. (24 858 kg ha^{-1}); the highest TSS value with cv. Challenger (23.7 Brix°), while the lowest TSS value with cv. 3167 (15.7 Brix°).At the end of the study, hopeful results were obtained for sweet corn cultivation for future canned and raw food industries in Van region. Analyses demonstrated that all cultivars were adapted to the Van region. However, in terms of all traits, the most prominent sweet corn cultivars were Challenger and 8529. Moreover it was also determined that the most suitable seed sowing time for sweet corn in Van region was between June 24th and July 8th.

Keywords: *Cultivars, Sowing time, Sweet corn, Van.*

GENOTYPES IN TERMS OF YIELD AND QUALITY

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Abstract

This study investigation was carried out to determine the properties of some barley genotypes on the yield and quality in different ecological conditions in 2011-2012 growing season in Diyarbakır. In the study, we used total of five varieties consisting of twenty lines obtained from ICARDA. Experiments were randomized complete block design with replications and they were conducted in GAP International Agricultural Research and Training Center field trial. In the study, heading date, plant height, thousand grain weight, test weight, protein content, starch content, lodging, grain of humidity and grain yield were investigated.According to the results obtained from the analysis, the average values among the spring barley genotypes were as follows heading time was changed between 112.0 -117.5 day, plant height betwen 90-117 cm, thousand grain weight between 32.0 and 46.4 g hectoliter weight between 65.1 and 73.5 g, protein content between 14.0 - 17.2 %, humidity between 68.6 –70.5 %, starch content between 8.0 - 8.4 %, grain of humidity between 0 – 60 % and grain yield changed between 6092 and 7870 kg/ha.In terms of grain yield lines 2, 16 and Lignee 131 varieties, In terms of quality, the Salmas varieties and lines 17, came to the fore and while some genotypes were tend to more litle others were. Depending on the results of a top-performing lines and varieties moved forward step.

Keywords: *Barley, develop cultivar, medium rainy area*

EVALUATIONOF SEED AND OIL YIELD WITH SOME YIELD COMPONENTS OF SAFFLOWER VARIETIES IN KAHRAMANMARAS (TURKEY) CONDITIONS

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Abstract

Oilseeds production of Turkey is not available to meet domestic requirements. Turkey has been facing a recurring shortage of vegetable oils for many years. Presently, about 50% of vegetable oil being consumed in Turkey has to be imported. Turkey has a suitable climate for producing of many oilseeds. Safflower (*Carthamus tinctorius* L.) is a multipurpose crop. Traditionally, the crop was grown for its seeds, and flower petals were used for colouring and flavouring foods. For the last fifty years, the plant has been cultivated mainly for the vegetable oil extracted from its seeds.Thus, there is an urgent need to take immediate actions for increasing oilseed production through growing underutilized and minor oilseeds like safflower. Increased safflower production will reduce the import of oilseeds and help meet our domestic oil requirement.

This research was conducted to determine the seed and oil yield with some yield components of safflower (*Carthamus tinctorius L.*) varieties in Kahramanmaras (Turkey) conditions using a randomized complete block design with four replications in 2015. In the study, Dinçer, Balcı, Remzibey, Rio, Nebraska 10, Oleicleed, Quiriego 88, San Jose 89, Sina and Gila cultivars were used as the plant material. These ten safflower varieties were evaluated for plant height, branch number and head number per plant, 1000-seed weight, seed oil content, seed and oil yield. The results showed that plant height, branch number per plant, head number per plant, 1000-seed weight and seed oil content for ten safflower cultivars ranged between 40.15-46.80 cm, 4.58-6.65, 8.23-14.20, 34.85-45.99 g and 29.53-35.31 %, respectively. The highest seed yield (99.23 kg da^{-1}) and the lowest seed yield (86.40 kg da^{-1}) were obtained from the varieties Balcı and Rio, respectively. Balcı variety had the highest seed yield and gave the highest oil yield.

Keywords: *Safflower, Carthamus tinctorius L., seed yield, oil yield, yield components.*

PRESENTANDFUTUREEFFECTSOF CO_2ONVARIOUS FIELD CROPS: A GENERAL EVALUATION

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Abstract

It was generally examined and been informed the present and future effects of carbon dioxide (CO_2) on field crops which were grown on the earth as morphologically, physiologically, agriculturally, etc. in this poster presentation. As known, agricultural sector is very sensitive to the global warming effects on field crops. Almost in each country, agriculture is the second or first largest direct or indirect contributor for the global warming. Especially, this phenomenon contributes to unwanted effect(s) through the emission of carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), chlorofluorocarbons (CFCs), etc. Especially, from them CH_4 has the highest global warming potential that is about 300 times than the potential of CO_2, and about 20 times than that of the N_2O. It was found that the average temperature of the Earth would be rise up to (1.4–5.8 ^{0}C) by the 2100, and some agricultural practices (poly, mono and mixed cropping) and ecosystems (such as agro-forestry, agro-silvo-pastoral systems, landscape, aquaculture, rangelands, wetlands, fallows, etc.) will be affect at different levels. It was verified by the satellite images, increasing in the CO_2 concentration (Its level in March 2016 is 404.83 ppm) will make accelerate plant growth, increase of water use efficiency (WUE) and physiological/metabolic activity (ies), reduce the grain filling period, nutrient efficiency, incubation and flowering periods. The purpose of this paper is to give some important, valuable and practical information(s) on the present and future effects of carbon dioxide (CO_2) on various field crops.

Keywords: *Global Warming, CO_2, Field Crops,Water Use Efficiency.*

EFFECTS OF DEFICIT IRRIGATION ON YIELD AND YIELD COMPONENTS OF GRAIN CORN (*Zea mais* L.)

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Abstract

This research was conducted to assess the effect of two irrigation methods (drip and furrow irrigation) and irrigation levels (25 %, 50 %, 75 % and 90 % of the water-holding capacity of the soil) on yield and yield components of grain corn (*Zea mays* L.) at the Agricultural Research and Extension Center, Igdır University from North East Turkey, in 2014. The experimental design was a split-plot arrangement with three replications on the soils of a clay silt loam. Plant height (185.0-253.3 cm),plant weight (583.3-930.0 g), stem ratio (47.2-57.4%), ear ratio (42.6-52.8%),ear weight (290.0-403.7 g), grain number in ear (350.7-640.0),ear length (24.0-28.7 cm), 1000-grain weight (359.5-450.6 g),crude protein ratio in grain (6.0-9.0%), andgrain yield (10.0–25.2t ha^{-1}) were varied between.While the highest plant height, grain yield, 1000-grain weight, stem ratio, grain number in ear was obtained from drip irrigation method, ear ratio and crude protein ratio were obtained from furrow irrigation method.Grain yield and yields components except for ear and stem ratio in corn production were significantly decreased according to decreasing of the water-holding capacity of the soil.Furthermore, the highest and lowest yield and yield parameters were obtained at 25% and 90%, respectively in both irrigation methods. In an arid region where rain never falls during the growing season, the question when to irrigate is rather crucial. According to the results of the study, irrigation should startwhen available water fallen to 25or 50 percent.

Keywords: *Corn, Deficit Irrigation, Yield, Yield Conponents*

MUTUAL EFFECTS OF BORON AND POTASSIUM ON THE YIELD AND CHEMICAL COMPOSITION OF LETTUCE (*LACTUCA SATIVA* L.)

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Abstract

Boron (B) toxicity is one of the important abiotic factors that limit plant growth. The aim of this study was to investigate combined effects of B and potassium (K) in lettuce (*Lactuca sativa* L. cv. 'Arap Saçı') on plant growth and mineral nutrition composition under greenhouse conditions. The present study showedthe combined effects of four B levels (0, 5, 10 and 20 mg kg-1, as H_3BO_3) and three K levels (0, 200 and 400 mg kg-1, as K_2SO_4) and three replicates per treatment. The results showed that the interactions of K and B on growth parameters (shoot fresh weight (sFW) and dry weight (sDW), root fresh weight (rFW) and dry weight (rDW) and leaf number were significant ($p<0.05$). Increasing B treatments decreased sFW, sDW, rFW, rDW and leaf numbers of lettuce. Also, a significant reduction was found in the contents of photosynthetic pigments (total chlorophyll (Chl) chlorophyll *a* (Chl *a*), chlorophyll *b* (Chl *b*), chlorophyll *a+b* (Chl *a+b*) and carotenoid (Car)) with increasing B treatments. But, 400 mg kg^{-1} K level increased the contents of Chl, Chl *a* and Chl *a+b*, compared to the control. While 10 mg kg^{-1} B level increased significantly the K concentration, the significant increase was found by 20 mg kg^{-1} B level in B concentration of lettuce. Regardless of K treatments, uptake of K, P and Mg of lettuce decreased with increasing B treatments, whereas B uptake decreased until 10 mg kg^{-1} B treatment and it increased about 2-fold more with the highest B level. Micronutrient contents (iron (Fe), zinc (Zn), cupper (Cu) and manganese (Mn)) of lettuce decreased significantly with 20 mg kg^{-1} B level. In conclusion, increasing K treatments have a negative effect on alleviation of B stress for lettuce.

Key words: *Boron, interaction, Lactuca sativa* L., *mineral nutrition, potassium*

EFFECTS OF DIFFERENT NITROGEN AND PHOSPHOROUS DOSES ON MOENCH PLANT*(Echinacea purpurea* L.*)* PROPERTIES

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Abstract

The effects of different nitrogen doses (0, 200, 400 and 600 kg/ha) and phosphorous doses (0, 100, 200 and 400 kg/ha) on plant properties, fresh and dry herb yields of *E. purpurea* L. was examined. The study was carried out in randomized complete block design with three replications in 2012 and 2013 in Bozyazi-Mersin/Turkey ecological conditions.According to obtained statistical data, the effects of nitrogen and phosphorous doses and nitrogen x phosphorous interactions were not significant for studied years. But, nitrogen doses were significant 1% regarding level on plant height, branch number per plant, fresh and dry herb yields. And also the effects of phosphorous doses were significant (1%)regarding plant height, fresh and dry herb yields. Correlation analyses were calculated between plant properties and nitrogen and phosphorous doses. Some correlations were found as significant 1% regarding level.

Keywords: *Moench, nitrogen-phosphorous, herb yield.*

EFFECTS OF SALİNİTY ON MİCROTUBERİZATİON OF DİFFERENT POTATO GENOTYPES

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Abstract

In vitro microtuberization is very useful method for physiological studies and selection of potato germplasm. Salt stress affects physiological responses in plants including photosynthesis. The aim of the study was, also, to determine effects of different salt concentrations on microtuberization of potato. Stem cuttings consisting of a single node of twelve genotypes were cultured on MS medium containing different concentrations of NaCL and 2.5 mg/ L Kinetin, 60 g/L sucrose with solidified with 7g/L agar. Microtuberization of all potato tested genotypes was delayed by 10-14 days at 100-150 mM NaCL and number of micro tuber per plantlet, weight of micro tuber per explant, microtuber yield per explant drastically decreased at high salt concentrations. Although no morphological differences and relative deterioration were observed at all salt concentrations for all genotypes, the genotypes exhibited various microtuberization responses at the different salt concentrations. Slaney cv. had the highest number of micro tuber per plantlet (2.067), weight of micro tuber per explant 0.026 g), weight of dry micro tuber per explant (0.003 g) at 150 mM NaCl. However, microtuberization was completely inhibited at high concentrations (100-150 mM) in other genotypes and the stolon growth of the genotypes was not significantly affected by salt concentrations.

Key words: *Potato, Salt stress, Micro tuber, Genotypes, İn vitro*

IN VITRO SCREENING OF POTATO CULTIVARS (*SOLANUM TUBEROSUM* L.) UNDER SALT STRESS

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Abstract

Twelve potato genotypes (Tokat 10/1, Tokat 6/24, Tokat Başçiftçilik Beyazı, Tokat 3/161, Marabel, Slaney, Hermes, Granola, Burren, Kennebec, Lady Claire and İnnovator) were screened for in vitro salt tolerant. Stem cuttings consisting of a single node of the genotypes were cultured on MS medium supplemented with different concentrations of NaCL (0, 50, 100 and 150 mM). Shoot length, number of node, number of leaflet, leaflet length, leaflet width, root length, number of root, fresh root weight, dry root weight, fresh plantlet weight, dry plantlet weight were determined. Innovator was the most salt tolerant genotype and showed greater tolerance to the highest salt doses with plantlet height (3.77 cm), number of nodes (6.40), number of leaflet (9.47), leaflet width (0.89), leaflet length (1.03 cm), root length (11.16 cm), number of root (5.13), fresh root weight (0.03 g), fresh plantlet weight plant (0.27 g), and dry plantlet weight (0.03 g) at 150 mM NaCl. The cultivar gave greater plantlet height, number of leaflet, fresh/dry plantlet weight than other cultivars at all salt concentrations tested. Hermes and Kennebec were moderately tolerant varieties to NaCl stress. The most sensitive variety Granola produced minimum Shoot length (1.13 cm), number of nodes (1.87), number of leaflet (3.13), leaflet width (0.27 cm), leaflet length (0.53 cm), root length (3.04 cm), number of root (0.60), fresh plantlet weight plant (0.06 g) at 150 mM NaCl.

Keywords: *Solanum tuberosum L.,Screening, Single node, Salt stress, in vitro*

EFFECT OF RAINFALL AND HUMIDITY DURING SHOOTING AND GRAIN FILLING PERIOD ON YIELD AND QUALITY IN BREAD WHEAT

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Abstract

Rainfall and humidity areamong abiotic environmental factors which may influence bread wheat quality during grain filling period in Trakya region. Effects of the rainfall and humidity, in April, May and June, to quality of the bread wheat cultivars were investigated. Rainfall and humidity from shooting up to grain filling period were taken in experimental area. This research was established with 25 genotypes in RCBD with 4 replications in Edirne, between 2005 and 2015 growing seasons. Aldane, Selimiye, Pehlivan and Gelibolu were selected from this experiment. Grain yield, TKW, TW, protein ratio, gluten, hardness and sedimentation and relationship amongst these traits were investigated.

There were various relations among investigated parameters. The rainfall in shooting stage positively affected and increased protein ratio, gluten, hardness, sedimentation, and grain yield. Rainfall during heading and grain filling period significantly affected and increased TKW, test weight, while negatively affected and decreased protein ratio,gluten value and sedimentation (r= -0.67). The rainfall in late stage of grain filling negatively affected test weight and grain hardness. Grain yield and sedimentation were positively correlated. Mean humidity from shooting up to grain filling positively and significantly affected and increased gluten index. Also, there was highly significant correlation between protein with gluten (r= 0.976**), hardness (r= 0.589), and sedimentation (r= 0.78). There was negative relation between TKW with protein ratio, gluten, index, hardness and sedimentation, while positive relation was found between yields. The rainfall in April and June positively affected yield potential of the cultivar. During heading and grain filling period high amount of rainfall and humidity decreased grain quality except TKW and test weight.

Key Words: *Bread wheat, cultivar, rainfall and humidity, yield, quality characters.*

EFFECT OF THE ENVIRONMENTAL CONDITION ON YIELD AND AGRONOMIC TRAITS OF THE BREAD WHEAT (*Triticum aestivum* L.) GENOTYPES

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Abstract

Wheat production area is not too large but environmental factors vary across location. Biotic and abiotic stress affected grain yield and agronomic characters of wheat cultivars. This research was carried out to determine the yield, some agronomic, quality and leaf disease traits of the bread wheat genotypes. This research was established with 25 genotypes in randomized completely blocks experimental design with 4 replications, at three locations in Edirne, Kırklareli and Lüleburgaz in Trakya region (Turkey) in 2007-2008 growing season. Grain yield, days to heading, days to maturating, plant height, lodging resistance, thousand kernel weight, test weight, protein, sedimentation, leaf rust, powdery mildew, and relationship between these characters were investigated.

According to the results, significant differences among location, genotypes and studied characterswere found. The mean yield of the genotypes was 664.5 kg/da. Kate A-1 had the highest yield with 753.7 kg/da over three environments. Edirne was the highest yielding (808.3 kg/da) location. Grain yield had significantly negative correlationwith protein ratio (r = -0.689**). There was a negative correlation between days to heading with TKW (r= -0.479*), protein content (r= -0.288) and sedimentation (r= -0.340). Also, significant relation between days to maturating and protein content (r= -0.445*) and sedimentation (r= -0.514**).was found.Plant height was also correlated with thousand kernel weight (r= 0.539**) and test weight (r= 0.731**). Leaf rust negatively affected days to heading and maturating, plant height, TKW and test weight. The higher infection of Leaf rust was determined in Edirne and there were differences among location and genotypes.

Key Words: *Bread wheat, genotypes, location, yield, quality, leaf disease.*

EFFECT OF NITROGEN AND SULPHUR ON YIELD AND YIELD COMPONENTS OF SUNFLOWER (*Helianthus annuus* L.)

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Abstract

This research was performed in order to determine the effects of nitrogen and sulphur rates on yield, yield components and quality characters of sunflower in Ankara conditions. The experiment design was in split plots of randomized complete blocks with three replications for two years. The treatments consisted of three nitrogen rates 40, 80, 120 kg N/ha as the main plots and four sulphur rates 0, 5, 10, 15 kg S/da as the subplots.

The results have shown that increasing nitrogen and sulphur rates decreased start of flowering about 6 days, increased the plant height (about 4-10 percent), head diameter, thousand seeds weight yield (6-20%) compared to the control. Effect of the increasing nitrogen and sulphur rates on oil content was significant and oil content was significantly increased from 48 to 53 percent by the treatments in second year. Results after two years of this research can be summarized as follows: 8-12 kg N/da nitrogen and 10-15 kg S/da sulphur rates provided earlier flowering and promoted the plant height, head diameter, thousand seeds weight, seed yield, oil content, harvest index and nitrogen, protein, sulphur content of seeds, seed N/S ratio, but decreased hull-kernel ratio.

Key Words: *Sunflower, nitrogen, sulphur, yield, oil content.*

DETERMINATON OF PHENOTYPIC AND GENETIC CORRELATION AND HERITABILITY OF GRAIN YIELD AND SOME QUALITY TRAITS OF BARLEY GENOTYPES

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Abstract

This study was carried out to determine genetic variation for grain yield and four grain quality traits such as 1000 kernel weight, large grain, volume weight and protein ratio. The experiment covered totally 24 genotypes including four common feed barley cultivars under randomized complete block design with four replicates in five locations of Central Anatolia trough in 2014-2015 growing seasons under rain-fed conditions. Broad sense Heritability (h^2) were calculated trough expected mean squares by ANOVA tables for each traits. Phenotypic and genotypic correlations were estimated based on variance and covariance matrix of all traits. The highest broad sense heritability was estimated for 1000 kernel weight with 0.73, while the lowest one was for protein ratio with 0.52. For genotypic correlations between grain yield and 1000 kernel weight the result was negative and significant ($P<0.05$), while between 1000 kernel weight and large grain the result was positive and significant ($P<0.01$). For phenotypic correlation between 1000 kernel weight and large grain the result was significant ($P<0.01$).

Key words*:* *Barley, heritability, genotypic and phenotypic correlation, grain yield, grain quality parameters.*

THE EFFECTS OF NITROGEN FERTILIZATION AND SOWING METHODS ON SOME AGRICURTURAL AND QUALITY OF POPPY (*Papaver somniferum* L.)

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Abstract

This study was conducted in period 2009-2010 and 2010-2011 in order to determine the sowing methods, cultivars and the doses of nitrogen fertilizer under the ecological conditions Amasya, Turkey. İn this study was used two sowing density (16 plants per m^2 and 25 plants per m^2) four poppy genotypes and four doses of nitrogen fertilizer. According to the research results, the number of capsules per plant was 2.002-2.708, 1000 seed weight was 0-434-0-451 g, seed weight in capsule 4.123-5.654 g, seed yield was 76.53-161.11 kg/da, capsule yield was 67.22-134.30 kg/da. Crude protein was 15.69-19.12 %, crude oil was 45.76-53.72 %,morphine was 0.312-0.817 %,tebaine was 0.035-0.147 %, codeine was 0-0.078 %,oripavine was 0-0.016%, noscapine was 0-0.469 % and papaverine was 0-0.029 %.

Keywords: *Poppy, fertilizer, tebaine*

DETERMINATION OF ALKALOIDS AND OIL RATIONS IN SOME POPPY (*Papaver somniferum* L.) VARIETIES AND LINES

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Abstract

Opium poppy (*Papaver somniferum* L.) is an important industry plant whose capsule yields alkaloids and seeds yield oil. This study was carried out to determine oil and alkaloid contents (such as morphine, codeine, oripavine, thebaine, noscapine, and papaverine) of some opium poppy (*Papaver somniferum* L.) varieties and lines. In the research, registered by different organizations 5 standard opium poppy varieties (Ofis 95, TMO3, Kemerkaya, Seyitgazi, Tınaztepe) and 97 advanced line material were used. The experiment was carried out with a randomized complete block design, under the field conditions in 2015 year at experiment plots of the Central Black Sea Gateway Zone Agricultural Research Institute, Tokat, Turkey. Oil analyses were done in soxhlet device using extraction method in Central Black Sea Gateway Zone Agricultural Research Institute. On the other hand, alkaloid analyses were done in HPLC device in the laboratory of Bolvadin Alkaloid Factory. As a result, varieties and lines; morphine, codeine, oripavine, thebaine, noscapine and papaverine ration values ranged between (0.26 - 1.46%, 0.045 - 0.33%, 0.006 -0.11%, 0.011-1.75%, 0,01 - 0.49 %, 0.02 - 0.40 %) respectively, and oil ration values ranged between 32.5-51.7%.

Key words: *Poppy , Papaver somniferum L., alkaloid , oil, seeds*

EFFECTS OF DIFFERENT MODIFIED ATMOSPHERE PACKAGES ON FRUIT QUALITY AND POSTHARVEST LIFE OF 'ZIRAAT 0900' CHERRIES

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Abstract

In this research, the effects of different modified atmosphere packages on postharvest life and fruit quality of 'Ziraat 900' cherries were investigated. For this purpose cherries were stored for 50 days at 0°C temperature with 90-95% relative humidity in three different packages. Fruit samples were taken at 10 days intervals and various physical and chemical changes on the fruit were determined during storage. Physical and chemical analyses such as weight loss, flesh firmness, breaking strength, soluble solid content, titratable acidity, skin colour (L^*, C^* and $h°$), percentage of pitting and stalk browning, taste, O_2 and CO_2 gas concentrations in bags were carried out on the fruit samples. Experimental results showed that the lowest weight losses were obtained on the cherries stored in MAP-3. The fruit stored in MAP-3 had the highest breaking strength, flesh firmness, soluble solids content, titratable acidity, L^*, C^*, taste values. The most effective modified atmosphere package for controlling of pitting and stem browning was MAP-3. As a conclusion, it seems that 'Ziraat 900' cherry fruit were successfully maintained at 0°C temperature and 90-95% RH condition up to 50 days in modified atmosphere conditions.

Keywords: *Cherry, Ziraat 900, Modified atmosphere packages, Postharvest, Quality*

ISSR-BASED DİVERSİTY AMONG WILD *FRITILLARIA IMPERIALIS* L. IN VAN LAKE BASIN

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Abstract

Turkey has lots of different plant species and variety because of their geographical location, climatic diversity and being intersection of three different genes centers. Geophytes which has underground organs such as tuber, rhizome and bulb are one plant group of these plant abundance in Turkey. *Fritillaria imperialis* L. is also included geophytes and it draws heavy attention with alluring flowers in spring.*Fritillaria imperialis* grows naturally in Turkey. *Fritillariaimperialis* has wide genetic variation in its habitat**.** Habitats of *Fritillaria imperialis* L. are damaged by different reasons, so *F. imperialis* L. is under threat of extinction. In the present study, we analyzed genetic diversity of 74 wild line by using ISSR markers. Area between two microsatellite regions can be replicated with ISSR marker technique. ISSR markers detected 66 bands with 84,6% polymorphism and an average of 4.69 bands per primer.Neighbor-joining tree was computed from Jaccard's genetic distance coefficient. According to dendogram 4 different group was obtained (A,B,C, D). C group is divided into 3 sub-groubs in itself (C1,C2,C3). According to the results of analysis, YYU62 and YYU63 genotypes are completely separated from other genotypes.End of this study we have found that successful implementation of ISSR marker systems on *Fritillaria İmperialis*.

Keywords: *Fritillaria İmperialis, ISSR, diversity*

INTERACTION BETWEEN GENOTYPE, SUCROSE AND EMBRYOGENESISIN ANTHER CULTURE OF EGGPLANT

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Abstract

Genotype and sucrose are the most effective factors on the anther culture in eggplant well as plant growth regulators, culture media, cultivation conditions of donor plants, incubation and stress conditions etc. Haploid embryo production is highly variable depending on the genotype. Embryo induction is very low in some genotypes. Factors such as sucrose, culture conditions, stress factors and culture media have an important effect on success of genotype. In this study, we investigated the effect of different sucrose doses, kinetin and 2,4 D on haploid embryo production of eggplant. Two eggplant genotype (Yamula and Anamur) and five sucrose doses (30, 60, 90, 120 and 150 $g.l^{-1}$) were tested. Donor plants were grown in soilless culture under a screenhouse. Anthers were incubated on solid C medium (DDV) with %8 agar, and 1-3-5 $mg.l^{-1}$ kinetin and 1-3-5 $mg.l^{-1}$ 2,4 D for 12 days. After the incubation anthers subcultured on Rı medium with 0,1 $mg.l^{-1}$ kinetin. Anthers were cultured for 8 days in darkness at 35 ^{o}C and then transferred to 16/8 h day-night photoperiod and 25 ± 2 ^{o}C conditions for 4 days. After that, anthers were transferred to regeneration media. Yamula genotype gave the higher response than Anamur genotype. Sucrose dose increases, increased embryo formation in low androgenic genotype. Doses of 60, 90 and 120 $g.l^{-1}$ sucrose were more effective than 30 $g.l^{-1}$ sucrose dose.

Key words: *Haploidy, oxin, cytokinin, sucrose, genotype.*

DETERMINING THE EFFECTS OF PACLOBUTRAZOL ON THE QUALITY OF LETTUCE SEEDLINGS

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Abstract

Paclobutrazole is the most widely used as plant growth retardant for seedling production of vegetables such as tomato, pepper, eggplant, cabbages and cucurbits. The effect of paclobutrazole on growth and quality of lettuce (*Lactuca sativa* var. longifolia) seedling unknown. In this study, the effects of different paclobutrazole doses on growth and quality of lettuce seedlings were investigated. Lettuce seeds were sown in the mix of 70 % peat and 30 % perlite. Seedlings were grown in 0,03 cm^3 cells. Six paclobutrazole doses (0,5 ppm, 1,0 ppm, 5,0 ppm, 10,0 ppm, 20,0 ppm and 40,0 ppm) were applied on plantlets two times by foliar spray and sprink irrigation . First application was realized when plantlets reached the cotiledonary stage. Secon application was realized when plantlets reached first true leafy stage. In the study, seedling height, leaf number, root length, leaf colour, biomass, soluble solid dry matter and head weight were observed. All of paclobutrazole doses resulted decreasing the seedling height according to untreated control plants. High paclobutrazole doses caused excessive shortened of the seedling and delayed the transplanting. Lower paclobutrazole doses increase the biomass and head weight. The highest seedling height obtained from control plants.

Key words: *Seedling height, plant growth retardant, Lactuca, sativa, paclobutrazol.*

PHENOTYPIC EVALUATION OF WILD BARLEY (*Hordeum spontaneum* C. Koch) AS A SOURCE OF RESISTANCE TO BARLEY SCALD

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Abstract

Scald (*Rhynchosporium secalis)* is one of barley diseases especially common under transitional zones of Turkey and it causes10-70 % grain yield loses. Turkey is the main gencenter for wild barley (*Hordeum spontaneum*C. Koch) close relationship to cultivated barley and the most important genetic source for biotic and abiotic stress factors. This study carried out at Central Research Institute Field Crops' greenhouses and experimental fields during 2012 and 2013 seasons has aimed to find out possible use of wild barley genotypes against scald. Scald resistant wild barley line HSPON(NE)-2 and susceptible two rowed and malting checks such as Aydanhanım and Durusu and their different progenies at F_2 were used as genetic material. In addition to these, six wild barley lines and one differential set consisting of 19 barley cultivars were tested against scald. Testing of genotypes against scald was artificially realized by using two-single spore isolate under greenhouse condition.

The disease reaction was scored on the first leaves of all genotypes by using 0-4 scale at the 15 th and 18th days after inoculation respectively. The second scoring was used to determine susceptible (3-4) and resistant (0-2) genotypes based on the scale. Phenotypic data collected from two different F_2 populations and analyzed by using chi-square test showed that resistant susceptible ratio was 3:1. This clearly indicated that resistance to scald is controlled by single dominant gene and the resistant wild barley lines can be used as new sources against to scald in barley breeding programs.

Key words: *Barley, Hordeum spontaneum, Scald, Resistance, F_2 segregation.*

SCALD REACTIONS OF SOME BARLEY PRELIMINARY YIELD TRIALS NURSERY DEVELOPED BY THE CENTRAL RESEARCH INSTITUTE FOR FIELD CROPS IN 2015

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Abstract

Barley (*Hordeum* spp.) is an important crop in Turkey. Biotic and abiotic stress factors cause reductions in yield and quality during all stage of barley production. Scald, caused by the fungus *Rhynchosporium commune* (*R. secalis*) reduces the yield and the quality of barley in Turkey. Using resistant cultivars is the easiest and the most economical way of controlling the diseases.The aim of this study was to identify the reactions of 41 barley (37 advanced lines and standard cultivars; Bülbül 89, Tarm-92, Aydanhanım, Akar) genotypes developed by the Central Research Institute for Field Crops (CRFIC). Seedling plant and adult plant stage tests were conducted for scald disease. Evaluations were carried out at CRIFC, Yenimahalle and İkizce (Ankara) locations in greenhouse and field condition in 2015 season.For seedling test, two monosporic isolates of scald pathogens were used as inoculum source. Scald development on each entry were scored after 14 days with 0-4 scale. For adult plant test, the genotypes were inoculated with local diseases populations. Scald development on each entry were scored using the digit scale. Values below 55 were considered to be resistant. As a result for seedling stage, Isolate A, 1 (2%) of the genotypes were determined resistant, while 40 (98%) genotypes were determined as susceptible. Isolate B 41 (100%) genotypes were determined as susceptible. As a result for adult plant stage, 4 (10%) of the genotypes were determined resistant, while 37 (90%) genotypes were determined as susceptible. The use of resistance genotypes in the adult plant stage would be useful in development of resistant cultivars.

Key words: *Barley, scald (Rhynchosporium commune (R. secalis)), genetic resistance, reaction test*

DETERMINATION OF POPULATION DENSITY AND DAMAGE RATES OF MEDITERRANEAN FRUIT FLY, CERATITIS CAPITATA (WIEDEMANN) (DIPTERA: TEPHRITIDAE) IN PERSIMMON ORCHARDS IN TURKEY

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Abstract

The Mediterranean fruit fly (Medfly), *Ceratitis capitata* (Wiedemann) (Diptera: Tephritidae), is one of the important pests of persimmon in Turkey. Studies were conducted in 2013-2014 to evaluate the population density and damage rates of Medfly at persimmon orchards in Defne, Antakya, Dörtyol and Belen districts of Hatay province of Turkey. The Econex yellow traps and pheromones (% 95 trimedlure) and DDVP impregnated tablets were used. The pheromone traps were weekly checked and captured Medfly adults were counted and then cleaned. Pheromones in the traps were replaced with the new ones in every 90 days. Damaged fruits were counted 5 times in 2013, and 7 times in 2014 by assessing randomly chosen 300 fruits in each of the orchards, except the ones from the pheromone trap hanging tree. In 2013, a total of 13944 Medfly adults were caught by pheromone traps. The highest number of the Medfly adults were caught by pheromone traps in Belen (6758), followed in Defne (3061), Antakya (2923), and Dörtyol (1202) districts. In 2014, a total of 10575 Medfly adults were caught by pheromone traps. The highest number of the Medfly adults were caught by pheromone traps in Belen district (4844), followed in Defne (4227), Antakya (1108), and Dörtyol (396) districts. In both years, the highest ratio of Medfly damaged fruits were observed with 100% and 95% in Antakya district, while the least were observed with 3.35% and 2.44% in Belen district.

Key words: *Medfly, Ceratitis capitata, persimmon, pheromone traps, damages rates*

Acknowledgement

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DETERMINATION OF DISTRIBUTION, POPULATION DENSITY AND DAMAGE RATES OF MEDITERRANEAN FRUIT FLY, CERATITIS CAPITATA (WIEDEMANN) (DIPTERA: TEPHRITIDAE) IN POMEGRANATE ORCHARDS IN TURKEY

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Abstract

The Mediterranean fruit fly (Medfly), *Ceratitis capitata* (Wiedemann) (Diptera: Tephritidae), is one of the important pests of pomegranate in Turkey. The studies were conducted in 2012 and 2014 to evaluate distribution, population density and damage rates of Medfly at pomegranate orchards in Hatay province of Turkey. The study was carried out using the Econex yellow traps and pheromones at six different pomegranate orchards which contain 'Hicaz' variety in 2012, and at four different pomegranate orchards two of which contain 'Hicaz' variety and the other two 'Katırbaşı' variety in 2014. The pheromone traps were weekly checked and captured Medfly adults were counted and then cleaned. Pheromones in the yellow traps were replaced with the new ones in every 90 days. During the harvest time, except from the pheromone trap hanging tree, 200 pomegranate fruits were randomly selected to evaluate the ratio of the damaged fruits in each of the orchards. The Medfly was found in all pomegranates orchards where the study was conducted. In 2012, a total of 2634 Medfly adults were caught by pheromone traps. The highest number of the Medfly were observed with 53.68 % in November. In 2014, a total of 1325 Medfly adults were caught by pheromone traps. The highest number of the Medfly were observed with 73.6 % in November. In 2012, the highest damage rates of Medfly were observed with 14 % at Orchard II (Hicaz). In 2014, the highest damage rates of Medfly were observed with 25 % at Orchard IV (Katırbaşı).

Key words: *Medfly, Ceratitis capitata, pomegranate, pheromone traps, damages rates*

Acknowledgement

This project was supported by University of Mustafa Kemal of Scientific Research Projects (BAP) (project number: 9380).

DETERMINATION OF POPULATION DENSITY AND DAMAGE RATE OF OLIVE FLY, BACTROCERA OLEAE (GMELIN) (DIPTERA: TEPHRITIDAE) IN OLIVE ORCHARDS OF TURKEY

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Abstract

Olive fly, *Bactrocera oleae* (Gmelin) (Diptera: Tephritidae), is one of the important pests of olives in Turkey. The study was conducted in 2013-2014 to determine the population density and damage rates of the olive fly in the olive orchards of Hatay province of Turkey.Olive fly pheromone (Docusnex® Combi 4 + Econex), Econex traps + DDVP impregnated tablets were used. Traps were placed southeast side of the olive trees at about 1.5-2 m above ground and weekly checked, captured adults were counted and then cleaned. Pheremone capsules were replaced with the fresh ones in every 90 days. In order to determine the damage rate of the olive fly, 50 olive fruits from each direction of the tree were checked and recorded for damage from ten randomly chosen trees totaling 2000 fruits in each orchard.In 2013, a total of 1374 olive fly adults were captured by the pheromone traps. The highest number of the adults were observed with 45.34% in August, followed with 19.72 % September, 17.75% July, 12.80% October and 4.36% November. In 2014, a total of 737 olive fly adults were captured by the pheromone traps. The highest number of the adults were observed with 43.15% in October, followed 25.37% September, 20.28% August, 11.40% November. The highest damage rates observed to be 17% in Halhali variety, while for Gemlik variety was 3-15% in 2013. Karamani variety had the highest damage rate of 20% and Gemlik variety 7-15% in 2014.

Keywords: *Olive fly, Bactrocera oleae, olives, pheremone trap, Turkey*

Acknowledgement

This project was supported by University of Mustafa Kemal of Scientific Research Projects (BAP) (project number: 10561).

USE OF VARIOUS ATTRACTANTS FOR CONTROL OF THE MEDITERRANEAN FRUIT FLY, *CERATITIS CAPITATA* (WIEDEMANN) (DIPTERA: TEPHRITIDAE)

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Abstract

The study was conducted in 2013-2014 to compare different attractants for control of Mediterranean Fruit Fly (Medfly) *Ceratitis capitata*(Wiedemann) (Diptera:Tephritidae) in Hatay province of Turkey.In 2013, the study was conducted in Katırbaşı pomegranate and Satsuma mandarin orchards. In 2014, the study was conducted in Hicaz and Katırbaşı pomegranate orchards.In 2013, ammonium acetate (AA), yeast (M) and ammonium carbonate (AC) were used as attractants. In 2014, AA, AC, trimethylamine (TA), acetic acid (ACE), ammonium bicarbonate (AB), di-ammonium phosphate (DAP) and cadaverine (C) were used as attractants. Transparent 500 ml polyethylene bottles with four holes were used as traps. Each of the traps consisted of 300 ml of one of the attractants, 2 ml of propylene glycol (10%) and 2 ml of DDVP (2%), were hanged 1-1.30 m above ground on the tree branches, placed as randomized complete blocks design with five replicates.In 2013, a total of 2789 Medfly adults (1619♀, 1170♂) were caught by different attractants on Katırbaşı pomegranate. A total of 176 Medfly adults (118 ♀, 58 ♂) were caught by different attractants traps on Satsuma mandarin. The highest catch of Medfly adults (♀♂) were by AA+AC in both trials. In 2014, a total of 7830 Medfly adults (5295♀, 2535♂) were caught by different attractant traps in Hicaz pomegranate. A total of 3400 Medfly adults (2306 ♀, 1094 ♂) were observed by different attractant traps on Katırbaşı pomegranate. The highest catch of Medfly adults (♀♂) were by AB+AA in both trials.

Key Words: Medfly, *Ceratitis capitata*, pomegranate, mandarin, attractants traps

Acknowledgement

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DETERMINATION OF CAPNODIS SPECIES, THEIR DISTRIBUTIONS, POPULATION DENSITIES AND DAMAGE LEVELS IN APRICOT ORCHARDS IN TURKEY

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Abstract

*Capnodis tenebrionis*and*C. carbonaria*(Coleoptera: Buprestidae)species are important pests of apricot trees. The studies were conducted in 2010-2011 to determine *Capnodis* species, their distribution, population densities and damage levels in apricot orchards in Akçadağ, Battalgazi and Doğanşehir districts of Malatya province of Turkey. The studies were carried out as weekly surveys. In 2010, a total of 1020 *Capnodis* adults were collected from all the sampling areas. Among these, 805 were *C. tenebrionis* (688♂:117♀)and 215 were *C. carbonaria* (193♂:22♀). The first adult male emergence for *C. tenebrionis* was observed on 27th April and the first female emergence was observed on 18th May. For *C. carbonaria* first male emergence was observed on 22nd June and the first female emergence was observed on 20th July. In 2011, a total of 1170 *Capnodis* adults were collected from all the sampling areas. Among these, 903 were *C. tenebrionis* (790♂:113♀)and 267 were *C. carbonaria* (225♂:42♀). The first adult male emergence for *C. tenebrionis* was observed on 23rd April and the first female emergence was observed on 30th April. For *C. carbonaria* first male and female emergence were observed on 30th April. In 2010, the highest damage levels were observed with 30% 'Kabaaşı + Hacıhaliloğlu', while the lowest were observed with 0.7% 'Hacıhaliloğlu + Kabaaşı + Hasanbey + Çataloğlu'.In 2011, the highest damage levels were observed with 30% 'Kabaaşı + Hacıhaliloğlu', while the lowest were observed with 1.3% 'Hacıhaliloğlu + Kabaaşı + Hasanbey + Çataloğlu'.

Key words: *Capnodis tenebrionis*, *C. carbonaria*, apricot, Turkey

Acknowledgement

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CONTROL OF THE MEDITERRANEAN FRUIT FLY, CERATITIS CAPITATA (WIEDEMANN) (DIPTERA: TEPHRITIDAE) WITH VARIOUS ATTRACTANTS AT POMEGRANATE ORCHARDS IN TURKEY

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Abstract

The Mediterranean fruit fly (Medfly), *Ceratitis capitata* (Wiedemann) (Diptera: Tephritidae), is a serious pest on pomegranate in Turkey. The study was conducted in 2015 to compare different attractants for control of Medflyat pomegranate orchards in Hatay province of Turkey.The study was conducted in Hicaz and Katırbaşı pomegranate orchards with different attractants; ammonium carbonate (AC), ammonium acetate (AA), putrescine (P), trimethylamine (TA), ammonium bicarbonate (AB), diammonium phosphate (DAP). Transparent 500 ml polyethylene bottles with four holes were used as traps. Each of the traps consisted of 300 ml of one of the attractants, 2 ml of propylene glycol (10%) and 2 ml of DDVP (2%). Traps were hanged 1-1.30 m above ground on the tree branches. The study was conducted as randomized complete blocks design with twelve treatments and five replicates. A total of 6444 Medfly adults were caught by attractant traps on pomegranate variety of Hicaz during the sampling period. Thehighest catch of Medfly adults were byAB+AAattractantstraps, whereas the lowest were by TA+AB+Pattractants traps. A total of 1865 Medfly adults were caught by attractant traps on pomegranate variety of Katırbaşı during the sampling period. Thehighest catch of Medfly adults were by AB+AA+P attractants traps, while the lowest were by TA+AB+Pattractants traps.

Key Words: *Medfly, Ceratitis capitata, pomegranate, attractants traps, Turkey*

Acknowledgement

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INFLUENCE OF PROHEXADIONE-CALCIUM INCORPORATED INTO PRIMING SOLUTION ON GERMINATION AND EMERGENCE OF PEPPER SEEDS AT HIGH TEMPERATURE

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Abstract

Influence of Prohexadione-calcium (Pro-Ca) incorporated into priming solutions on high temperature germination and emergence percentage performance of sweet pepper seeds was investigated. The seeds were primed in 2% KH_2PO_4, 3% KNO_3, and 10% PEG solutions containing 0, 25, 50, and 100 $mg.l^{-1}$ Pro-Ca in darkness at 25ºC for three days. After priming treatment, the seeds were washed with distilled water and dried on filter paper at 25ºC temperature for 24 h, then the seeds were subjected to germination and emergence tests at 35°C. In general, priming pepper seeds in the presence or absence of plant growth regulators improved final germination percentage (FGP), final emergence percentage (FEP), mean emergence time (MET) and emergence index (EI), emergence rate (E_{50}) and compared to control seeds. Priming seeds in KH_2PO_4 solution containing 0 $mg.l^{-1}$ Pro-Ca resulted in the highest germination percentage (81.33%) at 35°C. The highest emergence percentage (86.67%) was obtained from the application of KNO_3 + 50 $mg.l^{-1}$ Pro-Ca treatment. Final emergence percentage was 69.33% in nonprimed seeds. The results of the study indicate that inclusion of Pro-Ca into the priming solutions can be used as an effective method to improve high temperature germination and emergence performance of sweet pepper seeds.

Keywords: *Priming, prohexadione-calcium, pepper, high temperature, germination.*

EFFECTS OF ARBUSCULAR MYCORRHIZAL FUNGI IN MELON (*Cucumis melo* L.) SEEDLING UNDER SALT STRESS

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Abstract

Melon (*Cucumis melo* L.) is an important vegetable and it is cultivated in Eastern Anatolia regions of Turkey since the early times. Salinity is one of the important abiotic stress factors for plants. It is well known that arbuscular mycorrhizal fungi (AMF) have positive effects on plant growth and arbuscular mycorrhizal symbiosis can play a prominent role in tolerance to salinity. Plant material used in this study is cv. Napolyon F_1 cultivated commonly in the Lake Van Basin. The effects of two different mycorrhiza applications (*Glomus intraradices* and *Glomus* spp.) on some growth parameters in melon seedlings exposed to salt stress were studied. Salt applications were applied as four different dosages to plants. It was found that mycorrhiza improved the physiological and photosynthetic parameters of inoculated plants compared with non-AMF plants. Moreover, AM Fungi increased the chlorophyll content of melon seedlings. Results indicated that AMF can increase salinity tolerance in melon seedlings.

Key words: AMF, *Salinity tolerance, Seedling, Melon, Chlorophyll*.

SOIL CARBON AND NITROGEN IN A LEGUMINOUS/MAIZE CROP ROTATION WITH THREE TILLAGE SYSTEMS UNDER MEDITERRANEAN CONDITIONS

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Abstract

Conservation tillage is a promising agriculture system for improving soil carbon and nitrogen sequestration under rainfed Mediterranean condition. The aim of this study was to evaluate the mid-term effects of conservation and conventionaltillage systems on carbon and nitrogen sequestration and crop yield in western Turkey. The study was established in 2001 with three tillage systems in winter wheat (*Triticum aestivum* L.) /vetch (*Vicia sativa* L.) rotation, and then continued by vetch/summer maize (*Z. mays* L) from 2004 to 2010. Tillage systems were mouldboard plough (MP), rototiller (RT) and chisel (CT). Compared with MT, significantly higher soil carbon and nitrogen concentrations were observed in the surface layer (0-10 cm) under RT at planting, growing and harvesting in all years. The soil carbon and N stocks were higher under RT than MT and CT at three sampling time of three soil depths in all years. Compared with Mt and CT, soil carbon stocks were the highest under RT.However, the opposite trend was observed for N stocks which was the lowest under MT. Therefore, conservation tillage with rototiller plays an important role in soil carbon management, and improvement of soil quality. The higher soil carbon stratification was observed under RT and CT than under MT, whereas the C:N ratio was higher under MT than RT and CT in 2005 and 2006.However, opposite trend was observed in 2007 and 2010 when CT provided the highest C:N. Therefore, the notion is that RT leads to higher soil carbon stocks than MT.

Keywords: *Tillage, maize, soil carbon, soil nitrogen, rainfed conditions.*

EFFECT OF STRESS CONDITIONS, PLANT GROWTH REGULATORS, GENOTYPE AND MEDIA ON ANDROGENIC PERFORMANCE OF EGGPLANT

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Abstract

This study was conducted to determine the effects of genotype, culture media, stress and incubation conditions on haploid plant regeneration from anthers of eggplant (*Solanum melongena* L.). In the study, Yamula (local genotype), Karabaş F1, Malkara F1, Çantalı F1 and Tatlıcan F1 genotypes were used as donor plant. Anthers were cultured in MS and DDV medium supplemented with 0,01 mg/l Kinetin + 0,01 mg/l 2,4D + 0,03 mg/l Vitamine B12. Flower buds were treated with 4 ^{o}C during 24 hours for stress application. Buds untreated with low temperature were used as control plants. Anthers were cultured for 8 days in darkness at 9 - 35 ^{o}C and then transferred to 16 h light/8 h darkness photoperiod and 25 ± 2 ^{o}C conditions for 4 days. After that, anthers were transferred to regeneration media. Malkara F1, Çantalı F1 and Tatlıcan F1 genotypes did not produce embryo in all treatments. Yamula and Karabaş F1 genotypes produced embryoids. The highest embryogenic response was obtained from Yamula genotypes. The percentage of embryoid production varied between % 1,73 - % 9,44 depending on genotypes. The percentage of embryoid production varied between % 4,72 - 6,45 depending on stress application. Percentages of embryo production were higher in DDV media (% 7,29) than MS media (% 3,88).

Key words: *Anther culture, incubation, stress, genotype, MS, DDVX*

RESPONSES OF SOME BARLEY GENOTYPES IN PRELIMINARY YIELD TRIALS TO LEAF STRIPE

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Abstract

Barley (*Hordeum* spp.) is an important crop and widely grown in Turkey and worldwide. Leaf stripe disease in barley is caused by *Pyrenophora graminea* Ito & Kurib. [anamorph: *Drechslera graminea* (Rabenh.ex Schltdl.) Shoemaker]. Leaf stripe disease causes yield losses, and development of the resistant germplasms/genotypes are the most practical and effective means of disease control. The aim of this study was to identify the reactions of 41 barley (37 preliminary yield trials and 4 standard cultivars; Bülbül 89, Tarm-92, Aydanhanım, Akar) genotypes developed by the Central Research Institute for Field Crops (CRFIC) Barley Breeding Unit. Evaluations were carried out under greenhouse condition at CRIFC, Yenimahalle (Ankara) locations in 2015 season.All materials were tested to single hype two isolates of leaf stripe Sandwich method was used for seed infection. The evaluations were performed according to the infected plant rate and grouped modified from Tekauz (1983). The groups were immune (I): 0%; resistant (R): 1%-5%; moderately resistant (MR): 6%-20%; moderately susceptible (MS): 21%-30%; susceptible (S): 31%-70%; very susceptible (VS): 71%-100%. Scores below 20% were considered to be resistant. Infection was succeeded and infected plant rate was reached to 60-90% on susceptible check.As a result, 9 (22%) of the genotypes were determined resistant (0-20%), while 32 (78%) genotypes were determined as susceptible (21-100%) against to Isolate A. Nineteen (46%) of the genotypes were determined resistant (0-20%), while 22 (54%) genotypes were determined as susceptible 21-100(%) to isolate B. The use of resistant genotypes would be useful in development of resistant cultivars as candidate genitor plant.

Key words: *Barley, leaf stripe (Pyrenophora graminea), resistance, reaction test*

USE OF INDEX SELECTION METHODS FOR DETERMINATION OF HIGH YIELDING FEED BARLEY GENOTYPES IN MULTI ENVIRONMENTAL TRIALS

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Abstract

The principle aim of breeding programs is to improve superior genotypes which have higher yield than existing varieties for the target environments. This study was carried out to determine superior genotypes under rain-fed conditions in four locations of Central Anatolia (Turkey) trough 2013-2014 growing seasons and five locations trough 2014-2015 growing seasons. Totally, 24 genotypes including four common malt barley cultivars such as Aydanhanım, Tarm 92, Zeynelağa and Larende were tested under randomized complete block design with four replicates at nine different environments in two seasons. Grain yields were analyzed with ANOVA and combined to estimate an index selection criterion based on Smith-Hazel method for each genotype. Two different index selection approaches were used by using broad sense heritability (I1) and Economic weights vector (a) assigned as equal and 1(I2). Broad sense heritability was calculated trough expected mean squares by ANOVA tables for each environment. The highest broad sense heritability was estimated for Ulaş (Sivas) location in 2014-15 growing season 0.94 while the lowest one was estimated for Gözlü (Konya) location in 2013-14 growing season with 0.32. There was no significant difference ($p>0.05$) between two selection index approaches (I1 and I2) based on Wilcoxon signed rank test. However, there was a significant difference ($p<0.05$) between index methods (I1 and I2) and ANOVA combined analysis of grain yield (GY) based on rank test. These results showed that index selection methods can be used instead of combined analysis.

Key Words: *Barley, index selection, grain yield.*

STUDYING THE ROLE OF GIBBERELLIC ACID TO IMPROVE CHILLING TOLERANCE IN CHICKPEA (*Cicer arietinum* L.)

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Abstract

Abiotic stresses, including low temperature, cause abrupt growth and development of chickpea. This study was planned to reduce low temperature damage by seed priming with gibberellic acid (GA3) in chickpea. Seeds of chickpea cvs Cagatay, Zuhal and Azkan were soaked in distilled water, 5, 10, 15, 20 µM solution of GA3 for 5 hour and were dried under shade to their initial moisture level. Primed and unprimed seeds were germinated at 7±0.5 ^{o}C in controlled conditions. The results shows that final germination percentage (GP) was counted higher in all GA3 treated seeds when compared with hydroprimed and unprimed seeds. Cagatay and Zuhal genotypes gave maximum GP's. Among GA3 treatments, higher GP was observed in seed priming with 15 µM in Azkan and Cagatay, but Zuhal responded more at low concentration of 5 µM GA3 as compared with control and other treatments. Seed priming with GA3 improved coefficient of uniformity of germination (CUG) in all treatments. Among priming treatments, 15 µM was proved best for Azkan and Cagatay genotypes, but again Zuhal performed better at low concentration 5 µM of GA3. Time taken to 50% germination (T50) and mean germination time (MGT) were shortened significantly in all tested genotypes at all levels of treatments. Time for completion of T50 and MGT were shorter in Azkan and Zuhal at low 5 µM GA3, and in Cagatay at 15 µM when compared with control and other GA3 levels. Seed priming with 15 µM GA3 took less MGT irrespective to chickpea genotypes. Shoot length and vigor index were significantly improved with GA3 priming, but recorded higher in 10 µM primed seeds regardless genotypes. In conclusion, seed treatments with 10 or 15 µM were the best treatments in improving chilling tolerance in chickpea as compared with control and other used levels.

Keywords: *Gibberellic acid, chilling, chickpea, seed priming*

INVISTIGATION THE ROLE OF GLYCINEBETAINE TO IMPROVE CHILLING TOLERANCE IN CHICKPEA (*Cicer arietinum* L.)

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Abstract

Chilling stress hampered growth and development of chickpea. In this study the experiment was planned to reduce chilling injury by seed priming with glycinebetaine (GB). Seeds of Zuhal, Cagatay and Azkan chickpea cvs were soaked in distilled water, 50, 100, 150, 200 ppm solution of GB. After 5 hours, seeds were taken out and dry back to original weight under shade. Primed and unprimed seeds were subjected to germination test at 7±0.5 ^{o}C in growth incubator. Plants were observed daily and germinated seeds were recorded. The result shows that final germination percentage (FGP) was higher in Cagatay and Zuhal cultivars but no difference was observed in Azkan for GB treatments. Cagatay cultivar responded higher to increase FGP even when seeds were grown after hydro priming. Seed priming with GB 50, 100 ppm and hydro-priming improved the coefficient of uniformity of germination (CUG) regardless to chickpea varieties. Higher concentration of GB and control treatment had no effect on CUG. Time taken to 50% germination (T50) and mean germination time (MGT) were reduced significantly in all tested genotypes at all levels of treatments but overall 100 ppm GB seems better than other GB levels. Seed treatment with GB improved shoot length (SL) and vigor index (VI) of Azkan cultivar followed by Zuhal while no significantly improvement was found in Cagatay. Higher concentrations in Azkan and low concentration in Cagatay and Zuhal were found better in improving vigor index. In conclusion, seed treatments with glycinebetaine were proved best in improving low temperature tolerance in chickpea as compared with control.

Keywords: *Chickpea, Glycinebetaine, seed priming, chilling, stand establishment*

QUALITY CHARACTERISTICS OF 'LONG APPLE' VARIETY

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Abstract

'Long Apple' with perfect taste and aroma, color, and long storage time is a remarkable autochthonous table apple variety widely grown in Kağızman district. Kağızman located in the Eastern Anatolia is a part of the Aras River Basin very suitable for fruit growing. This research was conducted to determine fruit quality characteristics of 'Long Apple' varieties in 2013 and 2014 in the Kağızman district. In 19 'Long Apple' genotypes selected from among numerous apple tree, fruit weight is 122.79 g, fruit size is 73.07 mm, fruit diameter is 57.30 mm, shape index is 1.28, fruit flesh firmness 8.14 kg cm^{-2}, fruit peel thickness is 0.29 mm, on average. According to analysis pH, soluble solids and titratable acidity from fruit juice were determined as 3.60, 13.25% and 0.39%, respectively. Furthermore, gallic acid (1.40 mg kg^{-1}), catechin (82.22 mg kg^{-1}), chlorogenic acid (81.92 mg kg^{-1}), caffeic acid (2.78 mg kg^{-1}), syringic acid (17.7 mg kg^{-1}), p-coumaric acid (0.78 mg kg^{-1}), rutin (1.21 mg kg^{-1}), o-coumaric acid (10.89 mg kg^{-1}), myricetin (1.78 mg kg^{-1}), quercetin (1.42 mg kg^{-1}), oxalic acid (0.49 g L^{-1}), citric acid (1.08 g L^{-1}), tartaric acid (0.76 g L^{-1}), malic acid (6.22 g L^{-1}), succunic acid (1.80 g L^{-1}), antioxidant capacity (2.43 µmol TE g^{-1}), vitamin C (107.95 mg L^{-1}) were determined. 'Long Apple' variety has been found to be a high quality apple and also recommended for further study.

Keywords: *Apple genetic resources, chemical components, fruit quality.*

HOST PREFERENCE OF *GASTROPHYSAPOLYGONI* L.(COLEOPTERA: CHRYSOMELIDAE)

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Abstract

Polygonum and *Rumex* genera of Polygonaceae family contain numerous noxious weed species in agricultural habitats. The current study was aimed to determine the host preference of *G.polygoni* feeding on different weed species of *Polygonum* and *Rumex* genera by monitoring its biological characteristics. Adults of *G.polygoni* and weed species i.e., *Polygonum convolvulus* L., *P. cognatum* L., *P. aviculare* L. and *Rumexcripus* were collected from agricultural fields of Taşlıçiftlik village in Tokat province, Turkey. The egg laying of the collected adults was realized through mating under laboratory conditions. The 1st instar larvae were used in the experiment. The experiments were conducted twice each having 5 replications. The highest rate of adult (88%) was recorded in the larvae feeding on *P. aviculare*, followed by *P. convolvulus* (78%) and *P. cognatum* (72%). The adult rate of the larvae fed with *R. crispus* remained 32%. The periods from the 1st instar to adult were 16, 16.5, 16.8 and 18 days in the larvae fed with *P. aviculare, P. convolvulus, P. cognatum* and *R. crispus,* respectively. The adults fed with *P. convolvulus* had the highest weight (9.26 mg/adult) followed by *P. cognatum* (8.82 mg/adult) and *P. aviculare* (8.07 mg/adult). The lowest weight was recorded in the adults fed with *R. crispus* (5.01 mg/adult) compared with the adults fed with *Polygonum* species. The differences in specimens feeding on *Polygonum* genus were insignificant. However it was significantly different from the larva feeding on *R. crispus*. The results indicated that *G. polygoni* generally preferred *Polygonum* species particularly, *P. aviculare* and *P. convolvulus,* and may have potential as a classical biological control agent for these species.

Key words: *Host Preference, Gastrophysa polygoni, Polygonum spp., Rumex crispus*.

LIVE WEIGHT AFTER SHEARING AND GREASY FLEECE YIELD OF NORDUZ EWES IN DIFFERENT BREEDING CONDITIONS

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Abstract

In this thesis study, average live weight after shearing, greasy fleece yield and clean fleece percentage of Norduz ewes in different breeding conditions were examined. The animal material consisted of a total of 260 head of Norduz ewes including 52 head ewes in different flocks bred in the villages of Dolaylı, Geçerli, Geziyurt, Oğuldamı and Taşınacak neighbourhoods of Gürpınar in Van province (Turkey). Norduz ewes were sheared using shearing scissors at the end of June and beginning of July. Fleece samples were taken as sufficient quantity for analysis, according to the sampling technique, from area of the last rib on the right shoulder of 12 head of ewes in each flock. Then analysis of clean fleece percentage was performed in the laboratory at the Yüzüncü Yıl University, Agricultural Faculty, and Department of Animal Science. For the Norduz ewes, the effect of shearing age on greasy fleece yield was not significant ($p>0.05$) but the effect of shearing age on live weight was significant ($p<0.01$) in Dolaylı, Geçerli, Geziyurt, Oğuldamı and Taşınacak neighbourhoods. When all the farms were generally evaluated, the effect of shearing age and running farm from sources of variation examined the effect on greasy fleece yield was found insignificant ($p>0.05$), the effect of live weight after shearing was statistically significant ($p<0.01$).Least-squares means for greasy fleece yield of Norduz ewes bred in Dolaylı, Geçerli, Geziyurt, Oğuldamı and Taşınacak neighbourhoods were 2.01±0.01, 2.08±0.01, 1.94±0.01, 2.11±0.01 and 2.11±0.01 kg, respectively. When all the farms were generally evaluated, least-squares mean for greasy fleece yield of Norduz ewes was 2.05±0.04 kg. The effect of shearing age on live weight in the farms of Dolaylı, Geçerli, Geziyurt, Oğuldamı and Taşınacak neighbourhoods was significant ($p<0.01$). For Norduz ewes, live weight after shearing all the farms' average was found as 53.76±0.13 kg. All farms' average fleece yield value of Norduz ewes was found as 65.25±0.20%.

Keywords: *Greasy fleece yield, Clean fleece percentage, Live weight, Shearing, Norduz ewe.*

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WALNUT VARIETY BREEDING UPDATE TO 2015

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Abstract

During 1998-2000, 2008-2012 and 2012-2015, the following controlled crosses were made to found new walnut genotypes with late leafing, lateral bud fruitfulness and high nut quality. In first variety breeding program, Turkish walnut selections were crossed with Payne and between their in 1998-1999: 'Niksar 1'×'Niksar 2', 'Niksar 1'×'Payne', 'Niksar 1' ×'Şebin', 'Turhal 1'×'Niksar 2', 'Şebin'×'Niksar 2'. 757 seedlings from controlled crosses were obtained in 1998 and 624 seedlings were obtained in 2000. In second variety breeding program, 'Niksar 1', 'Şebin', 'Hartley', 'Topak', 'Chandler', 'Akça 2', 'Oğuzlar 77', 'Franquette', 'Sütyemez 1', 'Sütyemez 2' and 'Maraş 12' walnut standard cultivars and selections were used in variety breeding program in between 2008-2012. We have 1340 seedlings under evaluation in this breeding program. In third variety breeding program, during 2012-2015, the following controlled crosses were made to found the new walnut genotypes with tolerant to bacterial blight, late leafing and lateral bud fruitfulness, high nut quality: 'Pedro'×'Chandler', 'Pedro'×'Fernette', 'Pedro'×'Midland', 'Fernor'×'Pedro', 'Fernor'×'Chandler', 'Fernor' ×'Fernette', 'Fernor' ×'Howard', 'Fernor' × 'KZK1', 'Howard'×'Fernor', 'Howard'×'Chandler', 'Fernette' ×'Howard', 'Fernette' ×'Chandler', 'Fernette'×'KZK 1', 'Chandler'×'Kaman 1', 'Chandler'×'KZK1'. A total number 1633 F_1 seedling were obtained. The selected F_1 seedlings were planted in the breeding orchard with a distance of 4 × 4 m on their own roots. The results of only phenological and pomological characteristics of controlled crosses 'Hartley'×'Niksar 1' and 'Hartley'×'Oğuzlar 77' will be presented in this paper. The kernel weight ranged between 8.2 g (55-60-89) to 11.80 g (55-60-) and kernel ratio (%) was changed between 50.0 (55-77-81) to 61.0 (55-60-37). The leafing time of selected genotypes is same with 'Chandler' and later than.

Keywords: Walnut, crossing breeding, late leafing, nut quality

POLYPLOIDYBREEDING IN TEA (*Camellia sinensis* (L.) O. Kuntze)

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Abstract

Plant breeding plays an important role in terms of improvement of desired agricultural properties or regaining some traits of plants. In development of new cultivars are used in different breeding techniques. One of the methods used in plant breeding is a polyploidy breeding. Most of the plants in nature have become polyploidy spontaneously in the process of evolution. Breeders have placed great importance to polyploidy breeding due to the fact that polyploid plants showed some superior properties compared to the diploids. In polyploid plants, due to the increase in the number of genes, genetic variations have been increased and emerged new combinations. These combinations are called triploid, tetraploid,pentaploid etc.

Tea (*Camellia sinensis* (L.) O. Kuntze) from medicinal and aromatic plants is one of the most important crops in the world, which generally produced to be evaluated as a drink. It contains catechins and caffeine which are valuable components pharmacologically. These components show variation depending on genetic and environmental conditions. It is possible to develop, by polyploidy breeding, new cultivars of *Camellia* rich in these components. In this review, that polyploidy breeding of tea and developed polyploid cultivars

Keywords: *Polyploidy, tea, Camellia sinensis, cultivar*

AGRONOMIC EVALUATION OF SOME PERENNIAL GRASS CULTIVARS IN ALGERIAN SEMI-ARID CONDITIONS

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Abstract

Selection of perennial forage grasses is aimed at improving the economic and environmental sustainability of cattle and sheep production. Tolerance to drought conditions, water use efficiency, persistence and high forage yields are the major traits that determine the adaptability of the tested genotypes. This study was conducted at the experimental site of the ITGC institute in Sétif during the cropping seasons 2005/06, 2006/07 and 2007/08 with the objective to evaluate the performance of 13 varieties of perennial grasses, belonging to two species: *Festuca arundinacea* Schreb. and *Dactylis glomerata* L. in a semi-arid region. Characterization has focused on various morphological traits in order to assess their adaptability to drought prone environments. The results showed the existence of a wide range of variability due to the diversity of responses of the evaluated varieties of both species, particularly regarding biomass production, production cycle, persistence and water use efficiency, which is considered as one of the most important factors in the success of artificial grasslands in semi-arid areas. These results show high potential for the selection of a plant material adapted to the specific conditions of the semi-arid areas of the Algerian high plains. Indeed, this study allowed us to discriminate the most adapted genotypes characterized by high performance, good height growth, earliness in heading and good persistence.

Keywords: *Festuca arundinacea* Schreb.,*Dactylis glomerata* L., *morphological traits, drought.*

SENSITIVITY ANALYSIS OF AQUACROP EVAPOTRANSPIRATION TO WEATHER STATION DISTANCE

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Abstract

Water balance calculation is essential for reliable agricultural management, and the actual evapotranspiration (ET) is the most complicated balance term to estimate. In agriculture, the most common method used is based on Penman-Monteith reference evaporation is determined from weather conditions for an unstressed grass cover, further multiplied by crop specific and soil water availability coefficients to obtain the actual evapotranspiration. This approach is also used in the AquaCrop model. This model has proven to be accurate when all weather data are locally available. However, in many cases, weather data can't be collected on the site due to the limited number of stations and the vast region covered by each of them. Instead, data are often collected at many kilometers from the study site. The question we want to study is: how does evapotranspiration accuracy evolves with respect to weather station distance? A winter wheat plot in Lonzée (Belgium) was studied during the 2014-2015 agricultural seasons.Actual evapotranspiration was simulated with AquaCrop thanks to the weather data collected at 3 different distances from the study site: on the site (data collected by a fluxnet station), 20 km, 50 km and 70km from the site. The non-on-site weather data were derived from spatially interpolated 10 km grid data. These results were then compared to the fluxnet station evapotranspiration measurements to assess the impact of the weather station distance. Substantial differences, which were found between the four cases, evoking the importance of assimilating satellite derived ET products (e.g. MSG) into AquaCrop.

Keywords: *Agrometeorology, Evapotranspiration, AquaCrop, weather data.*

EFFECT OF INOCULATION ON SOME IMPORTANT CHARACTERISTICS OF PEAS GROWN IN HERZEGOVINA REGION (BOSNIA AND HERZEGOVINA)

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Abstract

Biological (symbiotic) nitrogen fixation plays an important role in sustainable crop production. It is a safe, productive and cost-effective form of land management which provides a significant input of biologically-fixed nitrogen in soil. In sustainable crop production, inoculation of pea seeds (*Pisum sativum* L.) with effective strains of *Rhizobium leguminosarum* becomes more and more exploited. Selection of *R. legumiosarum* strains that are effective and adapted to specific environmental condition is essential prerequisite for successful inoculation. The experiment was set up with two most common pea cultivars in Herzegovina in randomized block design with three replications. Influence of referent and indigenous strains on pea cultivars characteristics was assessed. The results confirm that higher values of nitrogen content in grain of peas are significantly affected by cultivars, while the nitrogen content in the aboveground plant parts were significantly affected by the interaction between the elected indigenous and referent strains and pea cultivars. The highest yield (3.83 t ha^{-1}) was obtained by application of referent strain of *R. leguminosarum* 1001 (inoculated) but without statistical significant differences to indigenous strains and control. The number of root nodules and their dry weight were significant affected by the indigenous strain S1 but the number of nodules was also influenced by the cultivars. Besides observing the effect of seed inoculation on some important characteristics in two pea cultivars (yield, number of nodules, dray weight of nodules, nitrogen content in the aboveground plant and grain) the paper also shows their correlations relationships.

Keywords: *Rhisobium leguminosarum, pea, nitrogen, yield, nodulations*

YIELD POTENTIAL OF LINES AND VARIETIES OF TRITICALE IN THE BREEDING PROGRAM OF THE AGRICULTURAL INSTITUTE OF REPUBLIC OF SRPSKA – BANJA LUKA (BOSNIA AND HERZEGOVINA)

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Abstract

Breeding of grain crops (wheat, barley, triticale, rye and oats) in our institution lasts about 50 years, but the completion of the breeding program of these plant species has been occurred in the last ten years. Realistically, there is a need and the possibility of breeding work on triticale, which resulted in the creation of multiple varieties and excellent lines of great genetic potential. The created lines have the weight of spike over 4 g and over 65 grains per spike in terms of less seeding. Significantly, our new lines, as well as recognized varieties, confirmed its production values in the experiments as well as in production. Besides varieties Oskar and Viktor, it is important to emphasize the excellent line of triticale, which was reported to the Directorate of Plant Protection, Ministry of Agriculture and Environment of Republic of Serbia under the code BL T – 55 at the end of 2011. In the trials conducted at 6 locations, this line achieved higher yield, 350 kg/ha^{-1} more than standard variety Odisej, and proved to be a significant carrier of genetic yield potential with a maximum yield of 12.141 kg/ha^{-1} at the location of Sombor city (Serbia). High-yield, early to mid-early variety of winter triticale Oskar was developed by crossing genetically divergent parents, variety Presto and one of the local lines of winter triticale. Variety Oskar is characterized with a high fertility potential, good technological quality, very good resistance to lodging, excellent resistance to low temperatures, as well as the causal agents of major diseases of grain crops. According to the two-year results of the Commission for the registration of varieties, variety Oskar achieved excellent grain yield of 8952 kg/ha^{-1}. The highest yield was achieved in conditions of intensive production in Serbia, in particular in municipality of Sremska Mitrovica (9509 kg/ha^{-1}), and cities of Novi Sad (9077 kg/ha^{-1}) and Kragujevac (8452 kg / ha^{-1}). In three-year comparative trials at the production part of the Public Institution (PI) Agricultural Institute of Republic of Srpska - Banja Luka, this variety achieved a yield of 8805 kg/ha^{-1}. This variety is characterized by extremely coarse grain, absolute mass of about 44 g, excellent gravity about 72 kg and the protein content of about 15%.

Keywords: *Breeding, Potential, Variety, Line, Yield, Quality.*

REAL-TIME IRRIGATION SCHEDULING CHARTS FOR APPLE (*Malus domestica*) IN THE CENTRAL-EASTERN AREAS OF BOSNIA AND HERZEGOVINA

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Abstract

The majority of smallholders in Bosnia and Herzegovina (B&H), who are engaged in fruit production, have a lack of experience regarding irrigation in general. Irrigation systems are usually installed without proper guidelines, design, operation and maintenance practices and farmers are not familiar with scheduling techniques and proper management. This often results in poor irrigation efficiency and unsustainable production.Due to increasingly common transfer from extensive to intensive production systems and the increased frequency of drought periods, especially during the vegetation months, fruit producers in the central-eastern, hilly areas of B&H are becoming increasingly aware of the importance of irrigation. To resolve the previously mentioned issues, we propose a simple tool for real-time irrigation scheduling called *Irrigation Charts*. These charts are based on the *Food and Agriculture Organization* (FAO) methodology for computing crop water requirements, which considers crop characteristics, length of the growing season, soil properties and climate data (precipitation, temperature, humidity, insolation and wind speed). The charts for day-to-day apple irrigation guide the users how to adjust the irrigation interval to the actual weather conditions throughout the growing session. As the pilot study, irrigation charts for intensive apple production at the central-eastern hilly areas of B&H were developed by using climate data from four meteorological stations: Zenica, Sarajevo, Goražde and Foča.With Irrigation Charts, apple producers will be able to achieve better irrigation efficiency, better quality and quantity of yields, leading to better and sustainable position in the local market.

Keywords: *Irrigation, Chart, Irrigation calendar, Scheduling, Apple.*

TOTAL PHENOLIC CONTENT OF DIFFERENT APPLE CULTIVARS

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Abstract

Apples are one of the most frequently consumed fruits in the world. From 2003 to 2005, the average per capita apple consumption in Europe was 61 g per day, which is twice as high as the per capita consumption worldwide and represents one quarter of the total European fruit consumption. Apple fruits are an important source of secondary plant metabolites and one of the major sources of dietary phenolic compounds. The apple cultivars evaluated in this study were: Braeburn, Fuji, Granny Smith and Red Delicious, grown in Sarajevo region, Bosnia and Herzegovina. The total phenols contents (TPC) in the apple samples weremeasured by using a modified colorimetric Folin-Ciocalteu method.Total polyphenol content was calculated by means of an external standard calibration with methanolic catechin standards and expressed as mg catechin equivalents/100 g fresh matter (FM). The mineral contents (N, P, K Ca and Fe) of samples were analysed by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES). The cultivar, Fuji contained the lowest amount of polyphenols (expressed as mg catechin equivalents/100 g), 98 mg per 100 g of edible FM), followed by Granny Smith and Red Delicious (117 and 125 mg per 100 g of edible FM), while Braeburn contained the highest concentrations (143 mg per 100 g of edible FM). These results suggest that variability accounted for fruit quality was due to either genotypes or environmental conditions prevailing in the growing areas or interaction of both the factors.

Key words: *Apple, Phenolic Content, Mineral Composition, Cultivars.*

BIOLOGICAL AND POMOLOGICAL CHARACTERISTICS OF INTRODUCED PLUM VARIETIES (*Prunus domestica* L.)

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Abstract

In the area of Balkans, plum was the most common fruit species based on the number of trees and quantity of the production. The biggest problem in growing of plum trees is plum pox virus (PPV), which endangers growing of the most important plum variety (Požegača) in our areas. One of the solutions to the problem of PPV is to grow resistant and tolerant varieties. To date, the series of plum varieties, which are tolerant to PPV, are selected. In addition to some well-known selections from Čačak (Serbia), there are also varieties selected in other selection centres. Trials with resistant varieties are the basis for the introduction of new varieties in commercial production.

Research was carried out during 2013 and 2015 in the collection orchard of the introduced plum varieties: Katinka, Haroma, Topper, Topfive, Jojo, Topfirst, Elena and Presenta. Čačanska ljepotica and Čačanska rodna were used as standards. In 2009, the orchard was set up in Banja Luka (Bosnia and Herzegovina). All varieties were grafted onto Myrobalan (*Prunus cerasifera*) and set up at planting distance of 4 x 2 meters, and growth form was the spindle bush. Each variety was represented with 5 trees. Protection against diseases and pests was carried out according to the principles of integrated production. The orchard was without irrigation.

The biological (flowering and ripening) and pomological (fruit and stone weight, height and width of the fruit, the fruit yield) were analysed, as well as the content of soluble dry matter in the fruit. According to the research results, the varieties Jojo and Presenta showed the best characteristics of the fruit. Time of ripening cannot be determined on the basis of skin colour. Analysis and monitoring of soluble solids content (SSC) in the fruit during ripening could give more reliable information on the determination of harvest time.

Keywords: *Plum, variety, flowering, fruit quality*

VARIATION IN FINAL LEAF NUMBER IN WINTER BARLEY (*Hordeum vulgare* L.)

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Abstract

Leaf emergence represents externally visible trait that is results of externally not visible leaf primordial initiation. Final leaf number initiated in the apex and the rate of leaf emergence determine of pre-anthesis phases. The aim of this study was to determine the effect of year and cultivars on final leaf number (FLN) in winter barley. In the present study no consistent differences were found in the FLN between 6-rowed and 2- rowed cultivars. FLN differs among barley varieties sown in the field at different years and was controlled by all three factors; cultivar, year and their interaction. Contribution of year in FLN variation was highest, about 74%. This can be explained as a direct effect of the year on the rate of leaf appearance or as an indirect effect of an ontogenetic decline in the rate of appearance. Low value of interaction showed stability of leaf number from year to year. Considered across the growing seasons (GSs), the early cultivar Novosadski 581 had the lowest (11.3) and the late cultivar Kredit the highest (14.7) FLN. In average the early cultivars had one leaf less than the late ones. Earliness is rather the result of leaf number reduction than grain filling reduction. FLN across cultivars and GSs was 13.5. Quadratic equation fitted best the relationship between GDD requirement and FLN per main stem, with R^2>0.99. In our investigation, the FLN was positively correlated with GDD accumulated till flag leaf completion, while the effect of precipitation was less important. The tested cultivars showed significant variability in FLN, which can be used for selecting most adaptable genotypes.

Keywords: *Barley (Hordeum vulgare L.), final leaf number, phenology, polynomial regression, correlation*

INFLUENCE OF RACHIS POSITION ON PHYSICAL AND COMPOSITIONAL PARAMETERS OF CABERNET SAUVIGNON BERRIES

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Abstract

The purpose of this investigation was to determine the characteristics of Cabernet Sauvignon/Kober 5BB berries according to the position of the rachis (bunch). The berries from 5 bunches (a total of 871 berries) were divided according to the position on the rachis (top, middle and bottom) and weight of berries (two classes of weight: 1) less than or equals 1g and 2) between 1.01 and 1.50 g). Each of the berries was used to evaluate physical characteristics (fresh berry weight, fresh weight of skin, seeds and flesh and seed number). Soluble solids content and total titratable acidity was measured on must obtained by crushing berries, taking into account the rachis position. Data analysis of berry percentage distribution showedthat there was a difference between each weight category and position. From the top to the bottom rachis position, a decrease in percentage of berry number occurred. With regard to physical characteristics, the analysis of the results indicated a highly significant difference in berry weight between the measured classes and a significant difference between the positions.The analysis of skin, seed weight and seed number also indicated that there was a highly significant difference among the two classes of berry weight. Concerning the compositional parameters, the highest content of soluble solids and total titratable acidity were found in the bottom part of the bunch. Berry variability is a factor influencing the yield and quality of grape and wine. Generally, it is difficult to obtain a uniform size of berries under filed conditions.

Key words: *Cabernet Sauvignon, berry position, berry weight, berry composition*

IMPACT OF CLIMATE FACTORS ON AGRO BIOLOGICAL CHARACTERISTICS OF PINOT NOIR VARIETY IN TREBINJE VINEYARD

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Abstract

The paper presents the results of studies on important agro biological characteristics of the variety Pinot Noir, during the growing season in 2013 and 2014, in Trebinje. The tests of agrobiological characteristics which were done included: phenological properties, fruitfulness of buds and shoots and yield. During the years 2013 and 2014 a significant influence of climatic factors on the phenological characteristics of the studied varieties was observed. The observed climatic factors have influenced the development of a large number of fruitful shoots (12) and bunches per vine (14) in 2013 compared to 2014, when the number of fruitful shoots was 10.5 and the number of bunches per vine was 13.4. During 2014 there was a larger number of clusters per bud (1.12) and per fruitful shoot (1.59) compared to 2013. The yield of grapes per bud (110 g) and per fruitful shoot (137.5 g) was higher in 2013, compared to 2014 when the grape yield per bud was 84 g and the yield per fruitful shoot was 120 g. The higher yield of grapes per vine (1.65 kg) and per hectare (7638.88 kg/ha) was also recorded in 2013, while in 2014 the yield per vine of 1.26 kg and the yield per hectare of 5832.54 kg/ha was determined.

Keywords: *Pinot Noir, phenological characteristics, fertility of buds and shoots, yield*

INFLUENCE OF SALT AND OSMOTIC STRESS ON GERMINATION OF DIFFERENT DOMESTIC WHEAT (*Triticum aestivum L.*) CULTIVARS UNDER LABORATORY CONDITION

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Abstract

The aim of this research was to identify the cultivars of winter wheat which tolerate drought and increased salinity at the germination stage. The testing was carried out under controlled conditions with an aim to test reaction of 3 different cultivars of winter wheat to salinity and osmotic stress during the early stage of a seedling's growth. The test included examination of germination energy and percentage of germinated seeds. After being sterilized in 96% ethanol and rinsed with distilled water, 50 uniform seeds were transferred to Petri dishes (divided on genotype and treatment) filled with a solution (Mannitol and salt) in which the water potential was of almost 0 (control), -0.3 and -0.6 MPa. Alcohol Mannitol was used to create water stress and NaCl to create salt stress. Seedlings were incubated for 7 days at 25°C. The results showed that the benchmark water potential (under the influence of Mannitol and salt), in which all varieties can germinate and have a good growth of seedlings, is of -0.3 MPa, i.e. of the low stress. Under the stronger stress (-0.6 MPa) all the varieties showed reduction in all measured parameters. Bosanka cultivar showed the best result of germination and germination energy under the influence of water and salt stress when compared to other cultivars. An exception was the cultivar Orion where stress conditions had inhibited germination energy and germination, when compared to other cultivars. Reasons for stronger resistance, or sensitivity, of certain varieties may be numerous and further studies conducted on this or other varieties of wheat would contribute to understanding and explanation of these differences.

Keywords: *Germination, cultivars, Mannitol, salt, drought.*

INFLUENCE OF LOCALITY AND FERTILIZATION ON YIELD OF BUCKWHEAT

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Abstract

Buckwheat is a plant species which has been spreading in Bosnia and Herzegovina in the last decade. Because of its brief vegetation period, this crop species is especially interesting for hilly-mountainous regions.

In 2015, the experiments were set in three localities (experimental field of the Faculty of Agriculture "Kula", private economy "Sando" on the Nišići plateau and private economy "Jugović" in Mokro), and two variants of fertilization (control variant – without the use of organic and mineral fertilizers and the use of $N_{60}P_{60}K_{70}$). The Slovenian sort Darja was used for the experiments.

The highest yield of buckwheat grains was at Nišići (1.95 t ha^{-1}), and the lowest (1.24 t ha^{-1}) in East Sarajevo. The highest absolute mass of a buckwheat grain (25.68 g) was at Nišići, and the lowest (18.59 g) in East Sarajevo.The buckwheat grain grown in East Sarajevo had the smallest hectolitre mass (51.8 kg), while at the localities of Mokro and Nišići the hectolitre masses were almost identical (55.5 kg and 55.7 kg). The average shell content for all these localities and fertilization variants was 24%.

Keywords: B*uckwheat, locality, fertilization, agro-ecological conditions, yield.*

SWEET CORN - CONVENTIONALTILLAGE VS. NO-TILLAGEIN HUMID CONDITIONS

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Abstract

The goal of the paper is to compare the impact of conventional tillage and no-tillage technology on the growth, the yield and yield components of sweet corn, cultivated on chromic luvisols.A field experiment with Super Sweet 71,12 R hybrid was carried out in 2014 in the region of Sofia, Bulgaria.The impact of both systems on the total fresh ear yield, marketable fresh ear yield, total ear number, marketable ear number, single marketable fresh ear mass, marketable ear row number, one row kernel number of a marketable ear,marketable fresh ear kernel mass, plant height, leaf number per plant, ear legth, and tassel lengthwas established. Analysis of variance was applied to all data obtained.The experiment was carried out on chromic luvisols, in a temperate-continental climate and inavery humid year.The results showed that the conventional tillagein such nature conditions have had better performance thanthe no-tillage technology. The yield of marketablefresh earsunder conventional tillage was twice higher than that under no-tillage, i.e. 8.5 Mg/ha vs. 4.2 Mg/ha; kernel mass of a single fresh ear was with 22.6% higher, i.e. 163.8 g vs. 133.6 g, the 1000-kernel mass was with 14.4% higher, i.e. 337.2 g vs. 293.0 g. Analogously, the plants were longer and had thicker stems with greater leaf number, resulting in 12.5% greater fresh-ear length – 20.7 cm. The total fresh biomass under conventional tillage reaches 633.0 g/plant vs. 414.6 g/plant under no-tillage andthe dry matter - 145.6 g vs. 103.7 g/plant. The protein content was 13.8% vs. 12.7%.The production under conventional tillage was more profitable. The price of a marketable corn ear wasmuch lower - 0.0358 EUR/pc vs. 0.0512 EUR/pc.No-till requires precise preliminary estimation of the nature conditions and weather prognoses and cannot be recommended to very humid areas and conditions. In very humid conditions it should be applied on weed-free areas after several-year control through herbicides.

Keywords: *No-till, Conventional tillage, Sweet corn, Yield, Yield components, Bulgaria*

GROWING TRITICALE BIOMASS AT VARIOUS NITROGEN FERTILIZATION RATES AND HARVESTING PHASES

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Abstract

The study was carried out in the field of Crop Science Department at the Agricultural University–Plovdiv, during the period 2013-2015. The experiment was set up following blok method withfour replications, and 20m^{2}for each experimental plot. That is why the purpose of our study was to determine the green biomass yield in the triticale varieties Musala and Attila which are grown under different nitrogen fertilizer rates (N_0; N_{120}; N_{160}; N_{200}; N_{240}). The varieties are harvested in heading stage and milk maturity stage and are grown in the region of Central South Bulgaria. During the first year of our experiment, in the two stages of the harvesting cultivar Musala and entered the coming later than the Atila. During the second year of the study, in the two stages of the harvesting cultivar Atila and entered the coming later than the cultivar Musala. During both years of the experiment, average over the study period in the two stages of the harvesting higher green biomass yield average for the two years was obtained at Attila variety in both harvesting stages. Depending on the nitrogen fertilizer rates, in both harvesting phases and two cultivars highest yield was obtained with nitrogen fertilization $N_{200.}$ The higher rate among organs that form the plants at the coming to ear stage, followed by leaves and ears. At the milky ripeness stage, the share of stems and ears increases while the share of leaves decreases compared to the coming to ear stage. With increasing nitrogen fertilizer rate, the share of all studied indicators increases up to fertilizer rate N_{200} and then drops at N_{240}.

Keywords: *Triticale, variety, nitrogen fertilization, yield.*

GENOTYPIC SPECIFICS OF TRITICALE VARIETIES (*X TRITICOSECALE* WITTM.) AS A FUNCTION OF THE NITROGEN FERTILIZATION LEVEL

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Abstract

A field experiments were conducted during three growing seasons, from 2012 to 2014, at the experimental field of Department of Crop Science in Agricultural University – Plovdiv. The experiment consisted of a randomized complete block design after predecessor rapeseed with three replicates and plots of 10 m^2 planted at a sowing rate of 550 viable seeds m^{-2}. Three triticale (×*Triticosecale* Wittm.) cultivars, one Bulgarian and two Spanish were studied – Rakita, Bulgarian standard, breeding at the Dobruja Agricultural Institute – Gen. Toshevo, Trujillo and Senatrit, created in Spain. Three nitrogen fertilization level has been studied – N_0, N_{80} and N_{160} kg ha^{-1} nitrogen expressed as ammonium nitrate – 1/3 of nitrogen was introduced after sowing, and the remaining 2/3 in early spring.To establish the productivity of the tested varieties of triticale under the influence of nitrogen fertilization were determined following parameters: grain yield, after plots were harvested at ripening and yield was expressed on a 13% grain moisture basis; number of spikes per m^2; plant height, cm; spike length, cm; number of spikelets per spike; number of grain per spike; mass of grain per spike, g; weigh of glumes per spike, g and spike harvest index, calculated as: (spike grain yield/total spike biomass) x 100.

Keywords: *Triticale, variety, nitrogen fertilization, yield.*

STUDY OF THE LEAF AREA AND DRY MATTER IN NEW WHEAT VARIETIES DEPENDING ON THE APPLIED NITROGEN FERTILIZATION

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Abstract

The study discusses the influence of the empty area in the spring before sunflowers reach third-fourth leaf, and later on when the sunflowers surpass the wheat in height and serve as a green screen during its most important phases, i.e. from the end of shooting-up to the milk and wax ripeness. This study focuses on the formed leaf area during these phases throughout the years of the experiment, the influence of the strips, the effect of nitrogen fertilization, and the performance of the varieties as quality factors. The photosynthetic potential is characterized by the Leaf Area Index (LAI), and by the formation of dry matter relevant to the biological output of the respective growth and developmental phases. During the period 2013-2015 a field experiment is carried out on the research field of the Agricultural University-Plovdiv with two experimental crops – the first one consisting of ordinary sown common wheat, while the second one consisting of alternating strips of wheat and sunflower. The fertilization effect of four rates of nitrogen fertilization is studied, namely N_0, N_8, N_{16}, N_{24}, on the crops, while using three wheat varieties: Sadovo 1, Gea 1 and Sadovo 772. With the increase of the nitrogen fertilization rate, the leaf area and the dry matter increase too, more significantly at the third and fourth fertilization rate for both crops.

Keywords: *Wheat, varieties, leaf area, fertilization.*

EFFECT OF LIMING OF THE CONTENT OF TOTAL SUGARS, TITRATABLE ACIDS AND pH INDIFFERENT WINE GRAPE VARIETIES

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Abstract

In a two-year field experiment, the effect of liming with $Ca(OH)_2$ was studied at rates of 1; 2,5 and 5 t/ha on the content of total sugars, titratable acidity and pH in the grapes ofvarieties Sauvignon Blanc, Chardonnay, Cabernet Sauvignon and Merlot, planted on Chromic luvisols in the land of Mezek village, Svilengrad municipality, Bulgaria.The grapes of all varieties were studied immediately after harvest in technological maturity, simultaneously with the mass harvesting of the variety in the vineyards, where was the lime experiment. Generally in the white varieties, liming causes increase in the level of total sugars. Relatively stable is the tendency to reduce the content of titratable acids, simultaneously with increase of the lime rate. During the second year, increase in the content of total sugars and reductionof the level of titratable acids in the white varieties was found only in the highest applied ameliorative lime rate of 5 t/ha.Liming affects technological indicators of the grapes mainly in the white studied varieties and causes an increase in the content of total sugars and reduce the titratable acidity.

Key words: *Liming, Wine grape varieties, Sugars, Titratable acids*

COMPARATIVE TESTING OF MAIZE HYBRIDS (ZEA MAYS L.), CULTIVATED FOR GRAIN, UNDER NON-IRRIGATION IN CENTRAL NORTH BULGARIA

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Abstract

The experimental work was performed in the Central North Bulgaria region – city of Pavlikeni in the period 2012 - 2014. The experiment was performed on carbonate chernozem soil type by means of a block method with four repetitions; experimental field area - 15 m2, after the predecessor winter wheat. The following hybrids were tested; P8523, P9606, P9721, P0412 and P1114. The aim of the investigation was to establish the productivity of five maize hybrids for grain, grown under the conditions of central north Bulgaria. All the stages of the established technology for maize growing under non-irrigation conditions were followed. The experimental data was processed according to the method of dispersion analysis. The analysis of the results showed, that the highest values of elements of productivity - length of the cob, number of the row per cob, number of the grains per row, mass of the cob, mass of the grains per cob and mass of 1000 grains were reported in the hybrid P0412 and the lowest in P8523 hybrid. Under the conditions of North Central Bulgaria the highest yield was obtained in P0412 hybrid – 8163 kg/ha, and the lowest one – in P8523 hybrid – 6821 kg/ha. The percentage content of protein in grain was the highest in P1114 hybrid (10.8 %) and that of fats – in P0412 (5.19 %). The highest starch content was established in P8523 hybrid (77.05 %).

Keywords: *Maize, elements of productivity, yield of grain, protein, fats, starch.*

WEATHER CONDITIONS IN THE 2013 - 2015 WHEAT GROWING SEASON IN CROATIA AND BOSNIA AND HERZEGOVINA

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Abstract

Winter wheat is a very important field crop on the arable lands in Croatia and Bosnia and Herzegovina (B&H).Wheat production is often characterized by significant yield variations, as affected by unfavorable weather conditions. The aim of this study was to analyze wheat yield in relation to weather data (precipitation and mean airtemperature) in Croatia and B&H in the 2012/2013, 2013/2014 and 2014/2015 growing seasons. The data from four meteorological stations in Croatia situated in the east and north of the country and data from four stations in the northern B&H were analyzed. Average wheat yields were 4.9, 4.2 and 5.4 t ha^{-1} (Croatia), and 3.9,2.9 and3.5 t ha^{-1}(B&H),for harvest in 2013, 2014 and 2015, respectively.The 2013/2014 growing season was less favorable for winter wheat growingas precipitationsums in the October-June period were considerably higher compared to the long-term reference mean (1961 – 1990), while mean air temperatures were significantly higher. The main cause of lower yields in 2014 for both countries was excessive precipitation in the period April-June, in some places also accompanied with floods. In the remaining two growing seasons, precipitations in both countries were mainly favorable distributed and temperatures somewhat lower compared to the 2013/2014 season.

Key words: *Wheat yield,precipitation, temperature, Croatia, Bosnia and Herzegovina*

DETERMINATION OF SOME BARLEY (*Hordeum vulgare L.*) VARIETIES SUITABLE FOR CYPRUS ECOLOGICAL CONDITIONS

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Abstract

This research was carried out on 6 barley varieties (two-rowed; Otis, Nure, Pewter Fouga, Prestige and six rowed; Athenais) in a Randomized Complete Block Design with three replications in 2008-2009 growing season in Cyprus; Turkmenkoy, Kumkoy, Tepebası and Haspolat locations. It was determined that the effects of genotype, environment and genotype x environment interaction were significant at 1% level of probability for grain yield. Grain yield varied from 61.0 – 410.5 kg/da. Kumkoy location had the highest grain yield (303.7 kg/da) while Turkmenkoy location had the lowest grain yield (118.3 kg/da). While, cultivars Nure and Pewter had the highest yield (250.0 and 261.4 kg/da), cultivars Fouga and Prestige had the lowest grain yield (156.3 and 158.0 kg/da) for all environments. While the highest grain yield is found in Kumkoy location with Nure (410 kg/da) and Pewter (400 kg/da), Turkmenkoy location has the lowest grain yield with Fouga (61 kg/da) variety.

Keywords: *Barley, location, grain yield, cultivars*

THE EFFECT OF N-FERTILIZATION ON *ROSMARINUS OFFICINALIS L.* (AN UPRIGHT VARIETY) YIELD IN CENTRAL GREECE

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Abstract

The effect of three different N-fertilization levels (N1: 625, N2: 385 and N3: 770 kg ha^{-1}; where in case of N1 was used the 3-6-10+3MgO+30% OM and in cases of N2-N3 the 26-0-0 fertilizers) on fresh and dry weight of the perennial *Rosmarinus officinalis* (upright cultivar) was investigated during the 2nd year after establishment at the Experimental Farm of the Technological Educational Institute of Thessaly in Greece (TEI; Larissa plain) in 2015. It is well documented that the crop reaches its potential yield on the third year of cultivation and continues producing biomass for as long as eight years. Complete weather data (air temperature, radiation, air humidity, precipitation) were recorded hourly in an automatic meteorological station, which was installed to the experimental farm of TEI. Upon harvest (November 3rd 2015), the crop reached a maximum fresh yield of 11.67 tons per hectare and dry yield of 4.3, respectively. The average fresh weight was 8.2, 8.4 and 8.9 t ha^{-1} and the dry weight were 2.6, 3.1and 3.2 t ha^{-1} for the N1, N2 and N3 levels, respectively. Furthermore the higher moisture content was observed in the case of N1 level (68%). Therefore, the above data show that rosemary cultivation could be a promising alternative crop, especially in case of the consideration that average selling price of dry rosemary in Greece is 3.5 € kg^{-1} and the average gross income exceeds the amount of 10.000 € ha^{-1}.

Keywords: *Rosmarinus officinalis L.*, fertilization, upright variety, fresh yield, dry yield.

THE USE OF UREASE INHIBITOR FERTILIZERS (AGROTAIN) AND THEIR EFFECT ON CEREAL CROPS AND COTTON YIELD

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Abstract

Many commercial compounds exist that promise the increasing efficiency of urea fertilizers by inhibiting urease activity in soils. Such a compound gaining in commercial importance in the last decades is N-(n-butyl) thiophosphoric triamide, broadly known with its registered trade name of "Agrotain". In this paper, the effect of nitrogen fertilizer dressings using Agrotain versus conventional (urea) fertilizers was studied under field conditions. In particular, the effect of three different nitrogen dressings using conventional N-fertilizers and Agrotain was investigated on the growth and final yield of (rainfed) durum wheat, and (irrigated) maize and cotton, grown on a fertile clay loamy soil in Velestino (Thessaly plain) area in central Greece in the year 2015. It was demonstrated that all three crops fertilized Agrotain obtained greater chlorophyll contents and reached significantly higher biomass and grain yields comparing to the crops receiving traditional nitrogen fertilization, obviously due to the more effective nitrogen release and uptake by the crops.Therefore, application of urease inhibitor fertilizers, such as Agrotain, might reduce nitrogen application dressings, reduce N-losses and nitrification, and their introduction to existing crop rotations is highly advisable.

Keywords: *Urea inhibitors, yield, chlorophyll, wheat, cotton, maize.*

EFFECT OF AMMONIUM FERTILIZER ON GROWTH AND QUALITY OF *Cichorium spinosum* PLANTS

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Abstract

In the present study, the effect of ammonium fertilizer rate on plant growth and quality of *Cichorium spinosum* L. was examined. Five fertilizer treatments were applied regarding the ammonium nitrogen percentage of total nitrogen, namely (1) 14%, (2) 24%, (3) 34%, (4) 43%, and (5) 53% of total nitrogen applied in the form of ammonium nitrogen. All the treatments received the same total nitrogen rate. Seeds of *C. spinosum* were sown in seed trays containing peat, and young seedlings were transplanted in 2L pots containing peat and perlite in a ratio 1:1. Plants were harvested twice during growing period and when rosettes reached the marketable size. On the harvest days, plant features regarding plant development (the number of leaves, the fresh and dry weight of leaves, and rosette diameter), as well as quality mineral composition, SPAD index of leaves) were recorded. From the results it is suggested that fertilizer composition had a significant effect on plant growth and quality. In particular, fresh weight for both harvests, as well total fresh weight were higher in treatments 4 and 5, where 43 and 53% of the total nitrogen was applied as ammonium nitrogen. Dry weight did not differ significantly in the first harvest, while in the second harvest treatment 1 had the lowest dry weight. Diameter and number of leaves were the lowest in treatments 2 and 3, respectively, while significant differences were also observed between treatments regarding the quality features.

Keywords: *Ammonium nitrogen, Cichorium spinosum L., nitrogen, stamnagathi.*

EFFECTS OF BRT® EVERGREEN AND AQUA +3 APPLICATION ON *AQUILEGIA FLABELLATA* VAR. *PUMILA* AND *PELARGONIUM PELTATUM* 'RAINBOW ROSE'

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Abstract

Nowadays, climate change is a serious problem in the world. The water management has become increasingly important because of the temperature increasing and the precipitation decreasing. The water holding capacity of the growing media have major role in the ornamental plant production. During our work, two moisture controlling agents, such as Finnish BRT® Evergreen in 10 v/w% and German Aqua +3 in 8 g/l and 16 g/l were applied in *Aquilegia flabellata* var. *pumila* and *Pelargonium peltatum* 'Rainbow Rose' production. Plant diameter, plant height, fresh weight, root parameters, chlorophyll content, phosphorous and potassium content of media were measured. BRT® had significant effects on plant diameter and plant height of *Aquilegia* and also doubled the chlorophyll content. BRT® had 50% increase in plant height of *Pelargonium*. The fresh weight was doubled and tripled by Aqua+3 (16 g/l) and BRT® as well. Aqua+3 (8 g/l) doubled and Aqua+3 (16 g/l) and BRT® tripled the number of roots. Aqua+3 (8 g/l) had 50% increase in root length and root weight. Chlorophyll content had 50% increase by Aqua+3 (16 g/l) and was doubled by BRT®. In the soil mixture of BRT®-containing group 50% of potassium and 150% phosphorous was measured comparing to the control. The results proved that the use of BRT® Evergreen and Aqua +3 have economic benefit for plant growers. With these products, the plants have more fresh weight without more irrigation water. Stress tolerance of plants is getting better using of these agents.

Keywords: *Moisture controlling agents, chlorophyll, fresh weight, plant height*

EFFECT OF SEWAGE SLUDGE COMPOST TREATMENT ON CROP YIELD

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Abstract

Due to the increasing number of sewage cleaning plants, the amount of sewage sludge also increases. We have to solve the environmentally sound disposal of the sludge. Results of many experiments show that sewage sludge and sewage sludge compost can be recycled as nutrient suppling material in agriculture. Municipal sewage sludge compost could cause the occurrence and accumulation of toxic elements in the soil. A small-plot experiment with sewage sludge compost was established in the spring of 2003. The applied compost contains 40% sewage sludge, 25% straw, 30% rhyolite, 5% betonite. The small-plot experiment was re-treated in the autumn of 2006, 2009, 2012and 2015. There are 4 treatments in five blocks, where the sewage sludge compost was applied at a rate of 0, 9, 18 and 27 tha^{-1} and then ploughed into the soil. Triticale as autumn cereal, maize and green pea as spring crops were sown in crop rotation every year. Plant samples were collected before harvesting. In this paper the results of crop yield between 2010-2012 are presented. Crops of triticale and maize were higher in the treated plots than in control one in 2010 and 2011. Treatment effect was not observed on green pea yield.The results show that the effect of applied compost doses depends on plant species and time. Our aim is to maintain this unique long-term experiment for studying the composted sewage sludge as a nutrient and organic matter source, applying it similarly to the farmyard manure.

Keywords: *Sewage sludge, long-term experiment, crop yield, compost treatment.*

ENERGY AND ECONOMIC ASSESMENT IN TILLAGE AND SOWING FOR ROTAVATORS, CONVENTIONAL AND NO-TILL WHEAT ESTABLISHMENT

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Abstract

Rice-wheat is major crop of IGP covering around 10 Mha area and contributing about 40% to national food grain production. Rice residue management in combine harvested fields, for wheat sowing, is performed primarily through intensive tillage. This demands more energy input leading to higher production cost and lesser benefit-cost ratio. Indian government is promoting rotavators for speedy seedbed preparation in rice-wheat system. No-till wheat sowing is also quite popular amongst the farmers. This study compares energy input and benefit-cost ratio of six treatments viz. T_1 (RM_1 x 2 + sowing), T_2 (RM_2 x 2 + sowing), T_3 (RM_3 x 2 + sowing), T_4 (RM_4 x 2 + sowing), T_5 (No-till sowing) and T_6 (Disc harrow x 6 + Planking x 2 + sowing). Result revealed maximum time and fuel consumed in T_6 (10.13 h/ha and 59.85 l/ha) and minimum for treatment T_5 (1.39 h/ha and 6.19 l/ha). Energy saving was maximum (89.57%) in no-till wheat sowing (T_5) followed by rotavator treatments (47.08-62.65%) compared to treatment T_6. The energy productivity was highest (13.06 kg/MJ) for no-till sowing (T_5). It ranged from 2.73-4.20 kg/MJ for rotavator treatments (T_1-T_4) and was minimum (1.59 kg/MJ) for T_6. The benefit-cost ratio was found 2.99 for treatment T_6 and 6.35% higher for no-till wheat sowing (T_5). It ranged from 2.91-3.53 for treatments (T_1-T_4). Based on the results, T_5 was found most energy efficient treatment followed by T_3, T_4, T_2 and T_1. Conventional method (T_6) was found to be most energy intensive method of wheat establishment.

Key words: *Energy requirement, rotavator, wheat establishment, cost of production, no-till*

EVALUATION OF THE EFFECTS OF PARTIAL ROOT ZONE DRYING IRRIGATION ON CORN YIELD AND YIELD COMPONENTS

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Abstract

Water scarcity is the main constraint in crop production within arid and sami-arid regions. In recent decades, the subject of partial root-zone drying irrigation (PRD) gained a lot of attention for increasing water use efficiency (WUE) in many plant species. The effect of water shortage stress on corn (Zea mays L.), single cross (SC704) yield was evaluated on a silt-sandy soil during 2012 farming season in Mahmoudabad, 5 km south of the Caspian Sea shore, Mazandaran province, Iran. A RCB design with 4 treatments of 1) Full irrigation (FI) plants receiving 100% of field capacity (FC); 2) PRD_{80} plants receiving 80% of FC; 3) PRD_{50}, which plants received 50% of FC and 4) Deficit irrigation (DI_{50}), which plants received 50% of FC. The effect of water treatments on corn yield and yield components were highly significant ($p<0.001$). The PRD_{80} treatment consumed 18% less water relative to FI treatment during its growing season, while its yield was not significantly different from FI. The high water stressed treatments of PRD_{50} and DI_{50} yields were significantly lower than that of FI and PRD_{80} treatments. The substantial compensatory effect of PRD irrigation on yield and yield components indicates that ABA and stomatal regulation in favouring of photosynthesis to transpiration could be the key. During calm, clear sky nights dew deposited on corn leaves, which finally dropped to soil close to the corn stem. No difference was found between water treatments regarding dew deposition. In conclusion, the PRD irrigation strategy in comparison with conventional DI irrigation could benefit corn growth and development.

Keyword: *Corn, deficit irrigation, water stress, ABA, PRD*

A STUDY OF THE EFFECTS OF DIFFERENT BIO-FERTILIZERS AND AMMONIUM PHOSPHATE LEVELS ON THE YIELD OF SUNFLOWER

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Abstract

Sunflower (*Helianthus annuus* L.) is one of the main crops producing the oil requirements of the Iran. This experiment was conducted in Ardabil plain to study the effects of different biological and chemical nutrition systems on Sunflower (Sanbro cultivars) yield, in 2013. A factorial field experiment in a randomized complete block design with three replications was done. The first factor was ammonium phosphate levels (zero, 150 and 300 kg ha^{-1}) and the second factor was seed inoculation with Mycorrhiza (*Glumus etanicatum*), Azotobacter, Mycorrhiza plus Azotobacter as bio-fertilizer and control without any bio-fertilizers. The results showed that grain and oil yield of sunflower were significantly affected by ammonium phosphate levels and biofertilizers as well. Also, there were interaction effects between ammonium phosphate levels and bio-fertilizer types on oil percentage and oil yield. Applying the highest levels of ammonium phosphate (300 kg ha^{-1}) had the maximum grain yield (4584.1kg ha^{-1}) and the minimum (2708.3kg ha^{-1}) was obtained from control. The application of mycorrhiza as bio-fertilizer on grain yield of sunflower was more effective than Azetobacter and increased it to more than 500 kg ha^{-1}. Means comparison of interaction effects between Ammonium phosphate and bio-fertilizer showed that combination use of 300 kg ha^{-1} of ammonium phosphate with both types of bio-fertilizers compared to control without any fertilizers could triple the oil yield.

Keywords: *Sunflower, Bio-fertilizer, Chemicals, Yield, Ardabil*

ETHYL METHANE SULFONATE AND ITS EFECT ON MUTAGENESIS IN RICE CROP IMPROVEMENT

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Abstract

The main purpose forinducing mutation in rice crops is to increase the mutation rate in a short period of time andto develop new plant varieties with useful agronomical traits in order for sustainable food production to become a possibility. The occurrence of a spontaneous mutation frequency rate is very rare and exceptional, making it difficult for plant breeders toexploit. Mutations are commonly induced by chemical (*e.g*. ethyl methane sulfonate) and physical (*e.g.* gamma radiation) mutagen treatment of both seed and vegetatively propagated crops. Here, more than 10,000 seeds of the rice variety Gohar were initially subjected to mutagenesis using ethyl methane sulfonate (EMS). The EMS-treated seeds were rinsed with deionized water, and then sown in the seedbed. A population of about 5,250 M1 plants was developed. At maturity, a single panicle was picked from each plant. The following year, to achieve 3,510 M2 plants, the seedlings selected from the nursery grown panicles were grown in the field. Then, one panicle was chosen from each mature plant in M2 to get the M3 population. In the M4 population, the selection criteria were early maturity, highfertility rate, dwarf growth habit, and plant type. Eventually, six plants possessing early maturing traits were selected for commercial release.

Keywords: *Chemical mutagen, early maturity, rice, mutation, ethyl methane sulfonate*

TOLERANCE TO SALINITY AND DROUGHT STRESS: STRATEGIESFOR CROP PRODUCTION IMPROVEMENT

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Abstract

Drought and high salinity are two major abiotic stresses negatively affecting crop productivity. More frequent occurrence of drought in many regions of the world and the use of inadequate irrigation water led to an increase in arable areas that are facing the problem of salinity. The salinity negatively affects the growth and development of plants by increasing the osmotic potential of the soil and the soil solution, which prevents normal water uptake.Second, but no less important, the negative effect of salted soil toxicity of excessive amounts of sodium and chloride ions, which leads to a lack of calcium and potassium and other nutrients imbalance. Plant adaptations to salinity are of three distinct types: osmotic stress tolerance; Na^+ exclusion; and tissue tolerance, i.e., tolerance of tissue to accumulated Na^+, and possibly Cl^-. Under drought condition, excess levels of reactive oxygen species are produced leading to oxidative damage. This paper provides an overview of the physiological and biochemical mechanisms by which growth and development of crop plants are affected by salinity and selection of crop cultivars that require relatively lower quantity of water for their growth and crop productivity. Understanding how plants respond to stress can play an important role in improving plant performance, especially since the climate-change scenariossuggest an increase in aridity in many areas of the globe.

Keywords: *Salinity, Drought, Plant adaptations*.

YIELD AND CHEMICAL COMPOSITION OF CAULIFLOWER (*BRASSICA OLERACEA* L.VAR. *BOTRYTIS*) CULTIVATED USING MICROBIOLOGICAL FERTILIZER

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Abstract

As a result of the intensive tillage, application of various agrotechnical measures, the use of large amounts of fertilizers and pesticides,during the production of horticultural crops with relatively high yields, including the cauliflower, disrupts natural processes in the soil. The microbiological activity and fertility of the soil can be improved by using pure cultures of the microorganisms used for the production of microbiological fertilizers – bio -fertilizers, that create or improve conditions for microbiological activity in the rhizosphere, without disrupting the natural processes in the environments.This research was aimed at determining the impact of microbiological fertilizer Slavol, applied in two ways, foliar with dorsal sprinkler and through the drip irrigation system, on the yield and chemical composition (water, dry matter, fiber, protein and calcium) of cauliflower produced outdoors during 2011, 2012 and 2013.The results of this study showed that the application of Slavol significantly affected the yield of the cauliflower, especially when applying through the drip irrigation system. Chemical analyzes showed increased content of water, fiber, protein and calcium in the curds of the cauliflower treated with the microbiological fertilizer.

Keywords: *Cauliflower, microbiological fertilizer, yield, chemical composition*

QUALITATIVE AND PRODUCTIVE PROPERTIES OF BIO-FORTIFICATION SOFT WHEAT OF THE VARIETIES„RADIKA„

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Abstract

Wheat is considered the most important cereal as a staple food for humans. For normal grow anddevelopment plants need at least 14 minerals elements such as micronutrients nitrogen, phosphorus, potassium, calcium, magnesium and sulfur and macronutrients chlorine, brown, iron, manganese, copper, zinc, nickel, and molybdenum. Deficit on any kind of these mineral elements in the soil reduced plant growth, yields and nutritional quality of products.Nowadays, the causes and consequences of zinc deficiency and iron in the soils are well documented and there are well-established effective methods to overcome the deficiencies in agriculture.Bio-fortification is a process with help on which increase concentration on micronutrientssuch as zinc, iron, manganese and etc. in the agriculture products–especially in the wheat cultures.The aim of this research is to examine the influence of Fe-EDTA and Zn-EDTA fertilizers through soil, foliar and soil+foliar application on qualitative and productive characteristics of soft wheat variety Radika.The analysis of variance for comparing on average values has shown existing of important differencesbetween variants in morphologic characteristics only in the place of the number of little earsthehectoliter mass of wheat obtained withfoliar application on Zn-EDTA showed value of 76.05(kg/hl), which is 1.33 % more than value of the control 75.05(kg/hl).During the investigation we determined that the largest weight of 1000 grains showed wheat obtained by application of Fe EDTA soil + foliar for 8.21%, compared to the control variant.It might be concludedthat the agronomic bio-fortification which nowadays is emphases alternative economic justified solution leads to improvement of the qualitative and productive features.

Keywords: *Bio-fortification, Fe-EDTA u Zn-EDTA,*

STUDY OF THE EFFECT OF DROUGHT STRESS ON GERMINATION AND SEEDLINGS GROWTH OF FIVE VARIETIES OF RAPESEED (*BRASSICA NAPUS*)

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Abstract

Drought stress is one of the major abiotic factors affecting seed germination and plant growth especially in arid and semi-arid regions. In current study, we investigated the effects of drought stress on seed germination and seedling growth of five varieties of rapeseed. Seven drought stress levels of zero (control), -3, -5, -7, -9, -11 and -13 bars were considered using polyethylene glycol-6000 (PEG-6000). Complete randomized design with three replications was used for this experiment. Germination percentage (GP), germination rate (GR), mean germination time (MGT), root length (RL) and shoot length (SL) were used to evaluate the varieties response to PEG-induced drought stress. Drought stress, variety and interaction of both had a significant effect on all studied parameters. GP and GR decreased with the increase in stress level while MGT increased. Rapeseed varieties 'INRA-CZH2' and 'INRA-CZH3' performed better in germination and early seedling growth. There was no seed germination for all varieties at the -11 bars and -13 bars. Shoot length decreased with increasing drought stress but varieties showed different performance under this stress. Root length decreased with increasing levels of severe drought stress. However, the presence of moderate drought stress could improve the root growth of the investigated varieties. The varieties 'INRA-CZH2' and 'INRA-CZH3' exhibiting the highest germination percentage could be recommended for environments with early cropping cycle drought.

Keywords: Rapeseed; Drought stress; Germination; Seedling growth; varieties.

HERITABILITY OF YIELD AND YIELD COMPONENTS OF ZAER LENTIL LANDRACE

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Abstract

Lentil (*Lens culinaris* Medik.) is one of the most important food legumes grown in Morocco under rainfall conditions. Zaer is the second lentil production region which is characterized by annual rainfall variability with a high incident of drought and heat mainly during flowering and pod filling season. Lentil is produced from both a landrace and L56 variety on farm conserved. They are distinguishing according to some agro-phenotypic characters. The landrace is threatened by both climate change and L56 variety. Thus, the aim of this study is to evaluate landrace yield variability and to estimate the contribution of ten agronomic traits related to yield for 24 accessions of the landrace. The analysis of recorded agronomic data of both 230 lines collected from farmers' field and 108 lines regenerated in experimental field, showed a high significant effect of genotype, year and genotype x year interaction on yield and yield components. In addition, the path analysis multiple regression methods provide us with the effective components of yield determination. Indeed, the result revealed that plant height, number of pods per peduncle, number of pods per plant, number of seeds per plant and thousands seed weight are the most effective components of the yield which account 50% of yield variation. Number of pods per plant (13%) and thousands seed weight (24%) are among the major components of yield according to their contribution to yield variability. Moreover, their broad sense heritability was high with 0.67 and 0.92 respectively. This information is useful to improve landrace yielding.

Keywords: *Lentil, landrace, yield components, path analysis, heritability*

EFFECT OF PLANTING DATES AND SPACING ON THE GROWTH AND YIELD OF TURMERIC (*Curcuma longa* L.).

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Abstract

Climatic conditions prevailing during crop growth, the period to which crops are planted and varying population densities are great determinants of yield of crops. Turmeric growers are faced with a lot of barriers affecting the production and the yield in Nigeria ranging from appropriate sowing date, inadequate plant population, and insufficient information about the emergence and growth and yield patterns. In an attempt to assess appropriate sowing date and spacing for turmeric, an experiment was carried out in the rainy season of 2010 at the National Horticultural Research Institute, Ibadan, Nigeria. Planting dates and spacing had a significant effect on the plant height, number of leaves and rhizome yield of turmeric. Early planting in May produced significantly higher plants, number of leaves and number of tillers while planting in June produced the highest rhizome yield. Wider spacing of 45cm x 40cm had significantly highest plant height, number of leaves and number of tillers while close spacing of 45cm x 10cm gave the highest rhizome yield. The appropriate planting date and spacing for optimum production of turmeric is recommended for the month of June and 45cm x 10cm spacing respectively.

Keywords: *Population density, planting dates, Curcuma longa, yield*

PERFORMANCE OF SOYBEAN (*Glycine max L.*) INFLUENCED BY DIFFERENT RATES AND SOURCES OF PHOSPHORUS FERTILIZER IN SOUTH-WEST NIGERIA

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Abstract

Low yields of soybean in Nigeria are attributed to many factors such as declining soil fertility and use of low yielding soybean varieties. Phosphorus is a soybean plant growth-limiting nutrient.Therefore, application of phosphorus fertilizer at optimum level is essential. Two experiments were carried out at Ibadan, Nigeria to estimate the optimum P-fertilizer rate for soybean and to investigate the response of soybean to different sources of P fertilizer applied at the optimum rate. The treatments in the first experiment were two soybean varieties (TGX1987-10F and TGX1987-62F) and single superphosphate (SSP) fertilizer applied at five rates: 0kgPha^{-1}, 20kgPha^{-1}, 40kgPha^{-1}, 60kgPha^{-1} and 80kgPha^{-1}. The treatments in the second experiment were: SSP, *Tithonia* compost (TC), poultry manure (PM), TC+PM, SSP+TC, SSP+PM applied at optimum P (40kgPha^{-1})rate obtained from Experiment 1and control. Data collected on morphological parameters, grain yield (GY) and nutrient uptake were subjected to analysis of variance, the means were separated using least significant difference ($p \leq 0.05$). Results showed that TGX1987-62F (1.96Mgha^{-1}) produced significantly higher GY than TGX1987-10F (1.26Mgha^{-1}). Application of SSP at 40kgPha^{-1} produced tallest plants (131.8cm), highest number of leaves/plant (19.0), number of pods/plant (19.4), and GY (2.28Mg/ha) across the two varieties. Highest K-uptake (6.1mgplant^{-1}) and P-uptake (2.6mgplant^{-1}) were obtained in plants treated with TC+SSP and SSP, respectively. The combination of TC and SSP at 40kgPha^{-1} produced highest number of flowers/plant (35.6), pods/plant (38.7) and GY (3.9Mgha^{-1}). A combination of *Tithonia* compost and SSP applied at 40kgPha^{-1} will increase grain yield of soybean in South-West Nigeria.

Key words: *Phosphorus fertilizer, Tithonia compost, SSP, soybean varieties, Nigeria.*

QUALITY AND YIELD OF TURMERIC (*CURCUMA LONGA* LINN.) IN RESPONSE TO MYCORRHIZAL AND NITROGEN APPLICATION

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Abstract

Nigeria is ranked fourth among the leading producers of turmeric in the world. However, there is dearth of knowledge about its agronomic requirements, this may be attributed to poor knowledge about its importance particularly its potential as foreign exchange earner for the country. The investigation was aimed at examining the effect of nitrogen and the contribution of arbuscular mycorrhizal fungi to the yield and quality of turmeric. It was a potted experiment with 5 levels of nitrogen (0, 45, 90, 135 and 180 kg N/ha), and 2 levels of mycorrhizal (with and without). The experiment was arranged in a 5 × 2 factorial fitted into a completely randomized design with three replications. Data were obtained on the dry shoot yield, rhizome yield, curcumin content of the rhizome, nitrogen, phosphorus and potassium content in the shoot. All data were subjected to analysis of variance using SAS PROC. GLM and significant treatment means separated using LSD values. Applications of nitrogen and mycorrhizal independently and in combinations significantly enhanced the yield and curcumin content of turmeric. The rhizome yield in the mycorrhizal infested soil was not significantly different with the non application of mycorrhizal but there was an increase of approximately 15 % in the rhizome yield in the mycorrhizal infested soil. Application of 180 kg N/ha with mycorrhizal gave the highest biomass and rhizome yield and as such is the most suitable for turmeric production.

Key words: *Curcumin, nitrogen, nutrient content, turmeric*

PHARMACEUTICAL COMPOUNDS IN LEAVES AND FLORAL STEM OF GLOBE ARTICHOKE (*CYNARA CARDUNCULUS* L. VAR. *SCOLYMUS* (L.) FIORI)

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Abstract

The phenolic composition of *Cynara scolymus* L. was determined by analyzing the methanol extracts of the different morphological parts of the plant. More total phenolic compounds in calculation for gallic acid was noted in floral stem and receptacle and inner bracts of capitula. Artichoke plants accumulated 3.9 times less total phenolic compounds in outer bracts, while in leaves the content was more than 9 times lower. The dominant phenolic compound in leaves and floral stem of artichoke was chlorogenic acid. Significantly more chlorogenic acid was noted in floral stem and receptacle and inner bract, over 2.2 times more than in leaves and over 4.1 times more than in outer bracts of capitula.Cynarin was the main hydroxycinnamic acid in artichoke extracts, particularly in leaves extract. Apigenin represented the most abundant flavonoids in cultivated artichoke extracts, especially in capitula receptacle extract, and floral stem. The highest mean content of luteolin characterized leaves of artichoke than floral stem and receptacle with inner bracts capitula. Our results showed that the extraction of phenolic compounds from all morphological parts of artichoke can be integrated in an industrial value chain, involving nutraceutics and as animal feedstuff.

Keywords: *Globe artichoke, Caffeoylquinic acids, Flavonoids, Cynarin, HPLC*

ACCUMULATION OF NPK AND S BY WINTER OILSEED RAPE DEPENDING ON FERTILIZATION LEVEL AND BIOSTIMULANT APPLICATION

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Abstract

Plant growth and nutrient uptake and yield can be supported by the use of biostimulants. The study aimed to assess NPK and S accumulation by winter oilseed rape after biostimulant application at varied NPK and S fertilization levels. The field experiment was located in Poland (53°13'N; 17°51'E), conducted in 2011-2013, on a typical Alfisol (USDA). In this experiment the applied levels of NPK were as follows: high (180 N, 70 P, 132 K kg ha^{-1}) or low (144 N, 35 P, 66 K kg ha^{-1}), elementary S fertilization (36 or 0 kg ha^{-1}) and the application of biostimulant Kelpak (2 l ha^{-1} in autumn + 2 l ha^{-1} in spring) or without the preparation. Kelpak is obtained from marine alga (*Ecklonia maxima* Osbeck) and contains auxins and cytokinins (11 and 0.031 mg l^{-1}). This study indicated that the higher NPK rates or S fertilization as well as the use of the biostimulant increased NPK and S accumulation in the plants of oilseed rape during generative development stages.Biostimulant application in rapeseed with lower NPK or without S increased N and P accumulation to the level obtained at higher NPK and with S, without biostimulant. At the fruit development stage S fertilization increased the accumulation of N, P and K in oilseed rape, but only in the case of high doses of NPK. At flowering and maturing, S accumulation was by 10% higher after the application of biostimulant and without S fertilization as compared with that found in rapeseed fertilized with this element but without the preparation.

Keywords: *Growing stage*, *nutrient uptake*, *biostimulant*, *mineral fertilization*

SOME EARLINESS ENHANCING METHODS IN SWEET CORN PRODUCTION

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Abstract

Aim of experiment, set up in 2014, was to study evolution of sweet corn growing period with application of some technological elements such as: propagation time, propagation method, floating row cover. The choosen variety was a conventional sweet corn hybrid, very early ripening 'Spirit'. The following growing technologies were compared: 1. direct sowing of plants with floating row cover, early period 2. direct sowing of plants without row cover, early period 3. plants transplantation with floating row cover, earlier period and 4. direct sowing of plants without row cover, normal period (regarded as control). The transplanted plants had shorter growing period by 9 days, compared to direct sowed covered treatment and were 26 days earlier harvested than control.The influence of above mentioned technological elements on some important morphological properties of sweet corn ears regarding: husked and unhusked ear weight, ear length, length of seeds and ear diameter was studied.

Key words: *Earliness, sweet corn, transplantation, fleece covering.*

ECOLOGICALLY BASED DISEASE MANAGEMENT TECHNIQUES IN BARLEY CULTIVATION IN THE CENTRAL BLACK SOIL REGION

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Abstract

At present, there are microbiological Bacillus-based products used to preserve valuable micro biota and improving the level of biological soil productivity as well as sustaining the local environment. The researchfocuses ondiscovering how some particular biological products and autochthonous microorganisms influence the yield capacity of barley grown in the Black-Earth region of Russia. The research objectives included a search for autochthonousstrains of microorganisms that improve resistance to diseases, estimation of how biological products contribute to the quality of barley seeds, biological products effect on the spread and disease resistance and estimation of how biological products enhance the yield capacity of barley.

The paper describes the results of identification of an autochthonous *Bacillus* strains. PCR diagnostic methods were used to confirm the strain specific origin of two sample cells extracted from soil (S1 and S2). The study involved the analysis of micro biota of leached chernozem, which revealed the autochthonous strain of *Bacillus* S1 having a germicidal effect. The S1 strain revealed *Bacillus subtilis* and *Bacillus cereus*, while S2 revealed only Bacillus subtilis, as detected by the method of molecular diagnostics based on using species-specific primers. Biological treatment of the seeds improved their sowing qualities, namely, germination readiness and germination capacity. In addition, it was found out that such treatment improves the resistance to disease affection and spread. *Bacillus* S1, in particular, reduces the disease affection by 16,5 % and the disease spread 3,5 as much. Finally, the experiment demonstrated that biological treatment can contribute to sustaining healthy environment for the plants and thus increase their yield capacity.

Key words: *Identification of Bacillus, the polymerase chain reaction (PCR),sowing quality of seeds, barley diseasecontrol.*

PHOTOSYNTHETIC ACTIVITY OF PEACH LEAF IN CONNECTION WITH DROUGHT TOLERANCE

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Abstract

The aim of our research was to study the leaf chlorophyll fluorescence parameters of peach and selection of cultivars with increased resistance to drought. Studies were conducted in the laboratory on intact leaf plates of 8 cultivars of foreign selection (Veteran, Zempush, Gavazuri, Tszyu-Yus-Tszyuy, Hidistavsky Belyiy, Baby Gold-7, Pintu, Favorita Morettini) in two periods - August and September. The control cultivar was Kryimsky Shedevr of Nikitska Botanical Garden selection. Photosynthetic activity was characterized by chlorophyll fluorescence parameters (Kautsky effect). It was established that, as a result of 24-hour water deficit parameter, Fm operates more stable in cultivars Hidistavsky Belyiy, Tszyu-Yus-Tszyuy and Baby Gold-7. More prone to dehydration were peach cultivars Zempush and Pintu. Suppression index have reached 21-22%. High stability parameter Fm combined with a high water-holding capacity was found in grade Tszyu-Yus-Tszyuy. The leaves of this cultivar have lost least amount of moisture by dehydration (45%). On an indicator of $(F_m-F_0)/F_m$ the highest value was recorded in cultivar Pintu. Cultivars Pintu, Gavazuri and Tszyu-Yus-Tszyuy are the best according to the indicators $(F_m -F_{st})/F_m$ and (F_m/F_{st}). Their photoactivity is 10-12% higher in comparison with other cultivars and control cultivar Kryimsky Shedevr. They are characterized by a high water-holding capacity and a significant degree of recovery turgidity of tissues (82-100%). Cultivars Hidistavsky Belyiy, Veteran are promising for further study. Some cultivars have a high photoactivity at various stages of photosynthesis (Zempush, Baby Gold-7), indicating a wide range of applications in order to diagnose the state of the photosynthetic apparatus in fluorimetry method of dehydration of the leaves.

Keywords: *Peach, cultivars, drought resistant, parameters fluorescence.*

Acknowledgements

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THE ENDEMIC SPECIES OF PIMPINELLA TRAGIUM VILL. (APIACEAE) ON CHALKS OF THE VORONEZH REGION (RUSSIA)

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Abstract

The aim of this work was to study the ontogeny and structure of populations of endemic species of chalk and limestone *Pimpinella tragium* Vill. from the Umbelliferae family. It is a perennial taproot plant for the European part of Russia. Species grows in open chalky substrates. Since they are very movable, *Pimpinella* helps them consolidate and further overgrowing other plants.For the first time the ontogenesis of endemic species *Pimpinella tragium*in natural conditions of Voronezh region was studied. To highlight the ontogenetic state of the *Pimpinella* the conventional methods were used. Six years of monitoring studies of *Pimpinella tragium*, taproot grass plant, allowed to distinguish four ontogenesis periods and nine age states: latent (seeds), pregenerative (seedling, juvenile, immature, virginal), generative (young, middle and old generative) and postgenerative (senile). Simultaneously with the ontogenesis, the ontogenetic structure of *Pimpinella tragium* was studied. The age structure of various coenopopulations, and morphological features of their age groups were revealed.The population had sinistral spectrum; absolute maximum more often is presented by juvenile individuals, local maximum is presented by individuals of the middle age. The formation of ontogenetic structure of coenopopulations*Pimpinella tragium* is significantly influenced by the substrate physical characteristics, and therefore by physiological characteristics of this species along with the peculiarities of ontogenesis.

Keywords: *Pimpinella tragium, ontogenesis, coenopopulations, chalk layers, endemic species, ontogenesis structure, Voronezh region.*

CLONAL MICROPROPAGATION AND SOME PHYSIOLOGY ASPECTS OF ESSENTIAL OIL ROSES VALUABLE CULTIVARS REGENERATION IN VITRO

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Abstract

Limiting factor for vegetative propagation of essential oil roses is their high rate of viral pathogens damages. Complex system of plants` diagnostics, cleaning up and propagation *in vitro* gives possibility to obtain high quality plant material.

This study aimed to investigate some features of *in vitro* meristem culture in essential oil rose cultivars Festivalnaya, Raduga, Lany, Kooperatorka, Michurinka, Iskra and to evaluate morphological, anatomical and physiological parameters of plants *in vitro*. For induction of microshoot regeneration and leaf formation explants we cultured MS medium with 0.5-1.5 mg l^{-1} BAP, 30 g l^{-1} sucrose, 8 g l^{-1} agar. For *in vitro* chemotherapy, Ribavirin was added to the media. It was found out that February and March were the optimum time for meristem isolation and development. The maximum length of regenerated microshoots was observed in the cultivars Iskra and Kooperatorka at the initial stage of cultivation. Cultivar Festivalnaya was characterized by high multiplication rate (1:5-1:6). Due to the maximum number of leaves per shoot, the minimum leaf shape index, anatomical characteristics of palisade tissue development, the number of chloroplasts in photosynthetic tissue cells, and the rate of vascular bundle sheath development the cultivar Festivalnaya were selected. However, the maximum integral index of photosynthetic activity and viability index were noticed in regenerants of Lany cultivar. Analysis of chlorophyll *a* fluorescence rate indicated that physiological state of leaves was normal in all investigated *in vitro* regenerants.

Key words: *Rosa damascena* Mill., *Rosa gallica* L., *meristem, clonal micropropagation, morpho-anatomy characteristic of leaf, fluorescence.*

Acknowledgements

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COMPARATIVE CHARACTERISTICS OF PHOTOSYNTHETIC ACTIVITY OF NECTARINE CULTIVARS AND FORMS WITH DIFFERENT COLORED LEAF PLATE

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Abstract

Genotypes of nectarine with red leaves were created in Nikita botanical gardens. They have commercially valuable properties and biological characteristics (resistance to powdery mildew, large-fruited, the ability of transmitting the trait of red leaves with constant result to progeny seed, etc.). The aim of our researches was to study the main indicators of photoactivity of leaf apparatus of nectarine with green and anthocyanin leaves coloration. Investigations have been carried out in 2010-2015 on intact leaf plates for three cultivars and forms of nectarine with green leaves – Rubinoviy-8 (control), Chemus, Krymtsuht 53-85 and 2 forms with anthocyanin coloration of leaf plate (NektadianaKrasnolistnaya 996-88, Krasnola 495-86). Photosynthetic activity was characterized by chlorophyll fluorescence parameters (Kautsky effect). The content of chlorophyll *a* and *b* were determined by spectrophotometry. The cultivar Rubinoviy-8 and the form - Krasnola 495-86 were selected according to intensity indicators of the primary reactions of photosynthesis. Anthocyanin forms concede cultivar Rubinoviy-8 in efficiency of the primary reactions of photosynthesis an average of 48-50%; but they exceed nectarines Chemus and Krymtsuht 53-85 with green color of leaves of 23-25%. The efficiency of energy supply in the "dark" reactions of photosynthesis in all varieties and forms of nectarine maintained within 41-46%. But the further ability to utilize received energy is most efficiently implemented at the nectarine cultivar Rubinoviy-8 and form Krasnola 495-86. The forms of red-leaved nectarine in comparison with traditional cultivars are distinguished by a great potential for retaining the stability and productivity of the functioning of the photosynthetic apparatus.

Keywords: *Nectarine, leaves, photoactivity, fluorimetric indicator, chlorophyll.*

Acknowledgements

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ADAPTIVE CAPACITY OF SOME LAVENDER AND LAVANDIN CULTIVARSIN VITRO AND IN SITU

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Abstract

Lavandula angustifolia Mill. and (*Lavandulaxintermedia*EmericexLoisel) are promising fragrant plants with medicinal, aromatic and ornamental properties. Since the collection plantations of these crops are very damaged with viral pathogens and there is lack of seed propagation in valuable cultivars 'Belyanka', 'Record' (lavender) and 'Rabat', 'Snezhnyi Bars' (lavandin), were introduced *in vitro*. Chemotherapy was used for cleaning up. Regenerants were cultured (4-5 months) on MS medium with 0.3 mg L^{-1} Kinetin, 0.025 mg L^{-1} NAA and 0.25 mg L^{-1} GA_3 at 25±1°C under 16-h photoperiod. Intact plants were studied during the growing season. In order to reveal plants` biotechnological and genetic capacity some biochemical stress indicators, indexes of photosynthetic activity and water regime were identified. Under the open field cultivation, tested plants were rich in ascorbic acid, phenolic compounds, and redox enzymes (catalase, polyphenol oxidase, superoxide dismutase) were active. Leaf tissue hydration was 56-62%, with greater part of bound water. Photosynthetic activity was reduced only in the samples with visible damages with viral pathogens. In plants cultured *in vitro,* amount of ascorbic acid and phenolic compounds were lower, so as enzymatic activity and proline concentration were higher than in intact plants. The rate of hydration was high (70-77%), with the same trend of water fractional composition. Photosynthetic activity and vitality index indicated no photoinhibition. It was found out the lavandin cultivars had better capacity for a wide use under various culture conditions.

Keywords: *Lavandula sp, tissue culture, biochemical indicators, photosynthetic activity, water regime.*

Acknowledgements

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CEREALS SEED LIFECYCLE

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Abstract

Cereals seed lifecycle is considered as duration of a variety commercial use, or period of having margin from variety market introduction till its withdrawal from the market. In most of cases, it coincides with average period of variety listing. But available National Registers includes list of approved varieties, and don't keep tracks about withdrawal ones. The article goal was to check author's methodology of calculation of actual cereals seed lifecycle. National Registers of Commonwealth of Independent State (CIS) countries (Belarus, Kazakhstan, Russia, Ukraine) compare to German Bundesortenamt were used as data base. It was assumed thatnumber of varieties, been listing within five years period, is constant; therefore share of listed varieties in older groups shows probability of a variety listing within any group. It was found, that winter wheat seed commercialization period lasts about 24 years in Kazakhstan, 14 in Russia, 13 in Germany, 12in Ukraine and 9in Belarus. Similar trends are calculated in other cereals (spring oat, spring wheat, spring barley, and winter rye). The higher yields are, the shorter variety lifecycle, the better seed exchange rate (certified seeds share), and even return of breeding investments. Seed lifecycle is under influence of such factors as average crop multiplication rate, seeding rate, crop margin, yields, operational risks, acreage, etc. Markets of high marginal crops with shorter seed lifecycle are attractive for international seed companies expansion.

Keywords: *CIS, National Register, Cereals, listing, Seed lifecycle.*

THE INFLUENCE OF VIRAL STATUS ON POLLEN CHARACTERISTICS OF SOME APRICOT CULTIVARS

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Abstract

Apricot is one of the leading temperate zone fruit-bearing crops and obtaining of its new cultivars with the highest economically-valuable features is an actual problem. The most effective method of new cultivars breeding is the hybridization. Considering the modern ecological situation, it is extremely important to create virus-free forms with high adaptive potential. During the monitoring of the viral diseases spread withing apricot collection plots of Nikita Botanical Gardens – National Scientific Center (NBG-NSC)the analysis of mature pollen of 11 apricot cultivars was investigated. It was found out that studied cultivars arecharacterized by resistance to pathogens and affection by viruses. Two cultivars of NBG-NSC breeding (Krymsky Amur and Krymsky Medunec) and two introduced cultivars (Harcot and Markuleshti) demonstrated the difference to specified parameters. For example, the cultivar Krymsky Medunec is resistant to viral pathogens; its mature pollen has a large percentage of morphologically normal pollen grains characterized by high germination (up to 90% and 32%, respectively). At the same time, cultivars Markuleshti and Harcot are strongly affected by *Plum pox virus*; their ripe pollen is morphologically normal, but low vital capacity level.. On 15% sucrose solution pollen grains of cultivar Harcot did not germinate, and cultivar Markuleshti had only 1% of germinating pollen grains. It should be noticed that complex application of biotechnological methods (chemotherapy and meristem culture), further using and propagation of virus-free explants *in vitro* let us get healthy plant material. Thus, the results suggest the potential for creating new perspective cultivars of apricot with preset characteristics for further breeding.

Keywords: *Apricot, cultivar, generative sphere, pollen grains, in vitro.*

Acknowledgements

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EFFECT OF GROWING SEASONS ON SOME QUALITY PROPERTIES OF WINTER WHEAT GENOTYPES

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Abstract

In this research, 16 genotypes of winter wheat (*Triticum aestivum* L.) were analyzed where 15 genotypes represent perspective lines created in Center for Small Grains in Kragujevac and one standard cultivar. Field experiment was conducted in three growing seasons (2012/13, 2013/14 and 2014/15) on the experimental field of Center for Small Grains in Kragujevac (Serbia). Some grain quality parameters (hectoliter weight and 1000 grain weight) were analyzed in this paper. In average for three years, values of hectoliter weight varied from 76.65 kg hl^{-1} (KG-60-3/3) to 80.05 kg hl^{-1} (KG-1/6). The analyses of variance showed highly significant differences in hectoliter weight between genotypes (F=4.554**) and investigated years (F=150.082 **), but interaction genotype x year was significant (F=1.629*). The highest values of 1000 grains weight expressed line KG- 52/23 (46.75 g) and the lowest line KG-28/6 (39.90 g). Compared to the standard cultivar Pobeda, 10 genotypes had higher values of 1000 grains weight. There were highly significant differences in the weight of 1000 grains among genotypes (F=25.011**), investigated years (F=117.267**), as well as their interaction (F=8.684**).

Key words*: Wheat, growing seasons, hectoliter weight, 1000 grain weight.*

APPLICATION OF FARMYARD MANURE IN GRASSLAND PRODUCTION

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Abstract

This experiment aimed at determining the effect of farmyard manure (FYM) applicationon a natural pasturein Western Serbia, with a 30 t ha^{-1}treatment in comparison to control (no fertilizer added) during two years (2012-2014).The FYM was applied in the autumn of 2012 and the trial plots were harvested twice a year. Dry matter (DM) yield and forage quality - content of crude protein (CP), nonprotein N (%CP), neutral detergent fiber (NDF), acid detergent fiber (ADF) and net energy for lactation(NE_L), were estimated for each production year. Treatment with manure gave a higher DM yield compared to control plots in both experimental years (5.91 t ha^{-1} vs. 3.01 t ha^{-1} in 2013, and 2.76 vs. 2.03 t ha^{-1} in 2014). As expected,the yield in the second cuts of both years was much lower than in the first cuts. The FYM application did not affect chemical composition and net energy concentration of forages, whereas significant effects of different cuts were found, but were inconsistent between the first and second experimental year. In general, it can be concluded that application of FYM did not have a significant effect on forage quality ina permanent grassland, whereas chemical composition was significantly affected by different cuts and experimental years. Based on the results, a grassland may have a good DM yield response if FYM is used as a fertilizer, while the effect on forage qualitymay be much weaker.

Keywords: *Manure, pasture, quality, yield*

WATER–YIELD RELATIONS OF MAIZE IN SEMIARID CLIMATE CONDITIONS

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Abstract

Deficit irrigation creates water stress that can affect the growth and development of maize plants. Effects of water stress on maize include the visible symptoms of reduced growth, delayed maturity and reduced crop yield. A field study was carried in 2015 in order to determine the water – yield relationship of maize in the Vojvodina region, a northern part of the Republic of Serbia. Maize sensitivity to water stress was determined using a yield response factor (K_y). To assess the irrigation effects on maize yield, irrigation water use efficiency (I_{wue}) and evapotranspiration water use efficiency (ET_{wue}) were determined. Irrigation has significantly increased the yield of maize. The yield in irrigation conditions (11698 kg ha^{-1}) was 39.3% higher as compared with control without irrigation (8395 kg ha^{-1}). K_y value of 0.52 in the growing season indicates that maize is moderately sensitive to water stress under semi-arid climate conditions of Vojvodina region. The amounts of water used on evapotranspiration under irrigated (ET_m) and non-irrigated conditions (ET_a) were 512 and 234 mm, respectively. The values of I_{wue} and ET_{wue} were 1.16 and 1.19 kg m^{-3}, respectively. K_y, I_{wue} and ET_{wue} can be used as a good basis for maize growing in the region in terms of optimum water use, and also for the improvement of crop technology.

Key words: *Maize, Water stress, Water use efficiency, Yield.*

FRUIT CHARACTERISTICS OF THE FIVE MERLOT CLONES IN BELGRADE WINEGORWING REGION, SERBIA

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Abstract

Cultivated the grapevine *Vitis vinifera* subsp. *vinifera* is one of the leading horticultural plants in the world. It was domesticated from wild dioecious species *Vitis vinfera* subsp. *sylvetris*. Today, cultivated grape vines known to manifest a greater diversity and heterozygous in comparing with wild vines. The selection process through further and closer history took place in two directions: spontaneous in nature and with the active participation of men in order to increase productivity grape and berries, sugar content and total acids. Vegetative propagation, expressed hermaphroditism with spontaneous hybridization have contributed significantly to the diversity of varieties. Clonal selection has contributed more variety and adaptability improved quantitative and qualitative characteristics. Merlo is a typical example. In Bordeaux keeps about 300 potential clones, 13 were approved and widely diversity in the world. And in other countries were selected clones of variety Merlo, in our experiment we included clones R12, R5 and I-ISV-F-V4 from Italy, as we include two clones 181 and 348 origineted from Bordeaux. In addition to the yield and quality, we were interested indicators supplied the composition of the cluster and berries. The bigger cluster with low seeds in berry and low total acid is clone characteristic of the I-ISV-F-V4, while the per share of sugar in close clones 348 and R-12 chargers.

Key words: *Merlot, clone, yield, quality, composition of grape and berry*

WATER PRODUCTIVITY OF MAIZE GROWN UNDER DIFFERENT IRRIGATION REGIMES IN VOJVODINA (SERBIA)

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Abstract

The objectives of this study were to compare the effect of different regimes of sprinkler irrigation of maize on its productivity and water use efficiency, on experimental fields of the Maize Research Institute of Zemun Polje, Serbia. Four irrigation regimes were studied: full irrigation (I_{100}), 75% of I_{100} (I_{75}), 50% of I_{100} (I_{50}),and no irrigation (I_0), in 2007 and 2008. The crop water use efficiency (CWUE), irrigation water use efficiency (IWUE) and evapotranspiration water use efficiency (ETWUE) are used to assess the water productivity of each studied treatment. The efficiency of the same treatment differs between the study years as it depends on seasonal water availability, weather conditions and their impact on grain yields. In general, CWUE increases with irrigation. In the two growing seasons, IWUE and ETWUE decreased with increasing ETa and the amount of water added by irrigation. On average, treatments $I_{50}$and I_{75}resulted in similar or higher WUE and ETWUE than treatment I_{100}in both years. IWUE rose as the amount of irrigation water increased in 2007, whereas the opposite was the case in the drier year 2008. Under the agroecological conditions such as exist in Vojvodina, treatmentswith 50% and 75% of I_{100}compare very well to full irrigation, in terms of productivity, such that they represent a sustainable irrigation strategy for improving the water productivity of maize, with an average of 43% and 27% less irrigation water, respectively, in which case the grain yields are reduced by 17% and 10%, respectively, on average.

Keywords: *Water management, Water stress, Crop water productivity, Irrigation water use efficiency, Evapotranspiration water use efficiency, Silty-clay soil*.

APPLICATION OF LIQUID ORGANIC FERTILIZER ON RED CLOVER PRODUCTION ON ACID SOIL

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Abstract

The aim was to analyze the impact of foliar application of liquid organic fertilizer on the forage and seed yield of red clover (*Trifolium pratense* L.) in conditions of dense sowing on acid soil. The field experiment with varieties of red clover (K-39 – diploid, Amos - tetraploid) and fertilizing treatments (control, Bioplant flora) was set up in Čačak (Serbia) on the alluvium soil type, with acid reaction (pH_{H2O}=4.8). The experiment was designed using a randomized block design with three replications, with the plot size of 5x1m, row spacing of 20 cm and the amount of seed of 18 kg ha^{-1}. The foliar application of fertilizers (Bioplant flora, Plant DOO, Russia at a concentration of 0.4%, with the implementation of 250 l ha^{-1} of water) was carried out in the first and second growth in the second year of cultivation, once at the beginning of intensive growth and the second time two weeks after that. The first growth was used for forage production and the regrowth for seed production. The foliar application of liquid fertilizer influenced the significant increase in forage yield at tetraploid variety Amos. Irrespective of foliar application of liquid fertilizer, cultivar K-39 had a significantly higher number of inflorescences per stem, number of inflorescences m^{-2}, number of seeds per inflorescence, fertility of flowers and seed yield than variety Amos. Foliar application of liquid manure has affected a significant increase in the value of yield components, primarily fertility of flowers and seed number per inflorescence in cultivar K-39.

Key words: *Red clover, Bioplant flora, yield, variety*

PRE-SOWING SEED INOCULATION IN THE BIRDSFOOT TREFOIL SEED PRODUCTION

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Abstract

A prerequisite for the improvement of birdsfoot trefoilproduction is the production of sufficient quantities of good quality seeds. The aim of the study was to analyze the impact of the seed inoculation with mesorhizobial bacteria on yield and yield components of birdsfoot trefoil seed (*Lotus corniculatus* L.).In experiment birdsfoot trefoil cultivars Zora, K-37 and Rocco, and two strains of *Mesorhizobium loti* were used.A trial was carried out in spring 2012 on a private estate in the village of Ivanovci near Ljig (Serbia) and were set up on brown forest soil type, using a randomized block design with three replications and plot size of 5 m^2 (5x1m). Seed inoculation was performed immediately before sowing. Sowing was carried out at a distance of 20 cm row spacing with the amount of seed of 10 kg ha^{-1}. Irrespective of inoculation, cultivars significantly differed in terms of the number of stems m^{-2}. Two-factorial experiment showed significant influence of *M. loti* strains as well as interaction between the strains and the cultivars on seed yield and yield components investigated (with exemption on seed number per pod). Generally, both strains of *M. loti* have had a positive impact on yield components and seed yield of the birdsfoot trefoil cultivars. Inoculation of seeds has significantly influenced the increase ofthousand seeds weight in the cultivar Rocco, number of stems m^{-2} and seed yield of cultivars Zora and Rocco.

Key words: *Birdsfoot trefoil, inoculation,seed yield, Mesorhizobium loti.*

DEPENDENCE QUALITY INDICATORS OF PEPPER SEEDS OF TESTING METHOD

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Abstract

The aim of this study was to determine the dependence on the two most important indicators of the quality of peppers seeds, germination energy and total germination of the test methods. Rating seed germination was performed on two different substrates (filter paper and sand). For the study two hybrids (SK-5 F1 and Atris F1) and one local variety (Elephant's ear)were used.Results of germination energy and total germination studied hybrids and cultivars show significantly (p=0.01) higher values on the surface filter paper, compared to the values obtained in the surface sand. The highest average germination energy 82% and total germination 95%, was found in the hybrid SK-5 F1, while the lowest average values of 68% and 77% recorded in the variety Elephant ear. Statistical analysis of the total germination showed significant (p = 0.01) difference under the influence of varieties and substrate tests. Between the two test methods for vigor, a significant correlation was established (r = 0.889, p = 0.01), while for the total germination determined highly significant correlation (r = 0.987, p = 0.001) was observed. It is very important that the seeds of peppers have a high germination energy and total germination, because uniform germination of seeds depends on them.

Keywords: *Germination energy, total germination, pepper.*

PHENOLOGICAL TRAITS, YIELD AND FRUIT QUALITY OF PLUM CULTIVARS BRED AT THE FRUIT RESEARCH INSTITUTE IN ČAČAK, SERBIA

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Abstract

Phenological traits, yield and fruit characteristics of ten plum cultivars bred at the Fruit Research Institute in Čačak were studied in the region of Belgradein the period of four years (2012-2015). Average time of flowering of tested cultivars was in the first half of April. The earliest flowering was recorded in 'Čačanska Rana' and 'Valerija', at the latest in 'Zlatka'. The range of fruit maturity was about 2.5 months, from June 24 ('Boranka') to September 6 ('Pozna Plava'). The average yield per tree was the lowest in 'Boranka' (7.8 kg) and the highest in 'Čačanska Najbolja' (23.6 kg). The cultivars 'Čačanska Rodna', 'Nada' and 'Valerija' stand out for high cumulative yield efficiency (0.34 to 0.36 kg/cm^2). Fruit weight was the lowest in the cultivar 'Mildora' (23.9 g), and the highest in the cultivar 'Čačanska Rana' (51.3 g). The cultivar 'Zlatka' is distinguished by a small stone (weight of 0.83 g and the share in a fruit weight of 3.1%). The cultivars 'Mildora', 'Pozna Plava' and 'Čačanska Rodna' are characterized by high soluble solids content (19.8-21.0%), while the cultivars 'Mildora' and 'Nada' are characterized by low acid content (0.47-0.48%) and a very sweet taste. The highest scores for fruit appearance obtained the cultivars 'Čačanska Najbolja', 'Čačanska Rana' and 'Nada', and for taste the cultivars 'Nada', 'Mildora' and 'Čačanska Rodna'.

Key words: *Prunus domestica, flowering, maturation, yield, fruit characteristics*

PRODUCTIVE TRAITS OF TRITICALE DEPENDING ON SOWING RATE AND METEOROLOGICAL CONDITIONS IN TESTED YEARS

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Abstract

The results of the examination of sowing density and meteorological conditions on productive traits of several genotypes of winter triticale are presented in this paper. The examination was conducted in the vicinity of Bijelo Polje, in the northern part of Montenegro in the period 2009-2012. The experiment, set in randomized block system with three replications included five varieties of winter triticale (Odysseus, Kg-20, Triumph, Rtanj and Tango) and two sowing rates (density)– 600 and 800 germinated seeds per m^{-2}. Common agronomical practices were used in the experiment, with the application of NPK fertilizer combinations 60:80:80. The following parameters were assessed: the number of grains per spike, 1000 grain weight, hectoliter weight and grain yields of triticale.

The results of the examination showed significant differences in reproductive traits of winter triticale, depending on the variety, sowing density and weather conditions in the years of research. Variety Tango had the highest average grain yield (5610.0 kg ha^{-1}) and 1000 grain weight (48.4 g), while Kg-20 had the lowest grain yield (4465.6 kg ha^{-1}). Variety Odysseus had the highest number of grains per spike (38.5), while the highest value of hectoliter weight was determined in variety Triumph. Significantly higher yields were achieved by applying higher sowing density in comparison to the standard application of lower sowing density. The results of the examination showed that the demonstrated differences of observed parameters of the varieties which were included in this examination are the results of the specificity of varieties, of agro technical practices and climatic conditions in the years of study.

Key words: *Triticale, productive traits, sowing rate, meteorological conditions.*

NUTRITIVE VALUE OF OYSTER MUSHROOM DEPENDING ON THE SUBSTRATE

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Abstract

Oyster mushroom has lately been more produced worldwide due to its shorter growing season and fruiting, high resistance to diseases and pests, and low requirements for growing conditions. Growing oyster mushrooms is simple and many different substrates are used which contain cellulose, hemicelullose and lignine. The degradation of these components provides fruiting bodies of mushrooms and they are important for human nutrition. The process of growing mushrooms uses agricultural residues, so oyster mushroom cultivation directly helps the management of organic waste. Storing and burning organic waste have become a significant environmental issue and large quantities of biomass are unnecessarily being destroyed. The aim of this study was to grow oyster mushrooms on agricultural waste most abundant in Vojvodina Province – wheat and soybean straw and maize and sunflower stalks, used as individual substrates and in combination with wheat straw, which is most often used as oyster mushroom substrate. Isolated and determined oyster mushroom (*P. ostreatus*) strain was used (NS 77). The effect of substrate on the nutritive content of mushrooms was analyzed, as well as the content of water, proteins, fats, cellulose, ash and mineral elements. Determination of the effect of substrate on the content of nutrients in the oyster mushroom enabled control of the quality of mushrooms depending on the market demands.

Key words: *Oyster mushroom, strain NS 77, substrate, nutritive value*

GENOTYPE AND FERTILIZATION INFLUENCES ON ZINCSTATUS IN MAIZEIN TEMPERATE SEMIARID CONDITIONS

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Abstract

Maize has large requirements for zinc and it is very susceptible to Zn deficiency, especially the inbred lines. The aim of this study was to analyze the response of maize genotypes to different fertilization treatments, as well as the zinc concentration in leaves and grain. The study included the following systems of fertilization: T_1: control – $P_{60}K_{60const}$; T_2: $P_{60}K_{60}$ + $N_{min\ spring}$; T_3: $P_{60}K_{60}$ + $N_{40autumn}$ + $N_{minspring}$; T_4: $P_{60}K_{60}$ + $N_{60spring}$; T_5: $P_{60}K_{60}$ + $N_{100\ spring}$; T_6: $P_{60}K_{60}$ + $N_{40autumn}$ + $N_{60spring}$ + Zn; T_7: $P_{60}K_{60}$+ $N_{40autumn}$ + $N_{80spring}$ + Zn; T_8: $P_{60}K_{60}$ + $N_{160spring}$ + Zn. Zn was applied as zinc sulphate ($ZnSO_4$), in the amount of 1.0 kg $ha^{-1}$with foliar spraying, in the fourth and sixth week after sowing. Average Zn content in maize leaves, across the treatments ranged from 44.4 mg kg^{-1} dry weight (DW) in 2011 to 41.2 mg kg^{-1}DW in 2012.Depending on the applied fertilization system, lower content of Zn in maize leaves (36.4 mg kg^{-1} DW), was found with application of $P_{60}K_{60}$ + $N_{60spring}$, and the highest (57.8 mg kg^{-1} DW) in the treatment $P_{60}K_{60}$ + N_{40fall} + $N_{80spring}$ + Zn. Higher Zn content in grain was found in the NS 6030 hybrid (26.3 mg kg^{-1}DW) and NS 6010 (26.1 mg kg^{-1}DW) compared to NS 4023 (24.1 mg kg^{-1}DW) and NS 640 (25.3 mg kg^{-1}DW). On average, Zn concentration in the grain differed in 2011 (27.6 mg kg^{-1})compared to2012 (23.3 mg kg^{-1}). The lower Zn content in the grain was observed in T_1 (23.4 mg kg^{-1}) and the highest in T_7 (31.0 mg kg^{-1}). Future breeding programs should be focused on developing new genotypes suitable for mineral bio-fortification and with increased mineral bioavailability in grains.

Key words: *Fertilization, maize hybrids, zinc, leaves, grain.*

EFFECT OF MULCH TYPE ON THE PRODUCTIVITY OF POTATO

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Abstract

Even though soilmulching is a common practice in vegetable crop production, there is only scarce information about effect of this technique on the yield of potato (Solanum tuberosum L.).Field experiments were conducted to investigate the effects of different mulch materials on productive characteristics of three potatocultivars: Marabel (medium early), Desiree(medium late)and Jelly (medium late)under agro-ecological conditions of Southern Srem, Serbia. Treatments were arranged in a randomized complete block design with four replications with irrigation drip system at the site of Zemun Polje (44°88'N, 20°35'E, 79 m a.s.l.) in years 2011 and 2012. The variants with silver plastic mulch, red plastic mulch and straw mulch were compared to a control plot with bare soil. The highest average number of tubers per plantwas determined in cv. Marabel subjected to the straw mulch treatment (11.85), while the lowest average number of tubers was determined in the cv. Desiree's control variant(8.65). Mulching combined with irrigation caused 2-3-fold increase in tuber yield compared to the average yield of potato in commercial production in Serbia.In a two-year study, treatment with red plastic mulchresulted in the highest average total yield in cv. Marabel and cv. Jelly, 55.9 t ha^{-1} and 46.7 t ha^{-1}, respectively, while combination of irrigation and straw mulch resulted in the highest average total yield of cv. Desiree (45.2 t ha^{-1}). The study showed that two investigated factors, type of mulch and cultivar, significantly affected the number of tubers per plant and total yield of potato.

Key words: *Mulching, potato, potato yield, number of tubers*

GERMINATION TEST METHODS OF INSECTICIDE-TREATED SEEDS

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Abstract

The seed treatment with insecticides in certain cases causes lower values of seed germination due to phytotoxicity, which is manifested as atruncated and thickened main root. In the Seed Testing Laboratory, the method most suitable for seed germination was sought out in order to reduce effects of phytotoxicity of treated seeds to the minimum.

This study encompassed germination tests of 10 seed lots of maize hybrids of different maturity groups stored in the controlled-environment chamber for a year. One part of seeds was treated with the fungicide Maxim XL, while the remaining part was treated with the fungicide Maxim XL + insecticide Sonido. The seed germination tests were carried out in the Seed Testing Laboratory, Maize Research Institute, Zemun Polje, by the between paper method (4x100 and 8x50 seeds) and the sand method (4x100 seeds). Seeds were germinated in the room germinator at the alternating temperature of 20<=>30^{o}C and 16:8 (light : dark) photoperiod. The first counting was done on the fourth day and the final one on the seventh day when the BP method was used. In cases when the S method was applied, the final counting was done on the seventh day. When seeds were germinated, the control sample was also placed for germination.

Considering results of the last year germination, it was determined that seed germination was not significantly changed after a year of storing in the controlled-environment chamber. The comparison of results on germination of seeds treated only with the fungicide with seeds treated with fungicide+insecticide, shows lower values in seed germination in all three treatments in fungicide+insecticide-treated seeds. The lowest germination values were recorded in seeds treated with fungicide+insecticide in sand, while the highest values were obtained by the BP method (8x50 seeds).

Key words: *Germination, insecticide*

IMPACT OF LIMING ON CHEMICAL PROPERTIES OF SOIL IN RASPBERRY ORCHARD

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Abstract

The decline and dieback of raspberry plantings observed in western Serbianot only lead to a decrease in yield in the current growing season, but also reduce productivity in future years. In order to determine possible causes of raspberry dieback, soil samples were taken in the 2012 growing seasonat Leušići (Municipality of Gornji Milanovac). Sampling results provided information on soil acidity, the content of available forms of macroelements (N, P, K, Ca, Mg) and microelements (Fe, Mn), the level of mobile aluminum and the total content of heavy metals (Ni, Pb, Cd, Cr). Samples of plant material (leaf and fruit) were also collected and analyzed for the concentrations of the above mentioned elements. To reduce acidity, two lime treatments, each at a rate of 500 kg/ha CaO, were applied, i.e. broadcasting treatment and row application. The soil exhibited an acid reaction (pH/H_2O 5.70; pH/KCl 4.45), a moderate humus supply (4.56%), good availability of nitrogen and potassium, and phosphorous deficiency. Regardless of the good soil Ca and Mg availability, the ratio between the two elements was unfavorable. The content of microelements was within the allowable concentrations, with no aluminum detected. The total levels of Ni and Cr were above the maximum allowable concentrations and the content of Pb was within the allowable range, whereas no Cd was found. Lime-induced changes in the chemical properties of the soil were likely to match the implemented soil neutralization, with the broadcast application of CaO being more effective.

Keywords: *Raspberry, soil acidity, macro- and microelements, heavy metals*

SIGNIFICANCE OF AGRO-ECOLOGICAL CONDITIONS ON TRAIT FORMATION OF MAIZE HYBRID SEED

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Abstract

Traits of the F_1 generation of maize hybrid seed were observed in four SC combinations produced in two locations. Agro-ecological conditions for the production of hybrid seed in these locations during three years differed. The coefficient of variation for germination energy and seed germination was 0.71% in ZP 341 during the first year. Produced seed of all observed hybrids was of satisfactory quality. The analysis of data shows that seed germination and energy (2.56% CV)varied the most in the hybrid combination ZP 434 in the three-year experiment. According to the location assessment, established differences in traits were greater, and the coefficient of variation for both locations amounted to $0.9 \leq 3.21$. The effect of agro-ecological conditions differed over locations during the same production season. According to obtained results, agro-ecological conditions have an essential role on the formation of traits of hybrid seed.

Based on gained results, the level of expression of the two observed traits in all four hybrids was high under all agro-ecological conditions. Moreover, effects of the factors (hybrid and location) on germination energy and seed germination were high.

Key words: *Maize, location, germination, variability.*

VITAMIN PROFILES OF MAIZE LANDRACES FROM A MINI CORE COLLECTION FOR GRAIN QUALITY

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Abstract

Profiles of vitamins A and E were analysed in 16 maize landraces from mini core collection for grain quality using HPLC technique. Contents of γ+ß and δ tocopherols (vitamin E fractions) were moderate on the average, and neither landrace showed exquisite values of these compounds, while α-tocopherol content was high in two landraces (13.330µg g^{-1} and 9.138µg g^{-1}). Since these 16 landraces are not high-oil ones, lack of high concentrations of some vitamin E fractions would not be reflected on quality and stability of oil potentially extracted from them. The tested landraces are white to orange flints or semi flints, and vitamin A fractions ranged from the trace values (white landraces) to 11.37µg g^{-1} lutein, 40.91µg g^{-1} zeaxanthin and 5.248µg g^{-1}ß-carotene. Maximum lutein value was not very high, but maximum values for zeaxanthin and ß-carotene were high in comparison with the literature data. One landrace, named L 161, had high values of α-tocopherol (second in range) and both the highest values of zeaxanthin and ß-carotene and it could be used for maize biofortification.

Key words: *Antioxidants, landraces, maize, vitamins*

SEED QUALITY PARAMETERS IN A SET OF SINGLE CROSS MAIZE HYBRIDS, THEIR INBRED COMPONENTS AND RECIPROCAL CROSSES

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Abstract

Standard seed germination rate (GR) and cold test germination rate (CTGR) were scored for 10 maize singlecrosses, their reciprocals and inbred line components, where five hybrids belong to FAO 300-400 and five to FAO 500-600 maturity group. A total of 12 inbreds was included, since the hybrids comprising the same maturity group have one inbred in common. The aim was to estimate influence of the reciprocal crosses on GR and CTGR. Analysis of variance showed statistically significant effect of genotypes on both parameters, while reciprocal crosses significantly influenced only GR. Average GR for hybrids was from 94,0% (ZP 335) to 99,25% (ZP 388), while among inbreds it ranged from 93,0% (ZPL12) to 99,5% (ZPL9). Average CTGR for hybrids was from 91,5% (ZP 335) to 99,5% (ZP 366), while for inbreds it was from 94,0% (ZPL6) to 99,0% (ZPL10). Among original hybrids with ZPL1 as the male parent average GR i.e. CTGR was 96,0% i.e. 95,8%, while among their reciprocals it was 98,6% i.e. 95,8%. The average GR i.e. CTGR for original later maturity hybrids (ZPL7 as the male parent) was 95,9% i.e. 97,4% and for their reciprocals it was 96,8% i.e. 97,2%. The highest difference in GR between original and reciprocal cross for a single hybrid was estimated for ZP 335, where original version had 89,5% and reciprocal 98,5% germination rate. Regarding this parameter both ZPL1 and ZPL7 performed better as a female parent.

Key words*: Cold test, maize, germination rate, reciprocal cross*.

THE EFFECT OF ORGANIC AND MINERAL FERTILIZATION IN DIFFERENT CROPPING SYSTEMS OF MAIZE

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Abstract

Cropping systems of maize that are predominant in Serbia include continuous cropping, two crop rotation with winter wheat, and to a smaller extent, three crop rotation with winter wheat and soybean. The application of fertilizers, organic and mineral, is necessary in order to achieve higher yields. The typical sources of farmyard manure (FYM) are farms with the livestock production which are affected by present changes in agricultural owner's structure. Instead of FYM, soybean as a previous crop of maize, could play a role of a natural nitrogen soil supplier. The objective of the study was to evaluate the effects of the organic and mineral fertilizer application in different maize production systems on crop development and yield. The study was initiated in the experimental field of the Maize Research Institute Zemun Polje, Serbia in 2008/2009. The following production systems were evaluated: maize continuous cropping (MC), maize-winter wheat (MW), maize-soybean-winter wheat (MSW) and maize-winter wheat-soybean (MWS). In the autumn of 2008, cattle manure was applied in all production systems and in MC and MSW every third year, in MW each second year and, FYM was not applied in MWS rotation. Additionally, mineral fertilizers were applied in autumn and during early development stages of maize in spring in all cropping systems according to recommendation based on soil analysis. In 2015, after two completed three rotation cycles, the nitrogen content in the soil, leaf area, chlorophyll content, harvest index and the grain yield of maize were analysed.The highest chlorophyll content, harvest index and grain yield of maize were achieved in the rotation with winter wheat and when FYM was applied. Growing of maize in continuous cropping or without the application of organic fertilizers reduces grain yield.

Key words: *Production system, maize, fertilisers, nitrogen, yield*

GENETIC VARIABILITY OF THE CEREAL (*POACEAE*) GERMPLASM COLLECTION MONITORED BY PROTEIN AND MOLECULAR MARKERS

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Abstract

All the new challenges that food production has been experienced, requires adequate response not only in wide agricultural practice, but also in modern breeding programs. Broadening genetic variability is indispensable to meeting the border set by climatic changes, land erosion, human population growth, and sustainable agriculture. Gathering genetic variability, forming and examining genetic collection are integral part of the task. A germplasm collection of 220 entries, consisting of cereal (*Poaceae*) genotypes has been formed. Genetic variability of wheat (*Triticum* sp.), barley (*Hordeum* sp.), and goat grass (*Aegilops* sp.), samples from the germplasm collection was analysed using gliadin blocks as protein markers, as well as, Random Amplified Polymorphic DNA (RAPD) markers. Gliadin allelic variation was notable within *Triticum* sp. samples, revealing not only genetic divergence, but also the origin and the structure of populations. Genotype variation and structure of populations of *Hordeum* sp. was followed by hordein allelic variation. Sampled population expressed heterogeneity from two to five genotypes per population sample. Landraces, old and modern varieties were separated in collection using hordein allelic variation, as well. A small, pilot, investigation was conducted on *Aegilops* sp. polymorphism using RAPD primers. Number and percentage of polymorphic loci, effective number of alleles, expected heterozygosity and Shannon's information index were used to estimate genetic variation.

Key words: *Biodiversity, wheat, barley, Aegilops* sp., *genetic marker.*

ADAPTATION OF WINTER WHEAT GENOTYPES TO LOW SOIL pH AND HIGH LEVELS OF MOBILE AL IN THE SOIL

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Abstract

Low soil pH and a high mobile Al content of the soil pose a significant threat to wheat production on over 60% of arable land in Serbia. Wheat is very sensitive to soil acidity and high levels of mobile Al in the soil. However, genotypes show different sensitivity to these stress factors and external factors. Some wheat genotypes exhibit significantly higher tolerance than other wheat genotypes, or other cereal crops. This paper presents the results of testing conducted over three years to evaluate10 genotypes of winter wheat for their tolerance to low soil pH and highlevels of mobile aluminum in the soil. The analysis of productive traits and grain Al content of plants showed that the highest tolerance to low pH and high levels of mobile Al in the soil was exhibited by the genotypes 'Roane', 'Rapsodija', 'Ornil', 'Nora' and 'Nevesinjka', as opposed to the low adaptability to these stress factors in 'Sana', 'Kalyansona', and 'Zarrin'. Tolerant genotypes had grain yieldshigher on average by 105%, number of grains per spike by 61%, grain weight per spike by 38% and 1000-grain weight by about 27% in comparison to sensitive genotypes. Also, grain Al concentrations in tolerant winter wheat genotypes were significantly lower(0.18-0.39 mg g^{-1}) than in sensitive genotypes (0.95-1.30 mg g^{-1}).

Key words: *Adaptation, aluminum, genotype, wheat, soil*

CHERRY BREEDING WORK AT FRUIT RESEARCH INSTITUTE – ČAČAK (REPUBLIC OF SERBIA)

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Abstract

Cherry breeding programme at Fruit Research Institute (FRI) – Čačak (Republic of Serbia) has had a long tradition since its initiation in 1960. The main method is the planned hybridisation within *Prunus avium* L. and *Prunus cerasus* L. Two sweet cherry (‘Asenova Rana’ and ‘Čarna’) and two sour cherry cultivars (‘Šumadinka’ and ‘Čačanski Rubin’) have been released in the previous period. Three new sour cherry cultivars (‘Sofija’, ‘Nevena’ and ‘Iskra’) were named and released in 2015, whereas a large number of hybrids are being intensively studied. Current sour cherry breeding work is based on the use of domestic genotypes, well adapted to the environmental conditions of the area (either obtained by planned hybridisation or autochthonous), and introduced genotypes – known sources of resistance, with a high cropping potential and good fruit quality. The investigations are also focused on different aspects of floral biology of these fruit species – flowering phenology, pollen quality, monitoring the pollen tubes growth in the pistil and cytoembryology. Cultivars’ specificities in reproductive behaviour as pollen donors/recipients were considered in order to find solutions for adequate choice of cultivarscombinations that yield the best performance in terms of good fruit set and satisfactory yields. Decades-long research work on self- and cross-(in)compatibility in cherries was started by monitoring fruit set percentage under field conditions, and was later considerably advanced by observing pollen tubes growth in the pistil using fluorescence microscopy. In recent years, *S*-genotyping of domestic and foreign sweet cherry cultivars has also been involved, using consensus primers that amplify the two introns of *S-RNase* and allele-specific primers.

Keywords: *Sweet and sour cherry, breeding, new cultivars, floral biology, S-incompatibility*

PHENOLOGICAL AND POMOLOGICAL TRAITS OF SOME INDIGENOUS APPLE GENOTYPES FROM THE *ex-situ* COLLECTION OF THE FRUIT RESEARCH INSTITUTE, ČAČAK (REPUBLIC OF SERBIA)

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Abstract

This study was conducted on five genotypes from the Fruit Research Institute (FRI), Čačak (Republic of Serbia) Apple Collection – 'Bošnjanka Sejanac', 'Jevtović Milutin', 'Jusuf Bećović', 'Tip 3' and 'Valjnika'– in order to determine the main biological properties. Flowering phenophase (onset, full and end of flowering), harvest maturity, pomological properties (morphometric and chemical) and disease susceptibility to scab [*Venturia inaequalis* (Cooke) Wint.], mildew [*Podosphaera leucotricha* (Ell. & Ev.)] and fireblight [*Erwinia amylovora* (Burnill)] were studied using Apple Descriptors, and standard morphometric and chemical methods. Regarding full flowering, the genotypes were classified from very early ('Jusuf Bećović') to late ('Tip 3' and 'Valjnika'). From the aspect of the fruit ripening time, all genotypes belong to the group of winter apples (from late September/early October to mid October). The average fruit weight ranged from 86.01 g ('Valjnika') to 135.21 g ('Tip 3'). The highest average fruit height and width were determined in 'Tip 3' and 'Jusuf Bećović' (58.51 mm and 68.12 mm, resp.), while the lowest was in 'Jusuf Bećović' and 'Valjnika' (50.77 mm and 56.67 mm, resp.). Regarding fruit quality among the assessed genotypes, the highest soluble solids content and total sugars were found in 'Jusuf Bećović' (15.10% and 12.83%, resp.). The highest content of total acids was found in 'Tip 3' (0.64%), accompanied with the lowest pH value (3.15%). 'Valjnika' showed low field susceptibility to scab and powdery mildew. All of the studied genotypes showed field resistance to fireblight, except for the 'Jevtović Milutin'.

Keywords: *Malus* × *domestica, autoshthonous genotype, biological properties, resistance*

CHANGE NUMBER OF MICROORGANISMS IN THE RHIZOSPHERE OF ALFALFA AS RESULT OF INOCULATION RHIZOBIA AND AZOTOBACTER

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Abstract

Microorganisms present the biotic component of soil and their abundance is an indicator of soil quality. Content of organic matter, as an energy source for microbial metabolism, and chemical properties, especially pH value of the soil, are limiting factors that influence the activity of microbial populations.In order to find solutions of growing alfalfa and other crops on acid soils different agricultural measures are used, and biological measures such as the use of microbial inoculants for better utilization of resources for the development of plants and microorganisms are increasingly introduced. In this paper, the effects of microbial inoculants on the abundance of microorganisms in the rhizosphere soil of alfalfa (*Medicago sativa* L.) were studied.Alfalfa seed of cultivar Syntéza 1inoculated with two nitrogen-fixing bacteria: rhizobium (*Sinorhizobim meliloti)* andazotobacter *(Azotobacter chroococcum).* The above listed microorganisms were used individually and in joined cultures. After inoculation seed from each inoculum variant were planted in the pots filled with corresponding soil.The control variant was without inoculation. For the purposes of research two types of soil with different pH were used (the soil with increased acidity and with neutral reaction).The results Fishers LSD test show that the total number of microorganismsin the rhizosphere of alfalfa after inoculation in comparison with the control varied depending on the variant of inoculation and soil type.

Keywords: *Microorganisms, alfalfa, inoculation*

VARIABILITY OF COCKSFOOT (*Dactylis glomerata* L.) AUTOCHTHONOUS POPULATIONS COLLECTED IN SERBIA

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Abstract

Cocksfoot (*Dactylis glomerata* L.) is one of the most important cool season perennial grasses used for animal feed production on grasslands and pastures. It shows a high yield of quality forage as a component of different grass legume mixtures with more than five years of utilisation. Basic requirement for successful breeding of this species, as well as other, is variability of the initial material. The collection examined consisted of twenty two autochthonous populations of cocksfoot collected in hilly-mountainous areas of Serbia. Trial was conducted as spaced plant nursery with 30 plants per genotype in two years. The aim was to determine genetic variability for the most important phenological (heading date), morphological traits (plant height, length of leaf, width of leaf, the leaf number, panicle length and the number of tillers per plant) and dry matter yield per plant. Investigated material has demonstrated significant variability within the genotypes for all studied parameters. The highest average within population variability was determined for dry matter yield (CV 95%), while the lowest variability was determined for date of heading (CV 24%). The highest dry matter yield per plant was measured in the population of Čestobrodica 1, Grza and Boljevac 3 locality. The data were analysed by ANOVA. Among populations variability was high statistically significant for all investigated traits.Genetic diversity of examined cocksfoot autochthonous populations was illustrated by cluster analysis. High level of genetic variability in this collection indicates that the cocksfoot breeding process can make progress in the further.

Keywords: *Cocksfoot, variability, autochthonous populations, dry matter yield*

EFFECTS OF DIFFERENT TYPES OF CYTOPLASM ON PLANT HEIGHT OF MAIZE INBRED LINES

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Abstract

The aim of the study was to determine effects of both, different types of cytoplasm (*cms*-C, *cms*-S and fertile) and environmental factors, on the plant height of 12 maize inbred lines. The trial with inbred lines was set up in two locations (ZemunPolje - Selection field and ZemunPolje - Školsko dobro) in 2008 and 2009. Very significant differences in the plant height among inbred lines in dependence on the type of cytoplasm and the location were established by the analysis of variance. The average plant height varied from 161.8cm (L_{11}) to 220.5cm (L_1). In relation to the type of cytoplasm (*cms*-C, *cms*-S and fertile), the average values of the plant height very significantly varied ($P \leq 1\%$). The plant height in inbred lines with fertile cytoplasm was very significantly higher ($Lsd_{0.01}$) (187.6cm) than in inbred lines with sterile *cms*-C (181.1cm) and *cms*-S (180.2cm) types of cytoplasm. Varying of average values of the plant height was very significant ($P \leq 1\%$) in both years of investigation and locations. In 2008, the average plant height of inbred lines (173.98cm) was significantly lower than the average values recorded in 2009 (191.94cm). Very significantly higher values of the plant height were determined in the first location, Selection field (189.25cm) than in the second location, Školsko dobro (176.67cm).

Keywords: *Cytoplasmic male sterility, inbred lines, plant height*

EFFECTS OF FERTILIZERS ON YIELD OF MAIZE HYBRIDS WITH DIFFERENT KERNEL COLOUR

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Abstract

White, red and yellow are the most common basic colours of maize, but other colour varieties exist, like blue, purple, brown and orange. Maize kernels with diverse colours have pigments and other substances with antioxidant capacity that can be highly beneficial for human health. This paper deals with results of the effects of different fertilizers on yield of maize hybrids with different kernel colour in two-year period (2014-2015). Trial was set up on chernozem soil type in the experimental field ofMaize Research Institute in Zemun Polje, Serbia. Maize hybrids differing in the kernel colour developed at the Maize Research Institute, Zemun Polje, Belgrade, Serbia, were selected for these study: red maize ZP Rumenka, white maize ZP 655b and yellow maize ZP 633. The treatments of fertilization consisted of following variants: control, mineral fertilizer AN, microbiological fertilizer Unikerand organic fertilizer under the trade name „Humus Vita Stallatico". On the basis of two-year results it is obvious that meteorological conditions have very significant influence on maize yield. The second season had weather pattern less favourable for the maze production due to severe drought and very high temperature during flowering. According to results the yield of different maize hybrids was significantly different depend on varieties too. Fertilization showed no significant influence on maize yield in this experiment. All maize hybrids have greater yield in 2014 growing season compared with 2015. Red coloured hybrid ZP Rumenka had very significant lower yield then white and yellow hybrid in both years. The highest yields were recorded on treatments with the organic fertilizer in maize with red and yellow kernels.

Keywords: *Maize, different coloured kernel, fertilizer, yield.*

STABILITY OF FLOWER HEAD YIELD IN CHAMOMILE VARIETIES(*Chamomilla recutita*L. Rausch.)

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Abstract

The objective of this study was to evaluate stability of the flower head yield in different chamomile varieties (Banatska, Bona, Novbona and Mina) using the model which provides not only regression coefficient *bi*, but also a second stability parameter - standard deviation from regression S^2di.Significant differences for the yield were determined among studied genotypes. Variety Mina expressed notably higher yield in comparison to the others. Significant differences in F-test were obtained on experimental locations. On locality in StaraPazova all experimental varieties achieved significantly higher yields.Analysis of stability parameters *bi* and S^2di showed that varieties have different levels of stability. According to the method applied, stabile genotype is achieved with $bi = 1$, and it is desirable that S^2di tends towards zero. In relation to the parameter *bi*, Banatska is the most while. Bona is the least stable variety. Variety Bona grows better in favorable cultivating conditions, while Mina variety is better adapted to unfavorable growing conditions. This implies that appropriate environmental conditions are crucial for growing these varieties in large extent.

Keywords: *Chamomile, flower head yield, stability, variety*

MAIZE POPULATIONS AS A SOURCE OF MICRONUTRIENT IMPROVEMENT

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Abstract

Maize grains contain a high level of *β*-carotene and tocopherols. This research was performed to estimate differences in tocopherols (*α-, β + γ-, δ-*), *β*-carotene, zeaxantin and lutein content in thirty maize populations from the MRI gene bank by using high-performance liquid chromatography (HPLC). Among the genotypes, variation was observed in the traits of interest: *α*-tocopherol content was higher in the introduced than in the local populations. The local populations showed a higher concentration of lutein (1.50-15.94µgg^{-1}) than the introduced populations (1.24-6.79µgg^{-1}). The content of *β*-carotene ranged from 0.55 to 4.80 µg g^{-1}in the local populations and from 0.26 to 7.95 µgg-1 in the introduced populations. The zeaxantin content was higher in the introduced (0.48 to 40.86µgg^{-1}) than in the local populations (1.51 to 30.05µgg^{-1}). The population 25 with orange kernels had a high level of zeaxantin, *β*-carotene and tocopherols. That population is used for improvement of tocopherol and carotene content in inbred lines. The population was crossed with 5 inbred lines during 2015. *β*-carotene content in the inbreds ranged from 0.47 to 2.98µgg^{-1}, and in the crosses from 3.22 to 16.48µgg^{-1}. Furthermore, the content of tocopherols was higher in the crosses than in the inbred lines per se. This population could be used in future breeding programs for improving the nutritive value of commercial inbred lines.

Keywords: *Maize, population, tocopherols, carotene*

SELECTIONOFWHEATSUPERIORGENETICVARIATIONFORGROWINGINHALOMORPHICSOILCONDITIONS

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Abstract

With the dramatically increment of human population, demand for food will increase significantly. In order to enhance food amount, there is a need for utilization of all available ways to produce food. One of those ways is the exploitation and utilization of production unsuitable and less productive soil. Solonetz is a type of soil characterized by increased alkaline reaction, high sodium content and unfavorable water-physical characteristics. Solonetz is mainly used as a destitute pasture, covering about 135 million hectares,about 20 million hectares in Europe, while in Serbia occupies about 80,000 hectares, mainly in Vojvodina. Trials were set up at two localities that differ in agro-ecological conditions, especially in terms of land. The experimental field of the Novi Sad Institute of Field and Vegetable Crops has been used as control part of the trial having normal growth conditions on chernozem soil. The other locality is in the village of Kumane in Banat. The aim of perennial trials conducted on chernozem and solonetz types of soil is to select usable genetic variation from the existing wheat gene pool and to create a novel genetic variability for the halomorphic soil growing conditions. Multiyear results show that desirable genetic variability could be selected within the existing genetic variation and that novel genetic variability of the enhanced tolerance to abiotic stress conditions of high sodium content and higher alkalinity could be selected in progenies of suitably chosen parents.

Keywords: *Wheat, abiotic stress, solonetz, breeding ,genetic variation.*

CONTENT OF β-GLUCAN INCREASES THE PRODUCTIVITYOF BARLEY KERNELS

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Abstract

β-glucan as a secondary metabolite of barley kernels is a biologically active component with a positive impact on human health. β-glucan from cereal grains is a soluble fibre that reduces the amount of cholesterol in blood, decreases glucose levels after meals, as well as insulin levels. From technological aspect, it negativelyaffects rheological properties of dough. Natural grain coat (chaff) and difficulties in its grinding as well as the lack of gluten narrows the applicability of barley in the fabrication of food. The content of β-glucan in barley kernels varies depending on genotype and agro-ecological conditions. Barley has multifunctional - medicinal role in human diet, which has led to an increase in market demand. The studying of β-glucan contents showed genotypic variations, ranging from 3% to 6.5%. Besides the genotype factors, the authors also detected some significant differences that came as a result of agro-ecological conditions and diseases. The tested samples were three genotypes of barley:*Rekord*, *Zlatnik* and *Nonius*. The content of β-glucan ranged from 3.91 to 4.21%. A higher content of β-glucan in barley kernels, a very important metabolite, is expected in increased demand and promotion of functional characteristics of food and food products. The aim of barley growers should be to increase the production of varieties with higher content of β-glucan. The use of modern technologies of cultivation, selection and breeding, and creation of mutagenic barley populations could pave the way for such development.

Keywords: *Barley, β-glucan, fibres*

EFFECT OF CLIMATIC FACTORS ON FRUIT QUALITY OF BLACK CURRANT (*RIBESNIGRUM* L.) CULTIVARS

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Abstract

The experiment evaluated the effect of climatic factors (air temperature and rainfall) on the content of primary metabolites (soluble solids, total sugars, invert sugars, proteins, titratable acidity and pH) and vitamin C in the fruit of seven black currant cultivars, including 'Ben Lomond', 'Ben Sarek', 'Tsema', 'Titania', 'Čačanska Crna', 'Tisel' and 'Tiben'. During the three-year experimental period, significant differences in the parameters tested were observed among the cultivars. Soluble solids content was highest in 'Tisel' (15.8%) and 'Tiben' (15.6%). High value of total sugars (14.1%) was found in 'Titania', and those for invert sugars (8.92%), proteins (1.28%) and vitamin C (227.5 mg 100 g^{-1}FW)were recorded in 'Čačanska Crna'. The highest content of titratable acidity(2.76%)and the highest pH value (3.21) of the fruit were determined in 'Tisel'. Climatic factors (air temperature and rainfall) had a significant effect on fruit chemical properties. High air temperatures and low rainfall amounts during berry formation and ripening promoted the synthesis and accumulation of soluble solids (15.4%), total sugars (11.2%), invert sugars (8.97%)and proteins(1.36%). Conversely, low air temperatures and high rainfall amounts had a positive effect on the synthesis of titratable acidity (3.00%)and pH value (3.06)of the fruit, whereas vitamin C content (210.0 mg 100 g^{-1}FW)was highest at moderate air temperatures and moderate rainfall levels.

Keywords: *Black currant, climatic factors, chemical fruit traits*

STABILITY OF SPIKE WEIGHT AND GRAIN WEIGHT PER SPIKE OF DIFFERENT WHEAT GENOTYPES

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Abstract

In this paper, the stability of ten divergent wheat varieties wasinvestigated, where two traits were analyzed: spike weight and grain weight per spike. The trial was conducted on the experimental field of the Center for Small Grains in Kragujevac during three growing seasons. The expressions of the analyzed traits were statistically significant and showed additive and non-additive sources of variation. The AMMI analysis showed significant effect of the genotype x environment interaction, where two main components were significant (PCA1 and PCA2). The first principal component (PCA1) expressed the largest share of the genotype x environment interaction.The genotypes reacted differently to different environmental conditions. Genotype Szegedi 765 had the highest value of analyzed traits, but moderate to low stability. Genotypes Sterna and Gruza expressed the highest stability, while genotype Mironovskaya 808 showed the highest instability in terms of both traits. The investigated genotypes had the highest stability in the second year of investigation, and the lowest stability in the first year. In terms of stability,these genotypes can be used in wheat breeding programs.

Keywords: *Stability, AMMI, wheat, interaction, PCA*

COVER CROPS EFFECT ON STATUS OF MAIN ANTIOXIDANTS IN SWEET MAIZE

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Abstract

Cover crops has important role in sustainability, owing to protection from soil erosion and soil enrichment with organic matter. Bio-fertilizers are important for increase of soil and crop quality. The aim of experiment was to examine nutritional quality of sweet maize, sown at experimental plots after different cover crops: T1 - common vetch (*Vicia sativa* L.), T2 - winter oats, (*Avena sativa* L.), T3 - fodder kale (***Brassica oleracea* (L.) *convar. acephala***), T4 - field pea (*Pisum sativum*L.) + winter oats, T5 - dead organic mulch, T6 - common vetch + winter oats, T7 - field pea and control - uncovered during the winter, in combination with bio-fertilizer Uniker, during 2013/2014. Content of main antioxidants: phenolics, glutathione, vitamin C, carotenoids and phytic acid were determined in technological maturity.

The highest content of carotenoids (2.48 µg g^{-1}) was obtained in T1 + Uniker combination, while the highest values of glutathione and phenolics were in T2 treatment (1927nmol g^{-1} and 716 µg g^{-1}, respectively). T3 was characterized with the highest vitamin C content in combinations with and without Uniker (29.92 and 31.09 mg $100g^{-1}$) and control had the highest phytic P content (3.69 mg g^{-1}). Correlation consigned that increased kernel yield was followed by carotenoid increase and phenolics decrease in general, while application of Uniker induced increase of P_{phy} and decrease of vitamin C, parallel with grain yield increase.

Keywords: *Sweet maize grain, nutritional quality, antioxidants*

OSMOTIC STRESS TOLERANCE OF FIELD PEA SEEDLINGS

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Abstract

The effect of different osmotic potential levels (0,-0.3 MPa, -0.6 MPa, -0.9 MPa, -1.2 MPa, -1.5 MPa) induced by NaCl on germination and early seedling growth in two divergent winter field pea cultivars (‘Kosmaj’ and ‘Letin’) was investigated. Germination was tested in sterile plastic vessels on filter paper moistened with 10ml of distilled water or salt test solutions, in the dark at 20 ± 1°C. Cultivars ‘Kosmaj’ and ‘Letin’ had a high percentage of germination under high osmotic potentials because germination was more than 75% (minimum germination standards is ≥75%). However, the tested cultivars showed different NaCl tolerance at the seedling stage. Cultivar ‘Kosmaj’ had better shoot growth, while cultivar ‘Letin’ root growth. Cultivar ‘Kosmaj’ had significantly higher germination energy (GE) (55.38%), shoot length (ShL) (5.58 cm), shoot fresh weight (ShFW) (79.28 mg), shoot dry weight (ShDW) (7.86 mg), relative seedling water content (RSWC) (87.81%) and phytotoxicity of root (PhR) (44.58%) than cultivar ‘Letin’ (27.83%, 2.23 cm, 57.54 mg, 6.71 mg, 86.10%, 15.32%, respectively). Contrary, cultivar ‘Letin’ had significantly higher germination (G) (98.58%), root length (RL) (10.28 cm), root fresh weight (RFW) (90.16 mg), root dry weight (RDW) (13.22 mg) and seedling vigor index (SVI) (1237.97) than cultivar ‘Kosmaj’ (92.13%, 5.62 cm, 49.62 mg, 6.26 mg, 1068.10, respectively). GE, G, RL, ShL, RFW, ShFW, RDW, ShDW, SVI, RSWC and dry matter stress tolerance index (DMSI) significantly decreased, while PhR and phytotoxicity of shoot (PhSh) significantly increased with the increase in osmotic stress.

Keywords: *Early seedling growth, Field pea, Germination, Osmotic stress.*

EFFECTS OF RAIN-SHIELD CULTIVATION SYSTEM ON MORPHOMETRIC AND CHEMICAL PROPERTIES OF BLACKBERRIES ČAČANSKA BESTRNA

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Abstract

In terms of economic significance, blackberry ranks 3rd in the Serbian production of berry fruits, following immediately after raspberry and strawberry. New systems for blackberry cultivation in enclosed and semi-enclosed areas which have gained global popularity over the past several years offer certain advantages – primarily in terms of protection of fruits from adverse weather conditions, but also by indirectly reducing the threat of infection with economically significant pathogens, thus yielding an overall advantage over open-field production methods. Considering that the Serbian blackberry yield suffers an annual loss of around 30% due to gray mold caused by the phytopathogenic fungi *Botrytis cinerea* Pers., introduction of more intensive blackberry cultivation systems is imperative in order to prevent adverse action of rain and other abiotic components, thus securing continuous harvest and supply of improved-quality fruits. The paper presents results of a three-year study (2011–2013) of rain-shield cultivation system on morphometric and chemical properties of blackberries Čačanska Bestrna. The results showed that most of the tested parameters were affected by production system and environmental conditions during the research, as well as by their interaction. The rain-shield system did not cause any deviation of morphometric properties compared to open-field cultivation. In terms of the chemical properties, soluble solids content (10.26%), total and invert sugar content (6.77%; 6.06%), and sucrose content (0.68%) were higher in blackberries under rain shields.

Keywords: *Blackberry, Rain shields, Fruit quality*, Serbia.

THE EFFECTS OF DIFFERENT COVER CROPS ON WEED INFESTATION IN POPCORN (*ZEA MAYS*L. SSP. *EVERTA*STURT)

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Abstract

Cover crops are specific system of growing and mainly cover the surface of the soil during the winter, improve the physical and mechanical properties of the soil, water regime, increase the content of nutrients, reduce weed control and contribute to the achievement of higher yields of the main crops. The experiments were performed in 2014 and 2015 on experimental field of the Maize Research Institute in Zemun Polje. We have included individual winter cover crops: common vetch, oat, fodder kale and field pea, mixtures common vetch and field pea with oats and two control treatments: dead organic mulch and conventional (traditional) variant. Sowing cover crops is carried out in the autumn, the elementary plots of 35 m^{-2}. Mowing and soil incorporation of cover crops was carried out in late April. Sowing popcorn was done manually in mid-May at a density of 65 000 plants ha^{-1}. In the phase of intensive growth of the popcorn, is determined total number of weed species, total number of plants per species and fresh biomass per m^{-2}.In a year that was rich precipitation (2014), the smallest number of plants per species and fresh biomass of weeds per square meter have been established on the variant with common vetch as a cover crop. The fresh biomass of weeds in the two control treatments (dead organic mulch and conventional variant) was the highest (694.5 and 524.2 g m^{-2}). In 2015, data about weed infestation differed in relation to the previous year, both in terms of total number of weed species and total number of plants per species, but also in terms of fresh biomass per unit area. We can be concluded that perennial weeds could be controlled effectively by sowing cover crops.

Keywords: *Cover crops, dead organic mulch, popcorn, weed infestation.*

GERMINATION CHARACTERISTICS OF TEDERA (BITUMINARIA BITUMINOSA VAR. BITUMINOSA)

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Abstract

This study was conducted to evaluate the germination response of tedera seeds (Bituminaria bituminosa var. bituminosa C.H Stirt) to water submersion t. Tedera is a perennial legume considered as a potential new pasture for Mediterranean, African and arid areas and traditionally used as forage for ruminants. It is characterized by deep-rootedness, drought tolerance, high protein content and nutritive value, offering elevate interest in animal nutrition. The experiment was undertaken from October 2015 with freshly harvested seeds collected by hand on natural populations from Gran Canaria, Canary Islands. Seed weight of tedera was compared using four replicates of 50 seeds. The seeds were divided into two groups (two replicates each group) and submerged on ambient temperature water during 16 or 24 hours each group. The mean seed weight was 23mg and it germinates in temperatures ranging from 12°C to 20°C. Tedera have no germination requirement for light. Tedera showed radicle protrusionfrom 4-8 cm with no significant difference between groups. However, the highest percentage of seed germination was achieved in the 24 hours group (65%) compared to the 16 hours group (27%), which showed a significant decrease ($p<0,05$) in the percentage of seed germination. This study demonstrated that submersion during affected the Bituminaria bituminosa var. bituminosa seed germination and suggesting that tedera is a promising species for direct seeding. The results suggest that additional experiments are required for direct seeding.

Keywords: *Bituminaria bituminosa, seed germination, water submersion, direct seeding.*

GROWTH DYNAMIC OF APPLE SEEDLING ROOTSTOCKS GENOTYPES IN NURSERY

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Abstract

This investigation was achieved in the General Commission for Scientific Agriculture Research in Pome and grapevine Division in Sweida province-Syria, by using 2 apple seedling rootstock genotypes, the local apple cultivar Sukari 2 (S2) and the hybrid genotype (H) derived by the hybridization between MM106 rootstock and the local apple cultivar Skarji, to study their growth dynamic during the first season under nursery conditions during 2010-2011.The results showed that the plants length at the end of growth season was 87.8 cm and 76.6 cmfor S2 and H genotypes, respectively. S2 genotype revealed highergrowth rates in plant length,leaves number, and primary root length, which were 7.5 cm, 6.7 leaves and 3.2 cm/15days, respectively, while H genotype revealed higher mean of growth rate in stem diameter (0.62 mm/15 days).However,S2 and H genotypes showed different growth behaviors,the peak of plant length was at the end of August for S2(10 cm),while it was in 20 July (8.6 cm) for H genotype. Likewise, the peak of leaves number was in 20 July (8.6 leaves) for S2 genotype, while it was at the mid of August for genotype H (7.8 leaves).Auto correlation coefficients did not show significant values during the season of plant length and leaves number in the two studied genotypes. Likewise, the highest increase of stem diameter in genotype S2 was at the beginning of August (1.05 mm), and the lowest rate was 0.27 mm at the mid of September, with insignificant values of auto correlation coefficient. The highest increase of stem diameter in genotype H was 0.88 mm at the mid of August, the auto correlation coefficient showed significant negative value synchronized with gradual decreasing at the mid of September. The peak of primary root length in the two studied genotypes was in June. Moreover, the two genotypes showed growth flush in autumn. On the other hand, the cross correlation coefficient between length of plant and main root showed that the main root length in the two studied genotypes affected positively the plant length. These results illustrated the mechanism of rootstock effect in the scion, which is differed depending on the variance of growth dynamic habit of each genotype.

Keywords: *Apple, seedling rootstock, growth dynamic, Auto and cross correlation coefficient.*

GENETIC SIMILARITY AMONG*PISTACIA VERA* L. FEMALE GENOTYPES AND CULTIVARS IN THE SOUTH OF SYRIA USING SSR MARKERS

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Abstract

This investigation was conducted at the General Commission for Scientific Agricultural Research, Sweida Research Center, and in the fields at the greenbelt area where pistachio cultivars are widely expanding, to assess genetic variation among female cultivars accredited by Ministry of Agriculture (Ashouri, Batouri, Ajami and Nab Al-jamal) and 43 genotypes using SSR markers. 20 SSR Primer pairs were used, 16 of them were able to detect the polymorphism, which revealed 43 putative alleles, 38 of them were polymorphic with polymorphism percentage (88.37%). The number of Alleles ranged from 1 to 7, with an average 2.69 allele per locus. Genetic similarity was 100% among Nab Al-jamal cultivar and Nab.1 genotype, also between Ajami cultivar and Ajam.2 genotype, indicating that those genotypes are identical with the accredited cultivars by Ministry of Agriculture. Cluster analysis using UPGMA method according to Jaccard coefficient clustered all genotypes into 3 main clusters, whereat the genotypes Batouri Grahi (Batg.mj, Bat.1) were layed in separated sub group in comparison with all other Batouri genotypes comprising the Batouri cultivar. Also the genotype Ashouri Abu Riha (Ash.6) was separated out of all other Ashouri genotypes including Ashouri cultivar. To estimate the efficiency of SSR technique, each of the observed heterozygosity (Ho), expected heterozygosity (He), and marker index (MI) were calculated, Ho (0.250), He (0.491), MI (18.658). The results showed the importance and the efficiency of SSR technique in revealing the genetic variation among *P. vera* genotypes, especially that some primer pairs revealed uniquealleles and co-dominant loci particularly in Batouri Grahi genotypes indicating that these genotypes are might be hybrids due to naturally open cross pollination.

Keywords: *Genetic similarity, P.vera, SSR technique, Expected Heterozygosity (He*)

GENETIC DIVERSITY AMONG OLD LOCAL GRAPEVINE CULTIVARS IN THE SOUTH OF SYRIA

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Abstract

The present investigation was carried out in Sweida province which located in the south of Syria at 1400m altitude, during 2011- 2012 in order to estimate the genetic diversity among 17 old local grapevine cultivars usingmorphological traits and SSR molecular markers. Principal component analysis for morphological traits revealed4 main components accounted for 50.34 % of variance, with eigen values 16.77%, 13.31%, 10.59% and 9.67%. However, the distribution of cultivars depending on the first and second components separated Aswad Sharar and Derbly cultivars significantly than other studied cultivars. Hierarchical cluster for morphological traits showed high diversity among studied cultivars which divided them into two clusters and 3 separate cultivars. On the other hand, molecular characterization using 8 informative SSR Primer pairs wasdone, 7 of them were able to detect the polymorphism, which revealed 18 polymorphic alleles, with polymorphism percentage 100%that reflected the genetic variation among studied cultivars. Genetic similarity has achieved, which was the highest(0.875) between Zeiny and Khedry cultivars, while the two cultivars Ebeidy and AhmarMokamaa showed the lowest genetic similarity (0.077). Cluster analysis of SSR markers according to Jaccard coefficient grouped the studied cultivars into three clusters.The first cluster placed Ebeidy, Aswad Helwany and Derbly cultivars together, the second cluster included two cultivars Beiady and AlbAtair, while the third cluster containedall the other studied cultivars. Consequently, the results showed the high diversity among studied cultivars, and some morphological traits were useful to discriminate among cultivars, as well as the integrity between morphological and molecular characterization is necessary for genetic diversity studies and conservation purposes.

Keywords*:* *Grapevine, morphological traits, molecular characterization and SSR.*

EFFECT OF SALT STRESS (NACL) ON GERMINATION AND PLANT PARAMETERS OF THREE VARIETIES OF BASIL (*Ocimum basilicum* L.)

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Abstract

Basil (*Ocimum basilicum* L.) is used as a medicinal. The effects of salt stress were studied on three varieties of basil ("Grand Vert" (GV), "Fin Vert" (FV) and "Grand Vert Sweet" (GVS)). Seeds were germinated in petri dishes and plants were cultivated under plastic house in plastic pots felled of black peat. Under salt stress (NaCl: 1-18g/l), seeds are able to germinate even at 15 g/l but germination period were delayed of 2 days. Plants grew up to 12g/ l, flowered and fruited up to 6 g/l. NaCl affected all organs of the plant (stem length, number of leaves, fresh and dry weight of stems and roots). Photosynthesis parameters (chlorophylls, photosynthetic active radiation, net photosynthesis, conductance, and CO_2) were also affected. Faced to salt stress (NaCl), variety "fin vert" (FV) was more tolerant thanks to large amounts of proline, synthesized and accumulated in stressed plants which had 13 times more than control plants which allowed probably their osmotic adjustment with culture medium.

Keywords: *Basil (Ocimum basilicum L.), NaCl, Germination, Photosynthesis Parameters,Proline.*

SOME PLANT PROPERTIES INTERACTIONSAND L-DOPA CONTENT OF FABA BEAN (*Vicia faba* L.) THAT DIFFERENT SOWING TIME

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Abstract

The study was carried out in Turkey's Samsun ecological conditions. The total of 26 genotypes (four of which cultivars) and two different sowing time (winter and early spring) were used in experiment that was conducted in a randomized block design with three replications. Winter sowing was made in November 2010 and spring sowing was made in March 2011. Winter and spring sowings effects was examined for biological yield, pod number, grain yield, protein content of the leaves, flowers and fresh fruit and L-Dopa (it is a metabolite used in the treatment of Parkinson's disease) content of the leaves, flowers and fresh fruit. L-Dopa content was determined by HPLC. The t-test was used for comparison of sowing times. According to t-test biological yield (t = 23.19 **), pod number (t = 15.54 **), grain yield (t = 21.752 **), crude protein content in leaves (t = 8.052 **) and the L-Dopa content in fruit (t = 3.801 **) were found with very significant differences regarding the sowing time and winter sowing came to the fore. Protein content of flowers (t = 7.58 **), protein content of fruit (t = 2.91 **), L-Dopa content of leaves (t = 2,831 **) and L-Dopa content of flowers (t = 5, 54 **) came to the fore for the spring sowing. When the results were evaluated, winter sowing seemed to be more advantageous than spring sowing.

Keywords: *Faba bean, Sowing time, L-Dopa, Yield components.*

EFFECT OF DIFFERENT HARVESTING TIMES TO YIELD AND EAR CHARACTERISTICS OF BABY CORN OBTAINED FROM SWEET CORN

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Abstract

Baby corn is also known as young corn, mini corn, finger corn, or candle corn. Baby corn is a type of vegetable and consumed as a fresh or canned. It is eaten whole and cob included both raw and cooked. Its cob is too fresh and crisp for human consumption. Baby corn ears are hand-picked as soon as the corn silks emerge or few days after. The harvest of baby corn must be timed to avoid matured corn ears. This study was aimed to determine effect of different harvesting times to yield and ear characteristics of baby corn obtained from sweet corn. Study was conducted in 2014 and 2015 under Harran Plain, Şanlıurfa, Turkey. Experiment was established to randomize complete block design with 3 replicates. In the study 12 harvest times were used. Ears were harvested from 1 to 12 days after ear silk emergence. Accordingto variance analysis, all tested characteristics were significant ($P \leq 0.01$). With husk and without husk ear length, ear diameter, ear weight and baby corn yield values increased with delaying harvest times but ear crisply decreased after 6 days. Considering to ear diameter, ear length and yield; harvest for baby corn can be done within 2-6 day, but considering crisply of ear and custom pleasure; the best harvest time was within 2-4 day after ear silk emergence.

Keywords: *Baby corn, Harvest times, Şanlıurfa.*

EFFECTS OF GROWING CONDITIONS ON CROSSING SUCCESS IN DIFFERENT POTATO(*Solanum tuberosum* L.)CROSSES

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Abstract

This study was carried out to determine the effect of growing conditions under different altitudes on seed production in different potato crosses in Tokat Province of Turkey in 2015. Plants were grown and crosses were made in open field or net house in Tokat location (altitude 600 m asl.), open field or net house in Artova location (altitude 1200 m asl.), or controlled polycarbonate greenhouse. Fifteen different crosses were made between 12 parent cultivars. Production of hybrid potato seed was considered "crossing success". Results showed that parent cultivars and cross combinations affected crossing success and no seeds were produced from some combinations while some combinations produced abundant seeds. The highest number of seeds were produced in controlled polycarbonate greenhouse, whereas very low amount of seeds were produced under low altitude (600 m asl.) open field conditions. Polycarbonate greenhouse produced 47.3% of all seeds, while low altitude net house produced 19.8%, high altitude open field produced 15.8%, high altitude net house produced 13.6% and low altitude open field produced 3.5%. It was concluded that for a high crossing success, potato crossing should be made by controlled polycarbonate greenhouse conditions and 23 C^0 day / 17 C^0 night temperatures produced more hybrid seeds.

Keywords: *Crossing,crossing success, combination, growing condition*

DETERMINATION OF *PHENOLOGICAL, POMOLOGICAL* AND *YIELDCHARACTERISTICS* OF LOW CHILLING APPLE CULTIVARSBUDDED ON M9 AND MM 106 ROOTSTOCKS

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Abstract

The purpose of this study is to determine the vegetative growth, yield, phenological, pomological and morphological characteristics of six apple cultivars graftedonM9 and MM 106 rootstocks underecological conditions of Sanliurfa in 2007-2012. According to th efindings of the study, full blooming occurred between March 25th(Anna/M9) and April 07th(William's Pride/MM 106).The fruits were harvested betweenJuly 10th(Vista Bella/M9)andAugust 12th(Mondial Gala/MM 106). The average fruit weights of the cultivars were determined as 140.9g(Summer Red/MM 106)and193.4 g(Anna/M9). Average total soluble solid content ranged between 12.7% (in Jersey Mac/MM 106) and 17.2% (in Mondial Gala/MM 106), while the highest of titratable acidity was observed as 0.76% in Vista Bella/MM 106. Trunk cross-sectional area of six apple cultivars at the end of the 9th year ranged between 54.4 cm^2/tree (Anna/M9) and 102.5 cm^2/tree (William's Pride/MM 106). Anna/M9has taken the first row with respect of cumulative yield (167.34 kg/tree)and the yield of fruits per $cm^2$of trunk cross-sectional area (3.08 kg/cm^2)in thefirst nine cropping years.

Keywords: *Apple rootstock, pomology, phenology, trunk cross-sectional area, cumulative yield, yield efficiency.*

DETERMINATION OF YIELD AND YIELD CHARACTERISTICS OF SOME SMALL SIZED RED LENTIL LINES (*Lens culinaris* Medik.) IN F5 AND F6 LEVEL

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Abstract

Lentil (*Lens culinaris* Medik.) is a source of high quality protein, mineral and vitamins and generally used for human food. The leaves, stems and threshed pods of lentil are used for animal feeding. Lentil plants fix nitrogen in the soil and increase nitrogen level of soil. Sanliurfa province which is located in the Southeastern Anatolia Regionhas the most sowing area and production in Turkey. This study was aimed to develop the high yield red lentil varieties to Southeastern Anatolia Region of Turkey. Study was conducted in 2009-2010 and 2010-2011 growing seasons under Şanlıurfa conditions. Experiment was established to randomize complete block design with 4 replicates. In the study 20 small sized red lentil lines in F5 and F6 level which are obtained from Icarda (International Center for Agricultural Research in the Dry Areas) collection and 2 standard varieties were used as a crop material. Genotypes were significant about days to flowering, plant height, first pod height, thousand kernel weight, biological yield and grain yield. According to average of years; the highest grain yield obtained from line 1 (2280 kg/ha), whereas the lowest grain yield was found at Yerli Kırmızı standard variety (1389 kg/ha). Some better lines than others were selected in considering plant height, first pod height days to flowering, thousand kernel weight and grain yield values.Line 1, line 4, line 5, line 6, line 9, line 12, line 13, line 15, line 16, line 17, line 18and line 19 were found better than others and were selected for next generation.

Keywords: *Red lentil, Small sized, Southeastern Anatolia, Grain yield*

DETERMINATION OF PROPAGATION PERFORMANCE FROM SEEDS IN RHODODENDRON SPECIES*

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Abstract

This study was carried out to determine the possibility of propagation of seeds in 5 different Rhododendron species of Turkey. The seed materials of the worked specieswere collected from the flora of East Black Sea Region in the period of August and October 2010. Study was carried out in randomized block design with 5 species and 4 replications each including 100 seeds. Results showed that the weight of thousand seed were between 0.067 and 0.142 g and their emergences were between 21 and 45 days. The longest emergence time was seen in *R. caucasicum* species having the *s*mallest seed while the shortest emergence time was seen in *R. luteum* having the heaviest seed weight. There was a positive correlation between the particular size of seed and emergence rate. The emergence rate was determined as between 55.50-78.50 %. To conclude, the emergence results evidenced the possibility of propagate Rhododendron species from their seeds.

Keywords: *Rhododendron*, seed sowing, seed weight, seed emergence

AGRICULTURAL MECHANIZATION IN FIELD CROPS IN THRACE REGION OF TURKEY

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Abstract

Instead of one of the well- developed industrial area of Turkey, Thrace Region has important agricultural production. Objective of this research is to determine mechanization chain for field crops in Thrace Region of Turkey. Agricultural machinery type, size, specifications application time of agricultural practices and amount of agricultural inputs were determined for wheat, sunflower, canola, maize, sugar beet and rice. Fuel consumption of each procedure and time requirements of field operations were determined from survey, research studies and articles. In addition, production costs were calculated. As an example: fuel consumption and time requirement of machinery operations were 107.5 l/ha and 3 h/ha for sunflower.In addition, human labour and requirements were determined 3.2 h/ha for field operations of sunflower production. From tillage to harvest of the sunflower, there are 13 field operations. These are plough, cultivator, harrow, centrifugal fertiliser spreader, planting, roller, fertilisation with centrifugal fertiliser spreader, hoeing, 2 times herbicide application, and harvesting. The results can be used to manage next year growing strategies such as field traffic, agricultural input requirements.

Keywords: *Mechanization, field crops, Thrace Region, Turkey*

THE EFFECTS OF SEED PRIMING AND NITROGEN DOSES ON SEEDLING GROWTH TRAITS OF BREAD WHEAT (T*RITICUM AESTIVUM* L.) VARIETIES

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Abstract

This study was conducted to investigate the effects of seed pre-treatments (control, pure water, 100 and 200 ppm GA_3) and nitrogen doses (0, 25, 50 and 75 kg ha^{-1}) on seedling growth of bread wheat (*Triticum aestivum* L.). The field experiments were conducted at Süleyman Demirel University (Turkey), Agricultural Research and Experiment Station throughout the growing season of 2007-08 and 2008-09. The winter wheat cultivars, Dagdas-94, Bagci-2002, and Karahan-99 were used in these experiments. The seeds which had been soaked up for 3 hours before sowing had been air dried at room temperature and then planted. Nitrogen dosages were applied with planting.The effects of seed priming on seedling growth traits were found to be significant. Gibberellic acid treatment (200 ppm) reduced the mean time for 50% germination and increased the length of seedling nearly 33%. Due to increase in the length of seedling, its stems turned out to be yellow and white and lodged. The number of plants per square meter was not affected by nitrogen doses or seed priming. Compared to control and pure water treatments, GA_3 treatments led to an increase in seedling root lengths in both years. Nitrogen doses on the seedling growth traits were not found to be significant.

Keywords: *Seed priming, Wheat seedling, Gibberellic acid, Nitrogen doses*

DETERMINATION OF NUTRITIONAL CONTENT OF SOME SILAGE CORN VARIETIES IN TERMS OF ANIMAL FEED POTENTIAL

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Abstract

This research was conducted to compare feed quality characteristics of some silage corn varieties in the irrigated experimental field of the Agricultural Research and Application Center of Igdir University in 2015. In research, ten silage corn varieties were established according to randomized complete blocks experimental design with three replications.CP (Crude protein), NDF (Neutral Detergent Fiber), ADF (Acid Detergent Fiber) ADL (Acid Detergent Lignin), DMD (Dry matter digestibility), DE (Digestible energy), ME (Metabolizable energy), DMI (Dry matter intake), and RFV (Relative feed value) of corn varieties were determinedand results varied significantly between varieties. According to results following values were found for different varieties: CP 8.72% (OSSK-602) with 5.98% (HİDO), NDF 52.18% (OSSK-644) with 39.51% (TK-6060), ADF 23.37% (HİDO) with 14.72% (72 MAY 80), ADL 3.71% (OSSK-602) with 1.57% (TK 6063), DMD 74.55% (72 MAY 80) with 66.83% (HİDO), DE 3.46 Mcal kg^{-1} (72 MAY 80) with 3.13 Mcal kg^{-1} (HİDO), ME 2.84 Mcal kg^{-1} (72 MAY 80) with 2.57 Mcal kg^{-1} (HİDO), DMI 3.04% (TK 6060) with 2.30% (OSSK 644) and RFV 62.18% (TK 6060) with 56.80% (HİDO).According to these results OSSK-602, 72MAY80, Shemall and RX-9292 varieties have been found to be most suitable varieties for this area and animal feed.

Keywords: *Silage corn, nutrient content, animal feed.*

DETERMINATION OF YIELD AND SOME PLANT CHARACTERISTICS IN SOME SILAGE CORN VARIETIES

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Abstract

The study was conducted to determine the yield and some plant characteristics of some silage corn varieties which are grown as the main product in Igdir province. The study was applied to randomized complete block design pattern with three replications in irrigate conditions. In this research, plant height (cm), forage yield (t ha^{-1}), dry matter ratio (%),dry matter yield (t ha^{-1}), leaf ratio (%), stem ratio (%), cob ratio (%), the number of leaf (number/ plant), plant weight (g) were determined in 10 silage corn varieties. According to the results; plant height was determined between 204.2 cm (OSSK-602) and 313.9 cm (OSSK-644), forage yield 60.5 t ha^{-1} (OSSK-602) and 110.5 t ha^{-1} (TK-6063), dry matter ratio 30.3% (OSSK-644) and 38.6% (TK-6063), dry matter yield 20.3 t ha^{-1} (OSSK-602) and 41.5 t ha^{-1} (TK-6063),), leaf ratio 14.3% (OSSK- 596) and 18.3% (RX-9292), stem ratio 42.3% (Hido) and 51.0% (OSSK-644), cob ratio 36% (OSSK-644) and 45.6% (OSSK-602), the number of leaf 11.0 (OSSK-602) and 13.3 (TC-6063) plant weight 635.9 g (OSSK-602) and 1160.6 g (TK-6063). As a result, TK-6063, HİDO and SHEMALL varieties has been determined as suitable for the region's ecology.

Keywords: *Silage corn varieties, yield components, plant characteristics*

IN VITRO SHOOT AND ROOT REGENERATION IN ERCIS CABBAGE *(BRASSICA OLERACEAE* VAR. *CAPITATA)*

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Abstract

Ercis head cabbage which is a population local to the Van province of Turkey was tested for ability to regenerate shoots and roots *in vitro*. Cotyledon and hypocotyl explants were excised from 7 day old *in vitro* seedlings, germinated on Murashige and Skoog (MS) medium, and cultured on MS medium supplemented with benzylaminopurine (BAP) (0.5 mg/l, 1.0 mg/l, and 2.0 mg/l) and naphthaleneacetic acid (NAA) (0, 0.05 mg/l, and 0.1 mg/l). The highest shoot regeneration (100%) was achieved in hypocotyls explants with MS7 (MS + 2 mg/l BAP) and 91.6% with MS6 (MS + 1 mg/l BAP + 0.1 mg/l NAA), MS4 (MS + 1 mg/l BAP), and MS3 medium (MS + 0.5 mg/l BAP+ 0.1 mg/l NAA). The MS4 medium (5.2 shoot/explant) was the most successful in terms of the number of shoots per explant. The highest shoot regeneration from cotyledon explants was obtained from MS1 (MS + 0.5 mg/l BAP) and MS9 (MS + 2 mg/l BAP + 0.1 mg/l NAA) mediums with 91.6%. In hypocotyls explants, indirect shoot regeneration was induced in all media combinations and the rate of regeneration was found to be higher than in cotyledon explants. In root regeneration trials, 4 different indolebutyric acid (IBA) doses (0 mg/l, 0.5 mg/l, 1.0 mg/l and 1.5 mg/l) were tested on 1/2 MS medium, and 100% rooting was achieved from the control and 0.5 mg/l IBA doses.

Keywords: *Regeneration, Cabbage, Hypocotyl, Cotyledon*

DETERMINATION OF BIO-VARIATION AMONG DIFFERENT MULBERRYSPECIES GROWN IN TOKAT REGION BY MOLECULAR MARKERS

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Abstract

In this study, 38 different mulberries genotypes collected from Tokat region in Turkey were used. ISSR-PCR analyses were carried on the DNA of genotypes isolated using mini-CTAB extraction method. The levels of polymorphism between genotypes were determined using the UBC-ISSR primers. A total of 96 bands were obtained from 15 UBC ISSR primers. Out of 96 bands, 80 bands were polymorphic. The number of bands obtained per primer ranged between 4 and 11, the average number of bands were determined as 6.4. The average number of polymorphic bands per primer was 5.33.

Similarities and differences between genotypes have been studied at the molecular level. The data used for statistical analysis were obtained by the evaluation of ISSR bands. Similarity coefficient and UPGMA dendrogram were built using the Basic Coordinates Analysis.

According to the dendrogram, the genotypes have been divided in two main groups, one small and other large group. While the small group was only comprised of black mulberry genotypes, the large group included white mulberry, weeping mulberry and wild white mulberry genotypes. Different mulberry species have been divided into different sub groubs within the large group. The polimorfizm level within the species was lowest in black mulberry genotypes, and this was followed by weeping mulberry, white mulberry and wild white mulberry genotypes, respectually.

Keywords: Mulberry, molecular, genotype, marker, ISSR

THE VARIATION OF SOME SOIL TRAITS UNDER LEGUME X CEREALS MIXTURE AND SILAGE CORN ROTATION

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Abstract

This study was conducted to determine some soil traits under legume (*Viciapannonica*Crantz)x cereals mixtures (*Hordeum vulgare* L., *Triticumaestivum* L. and*Triticosecale*Wittmack) and silage corn rotation during 2013-2014 and 2014-2015 growing seasons. The experiment was conducted in the experimental field of Bozok University in Yerkoy-Yozgat (Middle Anatolia, Turkey). The firstly of Hungarian vetch (*Viciapannonica*Crantz) and cereals (*Hordeum vulgare* L.*Triticumaestivum* L. and*Triticosecale*Wittmack) were sown as binary mixtures with different seed rates (100:0 70:30, 60:40, 50:50 and 40:60) and harvested at different stage (flowering and milk dough stages) as forage. Then silage corn was sown. The experiment was planned in split plot-design with four replications, main plots were cutting time and sub plots were mixture ratio. Soil samples were taken 30 cm deep and by three different points of each treatmentanalyzed to fallow traits; nitrogen, organic matter, phosphorus, potassium, salt and lime content. According to results, soil samples that beginning of experiment was more different than at the end of study. Nitrogen and organic matter of soil did not change after Hungarian vetch+cereals mixtures, while they decreased after silage corn. Phosphorus content of the soil decreased continuously during the trial.

Keywords: *Hungarian vetch, cereals, silage corn, rotation, soil.*

GLOBAL WARMING, INCREASING INVASIVE SPECIES AND THEIR EFFECTS ON CEREAL CULTIVATION

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Abstract

Global warming is an expression meaning rising temperature due to climate changes in the atmosphere. Our world has been facing the threat of global warming more and more for a few decades. According to studies, a global temperature increase of above 2 ^{0}C may cause problematic situations in many parts of the world. One of the problems caused by the global warming is the change in the floristic structure at different latitudes and altitudes of the earth due to rising temperatures. In this context, certain species, also known as invasive species and exotic species, have been encountered recently as new threats in cereal cultivation. These invasive species have been observed to negatively affect the bio region and the habitat in aspects of economics, environment and ecology. As long as these negative effects on agricultural production continue to threaten food security, it is inevitable that the estimated number of malnourished people (805 million) in the world will increase further. In this review paper, the floristic structure changes due to possible global warming and the foresights about invasive new species in cereal cultivation and related research results will be revealed.

Keywords: *Global warming, invasive species, changed floristic structure*

MINIMIZATION OF THE COST OF CONTRACTED TOBACCO PRODUCTION USING LINEAR PROGRAMMING

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Abstract

Turkey has a key role in oriental tobacco farming all over the World. There has been a significant change in tobacco production due to Governmental policies since 2001. The overall marketing system has been transferred to private companies where they are solely determining the tobacco leaf prices.Currently contracted farming system is in charge in tobacco production in Turkey. Under contracted farming, tobacco growers would agree to sell their tobacco at a predetermined price negotiated with buyers before the planting season. The contracts, signed over a one year period with farmers, include details about the production such as the responsibilities of farmers and companies. The contract goes beyond being an explanatory text about the details of tobacco production and works as a tool reformatting the entire tobacco market.The scope of this study is to summarize the tobacco production and marketing policies for last two decades in Turkey and to find out different approaches minimizing purchase costs for private companies.The data that is used in the studywere collected from different literature sources: contracted tobacco farming regions in Turkey and their land size, tobacco production amount and producing cost of raw leaf tobacco in these regions.This hypothetical application is done linear programming model with 6 variables and 15 constrains. As a result of the linear programming solution; it has been predicted that 65,556 ha. including Aegean Region, of total 93,117 ha. contracted farming should be done. The amount of tobacco leaf is 80,000 tons and the purchase cost is $ 335,840,770.78.

Keywords: *Turkish Tobacco Policy, Minimizing Purchase Costs, Linear Programming*

DETERMINING THE PRODUCTION AMOUNT OF LEAF TOBACCO USING GOAL PROGRAMMING

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Abstract

Tobacco farming is being done in Aegean, Marmara, Black Sea, East Anatolia, Southeast Anatolia and Mediterranean regions in Turkey.With the introduction of the new law (No: 4733) the marketing system of tobacco has totally changed and has been replaced with the auction system and contract production.The new Law abolished the Monopoly Status of TEKEL and this was the beginning of the withdrawal of the Government from all aspects of tobacco in Turkey. Private firms were allowed to produce cigarettes in Turkey. Leaf tobacco companies buy tobacco due to the contracts between them and the tobacco farmers every year. Tobacco farms vary considerably in size, location, yields and different characteristics in every region thus cause disparity in prices. For this reason this study aims to set the contracted tobacco production planning by using goal programming. This hypothetical study contributes some data for tobacco leaf purchaser companies in Turkey. Goal programming (GP) allows the decision maker to include multiple goals or objectives in the problem formulation. GP applies the linear programming model to situations which contain multiple goals or objectives. The GP approach involves the decision maker in a process that attempts to achieve a satisfactory level of achievement for several objectives, rather than an optimal outcome for a single objective. The goal programming consists of 6 variables and 8 goal functions. As a result, the solution of goal programming; it has been predicted that 61,450 ha. including Aegean Region, totally 90,000 ha contracted farming should be done, the amount of tobacco leaf is 78,708,650 kg and the purchase cost is $ 337,365,060.00.

Keywords: *Turkish Tobacco Production, Contracting Farming, Goal Programming*

DETERMINATION OF SOME EAR CHARACTERISTICS OF LOCAL POP CORN (Zea mays L. everta) GENOTYPES IN KAHRAMANMARAS CONDITIONS (TURKEY)

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Abstract

In this study, 8 pop corn (*Zea mays* L. Everta) genotypes were used. Five ear characteristics of 8 pop corn genotypes (6 local pop corn genotypes and 2 local pop corn varieties) were examined. Local corn genotypeswere collected from Tokat -Erbaa district, Samsun-Bafra district, Ordu-Çamaş district, Ordu-Perşembe district, Ordu-Ulubey district and Konya in the Turkey in 2014. And also, local corn varieties were used such as Ant-Cin 98 and Nermin-Cin as proprietary in kinds. At this study, field and laboratory studies were completed in 2015. The experiment was conducted in 3 replicates according to a randomized block design. At this study, ear length, ear diameter, number of row per ear, number of kernel rows per ear, 100-grain weight and popping volume were investigated. The ear length, ear diameter, number of row per ear, number of kernel rows per ear, 100-grain weight and popping volume characters were determined ranging 18.80-16.20 cm, 35.33-32.60 mm, 23.93-12.93 units/ear, 47.07-40.47 units/row, 21020-9431 g and 1005.6-345.6 m^3 respectively. Research results showed that there were not high variations in ear length, ear diameter, number of row per ear, number of kernel rows per ear from examination characteristics. However, 100-grain weight and explosion volume were determined statistically significant ($P<0.001$). The 100-grain weight's highest value was obtained in Ordu-Çamaş district and also highest popping volume value was obtained in Ant-cin 98 variety. But, other genotypes as Samsun-Bafra, Nermin-Cin, Tokat –Erbaa and Konya were determined to be in the same group with Ant-cin 98 variety. According to these results, the ear features of local corn genotypes have equivalent Ant-cin 98 and Nermin-cin varieties without 100-grain weight and popping volume features.

Keywords: *Local pop corn, ear characteristics.*

IN VITRO POLLEN VIABILITY AND GERMINATION OF BISEXUAL AND FUNCTIONAL MALE FLOWERS OF SOME TURKISH POMEGRANATE CULTIVARS

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Abstract

The evaluation of pollen viability and germination are two essential criteria for characterization of pollinating cultivars in pomegranate which is an andromonoecious species. With this point of view, pollens were collected from both bisexual and functional male flowers of 'Aşınar' and 'Caner II' cultivars to determine the pollen viability and germination. Colorimetric test of 2,3,5-triphenyl tetrazolium chloride (TTC) was used to estimate the pollen viability. Pollen germination was tested *in vitro* on a medium containing 1% agar and 20% sucrose. Results showed that pollen viability was not dependent on the type of the flowers. The highest pollen viability ratio (78%) was obtained in the pollen collected from functional male flowers of 'Aşınar'. Pollen germination ratio, however, varied with regard to the flower type in the same cultivar. Bisexual and male flowers in 'Aşınar', respectively, had 43.5% vs 22.3% pollen grains germinated. Pollens from two sexual morphs of pomegranates show different germination and viability ratios. Investigation on viability and germination capability of pollen grains coming from both bisexual and functional male flowers in pomegranate can enable growers and breeders to better select best crossing pollinators.

Keywords: *Punica granatum* L.,*Pollen,Viability,Germination.*

MICROMORPHOLOGY OF POLLEN GRAINS FROM BISEXUAL AND FUNCTIONAL MALE FLOWERS OF POMEGRANATE

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Abstract

Modern taxonomy uses pollen grain morphology as an important tool due to its specific and diverse features. Pomegranate is an andromonoecious species having two type flowers on the same plant, in other words, hermaphrodite flowers (bisexual) and male flowers (functional male flowers) that develop on the same plant. The length of polar axis (*P*) and the equatorial diameter (*E*) as well as*P/E* ratio of pollen grains, collected from both bisexual and functionally male flowers of the cultivar 'Caner I', were analyzed using scaning electron microscopy (SEM). The length of polar axis (*P*), the equatorial diameter (*E*), and *P/E* ratio was compared between the two grain. The sculpturing pattern of the exine of both type flowers was striate, with more parallel longitudinal ridgesPollen from both bisexual and functional male flower types is similar in size (≈21 μm). In contrast to the divergent pistil development observed between bisexual and functional male pomegranate flowers, no differences in pollen morphology were detected. The pollens had prolate shape(P\E=1.65 vs 1.59) in both types of flowers.

Keywords: *Punica granatum, Pollen Grains, Morphology, SEM*

CHANGES IN PROTEIN CONTENT IN DIFFERENT PLANT PARTS OF PEA DURING VARIOUS GROWTH STAGES

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Abstract

Adequate and balanced nutrition is important key for a healthy life. Needs for food and protein increase due to drastic increases in the world population and decreased resources. The world protein needs are supplied from plant sources, about 70%. Peas (*Pisum sativum* L.) are one of the important sources of protein. This study was conducted to evaluate changing of crude protein contents in different part of pea during various growth stages at the experimental area of Faculty of Agriculture, Ondokuz Mayis University, Samsun (Turkey). We monitor crude protein contents at vegetative stage, 50% flowering stage, full bloom stage, seed filling stage and at seed maturity period in different parts of the plants such as leaves, stem, flowers, and in matured seeds. Crude protein contents of different plant parts showed *broad range* of *variation due to growth stages.* Crude protein contents of leaves, stem flowers and seeds were ranged between 8.78-24.72%, 3.27-11.13%, 38.97-40.80% and 21.99-25.76%, respectively. In conclusion, the highest crude protein contents were found in flowers, According to study results, overall protein content has gradually decreased with the growing stages. Leaves had the largest range for crude protein content among the plant parts. Also different parts are harvested according to their usage during the production, and consumption regarding appropriate development can be determined.

Keywords: *Crude protein, Pea, Growth stages*

RELATIONS BETWEEN FRUIT BEARING HABIT, AND CARBOHYDRATE / NITROGEN LEVELS IN 'HACIHALILOGLU' APRICOT CULTIVAR

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Abstract

Turkey is the biggest apricot producer in the world. Most of the apricots are produced in the Malatya region of Turkey. The 'Hacihaliloglu' cultivar is the main apricot cultivar in Malatya. It has an exceptional dried fruit quality, but there are problems in pruning application with respect to fruit bearing habit. In this study, fruit set and carbohydrate–nitrogen level changes were investigated in relation to branch age in 'Hacihaliloglu' apricot.The minimum and maximum fruit set were observed in 1- and 3-year-old branches in two consecutive experimental years, respectively. The flower bud ratios on 2- and 3-year-old branches were higher than those of 1-year-old branches. The carbohydrate contents measured in bark of 2-and 3-year-old branches were higher when compared to 1-year-old branches. On the other hand, the maximum nitrogen contents of shoot barks were obtained in 1-year-old branches. Total carbohydrate/nitrogen ratio was higher on 2- and 3-year-old branches than those of 1-year-old branches.In adjusting the crop load of 'Hacihaliloglu' apricots, there is a need to better recognition of the 1-, 2- and 3-year-old branches on the trees. In years with higher crop load, a thinning on 2- and 3-year-old branches of mature trees in winter pruning would be helpful as well as preserving those branches in the young trees.

Keywords: *Apricot, Fruit bearing, Branch age, Carbohydrate / nitrogen ratio*

POPULATION DYNAMICS OF APHIDS AND NATURAL ENEMIES ON DIFFERENT WHEAT CULTIVARS IN AYDIN PROVINCE, TURKEY

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Abstract

The study was conducted to determine the population dynamics of aphids and natural enemies on different wheat varieties in Aydın Province, Turkey. Nine wheat varieties (Kiziltan, Atalay, Yaren, GAP, C1252, Tuten 2000, Ege, Turabi and Solen 2000) were used in the study. The experimental plot consisted of 8 m in length and 5 rows with three replicates. The sampling was begun on March 11, 2015 and finished at the end of harvest. The population densities of nymphs and adults of aphids were recorded at weekly intervals. Ten plants were randomly selected for each replicate and totally thirty plants for each variety was checked visually. Natural enemies were also recorded during the sampling of aphids. At the end of the study, three aphis species, *Sitobion avenae* (Fabricius), *Metopolophium dirhodum* (Walker)and *Rhopalosiphum padi* (L.), were recorded . *Coccinellie septempunctata* L. and *Chrysoperla carnea* (Stephens)aspredators and *Aphidius rhopalosiphi* De Stefani Perez as a parasitoid were also recorded during the study. Population of aphids were reached to the highest population on May 6th 2015 with 4.2±2.2 on Turabi and followed with 3.7±0.5 on Solen 2000 variety. The population was not observed after the end of May. The mean number of aphids per year was statistically important and lowest on GAP, Tuten 2000, Ege (0.7±0.5), and followed by Yaren (0.8 ±0.5), Kiziltan (0.9±0.5), Atalay (0.9±0.8), Turabi (1.1±1.0), Solen 2000 (1.2±1.0) and C1252 (1.4±0.7). Natural enemies were observed from the first week of April to the end of May and more predators were recorded on Ege, Tuten 2000 and C1252 varieties. Parasitic rate was higher on Tuten 2000, Turabi and C1252. As a result, the population of aphids in the region was observed under the economic injury level. However, it seems to be a potential pest for the wheat and the three wheat varieties could be effective in managing against the aphids and important tool for IPM program.

Keywords: *Wheat varieties, Aphids, Natural enemies, Parasitoids, Predators, Turkey*

DETERMING THE POPULATION DYNAMICS INFESTATION OF *TUTA ABSOLUTA* MEYRİCK (LEPIDOPTERA: GELECHIDAE) BY DIFFERENT TRAPS ON TOMATO IN AYDIN PROVINCE, TURKEY

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Abstract

The aim of paper was to investigate the population dynamics and infestation of *Tuta absoluta*(Meyrick)by using different traps on tomato field of glasshouse in 2010-2011 in Aydin province, Turkey. The study was conducted at the two growing seasons (Fall and Spring). Three different types of trap (Delta pheromone trap, pheromone+water pan and light trap) were used to evaluate the population dynamics during the experiment. At the end of the study, the highest population of *T. absoluta* was captured with 350 adult/trap in the pheromone+water pan trap in fall season and followed by 95 adult/trap in delta pheromone trap and 23 adult/trap in the light trap. After this time, the population decreased and continued at low amount (no more than 50 adult) in fall season.In spring season, the highest population was observed on two different sampling times. Pheromone+water pan trap captured 33 adults/trap and delta type pheromone trapped zero on 9 March 2011. On the other way, 40 adults/trap was capturedin the pheromen+water pan and 18 adult/trap in delta pheromone trap on 14th May 2011. In contrast, the light trap was not efficient and not useful due to catching bees in the glasshouse. Infestation rate on leaves caused by the *T. absoluta* varied %10-66.7 and %5-100in fall and spring season. On the other hand, the damage rate on the fruit varied %6.7-46.7 and %10-63 in fall and spring season. It is concluded that *T. absoluta* is major economically important pests, had four peaks for each season and gives 7-8 generations in both spring and fall tomato-growing seasons in the glasshouse. Pheromone+water pan trap with olive oil was 2.2-3.6 times more effective than the pheromone trap and 15 times more than the light trap. Therefore, it is more useful in management program against *T. absoluta*.

Keywords: *Tuta absoluta, tomato, traps, Aydın province in Turkey*

THE EFFECTS OF DIFFERENT CUTTING FREQUENCY ON BOTANICAL COMPOSITION AT A LOWLAND PASTURE

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Abstract

This study was conducted to determine the effects of different cutting frequency on forage yield and botanical composition of a lowland natural range in Engiz Village of Ondokuz Mayis County of Samsun Province during 2013 and 2014 spring growing periods. The experiment was established according to randomized block design with four replicates. Total hay yield was ranged from 1460.9 to 2741.9 and from 1009.5 to 3410.5 kg ha-^{1}in 2013 and 2014, respectively. The ratios of grasses, legumes and the other species in botanical composition ranged between 31.24-57.19, 20.77-42.79 and 8.75-47.13%, respectively. Crude protein ratios of hay were determined as 11.62-20.27% for grasses, 17.44-26.32% for legumes and 18.06-24.31% for the other species. While ADF ratios ranged between 28.38-38.27% for grasses, 22.54-34.67% for legumes and 23.48-32.33% for the other species; NDF ratios were determined between 46.61-60.27% for grasses, 35.19-46.68% for legumes and 38.49-52.64% for the other species. While phosphorus content of hay was adequate, potassium, calcium and magnesium was high. K/Ca+Mg and Ca/P ratios ranged between 0.82-2.76 and 1.98-8.60, respectively. In the light of the results obtained from this study, the pasture should be grazed concerning appropriate animal density; otherwise the weeds could increase at the low density grazing conditions. In order to sustain pasture yield, suitable range management program should be prepared and applied.

Keywords: *Cutting frequency; hay yield; botanical composition; mineral contents.*

EFFECT OF THE ENVIRONMENTAL CONDITION ON YIELD AND AGRONOMIC TRAITS OF THE BREAD WHEAT (*Triticum aestivum* L.) GENOTYPES

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Abstract

Wheat production area is not to large but environmental factors varies across location. Biotic and abiotic stress affected grain yield and agronomic characters of wheat cultivars. This research was carried out to determine of the yield, some agronomic, quality and leaf disease traits of the bread wheat genotypes. This research was established with 25 genotypes in randomized completely blocks experimental design with 4 replications and at three locations in Edirne, Kırklareli and Lüleburgaz in Trakya region in 2007-2008 growing season. In this research, grain yield, days to heading and days to maturating, plant height, lodging resistance, thousand kernel weight, test weight, protein, sedimentation, leaf rust, powdery mildew, and relationship between these characters were investigated. According to the results it was found significant differences among location, genotypes and studied characters. The mean yield of the genotypes was 664.5 kg/da. Kate A-1 had the highest yield with 753.7 kg/da over three environments. Edirne was the highest yielding (808.3 kg/da) location. Grain yield was significantly negative correlated with protein ratio (r = -0.689**). There was a negative correlation between days to heading with TKW (r= -0.479*), protein content (r= -0.288) and sedimentation (r= -0.340). Also, it was found significant relation between days to maturating and protein content (r= -0.445*) and sedimentation (r= -0.514**). Plant height was also correlated with thousand kernel weight (r= 0.539**) and test weight (r= 0.731**). Leaf rust negatively affected TKW and test weight, also there was negative relation between leaf rust with days to heading and maturating, plant height. The higher infection of Leaf rust was determined in Edirne and there were differences among location and genotypes.

Keywords: *Bread wheat, genotypes, yield, quality, leaf disease*

DETERMINATION OF SOME BOTANICAL AND AGRICULTURAL CHARACTERISTICS IN OPIUM POPPY (*Papaver somniferum* L.) VARIETIES AND LINES

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Abstract

Turkey is the, center for many plant species, where is one of the world's richest countries in terms of the diversity of plants. In our country opium poppy cultivation is traditional, *Papaver somniferum* L., which is a one-year crops. The aim of study was to determine some botanical and agricultural characteristics of opium poppy (*Papaver somniferum* L.) varieties and lines. The research was carried out under the field conditions year at experiment plots of the Middle Black Sea Transition Zone Agricultural Research Institute in 2015. In this study were used the 5 varieties of opium poppy with 97 ahead of opium poppy as standard. The lines were planted in a randomized block design. Capsules and seed yield have been investigated with some phonological and morphological signs of value. According to the research results, the output was observed within 15-20 days, while the output time did not show a significant difference. Flowering time 80-100 days, plant height from 46.22 to 79.77 cm, the number of branches per plant from 2.4 to 5.4, the number of capsules per plant from 2.4 to 5.4, the capsule length 26.2 - 40.44 mm, the capsule width from 21.88 to 40.2 mm, the number of stigmatic rays from 7.00 to 11.83, capsule yield per decare from 28.78 to 181.57 kg, seed yield per decare from 43.9 to 205,32 kg, were found.

Keywords: *Opium poppy, Papaver somniferum L., capsule yield, seed yield.*

TESTING PRODUCT AND PRICE RELATIONS IN THE COBWEB THEORY USING ALMON MODEL: DRY ONION FOR TURKEY

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Abstract

In Turkey, product-price relation in dry onion production is analyzed. Almon model is one of the distributed lag models employed in this study. There are several external factors that affect the production of dry onion. In this study, the secondary data belonging to Turkish Statistical Institute (TURKSTAT) will be used between 1991-2014. In this model, the amount of dry onion production is used as a dependent variable, price series of dry onion and the distributed lag values of the dry onion prices as an independent variables. In the light of these data, the yield of dry onion in Turkey for its predictions various econometric models through inspection will attempt to demonstrate the best fit model. Due to an Almon model obtained from the study, dry onion yield estimation can be made for the future years. Moreover, Whether cobweb effect for dry onion will be analyzed in free market conditions or not. The cobweb theory is an economic model. This model explains why pricesmight be subject to periodic fluctuations in certain types of market conditions.

Keywords: *Almon model, Dry onion, Cobweb, Distributed lag values, Turkey.*

EFFECT OF ESSENTIAL OIL AND EXTRACTS OF ROSEMARY ON THE STABILITIY OF FRYING OIL

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Abstract

Antioxidant activity of essential oil and extracts of rosemary on the oxidative stability of sunflower oil were determined. The essential oil and extracts of rosemaryat the concentrations of 0.1%, 0.3% and 0.5% into sunflower oil were added separately. Antioxidant effect of essential oil and extracts of rosemary on the oxidative stability of sunflower oil were evaluated as connected with colour (Hunter *L, a* and *b*) and peroxide values.*L* value of the frying oil in which 0.5 % extract of rosemary was added is very close to *L* value of the raw oil.The value of *L* of the frying oil in which extract was added is less than the frying oil that essential oil added. Peroxide value of frying made with 0.3 % concentration of the rosemary essential oil increased less than that of made with the raw sunflower oil. Peroxdie value of frying made with 0.5% the rosemary extract decreased, too. In addition, viscosity and free fatty acid (FFA%) values of frying sunflower oil were determined. FFA% of the frying oils of 1. and 2. frying made with the sunflower oil in which 0.5 % essential oil of rosemary added increased less than that of 1. and 2. frying made with the raw sunflower oil.The essential oil of rosemary have been effected more from the extracts of rosemary on the oxidative stability of sunflower oil.

Keywords: *Rosemary, antioxidant activity, frying, sunflower oil*

DRY MATTER YIELD AND FORAGE QUALITY OF PROMISING BITTER VETCH (*VICIA ERVILIA* (L.) WILLD.) LINES

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Abstract

The major limiting factor to livestock production in Southeastern Anatolia region is the inadequate quality roughage supply. The introduction of leguminous forage species in crop rotation systems are of great importance. Accordingly; two years field trials (2008-09 and 2009-10) were conducted to determine performance of some promising bitter vetch lines, provided from InternationalCenter for Agricultural Research in Dry Areas, Aleppo, Syria (ICARDA) in highland of Southeastern Anatolia Region of Turkey. Field experiments of the study were designed according to randomized blocks design with three replications. According to two years average, the examined traits were ranged among the genotypes as follow; dry matter yield (DMY) 4.13-5.40 t ha^{-1}, dry matter crude protein content (CP) 16.53-18.52%, acid detergent fiber (ADF) 21.30-23.52%, neutral detergent fiber (NDF) 29.81-32.04%, dry digestible matter (DDM) 70.58-72.31%, dry matter intake (DMI) 3.75-4.03%, total digestible nutrients (TDN) 69.3-71.9, relative feed value (RFV) 205-226, calcium (Ca) content 0.42-0.71%, magnesium (Mg) content 0.20-0.23% potassium (K) content 3.01-3.22%, and phosphorus (P) content 0.29-0.31%. In the study; inverse relation was determined between the two growing season for dry matter yield and crude protein contents. Namely, crude protein content of bitter vetch genotypes were lower in high dry matter yield obtained growing season. Results of the study revealed that Ca, Mg, K and P contents of the bitter vetch forages are sufficient for the optimum performance of ruminants, and, the forages obtained from the bitter vetch lines are of the best quality, when by taking into consideration the RFV values of forages.

Keywords: *Bitter vetch* (*Vicia ervilia(L.) WILLD), dry matter yield, forage quality, ADF, NDF*

ADDITIVE MAIN EFFECTS AND MULTIPLICATIVE INTERACTIONS (AMMI) ANALYSIS FOR FRESH FORAGE YIELD IN COMMON VETCH (VICIA SATIVA L.) GENOTYPES

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Abstract

The study was held to evaluate genotype × environment interactions and stability status of twenty common vetch (*Vicia sativa* L.) genotypes in terms of fresh forage yield trait by using additive main effects and multiplicative interactions analysis (AMMI). Field trials of the study were carried out during 2008-09, 2009-10 and 2010-11 growing seasons under the rainfed conditions of two different locations of the Southeastern Anatolia region of Turkey. The field trials were established according to randomized blocks design with three replications. Additive main effects and multiplicative interactions analysis (AMMI) showed that the effect of environments on genotype × environment interactions were found quite high levels for fresh forage yield trait. The first three principal component axes (IPCA 1 IPCA 2 and IPCA 3) were found highly significant (P<0.01), and they accounted for 93.44% of the total genotype by environmental interaction. Furthermore, the effect of environments on forage yields of common vetch genotypes was found to be highest (42.23%), it was followed by genotype×environment interaction (GEI) (36.13%) and genotypic effects (21.64%). AMMI analysis revealed that with their high yield means, and lower IPCA-1 scores, close to zero, respectively, D-135 (G6), IFVS-2541 (G4) and IFVS-715 (G3) were considered to be possessing high stable fresh forage yields. Therefore, these genotypes should be preferred for forage yield production in Southeastern Anatolia region conditions.

Keywords: *AMMI analysis, fresh forage yield, common vetch, genotype × environment interactions, stability*

ALLELOPATHIC EFFECTS OF OREGANO AND ROSEMARY ESSENTIAL OILS ON GERMINATION AND SEEDLING GROWTH OF DURUM WHEAT

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Abstract

Some allelochemical compounds secreted by variety plants parts may cause allelopathic effects on other organism. The aim of this study was to investigate the effect of *Origanum onites* L.(*Ori*)and *Rosmarinus officinalis* L.(*Ros*) essential oils on durum wheat germination and seedling growth. Doses of 0, 2, 4, 8 and 16 µL per petri dishes were applied,andfive durum wheat cultivar seeds were allowed to germinate at 20 ± 2 °C in the dark for 10 days. Germination percentage (GP), germination index (GI), mean germination time (MGT), seedling shoot length (SL), seedling root length (RL), and seedling fresh weight (SFW) of cultivars were measured. Results showed that the significant allelopathic effect of essential oils was depended on cultivars, oil types and oil practiced doses.Both *Ori* and *Ros* essential oil caused a generally reducing effect on GR, GI, SL, RL, and SFW of the tested genotypes. Inhibition rates related to tested traits was increased with the increasing doses. When control and lowest oil doses and control and highest oil doses were compared, *Ori* oil caused 46.2 to 98.3 % GP inhibition, 60.3 to 94.6% GI inhibition, 25.1 to 90.8 % SL inhibition, 47.8 to 95.6 % RL inhibition, 21 to 84 % SFW inhibition, respectively. When *Ros* oil was concerned inhibition rate range of GP was from 15.1 to 91.5 %, GI from 31.8 to 96.6 %, SL from 22.1 to 88.2 %, RL from 24.2 to 91.9 %, and SFW from 14.4 to 68.5 %. There was a delay on MGT of cultivars as the oil dose was increased. *Ori* oilhad higher allelopathic effect than did *Ros* oil on seed germination and seedling growth of durum wheat. The result of the study also demonstrated that essential oil of *Ori* and *Ros* had allelopathic potential and should be evaluated as allelopathic agents if it will be used for control of weeds and volunteer wheat species.

Keywords: *Durum wheat, oregano, rosemary essential oils, germination and seedling growth*

MORPHOLOGICAL AND CHEMICAL PROPERTIES OF MEDLAR (*MESPILUS GERMANICA* L.) FRUITS AND CHANGES IN QUALITY DURING RIPENING

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Abstract

Medlar has acquired increasing popularity in recent years for its edible fruits and some healing properties in modern medicine. Medlar fruits are often stored under non-cold conditions in straw. This study was conducted to determine morphological and biochemical characteristics of medlar fruits and changes in fruit quality occurring under ordinary storage conditions. For this purpose, eight types of medlar trees were evaluated. The trees were at a mature stage and productive. Morphological properties such as the fruit and seed weight (g), length, and width (mm) were measured after the harvest. Fruit soluble solid content (%) and pH values were determined at physiological maturity after harvesting, and the fruit soluble solid content was measured again at ripening (edible stage), after 25 days of storage under ordinary storage conditions (mean temperature of 10 °C and mean humidity of 65–70%). Leaf characteristics were also determined. The tree productivity was very different between the types, and it was determined to range from 5.9 and 17.8 kg. The fruit weight varied from 9.69 to 24.45 g, while the water content decreased nearly to the half of the harvest values in some genotypes. The soluble solid content changed depending on the water losses and increased during the ripening period. The seed numbers ranged from 1.7 to 4.7 among the types, and the seed weight varied from 0.12 to 0.45 g. The fruits were able to reach ripening maturity in three weeks under the ordinary storage conditions depending on the type. Thus, this method of storage is practical for the medlar producer, but the results clearly showed that the storage period was too short and that the fruit quality was negatively affected. Cold storage conditions are needed to ensure quality and a long selling time.

Keywords: *Medlar, fruit characteristics, storage, ripening*

THE EFFECTS OF OMEGA FATTY ACIDS ON HUMAN HEALTH

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Abstract

Oil is one of the most important organic substances required for human nutrition. Omega fatty acids play an important role in the body's physiological and biochemical activity of constructive and restorative functions and they are effective in the development of healthy tissue. Omega fatty acids consist of Omega-3, Omega-6 and Omega-9 and they have important function in the treatment of obesity, strengthening the immune system and the prevention of cholesterol and heart disease. Poly-unsaturated fatty acid/Saturated fatty acid rate (P / S) is an important quality factor. Higher P/S ratios increases the quality of oil. The most important plant sources for linoleic acid are; sunflower, safflower, soybean, corn, sesame, peanut, cotton and linolenic acid major sources are rapeseed and flax. The lack of omega fatty acids causes many diseases. Saturated fatty acids cause cardiovascular diseases and weight gaining due to fat accumulation. Omega fatty acids such as Omega-3, Omega-6 and Omega-9 have positive effect on health. For adequate and balanced consumption of oil fatty acids, consumers should have minimum and maximum limits. In this paper; the effects of omega fatty acids on human health will be discussed.

Keywords: *Fatty acid, Omega fatty acids, Omega-3, Human Health.*

BREEDING LOW LINOLENIC ACID CONTENTED LINSEED VARIETIES FOR SAMSUN ECOLOGICAL CONTIDITONS

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Abstract

Research results indicate that stem weight found 1.2-5.1 g per plant, seed weight 0.07-1.02 g per plant, biological weight 1.7-6.8 g per plant, plant height 40.4-57.8 cm per plant, number of branches per plant 2.6-6.5, number of capsules per plant 4.6-37, capsule weight per plant 0.14-1.7 g/plant, palmitic acid rate 5.5-6.0%, stearic acid rate 3.7-6.8%, oleic acid rate 17.6-31.0%, linoleic acid rate 10.3-55.0%, linolenic acid rate 10.1-6.1%. There were positive and significant correlation found between palmitic acid and stearic acid; positive and significant correlations found between palmitic-linoleic acid and stearic-oleic acid; significant and negative correlations found between linoleic-linolenic acid and linolenic-palmitic acid. Agricultural characters and fatty acid composition is not significantly correlated. According to our results, BxW combination has the lowest linolenic acid content and it is considerable most suitable for edible oil.

Keywords: *Linseed, linolenic acid, gene pool*

DETERMINATION OF MYROBOLAN 29C ROOTSTOCKS REACTIONS AGAINST DROUGHT STRESS *IN VITRO* CONDITIONS

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Abstract

In this study, it was investigated morphological response of Myrobolan 29C rootstock against drought stress establishing on culture media including different PEG (Polyethylene Glycol) levels. Three PEG levels (-0.5MPa, -1.0MPa, -1.5MPa) was used in order to make drought stress condition. Plants were measured at 0, 3, 5, 7, 9, 11, 13 and 15 days for morphological parameters (plant height, relative plant weight, leaf area, chlorophyll content) and collected leaves for proline and protein analysis. There were also measured the permeability of membranes and leaf relative water content (LRWC).

The highest growth of plant height was obtained by control (4,04%), the lowest growth was obtained by -1,5MPa drought stress level (1,98%). Under all drought stress, plants died on 15 days of culture. The lowest drop rate of relative plant weight was measured from -1,5MPa drought stress level (18.22%). The lowest leaf area was determined to 1cm^2 in -1,5MPa while the highest leaf area was determined to control (2.77cm^2). According to the leaf membrane permeability, -1,5MPa (97.92%) was the highest. LRWC was the lowest in -1,5MPa drought stress level (2.44%). Total protein level increased from initial day to 3 days and after this time its level decreased under all drought application to end of study. The proline content decreased in -0,5MPa and -1,0MPa until end of 13. Days while proline content decreased after 9 days in 1,5MPa.

Keywords: *Drought Stress, Myrobolan 29C, Plant Tissue Culture*

PROHEXADIONE-CALCIUM AFFECTS VEGETATIVE GROWTH AND YIELD OF PEPPER

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Abstract

Some crops like red pepper (*Capsicum annuum* L.) tend to stretch very early after germination especially if it is grown in low light environments. Therefore, the height of vegetable crop seedlings must be controlled by any possible way. The most common way to control plant height is to apply a plant growth retardant that inhibits stem elongation. This study was conducted to compare the effects of Prohexadione-Calcium (Pro-Ca) concentrations (0, 25, 50, 75, and 100 $mg.L^{-1}$) and application methods (seed soaking, foliar spray, and soil drench), on growth and quality of pepper seedlings and to determine any subsequent effects in the field on vegetative growth, flowering and yield. At field transplanting (42 days after planting), Pro-Ca concentrations higher than 25 $mg.L^{-1}$ and application methods except for seed soaking reduced seedling heights by 25-31%, leaf area size by 7-16 %, shoot fresh weight by 23-32%, shoot dry weight by 19-29%, root fresh weight by 10-22%, and root dry weight by 20-24%. No delay in flowering and fruit set time were found in pepper plants grown from Pro-Ca treatments. However, the 100 $mg.L^{-1}$ Pro-Ca treatment was found to decrease yield by 22%. These results indicate that lower Pro-Ca concentrations (25 and 50 $mg.L^{-1}$) can be used to control excessive elongation growth of pepper seedlings without yield loss.

Keywords: *Growth retardant, height control, application method, Capsicum annuum L.*

EFFECTS OF SOME APPLICATIONS ON *IN VITRO*POLLEN GERMINATION OF CAPRIFIG GENOTYPES (*Ficus carica* var. *caprificus*)

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Abstract

Fig (*Ficus carica* L.) is a gynodiocius specieswhich has male and female fruits on the different trees.Smyrna type figs are needed to pollination for the enough fruit set. Therefore, caprification (meaning the transfer of pollen grains from male trees to female trees by a vector, *Blastophaga psenes* L.) are commonly used for the figs. The aim of the study was to carry out and evaluate theeffects of some applications on pollen germination of caprifig genotypes (*Ficus carica* var. *caprificus*). For this purpose, we investigated effects of light and dark conditions, pH of medium, sucrose, glucose and fructose levels and H_3BO_3, $Ca(NO_3)_2$, $MgSO_4$, KNO_3concentrations in petri dishes on the temperature of 24°C for 24 h.Pollens from caprifigs were collected from anthers cracking on the June 10-25 from eastern Mediterranean region of Turkey. Germination rates of the caprifig genotypes were higher in the dark conditions (44.41%) compare to light conditions (30.65%). pH of medium were significantly affected on germination rates and optimal germination was obtained from pH 5.0 (56.39%).As a result, best condition for *in vitro* caprifig germination were in 1% agar+3% sucrose +100 ppm H_3BO_3+300 ppm $(CaNO_3)_2$+200 ppm $MgSO_4$+100 ppm KNO_3tests in pH 5.0 and dark conditions.

Keywords: *Fig, caprifig, pollen, germination.*

A STUDY ON THE DETERMINATION OF YIELD PROPERTIES AND FACTORS THAT AFFECT THE YIELD IN COWPEA UNDER KIRSEHIR/TURKEY ECOLOGICAL CONDITIONS

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Abstract

This study aimed to determine cowpea seed varieties that may be suitable for the production efficiency and affecting yield factors in Turkey's located Middle Anatolia Kırsehir ecological conditions. The study was conducted for 2 years in 2014-2015. In research, 4 cowpea varieties (Amazon, Sırma, Karagoz, Akkız) and control Nevsehir / Hacıbektas, obtained from the district domestic genotype 1, were used. Research was conducted in a randomized complete block experimental design with three replications. Sowing was performed on 10 May 2014 and on 8 May 2015. The local cowpea cultivars and genotypes according to the two-year average grain 50% flowering number of days 68-80 days, 50% pod connecting number of days 93-102 days, plant height 41-83 cm, pod number in plant 2-10 pieces/plant, pod length of 5-15 cm/pod, 100 seed weight and seed yield 11.46-18.75 g per plant between 1:21 to 6:19 g/plant ranged. As a result, number of pods per plant and seed per plant, plant and yield per plant and the number of days between the number of pods per pod connect with biological yield was found to be very important relationship. At the same time the first pod height, plant height and number of pods with one seed per plant were among the important relationships that were identified in both years. In cowpea breeding programs, in the number of pods per plant, yield per plant, number of pods per plant and has laid the biological traits could be used as selection criteria.

Keywords: *Kırsehir, cowpea, local genotypes, yield, yield components*

COTTON PRODUCTION IN TURKEY

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Abstract

Fiber is one of the most indispensable basic needs for our life. There are several types of fibers that are important for human health. Cotton fiber is the most important one and has a share of 28% in all the fibers consumed and a share of 75% among vegetable fibers. Cotton (*Gossypium hirsutum* L.) being a major cash and industrial crop of Turkey, plays a key role in the boosting of national economy. Besides earning huge amount of foreign exchange through textile export, it also provides fiber for inland textile industry. Cotton cultivation is mainly dependent on the environmental conditions. Thus, while the fiber properties of cotton depend on the genetic potential of cotton varieties, they might also be affected by environmental conditions. In our country, cotton cultivation is mainly carried out in three regions including Southeastern Anatolia, the Mediterranean region (including the province of Antalya) and Aegean Region. Southeastern Anatolia Project (SAP) called GAP is carried out in Southeast of Turkey and it is a multifaceted project covering irrigation, energy and health. Under this project, with the release of water into the Harran Plain in 1995, cotton production has been increasing year by year in the region. Cotton varieties grown in each of the three geographic regions are different from each other due to the different ecological conditions of the regions. In this article, the impact of GAP project on cotton production, cotton acreage and the production situation in the cotton production regions, varieties used in the cotton production and developments in bailing chain will be examined.

Keywords: *Cotton, Turkey, production, GAP*

KARYOLOGICAL INVESTIGATIONS ON SOME *NIGELLA* L. SPECIES

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Abstract

This study was performed in the laboratory of the Kahramanmaraş Sütçü İmam University Faculty of Agriculture Department of Field Crops in Turkey. In this research were investigated karyological properties of some *Nigella* species and used three nigella species. These species were *Nigella damascene, Nigella sativa* species and *Nigella* Çameli registered varieties. The scope of karyological analysis examined the number of chromosome, the length of chromosome, relative length of chromosome, chromosome arm ratio, centromere index, centromere situation and idiograms of these species were performed. The somatic chromosome numbers were determined as 2n = 2x = 12 in all species. Karyotype analysis indicated that chromosomes of *Nigella* species generally have median region (m), subterminal region (st) and terminal point (T) karyotypes. Karyotype formula was observed as 5m+T in *Nigella damascene*, 5m+1st in *Nigella sativa* and 5m+1st in Çameli. Relative length was changed 9.60-19.40 in *Nigella damascene*, 9.45-20.26 in *Nigella sativa* 8.48-22.55 in Çameli. Karyological properties and the number of chromosome of three species were almost observed similar.

Keywords: *Nigella, chromosome, karyotype, black sesame*

EFFECTS ON SOME PLANT GROWTH PARAMETERS OF GA_3 APPLICATIONS IN PEPPER PLANTS UNDER SALT STRESS

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Abstract

Seedlings of Demre sharp pepper varieties, in the hydroponic system containing Hoagland nutrient solution were grown in climate – controlled plant growth room. In the study, 100 mMNaCl was applied to three week old seedlings in stages and salt applications were continued in the same concentrations at the stage of refreshment of solutions that were renewed on a weekly basis. In order to to reduce the negative effect of salt on plant development, GA_3 (gibberellic acid)with 5 ppm, 7.5 ppm and 10 ppm dose together with salt were added to pepper seedlings. In the samples taken on 10 th and 20 th day of this application were investigated physiological changes that occurred as a result of salt stress. Also, plant root,stem, leaves wet weight, number of leaves, plant height and node intermediate distance were investigated. Furthermore, a scale of stress resistance was created based on the symptoms on leaves. In GA_3 applications made along with salt during the study, the best plant growth was observed in plants which had been applied the 10 ppm dosage of GA3. Furthermore, it was observed that the NaCl+10 ppm GA_3 application caused the least morphological damage and the lowest scale value among NaCl applications.

Keywords: *Pepper (Capsicum annuum L.), gibberellic acid, hormone, plant growth, salt stress*

THE EFFECTS OF SOME ROOTSTOCKS ON BIOLOGICAL ANDPHENOLOGICAL PROPERTIES OF NAVEL ORANGE TYPES IN TURKEY

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Abstract

Citrus fruits export is ranked as the 1st in fresh fruits and vegetable export in Turkey. In Turkey, the total citrus fruit productionis 3.975.873 tons in 2015. About 86.64% of the total citrus productions in Turkeyare in the Mediterranean Region.Orange production constitutes 45.70% with 1.816.798 tons of this production. Approximately 27.33% of orange production in Turkey is cultivated in Antalya province. In this study, four navel orange clones (numbers 3, 38, 39 and 86) and three navel orange varieties (‘Gillette’, ‘Navelina’ and ‘Tule Gold’) grafted onto common Sour orange and Troyer citrange rootstocks were used. Blooming dates (The first blooming, full blooming and the last blooming dates); flower and June drop (fruitlets) rates were examined by using Navel orange clones and varieties. Furthermore, some development parameters of the trees (canopy volume, stem diameter and canopy area) were alsostudied. The blooming period of Navel orange clone and varieties under Antalya seasonal conditionshas been determined and has ranged between the periods of April 7 to May 2. Although, flower and June fruit drop rates were not fundamentally affected by the rootstock, clones and varieties have influenced the flower and fruit drop rates. There wasn’t any statistical effect on the rootstock of flower drop and June fruit drop rates. However,significant positive correlations were observedregarding development parameters of the orange clones and varieties.

Keywords: *Citrus, blooming, June drop, Sour orange, Troyer*

YIELD AND POMOLOGICAL TRAITS OF RED CHIEF AND MONDIAL GALA APPLE CULTIVARS IN SUBTROPICAL CONDITIONS OF TURKEY

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Abstract

The aim of this study is determined to yield and fruit characteristics of the 'Red Chief' and 'Mondial Gala' cultivars (*Malus domestica* Borkh.) grafted on M9 and MM106 rootstocks under subtropical conditions of Turkey. The experiment was conducted on a private sector orchard in the Eastern Mediterranean Region of Turkey (Yayladağı/Hatay) in 2011. In this study, harvesting date, yield parameters and pomological characteristics of 'Mondial Gala' and 'Red Chief' apple cultivars were evaluated. The fruit characteristics such as fruit weight, fruit width, fruit length, seed number per fruit, pH, TSS, acidity were investigated based on the cultivars and rootstocks. The results showed that, fruit harvesting was 18 August for the 'Mondial Gala' and 29 August for the 'Red Chief'. Average fruit weight was 129.86 g for the Mondial Gala/MM106, 99.13 g for Mondial Gala/M9, 189.86 g for the Red Chief/MM106, and 178.10 g for Red Chief/M9. Yield produced was 0.60 kg/cm^2 for Red Chief/MM106, 0.89 kg/cm^2 for Red Chief/M9, 0.45 kg/cm^2 for Mondial Gala/MM106, and 0.27 kg/cm^2 for Mondial Gala/M9. In conclusion, according to pomological and yield properties, Mondial Gala/MM106 for summer apple and Red Chief/M9 for winter apple cultivations can be promising for the subtropical conditions in the region.

Keywords: *Apple varieties, yield, pomological properties, subtropical conditions.*

WILD ALMOND SPECIES IN TURKEY AND USE OPPORTUNITIES

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Abstract

Due to the suitable climatic conditions, Turkey is one of the most important growing center for wild and domesticated species/varieties of almond. Because of the adaptability of wild almond species to severe environmental conditions and resistance to drought, salinity and some pest and diseases, these can be used as rootstock for almond cultivars and in breeding programs for rootstock improvement in Turkey. In this review, we evaluated to the distribution of *A. orientalis, A. turcomanica, A. arabica and A. webbi* almond species in Turkey and its potential as a multi-purpose crop. These species are naturally widespread as genetic resources in many regions of Turkey. Seedlings of these species can be used for as dwarf rootstocks for almond cultivars due to them are growing weak. In addition, the species show a great tolerance to abiotic stresses such as drought, salinity, low soil fertility and low winter temperatures; therefore the species may present an important genetic resource to be used for development of new cultivars and rootstocks that are more adapted to differ climate change in almond breeding programs.

Keywords: *Wild almond, species, rreeding, rootstock*

SOIL CARBON AND NITROGEN IN A LEGUMINOUS/MAIZE CROP ROTATION WITH THREE TILLAGE SYSTEMS UNDER MEDITERRANEAN CONDITIONS

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Abstract

Under rainfed Mediterranean condition, conservation tillage is a promising agriculture system for improving soil carbon and nitrogen sequestration. The aim of this study was to evaluate the mid-term effects of conservation tillage systems (rototiller (RT) and chisel (CT)) on carbon and nitrogen sequestration compared with conventional tillage (MT) in western Turkey. The study established in 2001 with winter wheat-vetch rotation, and then continued by vetch-summer maize rotation from 2004 to 2010. Compared with MT, significantly higher soil organic carbon and nitrogen concentrations were observed in the surface soils (0-10 cm) under RT at planting, flowering and harvesting in all years. The soil organic carbon and N stocks were higher under RT than under MT and CT at three sampling time of three soil depths in all years. Compared with 2001, the net depth (0-30) soil carbon sequestration rate was 4.74, 5.96 and 5.44 Mg ha^{-1} in 2010 under RT, MT and CT, respectively. The trends in N stocks in the same soil depth were 1.41, 1.32 and 1.53 Mg ha^{-1} for RT, MT and CT, respectively. Soil carbon stocks were the highest under RT, however, the opposite trend was observed for N stocks. The higher soil carbon stratification was observed under RT and CT than under MT.So, the notion that RT leads to higher soil carbon stocks than MT. Nonetheless, some benefits associated with CT present a greater potential for its adoption in view of the long-term environmental sustainability under vetch-summer maize double-cropping system.

Keywords: *Tillage, maize, soil organic carbon, N concentration, Turkey*

SOME LEAF PROPERTIES OF NATURAL *Laurus nobilis* L. POPULATION IN KARABURUN PENINSULA (IZMIR/TURKEY)

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Abstract

There is an increasing global demand to driedof bay laurel leaf,Many bay laurel areas, primarily in the Aegean region of Turkey, have been destroyed because of several factors: Therefore, new bay laurel areas should be established:New plantations should be formedbygenotype(s) with superior characteristics. The present study was undertaken to examine leaf characteristics of natural laurel genotypes in Karaburun Peninsula, İzmir/Turkey. Two years old leaves samples were taken in the middle of March, June, September and December from 23 different trees. Leaf size and thickness, leaf area and leaf color were determined. As a result of study, average leaf length was found that ranged between 4,02 and 6,83 cm and average leaf widthbetween 1,90 and 3,58 cm. Thickness of leaves changed between 0,250 and 0,306 cm and leaf areas ranged between 6,64 and 19,27 cm^2. Some values differed by season. As a result of study there were found differences among bay laurel genotypes grown in the Karaburun peninsula.

Keywords: *Laurus nobilis L,, Karaburun peninsula, leaf characteristics, Leaf color, Turkey*

THE EFFECTS OF IRRIGATION WATER AMOUNTS ON LEAF CHLOROPHYLL AND NUTRIENT CONTENTS OF IZMIR 1 POMEGRANATE VARIETY

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Abstract

Pomegranate (*Punica granatum*) is an important horticultural crop for both domestic and export markets in Turkey.It adapts to all kinds of climate and soil. It is well adapted to the growth conditions in Turkey and Mediterranean countries is frequently found growing in wild or semi wild conditions. Pomegranates can tolerate long periods of drought once the plant is established but regular irrigation is mandatory in commercial production. We investigated the effect of different irrigation water amounts on nutrient uptake and content of leaf pigments of 10-year old pomegranate cv İzmir 1 trees two consecutive years (2009-2010). Three different irrigation water quantities (control, deficit and full irrigation) were applied by drip irrigation system. First leaf samples were taken a week before starting the irrigation treatments and continued until the end of the harvest season with four weeks interval. Results showed that leaf content of phosphorus, potassium, calcium, iron, and zinc was affected with quantity of irrigation water in the first year. But in the second year, only phosphorus content changed by the irrigation levels. In both years of the experiment chlorophyll a, b and total were not affected by the irrigation treatments but they differed during growth periods. Chlorophyll a and chlorophyll b contents increased in the first year, and decreased in the second year during vegetation periods. Total chlorophyll contents of leaves showed same behaviour as chlorophyll a and b. In the first year, all chlorophyll components contents in leaves were found to be higher compared to second year.

Keywords: *Pomegranate, İzmir 1, drought stress, deficit irrigation, leaf content*

DETERMINING THE APPROPRIATE PLANTING TIME FOR PEANUT (*Arachis hypogaeaL.*) PLANT IN CONDITIONS OF GAP REGION

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Abstract

This research was carried out in order to determine the suitable sowing time for peanut in the condition of GAP region (is located in Turkey's Southeast) at the GAP Agricultural Research Institute Talat Demirören Research Station in 2013-2014. Two peanut cultivars (NC-7, Halisbey) and eight different sowing dates (April 15, April 25, May 5, May 15, May 25, June 5, June 15 and June 25) were studied. Trial was conducted as split plots design with three replications. The main plots were consisted of planting dates; the sub-plots were consisted of cultivars. In the result of combined analysis of two year, the differences between sowing dates were found significant at the level of 1% in terms of capsules number per plant, seed number per plant, seed yield, protein ratio, and oil yield except 100-seed weight.

As a result of two-year interaction of this research, the seed yield ranged between 489.1 kg/da and 325.4 kg/da in terms of sowing times. While the highest seed yield was obtained either from the sowing date of April 25 with 489.1 kg/da or from the sowing date of May 15 with 488.7 kg/da, the lowest capsule yield was obtained from the sowing date of June 25 with 325.4 kg/da. While the highest oil yield was obtained from the variety of NC-7 with 144.3 kg/da in the sowing date of May5,the lowest oil yield was from the variety of Halisbey with 84.6 kg/da in the sowing date of June 25, and the highest protein ratio received from the variety of NC-7 with the 20.75 % in the sowing date of June 25.

Keywords: *GAP region, peanut, sowing date, variety, yield and yield components*

EFFECT OF SOME PLANT GROWTH PROMOTING RHIZOBACTERIA ON GROWTH, LEAF WATER CONTENT AND MEMBRANE PERMEABILITY OF TWO CITRUS ROOTSTOCK UNDER SALT STRESS CONDITION

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Abstract

Some plant growth promoting rhizobacteria (PGPR) (*Bacillus subtilis* EY2, *Bacillus atrophaeus* EY6, *Bacillus spharicus GC subgroup B* EY30, *Staphylococcus kloosii* EY37 and *Kocuria erythromyxa* EY43) were investigated under salt stress conditions in two citrus rootstocks (*Citrus aurantium* L., *Poncirus trifoliate* L. Raf.). Effects of EY2, EY6, EY30, EY37 and EY43 were tested on plant growth (plant height, plant and root fresh weight, root length), leaf relative water content (LRWC), and membrane permeability in citrus rootstock. The plants were grown in pots and irrigated with a NaCl solution (100 mM). Irrigation was applied once a week during growing period which continued for ten weeks. All bacteria treatments significantly increased plant height and root length in both citrus rootstocks. The LRWC range from 58.62% (100 mM NaCl treatment) to 87.08% (EY43 bacteria strain) in trifoliate. On the other hand, in sour orange, LWRC ranged from 23.20% (100 mM NaCl treatment) to 75.49% (Control). The highest membrane permeability rate was determined in NaCl treatment in sour orange and trifoliate orange.

Keywords: *PGPR, NaCl, citrus rootstock, plant growth*

THE EFFECT OF CULTIVAR AND HARVESTING DATES ON ROOT YIELD AND SUGAR CONTENT OF WINTER SOWN SUGAR BEET

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Abstract

Sugar beet is cultivated on irrigated areas in summer; sugar beet cultivation, root yield and sugar content are dependent on irrigation significantly. In addition, summer sown sugar beet harvest begins in October at the earliest, until this month the sugar factories waiting for work. This condition is caused by the rising costs of production and sugar factories remain idle. Using less water in the production of sugar beet, sugar beet factories to process early and in order to grow a second crop after sugar beet harvest, wintery sugar beets were sown. The aim of this study was to determine root yield and sugar content of two winter sugar beet species (Eudora and Sculta) in three harvesting dates (June 11, 27 and July 19). This study was conducted in 2011-2012 growing season of Kahramanmaraş, established as a split plot design with 3 replicates. Species in main plots and harvesting dates in the sub-plots were placed. In the study, the head and leaf yield, root yield and sugar content were examined. As a result of analysis of variance, it was determined that there were no significant differences between species in terms of investigated features, the effect on the head and leaf yield and root yield of harvesting times were significant. At the end of the study, 14.43% sugar content, 2.63 ton/da head and leaf yield and 6.83 ton/da root yield from Eudora; 14.34% sugar content, 2.84 ton/da head and leaf yield and 6.80 ton/da root yield from Sculta species were obtained. The effect of harvesting dates on head + leaf and root yields except sugar content were significant. The highest head and leaf yield (3.13 ton/da) in the second harvest (June 27), the highest root yield (8:42 ton/da) in the third harvest (July 19) was obtained. Delayed harvest date increased root yield, the head and leaf yield decreased after the second harvest. Drying of leaves and leaf losses resulted in the head and leaf yield reduction in the time of final harvest.

Keywords: *Sugar beet, Beta vulgaris L., winter beet, root yield, sugar content*

EVALUATION OF SOME SESAME (*Sesamum indicum* L.) VARIETIES' PERFORMANCES UNDER MICRO-CLIMATE CONDITIONS of IGDIR-TURKEY

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Abstract

The yield of any crop is directly or indirectly a function of the interaction between the crop's genotype and the existing climatic and ecological factors. This study was carried out to determine the performances of some sesame cultivars under Igdir plain ecological conditions in Igdir -Turkey, 2012. Cumhuriyet-99, Kepsut-99, Muganlı-57, Orhangazi-99, Osmanlı-99, Tan-99, Tur-S-90 and Tur-S-203 varieties were used as trial materials. The study was conducted in the Randomized Blocks Experimental Design with three replications to investigate plant height, number of branch per plant, first pod height, pod length, pod width, number of pod per plant, number of seed per pod, 1000 seed weight and seed yield. Results of experiment revealed that all investigated properties showed significant differences among the genotypes. Plant height varied among 121.0-147.1 cm, number of branch 3.6-7.2, first pod height 43.6-67.1 cm, pod length 25.3-28.6 mm, pod width 4.8-6.5 mm, number of pod per plant 56.1-125.5, number of seed per pod 53.2-72.3, 1000 seed weight 2.85-3.67 g and seed yield 523.3-1005.9 kg ha^{-1}. The highest seed yields were obtained from Orhangazi-99 while the lowest seed yield was recorded from Tan-99.

Keywords: *Sesame, Sesamum indicum, variety, yield, yield components*

FORAGE YIELD AND QUALITY PERFORMANCE OF HUNGARIAN VETCH AND ANNUAL RYEGRASS MIXTURES UNDER DRY LAND CONDITIONS

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Abstract

The aim of this study was to determine the performance of yield and some quality features ofsole sowing and different mixture ratios of Hungarian Vetch and annual ryegrass. The experiment was conducted in a randomized complete blockdesign with Altınova-2002 Hungarian vetch and Trinova annual ryegrass varieties in Kırşehir (39°08'32"N, 34°06'48" E), Turkey. Fresh herbage, dry matter and crude protein yields were determined between 683.5 and 963.3 kg da^{-1}, 205.3 and 315.9 kg da^{-1}, 23.70 and 50.18 kg da^{-1}, respectively. Crude protein, ADF, and NDF ratios ranged between 11.58 and 17.86%, 28.69 and 39.66%, 37.12 and 59.67%, respectively. Dry matter yields of mixtures were higher than those of pure sown Hungarian vetch and annual ryegrass. The highest value of this yield component was obtained from the Hungarian vetch 80% + annual ryegrass 20% mixture. Because of the increasing rate of Hungarian vetch in the mixtures, NDF and ADF ratios of mixtures decreased. Reductions in ratios of NDF and ADF caused increases in the crude protein content and yield. Consequently, Hungarian vetch 80% + annual ryegrass 20% mixture was found superior than the other pure sown species and mixtures in terms of yield and quality features. It is concluded that this mixture can be grown successfully for the production of high quality roughage in Kırşehir or similar ecological conditions.

Keywords: *Hungarian vetch, annual ryegrass, yield, ADF, NDF*

EFFECTS OF 18 LOCAL*BEAUVARIA BASSIANA* (BALSAMO) VUILLEMIN ENTOMOPATHOGEN FUNGI ISOLATES ON PINK CORN BORER *SESAMIA CRETICA* LED. UNDER LABORATORY CONDITIONS

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Abstract

The spread of silage maize production in Turkey caused significant increase at population level of corn borer, *Sesamia cretica* Led. (Lepidoptera: Noctuidae) In the management of this pest general insecticides, such as organic phosphates and synthetic pyrethroids are used. Its damage still occurs in corn fields, in spite of the use of biological control agents, such as entomopathogenic fungi, nematodes or bacteria and egg-larval-pupa parasitoids, as well as Bt-maize, as a popular application for management of *S. cretica*. In order to detect more effective microbial control agents against this pest and contribute to the integrated pest management studies of corn borer, a study of insecticidal effect of 18 different isolates of entomopathogenic fungi *Beauvaria bassiana* obtained from soil collected from different fields crop production areas in Tokat Province in 2015. The isolates consist of *B. bassiana* isolates (GOPT-19(2)-1, GOPT-41-1, GOPT-64, GOPT-107, GOPT-114, GOPT-122, GOPT-127, GOPT-144, GOPT-167, GOPT- 221, GOPT-284, GOPT-294, GOPT-302, GOPT-355, GOPT-440, GOPT-453, GOPT-458, GOPT-465). Pathogenicity of tested isolates to *S. cretica* was evaluated by dipping larvae (fourth instar) to spore suspension from each isolate. Within 9 days, all fungal isolates caused significant mortality against larva of *S. cretica*. *B. brassiana* isolates GOPT-144 was found to be the most virulent with 90.83% mortality among investigated fungal isolates, followed by GOPT-64 (75.42% mortality) and GOPT-107 (63.75% mortality) against the *S. cretica*. These results indicated that isolates with high virulence could be used for biological control and integrated management of *S. cretica.*

Keywords: *Sesamia cretica, Corn borer, entomopathogen, Beauvaria*

CLASSIFICATION OF HEAT TOLERANT COTTON GENOTYPES BY USING COMBINATION OF CORRELATION AND PRINCIPLE COMPONENT ANALYSIS

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Abstract

Cotton is often grown in hot and semi-arid regions of the world, but, high temperatures decreases cotton fiber yield. Plant breeders strive extensively to find simple, quick, and reproducible screening methods to distinguish heat-resistant cotton plants. A heat-resistant cultivar was previously defined as a cultivar that still has higher productivity while growing in heat stress conditions. Thus, seed cotton and lint yields under hot temperature conditions are considered as the most suitable traits for distinguishing heat resistant cotton. However, screening in the field conditions is labor intensive, depends on highly variable environmental conditions, and requires comparison of the data collected after harvest. Therefore, a rapid, efficient and reproducible screening method under controlled environmental conditions is required to distinguish heat resistant cotton genotypes in early developmental stage. Besides, a suitable statistical approach is essential to classify genotypes based on their response to high temperature. Herein, we discuss our previously published study results on classification of cotton cultivars for heat resistance in the context of using correlation analysis and principle component analysis (PCA). Briefly, significant correlations were found between some physio-morphological traits under controlled environmental conditions and two-year average yield values under hot field conditions. Then, cotton cultivars were classified for their tolerance by PCA using data of yield-correlated traits. Finally, heat tolerance classification coincided with yield performance of cultivars grown under hot field conditions. We concluded that cotton genotypes could be classified for their heat tolerance by performing PCA using data of yield-correlated traits collected from controlled environmental conditions.

Keywords: *Cotton, Heat tolerance, Classification, Principle Component Analysis*

COMPANION CROPS FOR ALFALFA ESTABLISHED IN SPRING

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Abstract

Alfalfa is generally sown in spring season in the Inner Anatolia (Turkey) having cold winter conditions. However, low forage yield and weed infestation are the significant problems in spring–sown alfalfa at the establishment year. This problem can be eliminated to a large extent with suitable annual companion crops in alfalfa stands. In this study, alfalfa (A) was seeded with five annual crops (C) with three seed rates (A:C, 100:100; 100:80, 100:60) under irrigated condition of Yozgat-Turkey in May 2014. As companion crop buckwheat, maize, sorghum-sudangrass hybrid, soybean and cowpea were used. Companion crops were removed individually on different dates as forage in first cutting; however, sorghum was cut off three times during the establishment year, as pure alfalafa due to its regrow ability. Sowing with companion crop significantly ($p<0.05$) affected hay and protein yield of alfalfa stand. At the establishment year, alfalfa intercropped with sorghum by the seed rate of 100:80 produced higher hay (22272 kg ha^{-1}) and protein yield (4042 kg ha^{-1}) compare to alone alfalfa and other mixtures. Also mean protein, ADF, NDF, Ca, Mg, P and K content of the hay were different among cropping treatments

Keywords: *Alfalfa, companion crop, buckwheat, maize, sorghum soybean, cowpea.*

THE NEW WALNUT VARIETY BREEDING PROGRAM IN TURKEY

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Abstract

Turkish walnut cultivars are considerably early leafing and they are bear fruit on terminal buds. The most widely used breeding method in walnut variety breeding programs in Turkey was selection. Cross breeding method was used in only three studies. The new walnut variety breeding program was started in 2008. The aim of this breeding program is to provide new walnut cultivars by crossing for the Turkey walnut industry. The primary goal is to develop cultivars with late leafing, lateral fruit bearing, early harvest dates, and good nut quality. Thirteen crosses have been carried out in different three ecological conditions. The varieties with late leafing and good nut quality chosen as female parents were pollinated by varieties with lateral fruit bearing and high yielding. To ensure the highest possible germination, seed are straficated in cold room (4 °C). After stratification, germinated seeds were sowed in to plastic containers containing peat, perlite and soil for growth in the greenhouse. We have 1340 seedlings under evaluation in the breeding program. Leafing time of seedlings was observed in greenhouse at second year; and late leafing seedling were selected and planted in a breeding orchard. Leafing time of seedlings are determined and compared by 'Franquette', 'Serr' and 'Chandler' cv. during three years in breeding orchard. If no nuts have been produced by age four they are painted by red. The results showed that 189 genotypes were selected according to late leafing, and six genotypes early fruiting and late leafing. In 1340 hybrids observed, 33.52 % of seedling varied from medium late to late leafing. The data showed that there are correlation between the leafing time of first and third year.

Keywords: *Walnut, crossing breeding, cultivar*

ANTIFUNGAL ACTIVITY OF *SISYMBRIUM SOPHIA* EXTRACTS AGAINST PHYTOPATHOGENIC FUNGI

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Abstract

The purpose of this study was to assess the effectiveness of methanol and aquatic extracts from *Sisymbrium sophia* against the plant pathogens, *Fusarium oxysporum* f. sp. *radicis-lycopersici* (FORL) (Sacc.) W.C.Synder and H.N. Hans, *Rhizoctonia solani* J.G. Kühn., *Sclerotinia sclerotiorum* (Lib.) de Bary, *Verticillium dahliae*Kleb., and *Alternariasolani.* Various volumes of methanol and aquatic extracts were mixed with the sterile PDA in order to obtain different concentrations. Antifungal activity assessments were performed under in *vitro* conditions using 60 mm diameter petri dishes containing potato dextrose agar (PDA). Plant pathogen mycelial discs of 5 mm diameter were inoculated onto Petri dishes containing PDA medium (10 mLpetri^{-1}).Then the mycelial growth inhibition (MGI) was calculated. Additionally, the antifungal activity of plant extracts was evaluatedstatistically. Methanol 100 mg, 200 mg 400 mg/mL and 5%, 10% and 20% aquatic extracts of plant extract doses were used respectively. *Sisymbrium sophia*methanol and aquatic extracts showed distinguished antifungal activity. These results revealed that methanol and aquatic extracts of *Sisymbrium sophia*could be of use for the future development of plant disease agents.

Keywords: *Antifungal effect, plant extracts, Sisymbrium sophia, Plant pathogenic fungi*

A PLANT (*Bituminaria bituminosa*) SUITABLE TO PRODUCE FORAGE WITH LOW INPUT IN MEDITERRANEAN ENVIRONMENT

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Abstract

Bituminaria bituminosa (*Bitbit*) is a perennial species in *Bituminaria* genus. It naturally grows in open fields, road sides, eroded and slide areas and woodlands of soil pH 4.7-8.5.*Bitbit*plays important rolein natural vegetation of the coastal areas in Turkey and keeps greenery throughout the summer period in northern and western areas. We have been carrying out studies on *Bitbit* since 2010. We have collected 86 genotypes from Central Black Sea Region of Anatolia. No fertilizer and water were applied throughout the study and hay and seed yields, agronomical, morphological and phenological traits of genotypes were investigated. It was observed that there were significant differences and diversity in terms of all aspects amongst the genotypes. In some genotypes,only one harvest was performed, but in others, two harvests were done in the same season.Hay yield obtained from the second harvest decreased sharply for all genotypes. In the first year, average hay yield per plant of genotypes was 7.81 g, but it reached to 351.6 g in the second year. When we evaluated all genotypes, average hay yield per plant was between 83-994 g in the second year. While average seed yield obtained per plant was 85.22 g, it exceeded 250 grams for some genotypes.Especially leaves of the plant are very rich in terms of Ca, Mg, K and P. At the early growing stages, leaf ratio was 70-80%, crude protein 23%, ADF 20%, NDF 30% and Relative Feed Value(RFV) value more than 150. Even though *Bitbit* plants contain some chemical compounds, they do not cause a detrimental effect on animal health and on quality of animal products. Considering the plant needs, it needs very little input to grow. Therefore, it might be very important for extensive livestock farming at summer and winter periods in Mediterranean Basin.

Keywords: *Bituminaria bituminosa, genotype, yield, quality, low input.*

GROWING POSSIBILITIES OF FORAGE RAPE WITH SOME ANNUAL CROPS

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Abstract

In Turkey, there are more than 14 million livestock as Animal Units. But, meat and milk production of livestock is very low compared to European countries. Main reason is lack of forage production in high quality. Some farmers have to feed livestock with straw and chaff during winter period. On the other hand, generally warm season main crops such as; corn, cotton, sugar beet, sesame, soya bean, rice, tobacco are grown in fertile and irrigated coastal areas in summer period. If we put some annual, and high yielding forage crops in quality such as forage rape, oat, vetch, forage pea into crop rotation system, it would be possible to increase high quality forage production.

In 2015, we started to carry out a project aimed to determine yield and the other traits of forage rape, common vetch, Hungarian vetch, forage pea and oat grown alone and forage rape binary mixtures with others during winter period. According to the first year results, plant height of forage rape and the other crops decreased in mixtures. While branch number of forage rape increased into the mixture with common and Hungarian vetch, it decreased in the other binary mixtures. Stem diameters of forage rape increased in binary mixtures with legumes. All binary mixtures gave higher hay yield than sown alone, except oat. While hay yield was 5.90 ton ha^{-1} for sole forage rape, it increased to 9.44 ton ha^{-1} for forage rape + oat binary mixture.The early results showed that forage rape was very promising crop for forage production during winter period in northern coastal areas of Anatolia.

Keywords: *Forage rape, vetch, oat, forage pea, hay production*

EFFECTS OF BRASSINOSTEROIDS AND GIBBERELLIC ACIDS APPLIED *IN VITRO* CONDITIONS ON POLLEN VIABILITY AND GERMINATION OF SOME GRAPE CULTIVARS

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Abstract

There are numerous factors affecting pollen germination in plants. Plant growth regulators have produced different results on pollen germination both *in vivo* and *in vitro*. In this research, pollen viability using IKI test and effects of three different growth regulators (epibrassinolide, homobrassinolide and gibberellic acid) added into growth medium on the *in vitro* pollen germination of two wine grape cultivars (Cabernet Sauvignon and Merlot) were investigated. Pollen viability results showed that Cabernet Sauvignon contained more viable pollens (63.12% that Merlot (59.06%). Pollens collected from fresh flowers were sown on medium containing 1% agar and 20% sucrose using 'agar in petri dish' method. Results revealed that growth regulators did not affect germination in the cultivars, but the treatments had an overall increasing influence (about 25%). Although, in general, treatments produced similar ratios with the control group, 100 mgL^{-1} GA3, alone, and in combination with 0.01 and 0.001 mgL^{-1} epibrassinolide were found to cause significant increase. In addition, applying the lowest GA_3 concentration (25 mgL^{-1}) with 0.1 mgL^{-1} epibrassinolide provided the highest germination (23.54%). Only 0.001 mgL^{-1} homobrassinolide resulted in the almost the same ratio with the control group. Information obtained here show that effects of growth regulators change with the genotype, type of the hormones and composition of the basal growth medium.

Keywords: *Vitis vinifera* L., *Pollen Germination, Gibberellin, Epibrassinolide, Homobrassinolide*

MICROMORPHOLOGY OF POLLEN GRAINS OF SOME GRAPE CULTIVARS

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Abstract

Micromorphological characteristics of the pollen grain are one of the most important parameters to identify plant material. Pollen grains in various species are characterized by surface features, the length of polar axis (*P*) and the equatorial axis (*E*) of grain and *P/E* ratio. In this study, pollen grains of two cultivars of *Vitis vinifera* (Cardinal and Cabernet Sauvignon) collected from South Marmara of Turkey were examined for their micromorphological characterization through scanning electron microscopy. The length of polar axis (*P*), the equatorial axis (*E*), and *P/E* ratio were compared. There is no difference in size between 'Cabernet Sauvignon' and 'Cardinal' cultivar. Pollen from both cultivars is about 25 μm. The *P/E* ratio was 1.09 in 'Cabernet Sauvignon' and 1.08 in 'Cardinal'. The pollen grains shape is classified as elliptical-oval.

Keywords: *Vitis vinifera, Pollen Grains, Micromorphology, SEM*

INFLUENCE OFEXPLANT SOURCE AND PLANT GROWTH REGULATORS ON CALLUS INDUCTION ANDSHOOT REGENERATION OF CHICORY (*Cichorium intybus* L.)

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Abstract

Chicory (*Cichorium intybus* L.) is an important medicinal plant used traditionally to cure variousdiseases. The whole plant contains various medicinally important compounds and the concentrations of the compounds vary in different tissues.Callus induction andshoot regeneration of **Chicory**using leaf and petiole explants were investigated by studying the effects of different combinations of plant growth regulators. Leaf and petiole explants were cultured on MS medium supplemented withdifferent concentrations of IAA/KIN and NAA/TDZ.In leaf and petiole explants highest callus induction were obtained in the medium containing 0.3 mg l^{-1} IAA with 0.5 mg l^{-1} KIN and 0.6 mg l^{-1}NAA with 0.02 mg l^{-1}TDZ**.**The results showed thatthe highest regeneration percentage and the number of regenerated shoots were obtained in the medium containing 0.1 mg l^{-1}IAA with 1.5 mg l^{-1}KIN in leaf and petiole explants**.**In addition, the highest regeneration percentage and the number of regenerated shoots were obtained in the medium containing 0.1 mg l^{-1} NAA with 0.5 mg l^{-1} TDZ in leaf explant and no regenerated shoots were produced in the presence of NAA and TDZ in all combination tested in petiole explant.

Keywords: *Cichorium intybus*L., *Callus induction*, *Explant, Plant growth regulators, Regeneration.*

AMMIVERSUS NONPARAMETRIC ANALYSIS FOR INVESTIGATION OF GE INTERACTION OF PLANT DISEASE EVALUATION

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Abstract

In breeding for plant disease resistance programs, a large number of new improved genotypes are tested over a range of test pathogens or environments and the underlying statistics used to model this system may be rather complicated. Due to ordinal nature of most measured traits of disease responses, some nonparametric methods used for analyzing genotype × environment (GE) interaction in two datasets for disease severity of gray leaf spot of maize (with ten genotypes planted in 10 and 11 environments). Usually, the presence of the GE interaction effect complicates the selection of the most favorable genotypes and there are several statistical procedures available to analyze these dataset including a range of univariate, nonparametric and multivariate procedures. Present analysis separated nonparametric methods based on dynamic concept from those which are based on the static type indicated that RS statistic following to S6, NP2, NP3 and RS statistics were found to be useful in detecting the non-complicated phenotypic stability in disease severity dataset. In complicated GE interaction, the ability of AMMI stability parameters especially SPC1, SPCF, D1, DF, EV1, EVF and ASV statistics were high in the detection of stability in complicated GE interaction. In general, nonparametric methods are useful alternatives to parametric methods and allow drawing valid conclusions with considerably better chances of detecting the GE interaction in experiments of plant pathology. Also, in some cases the GE interaction structure is too complex to be summarized by only one parameter and so, it is essential to use multivariate statistical methods like AMMI.

Keywords: *Stability analysis, disease severity, ranked based dataset, principal components analysis.*

EFFECT OF PLANT GROWTH REGULATORS ON *IN VITRO* MICROPROPAGATION AND EVALUATION OF ANTIMICROBIAL ACTIVITY EXTRACTS FROM *EX VITRO, IN VITRO* AND CALLUS OF RUE (*RUTA GRAVEOLENS* L.)

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Abstract

Micro-propagation, callus and antimicrobial activity developed efficient protocols of *R. graveolens* were usedunder controlled conditions to overcome limitations of the conventional propagation methods. MS medium supplemented with different plant growth regulators IBA, IAA, 2,4-D and NAA using different concentrations of 0.0, 0.4, 0.8, 1.2, 1.6, 1.8 and 2.0 mg/l were evaluated for their effects on adventitious root induction. Our result showed that the highest number of new root (3.25 cm) was obtained using MS medium with 0.4 mg/l 2,4-D. Whereas, using 0.2 mg/l 2,4-D resulted in highest root length per explants. In our research the Antimicrobial activity of different extract types and volume (40 or 80 µl) was studied using agar-well diffusion assay against five bacterial species of three gram positive bacteria (*Staphylococcus aureus, Bacillus cereus, Micrococcus latus*), two gram negative bacteria (*Escherichia coli, Salmonella typhmurim*), and four fungal species (*Alternariasolani, sclerotiniasclerotiorum, Fusariumoxosporium,* and *Verticillium dahlia).* Results indicated that all tested extracts at different volume revealed antimicrobial activities against all tested bacterial species and did not display antifungal activity against *Alternariasolani, Sclerotiniasclerotiorum* and *Verticillium dahlia* except *Fusariumoxosporium.*

Keywords: *In vitro, Ruta Graveolens, Antimicrobial, Ex Vitro*

INFLUENCE OF PROPAGULE SIZE AND ORGANIC MANURE ON THE GROWTH AND YIELD OF GINGER (*Zingiber officinalis*).

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Abstract

Ginger is grown majorly in the derived savannah of Nigeria for its potential health benefits, this health related usefulness of ginger have also stimulated farmers concern for the growing of the plant having realized its efficacy in life changing ailments as a result of this the availability of the propagule for planting became so scarce and not within the reach of farmers. Its cultivation has recently been introduced to the South western Nigeria. A field trial was carried out at the National Horticultural Research Institute, Ibadan (Nigeria) to study the influence of propagule size and organic manure on the vegetative growth and rhizome yield of ginger in the rainy season of 2008. Propagule size had significant effect on plant height and number of tillers. 10g propagule size of 28.2 was highest while the organic manure control was the least for all the vegetative parameters considered. As the rate of organic manure increases, there was an increase in all the vegetative parameters reaching its peak at 15t/ha and decreased again at 20t/ha. The interaction between the propagule size and organic manure was significant for the number of rhizomes, number of tillers and the yield. 10g propagule size and 15t/ha organic manure produced optimum growth and yield of ginger.

Keywords: *Planting material, Size, Propagation, Organic manure*

THE INFLUENCE OF NANO-GRO® PREPARATION ON GROWTH, DEVELOPMENT AND YIELD OF PEPPERMINT (*MENTHA x PIPERITA* L.)

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Abstract

Peppermint is one of the most popular medicinal plants cultivated in Poland. Over the years, the demand for herbs, leaves and essential oil of this species is very high and still increasing. Therefore, it has been looking for methods for improving the yield and the quality of the raw materials.The aim of this study was to analyze morphological and developmental characteristics (e.g. plant height, number of leaves, number of lateral shoots per plant) of peppermint plants treated and untreated with NANO-GRO® preparation.Evaluation of yield and quality of the herb including essential oil content and its chemical composition, were analyzed. The influence of harvest time of raw material and the impact of different methods of application NANO-GRO® were determined. Herb was collected twice: in first decade of July and in third decade of August (regrowth). Plant height ranged from 43.44 to 76.94 cm, the number of lateral shoots from 0.91 to 9.69 pcs, the number of leaves per plant from 19.30 to 92.76 pcs. Method of application of NANO-GRO® did not significantly affect plant height, while it increased the number of leaves and lateral shoots. Different variants of NANO-GRO® application significantly affect the mass of dry herb. This parameter was also influenced by the date of harvest of raw material.All factors used in experiment influenced the content of essential oil in peppermint herb.

Keywords: *Morphological features, yield of herb, essential oil, menthol*

THE INFLUENCE OF Nano-Gro® PREPARATION ON GROWTH, DEVELOPMENT AND YIELD OF SWEET BASIL (*OCIMUM BASILICUM* L.)

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Abstract

Sweet basil is a species with high environmental requirements, especially temperature conditions. Therefore, in Polish climate, its cultivation in the field is difficult. The solution of the problem may be e.g. modern fertilizers that positively influence on the general condition of the plants so that they can increase their yield. In this work, morphological and developmental traits (plant height, number of lateral shoots per plant, number of leaves) as well as the yield and quality of sweet basil herb were determined. Herb was collected twice: in July and in September (regrowth). The raw material was assessed in respect of essential oil content and its chemical composition, as well as flavonoids and polyphenolic acids content. Plant height ranged average from 31.65 to 32.50 cm, the number of lateral shoots from 10.01 to 10.73 pcs, the number of leaves per plant from 59.73 to 68.88 pcs. Mass of herb depended only on the term of harvest and for the first harvest it was 121.92 g dry mass·m^{-2}, for second harvest – 314.69 g dry mass·m^{-2}. Essential oil content ranged from 0.620 to 0.72 ml·$100g^{-1}$. Its main components were: linalool, 1.8 cineol and eugenol. Flavonoids content ranged from 0.31 to 0.39 g·100 g^{-1}, polyphenolic acids from 0.63 to 1.48 g·$100g^{-1}$.

Keywords: *Basil, growth stimulator, biometric features, essential oil, polyphenolics*

PEACH CUTIVARS RESEARCH AND BREEDING IN NIKITA BOTANICAL GARDEN

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Abstract

Peach breeding was focused on obtaining cultivars with high commercial properties, enhanced adaptability to frosts, drought and fungus diseases.Gene fund is the basis for breeding. Peach collection on the southern coast of Crimea, owned by Nikita Botanical Garden,includes 483 cultivars, 103 elite hybrid forms and above 2000 hybrid seedlings. Gene fund has been formed by means of introduction and inclusion of cultivars and forms from own breeding. Gene fund is systematized on grounds of belonging to certain ecogeographycal groups and ecotypes, among them were recognized carriers of economical valuable features and was showed efficiency of their selection amid diverse cogeographycal groups for use in the breeding.Evaluation of selected varieties and their comparison with the cultivar model based on cluster analysis allowed to determine the degree of similarity between them after a complex of characteristics. Together with intraspecific (direct, reciprocal and back-crossing as also inbreeding) was effected distant (interspecific, intergeneric) hybridization, without and with treatment of pollen by mutagens. Clone selection of somatic mutations was effected without and with treatment of vegetative buds and seeds by mutagens. As a result of cultivars research and breeding were selected 28 new peach cultivars, afterwards included into Plant Varieties Register of Russia and Ukraine.

Keywords: *Gene fund, ecogeographycal groups, ecotypes, hybridization, cultivars.*

Acknowledgements

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CONSUMING QUALITY OF FRUITS OF NEW SWEET CHERRY FORMS SELECTED IN NIKITA BOTANICAL GARDENS

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Abstract

The fruits of sweet cherry are valued for early maturing and high quality of a taste. The sweet cherry likes a warm dry climate. The steppe Crimea (Russia) is a favorable region for cultivation of sweet cherry varieties with high-quality fruits. The aim of research was to evaluate a consuming quality of fruits of new sweet cherry forms selected in Nikita Botanical Gardens. The study included 33 perspective forms and control zoned varieties, growing at the plots without irrigation in Simferopol region of the Republic of Crimea. As the rootstocks of studied forms we used seedlings of *Prunus mahaleb L. Mill*. The study was carried out during 2012-2015. Characteristics such as fruits size, attraction of appearance, density and succulence of a pulp, quality of a taste and fragrance of the fruits were valued. According to the results of evaluation, 12 forms were marked out: № 387, № 275, № 434, № 767, № 305 and etc. According to the results of evaluation of fruits size, all marked samples were evaluated at 4,7-5,0 points (according to 5 point scale). The fruits weight was ranging from 7,2 to 8,9 g. The evaluation of attraction of appearance of marked samples was ranging from 4,8 to 5,0 points. The evaluation of the quality of taste was 4,8-4,9 points.

Keywords: *Fruits, New sweet cherry forms, Quality of a taste, Appearance, Evaluation*

Acknowledgements

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FIELD PEA AS A PROTEIN SOURCE IN CROP ROTATIONSUNDER MODERN PRODUCTION SYSTEMS

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Abstract

Field pea grown for grain and forage is an important protein source which can improve milk and meat production. Along with common vetch, field pea is the most important annual forage legume in Central Serbia, and can substitute alfalfa, whose potential for expansion has been constrained by large areas of acidic soils. As a legume, field pea also plays a major role in field crop rotations, and has been increasingly used in conventional, integrated, organic and sustainable farming systems. Under dryland conditions, grain yield of spring pea cultivars 'NS-Junior' and 'Javor' was analyzed in 2011, 2012 and 2014 on an acidic soil receiving amendments. The field trial was established in Čačak (43°54'39.06" N, 20°19'10.21" E, 246m a.s.l.) on an alluvial soil acid in reaction (pH_{H2O} 4.8). The entire experimental field was fertilized with 300 kg ha^{-1} $N_{15}P_{15}K_{15}$. In addition to an untreated control, two liming treatments were applied, at rates of 3t ha^{-1} and 6t ha^{-1}. The experiment was laid out in a randomized complete block design with four replications. Plot size was $5m^2$ (1x5m). 'Javor' gave a significantly higher average grain yield compared to 'NS-Junior'. There was no significant difference between the control and lime treatments. In all three years, grain yield was significantly below the genetic potential of the cultivars, largely due to rainfall deficiency, delayed sowing dates, and very dry soil and air conditions during critical stages of plant growth and development.

Keywords: *Pea, protein, grain, production systems, yield*

DETERMINATION OF GENOTYPE X ENVIRONMENT INTERACTIONS OFSOME AGRONOMIC CHARACTERS OF COWPEA (*Vigna unguiculata* L.)

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Abstract

Cowpea, with its temperature and drought resistance, is one of the best legume plants andmore adaptable to dry environments compared to the common bean. Flowering and pollination period of common bean has suffered due to recent temperature increases in our region. Expected temperature increases in the forthcoming years will further affect bean cultivation, and thus will lead to widespread cultivation of cowpea thanks to its substitution of bean in foods aseither in the dry seed or fresh pod form. In this study, 16 cowpea genotypes (14 lines and 2 registered varieties) fromfour different environments (2 years and 2 locations) were evaluated for genotype (G) x environment (E) interactions and for stability parameters of regression coefficient and mean square of deviation from the regression. The effects of genotype, environment and GxE interactions on seed yield, plant height and biological yield were highly significant. It was found that 5 lines for plant height, 4 lines and 1 registered variety for biological yield and 4 lines for seed yield were stable. The seed yield of genotypes was 126-226 kg da^{-1}.

Keywords: *Cowpea, genotype x environment interaction, stability*

THE DETERMINATION OF SOME MEDICINAL PROPERTIES OF BERMUDAGRASS, WHITE CLOVER AND BUCKWHEAT USING AS FORAGE CROPS

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Abstract

The plants of *Cynodon dactylon* (L) Pers, *Trifolium repens* L, and *Fagopyrum esculentum*Moench, which have vegetable properties such as their being able to use erosion control plant and soil improving plant, due to pollution in resources, which increases in the recent years in the world, are considered as forage plants not only for breeding but also in terms of sustainability. In addition, bermudagrass, white clover, and buckwheat, due to important effective substances (respectively, vitexin, quercetin, myricetinand rutin) they have, are used in the traditional medicine in the different places of the world. Therefore, in our study carried out as three repeated pot trial in greenhouse conditions, these three species of plants were grown in such a way that there will be five plants in each pot. In our study, bermudagrass andwhite clover, were mowed in 130 days after seeding; buckwheat, in 50^{th}days when flowering of 10 % occurred. After the heights and wet weights of plants are determined, the plants mowed were dried at shadow and their wet weights, and ash, moisture, antioxidantactivity, total phenol, and total flavonoid contents were identified. It was detected antioxidant activity, total phenols and total flavonoids using by spectrometer as a method DPPH free radical scavenging activity. As a result of trial we carried out, in buckwheat and bermudagrass, while antioxidant activity and total flavonoids are high, in white clover, total phenol was found high. In this study, the similarities and differences of three plants in terms of medical use were tried to be interpreted.

Keywords: *Bermudagrass (Cynodon dactylon L. Pers.), Buckwheat (Fagopyrum esculentum Moench), Forage crops, Medicinal plant, White clover (Trifolium repens L.)*

HAWTHORN SPECIES FROM TURKEY AND POTENTIAL USAGE FOR HORTICULTURE

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Abstract

In the review, we aimed to investigate distribution of hawthorn species from Turkey and potential usage for horticulture. Many hawthorn species are grown for their edible fruit in Asia, Central America, and the Mediterranean. Turkey is one of the genetic centers for hawthorn species. Due to its positive effects on the cardiovascular system, *Crataegus* genus has recently become quite a popular herbal medicine in phototherapy. Currently, more than 20 *Crataegus* species have been identified in Turkey, including *C. monogyna* Jacq., *C. pentagyna* Willd., *C. azarolus* L. (synonym *C. aronia*), *C. orientalis* M. Bieb., *C. rhipidophylla* Gaud. and *C. laevigata* (Poir) DC. In different regions of Turkey, hawthorn plants are known by many different names, including 'alıç', 'yemişen' and 'haziran'. They are usually utilized for scattered hedgerow planting in orchards and along road borders. In recent years, the hawthorn has become favored for both fruit size and sweet-sour fruit taste. Especially, *C. azarolus* genotypes are grown in regular orchards for fresh fruit consumption in Hatay and Mersin provinces, Eastern Mediterranean region of Turkey. The fruits has been sold at higher prices in the local markets. There is not yet found a standard hawthorn cultivar although some genotypes has perfect fruit quality characteristics. The most important limiting factor for the hawthorn growing is propagation. Hawthorns can be propagated either seeds or grafting. Generally, *C. monogyna* seeds that has higher seed germination than other species are used as rootstock for the *C. azarolus* genotypes. As a result, we can say that *C. azarolus* and *C. orientalis* will be potential as horticultural crops in the future.

Keywords: *Turkey, Hawthorn species, Horticulture, Fruit*.

IDENTIFICATION OF AGRICULTURAL CHARACTERISTICS OF CERTAIN LINES AND SPECIES OF GRASS PEA IN KAHRAMANMARAS CONDITIONS TURKEY

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Abstract

An experiment carried out for grass pea (*Lathyrus sativus*L.) crop in Kahramanmaras conditions Turkey in 2012/2013 planting season in order to identify the agricultural characteristics of M1-7, M1-15, M1-16, FLS-225 lines and registered Gürbüz cultivar of grass pea. The lines and species used in experiment were planted in November 2012 and harvested in June 2013. Cultivation was made with the existing precipitation and no additional irrigation was made. The experiment was established as a completely randomized block with three replications. At the end of the experiment, no differences were observed in terms of some agronomic characteristics, yield and yield components such as plant height, number of florescence days, grain yield and thousand seed weight among lines and varieties tested. The highest grain yield and thousand seed weight was observed in M1-15 line as 390 kg da^{-1} and 152.607 g respectively. The differences among species have been significantly important in terms of number of pods per plant, biological yield and harvest index and the highest value was obtained in M1-15 line as 27.67 pods, 1391.7 kg da^{-1} and 37.8% respectively.

Keywords: *Grass pea, grain yield, biological yield, herbage yield, harvesting index*

DISPONIBILITY AND PERFORMANCE OF BENTONITE IN TOP WORKING OF WALNUT TREES AS GRAFTING WAX

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Abstract

Bentonite is a form of clay consisting mostly montmorillonite. It is mainly used as drilling mud in geological studies. Hydration, swelling, water absorption, viscosity and thixotropic properties of bentonite make it a valuable material for a wide range of industrial uses and applications. Bentonite is used in foundry, cosmetic, medical, agriculture, food and construction industries. It is a natural, abundant, low cost and sterile material which can be used as a graft wax. Bentonite was experimented in top working of walnut trees to determine its disponibility and performance in grafting. Study was performed on 10-12 years old walnut trees in two orchards that are located at 750 and 1240 m altitudes. Experiment was designed with two replicates at two locations. Graftings were made using bentonite and water holder paint by bark modified grafting method at the beginning of May in 2015. Graft-take rates, length and thickness of shoots from grafted scions were measured, and total shoot lengths were calculated. During the growing season, disponibility of bentonite were evaluated by observations of top worked trees. The differences between graft-take rates and total shoot lengths were found statistically important according to wax type. Anti-bleeding effect of bentonite were observed that might overcome bleeding problem that is frequently seen in top working of walnut trees.

Keywords: *Walnut, top working, graft-take success, graft wax, bentonite*

POSSIBILITY OF PEPPER PRODUCTION BY DIRECT SOWING

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Abstract

The aspiration for economic, yielding and qualitative production has led to the introduction of the improved technology for pepper cultivation by direct sowing of seed with the application of the specific machinery and a suitable protection from pests. The aim of the pepper production by direct sowing is neither an early harvest nor big fruits. It is a high yield, a single harvest and the simple economic cultivation practices. In pepper production by a direct sowing the period of disease is avoided, and a possibility of the occurrence of a disease is a lot lower in comparison to the peppers that are produced from seedlings. The share of human labor during the production is much smaller and the greatest part of cultivation practices is done by machinery; the production is more simple and safer, and the yield and quality of fruits are at the level of the yield of a classical production of pepper from seedlings. The advantage of pepper production by direct sowing is also reflected in the achievement of plant spacing per hectare that is by even 4 to 6 times larger compared to the classical system of cultivation. Such a cultivation system introduces a low yield per a plant, but a high total yield. Beside all these statements, the pepper production by direct sowing is little present on the plots in Semberija because of many restrictions in the production.

Keywords*: Pepper, direct sowing, seedling, yield, a number of plants.*

INFLUENCE OF ROOTSTOCKS ON THE PROPERTIES OF FRUITING TWIGSIN PLUM CULTIVARS

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Abstract

The paper presents the results of research on the influence of three clonal rootstocks ('Pixy', 'Fereley' and 'St. Julien A') and one seedling rootstock (Myrobalan as a control) on the properties of fruiting twigs of three table plums cultivars ('Čačanska Rana', 'Čačanska Lepotica' and 'Čačanska Najbolja') for a period of three years (2013-2015). Morphological properties of fruiting twigs (long and short): length, thickness, number of flower buds and vegetative buds were examined. The average length of long fruiting twigs was from 51.4 cm to 73.4 cm. The results of the study showed that clonal rootstocks 'Pixy' had a statistically significant influence on the lowest length and thickness of long fruiting twigs. The medium vigorous clonal rootstock 'Fereley' had a statistically significant influence on the formation of the highest number of the flower buds per twig. Myrobalan seedling rootstock had the highest number of the vegetative buds per twig. Cultivar 'Čačanska Rana' had lower number of the flower buds per twig in relation to 'Čačanska Lepotica' and 'Čačanska Najbolja' cultivars. The average length of short fruiting twigs was from 2.8 cm to 7.1 cm. Number of flower buds per short fruiting twig ranged from 2.3 to 4.8, while the number of vegetative buds ranged from 2.4 to 4.1. Myrobalan seedling rootstock had influence on the formation of lower number of flower buds per short fruiting twigs in relation to clonal rootstocks.

Keywords: *Prunus domestica, rootstock, short fruiting twigs, long fruiting twigs, buds.*

DETERMINING THE NEED OF ALFALFA FOR WATER IN THE CONDITIONS OF SARAJEVO AREA

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Abstract

Alfalfa has a great need for water, because it creates a huge plant mass. For this reason, yield level, similar to the other species with large green mass, primarily depends on provided water during the growing season. Alfalfa uses water well from the pre-vegetation reserve in land, especially of rainfall during the growing season. In this paper, the need for water in alfalfa for average, the most rainy and dry hydrological year in the conditions of Sarajevo area was established. Evapotranspiration of alfalfa is 567 mm for the most dry, 569 mm for the most rainy and 540 mm for average hydrological year. Water deficit occurs in May, June, July and August in the amount of 323.9 mm for the most dry, 178.4 mm for the most rainy and 222.1 mm for average hydrological year. In the study area, alluvial soil is predominant (fluvisol), which is of a light mechanical composition (sandy loam) and favorable chemical characteristics for alfalfa growing.

Keywords: *Alfalfa, evapotranspiration, water deficit, land*

YIELD AND CHEMICAL COMPOSITION OF CAULIFLOWER (*BRASSICA OLERACEA* L.VAR. *BOTRYTIS*)CULTIVATED USING MICROBIOLOGICAL FERTILIZER

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Abstract

As a result of the intensive tillage, application of various agrotechnical measures, the use of large amounts of fertilizers and pesticides during the production of horticultural crops with relatively high yields, including the cauliflower, disrupts natural processes in the soil. The microbiological activity and fertility of the soil can be improved by using pure cultures of the microorganisms used for the production of microbial fertilizers – bio-fertilizers that create or improve conditions for microbial activity in the rhizosphere without disrupting the natural processes in the environment.This research was aimed at determining the impact of microbiological fertilizer Slavol applied in two ways, foliar with dorsal sprinkler and through the drip irrigation system, on the yield and chemical composition (water, dry matter, fiber, protein and calcium) of cauliflower produced outdoors during 2011, 2012 and 2013.The results of this study showed that the application of Slavol significantly affected the yield of the cauliflower, especially when applying through the drip irrigation system. Chemical analyzes showed increased content of water, fiber, protein and calcium in the curds of the cauliflower treated with the microbial fertilizer.

Keywords: *Cauliflower, microbiological fertilizer, yield, chemical composition.*

EFFECTS OF SOME POSTHARVEST TREATMENTS AND MODIFIED ATMOSPHERE PACKAGING (MAP) ON FRUIT QUALITY AND POSTHARVEST LIFE OF BABY CUCUMBER

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Abstract

In this study, the effects of 1% Disper Cu Max and 5% sodiyum hypochlorite treatments were evaluated on postharvest quality and decay control of baby cucumbers. After Disper Cu Max and sodiyum hipochloriteapplications, cucumbers were packaged into modified atmosphere packaging. Packed baby cucumbers were stored at 8°C with 90-95% relative humidity (RH) for 28 days. Samples were taken at 7 day intervals from storage room and various physical and chemical analyses such as weight loss, flesh firmness, titratable acidity, pH, soluble solids content, skin color (*L**, *C**, *h*°), percentage of physiological disorders and decays were determined. Furthermore, the changes in O_2 and CO_2 concentrations in the MA bags were recorded. Experimental results showed that the lowest weight loss, disease and disorder development were determined on the baby cucumbers treated with sodiyum hipochlorite + MAP. Dipping of cucumbers in Disper Cu Max solution had the highest titratable acidity and soluble solids content at the end of storage. The highest *L**, *C** and pH values were obtained from Disper Cu Max + MAP treated baby cucumbers. It can be concluded that baby cucumbers were successfully stored at 8°C temperature and 90-95% RH in Disper Cu Max + MAP for 28 days with minimal quality losses.

Keywords: *Baby cucumber, chloride, copper, modified atmosphere packaging, postharvest, quality*.

EFFECTS OF ECOLOGICAL CONDITION OF SIIRT PROVINCE ON YIELD AND YIELD FACTORS OF SOYBEAN (*Glycine max* (L.) Merr.) VARIETIES/LINES

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Abstract

Thisstudy was conducted to investigate the effects of yield and yield componentsof some soybean varieties and lines in ecological condition of Siirt province in 2014 and 2015 growing seasons. They had a production potential as a main product in Siirt province. This study was designed as randomize blocks of four replication at Kezer Campus of Siirt University. Important components such as yield (kg ha^{-1}), plant height (cm), first pod height (cm), pod number per plant (number/plant), and thousand seed weight (g) were determined. According to the results of combined two-year variance analysis, the lowest seed yield was obtained from the line 834 with 1798.7 kg ha^{-1}, the highest seed yield obtained from the variety of Gapsoy 2016 with 2672.1 kg ha^{-1}. Additional to the variety of Gapsoy 2016, line 1022with 2639.2 kg ha^{-1} came to the forward with of seed yield. Considering first pod height in the line and varieties, line 1022 was seen that reaching the highest value in two years. When compared the first pod height for first year in general appears to be higher than the second year,that is thought to be associated with the first irrigation performed. As a result; the properties examineddepending with line/varieties and years in terms of statistical significance was determined important. The values of the properties examined was observed varied under the influence of different climatic and soil conditionsin both years. The two-year study results shown that soybean can be grown successfully in Siirt province under irrigated conditions and thevariety of Gapsoy 2016 and line 1022 gave the highest yields.

Keywords: *Soybean, Yield, Siirt province, Climate.*

STOMATA ANALYSIS ON GRAPEVINE WITH DIFFERENT METHODS

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Abstract

Water loss occur in different ways in grapes, but the excess water loss becomes via transpiration.It is released through the stomata on the leaf surface of water lost in the form of water vapor. Stoma; formed by differentiation of the epidermis, controls the transpiration and gas exchange with the opening and closing feature which is performed live.The number of stomata in the leaves varies according to grape variety. Today number of stomata on grapes are examined and taken into consideration the different conditions adaptation studies.In studies to determine the number of stomata of grapes different methods are used.This study compared “clearnail varnish” and “transparented leaf” methods which applied on grapevine leaf stomata analysis.

Keywords: *Stomata, Grapevine, Stomata analysis methods*

GENETIC DIVERSITY IN WILD *FRITILLARIA IMPERIALIS* L. IN VAN LAKE (TURKEY) BASIN BY iPBS PRIMERS

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Abstract

Turkey has wide biodiversity because of being junction of different gene centers, various climate conditions and geographical formations. *Fritillaria* species are part of this genetic diversity. *Fritillaria imperialis* grows naturally in Turkey and it is valuable as ornamental plant. *Fritillariaimperialis* has wide genetic variation in its habitat. Despite this genetic potantial in *Fritillaria imperialis*, new varieties have not been breed. Detection of genetic diversity among wild lines is needed to determine parent lines in plant breeding program. In the present study, we analyzed genetic diversity of 74 wild line in Van Lake Basin by using iPBS-retrotransposon markers.Retrotransposons cause mutations and increase of genome size in plants and it results genetic variation. Transposable elements, present abundantly in plant genomes, generate genomic diversity through their replication and are thus an excellent source of molecular markers. iPBS-retrotransposons detected 94 bands with 100% polymorphism and an average of 4.94 bands per primer.Neighbor-joining tree was computed from Jaccard's genetic distance coefficient. The analysis seperated 74 *Fritillaria imperialis* into two different groups. The number of *Fritillaria imperialis* in split A and B were 1 and 73 respectively. Group B was further divided into different subgroups.

Keywords: *iPBS-Retrotransposon, Fritillaria imperialis, Genetic diversity, Van Lake Basin.*

EFFECT OF DIFFERENT LEVELS OF PRUNING ON YIELD AND QUALITY BY CABERNET SAUVIGNON VARIETIES GROWN IN ANHYDROUS CONDITIONS

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Abstract

For economically viticulture; irrigation have to be done which regions under 600 mm annual precipitation. Many grape producers think about that, vineyard doesn't need irrigation so that grape producers mostly doesn't irrigate their vineyard in Sanliurfa region.The effect of pruning fruit trees and vineyards on yield and quality has been proven by research. Winter pruning vineyards is usually carried out between the months of November-March in the province of Sanliurfa. Depending on the variety of wine grape varieties are usually long offshoot pruned in winter period.This study was conducted of Cabernet Sauvignon varieties grafted on 140 Ruggeri rootstock. Different pruning levels tried on grapes which given of double-stranded cordon shape. Research inclusion yield, the number of bunch, bunch length-width, berry size, titratable acidity, pH, soluble solids and hundred berry weight which are yield and quality parameters. Cabernet Sauvignon grape varieties grown under anhydrous conditions as a result of research in different pruning levels were caused by significant changes in yield and quality.

Keywords: *Pruning level, Cabernet Sauvignon, Yield and Quality*

COMPARATIVE EXTRACTION PROTOCOLS FOR AN EFFICIENT GENOMIC DNA FROM *SALVIA OFFICINALIS*, L.

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Abtsract

Studies on plants genetics generally and those on aromatic-medicinal species, including sage, particularly start with establishing of protocols for high quality DNA extractions. Different protocols have been reported, including CTAB based and commercially available kits. Medicinal and aromatic plants such as common sage (*Salvia officinalis,* L.), as a result of the high content of secondary metabolites, which interfere with DNA isolation, need to be extracted with protocols modified in order to produce a DNA of good quality. In this study, two protocols, one CTAB-modified (Doyle and Doyle, 1987) and one kit-based were compared. DNA was isolated from fresh and dried leaf materials of 10 populations of *Salvia officinalis* of Northern Albania and quantity and quality in each case were determined based on spectrophotometry. Results show that for a good quality and quantity of genomic DNA the samples should be fresh young leaves and that both CTAB modified protocol and Plant Genomic DNA Kit (SIGMA) protocol avoid contaminants as carbohydrates and phenolics.

Keywords: *Genomic DNA, CTAB, Salvia officinalis*

PRELIMINARY DATA ON GENETIC VARIATION BETWEEN NATURAL POPULATIONS OF *SALVIA OFFICINALIS* OF NORTHERN ALBANIA BASED ON RAPDs

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Abstract

Garden sage *(Salvia officinalis* L.) which grows naturally in Albania,is also one of the most economically important aromatic plants cultivated in some areas of the country. In the last decades, molecular markers have been successfully used to assess genetic relationships and genotype identification with great impact on plant breeding programs, germplasm management, and biodiversity preservation.In this study, in order to evaluate the natural biodiversity of populations of northern Albania, eight populations were analyzed based on RAPDs. Genomic DNA was isolated based on a modified CTAB protocol and PCR amplification was completed, using five decameric random primers from Operon Technologies, performed in a volume of 25µl, according to Khanuja *et al*., 2000. Amplified profiles were visualized in agarose gels and genetic polymorphic distances were analyzed based on PCoA and R-software. A dendrogram of similarity for the eight populations was produced as well. RAPDs markers proved to be an efficient marker system in detecting polymorphisms among *Salvia officinalis* populations and work will continue with more populations and decameric primers, in order to have these preliminary data enriched and reliable.

Keywords: *Common sage, molecular markers, genetic variability, RAPDs*

THE STUDY OF VARIATION OF UVA URSI (ARCTOSTAPHYLOS UVA-URSI L.) IN KORABI MOUNTAIN BASED ON SOME MORPHOLOGICAL INDICATORS

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Abstract

Uva Ursi is widespread in Mount Korab, mainly in soils with high content of gypsum. From the appearance and morphologic construction, the plants represent changes of plant organs in the number and size. This was the reason that the study was undertaken to determine the morphological variation for some indicators, such as the length and number of branches and internodes length, the number of leaves, the length of leaves, the width of leaves and length of the leaf tail. Besides morphological indicators, the weights are made for: the quantity of leaves per plant, the weight of the wet and dry mass and their ratio, the weight of 100 dried and fresh leaves. These indicators are measured and weighed for seven geographic points where the spread and development of plants is very good. In conclusion it was made the data processing and calculation of the correlation coefficients between the measured indicators. By processing and analysis of morphological indicators it is concluded that the plants represent statistically validated changes in the indicators measured for seven points, where the samples are taken. Among the indicators it has strong links, and specifically between the length of the leaf with the leaf width, as well as for plant production

Keywords: *Uva ursi, indicators, morphological, correlation and sample*

THE EFFECT OF DIFFERENT DOSES OF NITROGEN ON THE YIELD AND THE EXUBERANCE OF CHAMOMILE

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Abstract

Application of fertilizers in the production of aromatic herbs and other crops depends on several factors, wherby the soil fertility and requirements for individual nutrients culture are the most important. The principle of application of mineral fertilizers should ensure optimal conditions for maximum nutrition grown culture, whereas the contamination of the environment is not questionable. Since the Chamomile is characteristic plant of poor soil, it requires very little nutrients. However, intensive farming and carefully balanced fertilization helps achieving better results.The present study was carried out to determine the effects of different nitrogen doses on yield and exuberance of Chamomile flower. The experiment was set in randomized block design with four replications which included four different types of fertilizers.Fertilization consisted of applying increasing nitrogen unit in quantities of: a1-control, A2-15 kg / ha, a3-27 kg / ha, a4-41kg / ha. Larger amounts of nitrogen resulted in the increased share of green mass (herb). The most vigorous plants have been registered with the highest nitrogen concentration variant a4 (57,51cm; 25,13g). On the other hand increased nitrogen rates had a negative impact on the formation and development of the flower.The least number of flowers was registered in the variant with the highest nitrogen concentrations a4 (11.68), while the highest number of flowers was registered in the variant a2 (21,68).

Keywords: *Chamomile, fertilization, exuberance, yield.*

BIOCONTROL OF *MELOIDOGYNE INCOGNITA* IN TOMATO BY RHIZOBACTERIA AS RESISTANCE INDUCERS

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Abstract

Ten bacterial strain viz., Bacillus brevis, B. cereus, B. firmus, Klebsiella planticolla, Lactobacillus agilis, L. ermentum, Methylomonas methanica, Neisseria elongate, Obesumbacterium proteus and Pseudomonas aeruginosa, recovered from tomato rhizosphere which achieved highly reduction in nematode build-up and tested for their ability to induce systemic resistance or bio-control agent against root-knot nematode, Meloidogyne incognita in tomato under greenhouse conditions. Results showed that all tested bacterial strains showed significant reduction in nematode development and reproduction. The most effective strains were M. methanica, B. cereus, B.brevis and O. proteus. They were achieving the highest reduction in nematode total population and fecundity. Plant growth was improved as a result of application of rhizobacteria. Antioxidant enzymes activity for both peroxidase and polyphenol oxidase were elevated in bacteriazed plants as compared nematode infected plant as well as total contents. Results revealed that crude culture suspension of bacteria was more effective for reducing nematode population followed by cell-free culture filtrate, bacterial live cells and bacterial dead cells sequantly. It was concluded that bacteria has induced tomato resistance or bio-control effects against Meloidogyne incognita in tomato.

Keywords: *Bacterial strain, bio-control agent, induce systemic resistance, Meloidogyne incognita.*

SEED GERMINATION RATES OF DIFFERENT COOL SEASON LEGUMES

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Abstract

Temperature is the main factor affecting plant growth and development. Seed germination and seedling establishment are the most critical stages in the life cycle of plants For the purposes of the study, the germination temperatures of six cool-season legumes (*Vicia faba, Lens esculentus, Vicia sativa, Lupinus albus, Pisum sativum, and Lathyrus sativus*) important cultivars were determined. Seed germination rate was measured at different temperatures in the range 4-10^{o}C in a growth chamber with constant parameters (light, water) at three-day intervals for a period of three weeks. Each treatment was repeated four times for each temperature value, where 100 seeds were placed in five different separate glass made containers. The measurements were taken at three-day intervals. A seed was deemed to have germinated when at least 1 mm of radicle was visible.It was found that pea germinated faster than the rest cultivars under low temperatures, whereas *Vicia sativa* and *Lathyrus sativus* showed the slowest germination rates. The descending order of germination rate *Pisum sativum> Vicia faba > Lens esculentus> Lathyrus sativus >Vicia sativa>Lupinus albus*. Germination rate increased with increasing temperature for all cultivars. *Lupinus albus* was the legume seed with the less germination percentage. Therefore, temperature is the most limited factor on germination process and the increase of 4 degrees is enough to give better germination results. As a general conclusion, *Pisum sativum* and *Vicia faba* may satisfactorily germinate in rather cool micro-environments, and their sowing in the fall may be postponed for some weeks without substantial germination risk comparing to the rest legume cultivars.

Keywords: *Germination rate,cool season legumes, temperature*

EFFECT OF INTEGRATED WEED MANAGEMENT AND NITROGEN FERTILIZATION ON GROWTH AND YIELD OF CHICKPEA IN DRY CONDITIONS

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Abstract

An experimental study in the form of split plot as RCBD in basic plan with three replications was done in dry farming research center of Sisab, North Khorasan, Iran, at 2013-14. Treatments include three Nitrogen consumption level from Urea source as main factor: 1- without Urea, 2- 25kg/ha Urea, 3- 50kg/ha Urea and weeds controlling methods in five levels were considered as sub-factors: 1- Without weed controling 2- Hand weeding at one time 3- Chemical controling of weeds at one time 4- Return the wheat remains to soil 5- Return the wheat remains + herbicide. Characteristics such as seed yield, weight of 100 seeds, number of seeds in pod, number of pod in plant, leave area index, density and dry weight of weeds were investigated. Results showed that 25 kg N/ha had the highest impact and no fertilizer had the lowest impact on most of the traits of chickpea. Also, hand weeding control methods most effective and least effective of no weeding and return the remains to the earth. With regards to the performed investigations, the effect of 25kg Nitrogen per hectare along with hand weeding had the greatest effect in the most studied characteristics and the smallest effect was related to the evidence case (without Nitrogen usage) along with no-weeding care. Although hand weeding had best yield, but because the cost of this method on large surfaces not have good economic, thus in order to properly control weeds in chickpea fields integrated methods is recommended.

Keywords: *Nitrogen fertilizer , Weeds control , yield , chickpea , dry farming*

ANATOMICAL STUDIES OF DROUGHT TOLERANCE RELATED TRAITS OF 26 WHEAT VARIETIS IN IRAN

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Abstract

Wheat (*Triticumaestivum* L.) is known as a drought semi-tolerant species. Reduction in wheat growth and yield are the most common responses to drought or salt stress mainly caused by an inhibition of leaf expansion and stem elongation. One of the important abiotic stress factors limiting wheat production in semi aridregions is drought. Recent climate changes such as temperature changes and decreasing rainfall in different regions of Iran have had significant impact on agro-ecosystems and have caused drought stress to become a severe limiting factor in wheat production. This research was conducted for evaluation of Leaf anatomical and cytological traits of 26 wheat varieties in Golestan province (Iran) over 40 years in order to identify the most effective traits in determining maximum yield potential. The width and length of vascular bundles, diameter of meta xylem, distance between vascular bundles to upper and lower epidermis, fiber bundles diameter and width of midrib and lamina were measured. Finally, based on the anatomic results, wheat varieties with the highest adaptation ability to drought stress were identified and introduced.

Keywords: *Waterless stress, wheat, anatomical study, Iran*.

FORAGE FENUGREEK (*Trigonella foenum-graecum* L.) PRODUCTION: A BOON FOR SEMI-ARID AGRICULTURAL REGIONS

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Abstract

Fenugreek (*Trigonellafoenum-graecum* L.sp.) is one of the oldest reported medicinal plant, spice herb and forage crop in the world. The plant is believed to be native to the Mediterranean region. Indigenous species of fenugreek have been reported from Asia, North Africa, Europe and Australia. Over 25 species of fenugreek are reported across the globe. Currently grown widely across the Indian subcontinent, China, some parts of SE Asia and the Far East; in West Asia and North Africa; Mediterranean Europe and Russia; Australia and recently in parts of Western Canada, the United States and Argentina in the Americas. Fenugreek is an annual forage legume with appreciable genetic diversity and is suitable for the low input agricultural regions of Asia, Africa and Latin America as a forage crop, medicinal herb, spice as also an industrial crop for the nutraceutical and functional food industry.

Keywords: *Fenugreek, Trigonella foenum-graecum L., forage, spice, medicinal. Phytochemicals*

RED PANDA (*Ailurus fulgens* F. Cuiver 1825): AN ENDANGERDEDSPECIES IN IMMIDATE NEED OF CONSERVATION ALONG ITS RANGE OF DISTRIBUTION

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Abstract

The Red Panda (*Ailurus fulgens* F. Cuiver 1825), an endangered species according to IUCN constitutes an important fauna of the majestic Southern Himalayan forests and are found in Southern China, Nepal, Bhutan, along the forests of the eastern Himalayas of India as well as parts of Northern Myanmar and some references for its distribution in Lao PDR. The elusive mammalian species though highly adored for their cute look and impressive reddish fur coat; however has been significantly impacted by anthropogenic pressures along its entire range of distribution. Less than 10, 000 members are currently estimated to be surviving in the wild. The rapid destruction of the rich bamboo forests, their primary habitats in South and SE Asia has been causing devastating impacts on the ecosystem of this highly sensitive species due to habitat loss, habitat fragmentation, illegal captures and poaching. Unless immediate conservative measures are made available to the species immediately; their long term chances of survival in the wild is highly jeopardized.

Keywords: *Red panda, conservation, anthropogenic, population, bamboo forests*

CANADA GOOSE (*Branta canadensis* L.): AN ICONIC SYMBOL OF WILD CONTINENTALNORTH AMERICA

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Abstract

Canada goose (*Branta canadensi*s L.) is one of the iconic species representing wild America; and is a native of the continent of North America, northern Europe and Far Eastern Asia. The range of the species stretches from Canada, through continental US to some parts of Central America. Within continental North America the species is widely distributed within several ecosystems from the Pacific on the west to the Atlantic in the east. It is a truly pan American avian species for its widespread distribution in the continent of North America stretching from northern Canada across the US to northern parts of Mexico. Canada goose is a grandeur symbol of the North American life, nature and eco-environmental values and is being currently reviewed based on popular voting organized by the famous Canadian Geographic magazine as one of the top five contending species for being considered as the National Bird of Canada. The majestic migratory avian species has several sub species reported across the west to east stretch of the continent of North America. The species usually travel to southern US, northern Mexico and some other parts of Central America during winter and returns to their northern breeding grounds in US and Canada during summer for nesting and breeding purposes Although the exact number of sub species is debated; but researchers consider around 8-10 distinct sub-species. The species is related to the socio-cultural and ethnic history of the continent and the migrating flocks to the south during fall is considered to be an important iconic symbol of continental North America.

Keywords: *Canada goose, eco-environmental, eco-sociological, North America, species*

COMPARING THE EFFECTS OF POLYETHYLENE GLYCOL-INDUCED DROUGHT STRESS AND PACLOBUTRAZOL ON SIX CULTIVARS OF *Medicago sativa*

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Abstract

This investigation was carried out with the aim of determining the effect of polyethylene glycol 6000 (PEG; 0, 3%, 6% and 9% w/v) treatment on six cultivars of *Medicago sativa*. PEG treatment significantly decreased the germination index in cultivars of Isfahani, Hamedani, Bami, Baghdadi, Yazdi and Ghare-Medicago, with the highest reduction in Ghare-Medicago and Hamedani cultivars. PEG treatment significantly decreased germination percentage and germination rate in two cultivars of Ghare-Medicago and Hamedani while increased mean germination time in them. The seedlings height, fresh weight and water content significantly decreased in all PEG-treated cultivars. The highest reduction in mentioned factors was observed in Ghare-Medicago and Hamedani, while the lowest reduction was observed in Yazdi cultivar. Data showed that PEG treatment reduced seedling dry mass only in Ghare-Medicago and Hamedani cultivars. PEG treatment significantly decreased the chlorophyll a, b and total, anthocyanins, phenols and α-tocopherol contents of six *Medicago* cultivars. The results of greenhouse experiments showed that PEG treatments resulted in a significant reduction in fresh weigh, dry weight and water content of all studied cultivars. In conclusion, the findings of both petri dish and greenhouse experiments suggested that Ghare-Medicago and Hamedani cultivars can be considered as drought sensitive cultivars while Yazdi is a drought tolerant cultivar. It should be noticed that Bami and Baghdadi cultivars were also relatively drought tolerant. Also, our study on paclobutrazol (PBZ) treatment showed that PBZ effectively decreased the negative effect of drought stress on growth of all cultivars of *Medicago*.

Keywords: *Cultivar, Drought sensitive, Drought tolerant, Medicago sativa, Paclobutrazol, Polyethylene glycol*.

DETERMINATION OF SOME PESTICIDE RESIDUE IN VEGETABLES AND FRUITS IN DERNA MARKET AT ESREN PART OF LIBYA

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Abstract

In this study, the residues of commonly used carbamate and pyrethroids pesticides in Libya, (oxamyl, bendiocarb, carbofuran,carbaryl,methomyl, thiocarb,permethrin,deltamethrin ,fenvalerate,esfenvalerate , and cypermethrin) in vegetables (tomatoes, cucumber, green pepper, scald, cabbage, lettuce and squash) and fruits(grape, peach, apple and plume) were determined in different seasons (summer2013, autumn 2013, winter 2014 and spring 2014). HPLC with UV detector was used for quantification, while the quick, easy, cheap, effective, rugged and safe (QUECERS) extraction and purification method was used to isolate the pesticides found in samples. The mean recovery ranged between 75-95% with relative standard deviations ranged between 15%-25%. Results indicated that pesticide residues were found in some monitored fruits and vegetable samples. In all, 93.71% of fruit and vegetable samples analyzed contained no detectable level of the monitored pesticides, 2.81% of the samples gave results with levels of pesticide residues above the MRL, while 4.11% of the samples showed results below the MRL. Carbofuran and oxamyl appear to have health risk associated with them while rests of tested pesticides were found to be under safe limit. The results suggested that the consumers of the eastern area of Libya are exposed to concentration of pesticides that may cause chronic diseases correlated with carbofuran and oxamyl. A future study in a longer period of time would allow obtaining a deeper knowledge about the fulfillment of vegetables and fruits produced in Libya with respect to the use of pesticides and their presence in them.

Keywords: *Pesticide residue, cow milk, soil, water, Aljabal Alakhtar*

Acknoledgement

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THE ASSESSMENT OFMORPHOLOGICAL INDEXES ON FIVE TYPES OF BASIL (Ocimum basilicum L.)

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Abstract

Basil is a plant of Lamiaceae family, with wide spectrum use in food industry, perfumery, as fresh spice, flavoring different environments, as well as in medicine. This is why basil is considered both a spice and a medical herb. These values are resulted from high content of ocimol in all plant organs (leaves, flowers, fruits, seed and roots. The fact that Dioscorides mentions that herb early in the first century, as a medicinal plants for the disinfection of premises, mouth and teeth, shows the values and its recognition since Antiquity. In Albania it is a known and cultivated plant, in families, gardens, and it has synonyms by area. For essence production, it begins to be cultivated in the 60s and, nowadays the demand is growing. Basil studies are limited in technology and comparisons of subspecies and varieties. A study of five subspecies in coastal plains of Albania (Toshkëz-Lushnja) is presented in this paper. The differences found are statistically significant.

Keywords: *Basil, essence, spice, cultivation, indexes.*

CORRELATION BETWEEN CLIMATIC CONDITION, YIELD AND CHEMICAL COMPOSITIION IN MUST ON THREE GRAPES VARIETY

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Abstract

In this research were examined three different grape varieties Tempranillo, Sangiovese, Petit Verdot a period of 2010-2012 at the locality Lepovo, near Negotino an altitude of 250 m.The main parameters in these research are yield (kg/ha) and chemical characteristics of the must, sugar (g/L) and total acids(g/L) from this three grape varieties and climatic factors, the vegetative sum of precipitation and the vegetative temperature sum measured at the meteorological station on Winery Bovin, at the locality Lepovo.The obtained results from this work were statistically processed using the SPSS statistical software package 19, from where it can be measure the frequency, the percentage share of data, measures of central tendency (median, standard deviation, dispersion, arithmetic mean), such as graphic representation of data (a histogram).The analysis indicates that there is a high correlation value between yield and climatic factors, chemical characteristics and climatic factors. Although the correlation between yield, sugar and total acids in the must with the vegetative sum of precipitation is a negative value, still shows a high correlation coefficient.

Keywords: *Yield, chemical characteristics, climatic condition, correlation coefficient.*

INFLUENCE OF PROPAGULE SIZE AND ORGANIC MANURE ON THE GROWTH AND YIELD OF GINGER (*Zingiber officinalis*).

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Abstract

Ginger is grown majorly in the derived savannah of Nigeria for its potential health benefits. Its cultivation has recently been introduced to the South western Nigeria. A field trial was carried out at National Horticultural Research Institute, Ibadan, Nigeria to study the influence of propagule size and organic manure on the vegetative growth and rhizome yield of ginger in the rainy season of 2008. Propagule size had significant effect on plant height and number of tillers. 10g propagule size of 28.2 was highestwhile the organic manure control was the least for all the vegetative parameters considered. As the rate of organic manure increases, there was an increase in all the vegetative parameters reaching its peak at 15t/ha and decreased again at 20t/ha. The interaction between the propagule size and organic manure was significant for the number of rhizomes, number of tillers and the yield. 10g propagule size and 15t/ha organic manure produced optimum growth and yield of ginger.

Keywords: *Planting material, Size, Propagation, Organic manure*

EVALUATION OF MACRO PROPAGATION TECHNIQUE ON *Ananas comosus cv smooth cayenne* (PINEAPPLE) STUMP AND NURSERY PERFORMANCE OF PLANTLETS

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Abstract

An experiment was set up to evaluate techniques of multiplication of plantlets through stumps was laid in a Randomized complete Block Design (RCBD) with 10 treatments in two replications. The treatments were of different sizes of 5,7,10 and 20cm split and unsplit with a whole stump as control. Data were days to 50% emergence, number of plantlets and weight of sucker. The evaluation of sources and rate of Nitrogen influence on rapid early growth of plantlets was in a completely randomised design (CRD) with 10 treatments replicated 3 times. The treatments:control, brewery waste + poultry dung 200, 150 and 100 kg N/ha, brewery waste + cattle dung 200, 150 and 100 kg N/ha, N.P.K 20:10:10 200, 150 and 100 kg N/ha. Parameters were; area of the D leaf (cm^2), Plant height (cm) Number of leaves and weight of suckers (g). Data were analysed using descriptive (ANOVA). Significant means were separated with DMRT at $\alpha 0.05$. Apical, middle and basal portions gave100%, 87.5% and 75% emergence respectively. The number of plantlets was significant on control (2.5) and split 5cm (7.0) weight of plantlets on split cut 20cm (66.25) and control (70.15). All fertilizer sources at 150 kg N/ha rate gave a significant difference in size (450-500g), area of the D leaf (47.87) and number of leaves (25.33). Therefore, 20cm cut is recommended for high quality plantlet on weight basis while 5cm cut gave highest number of plantlets and fertilizer rate of 150 kg N/ ha is also recommended.

Keywords: *Plantlets, pineapple sucker, compost, macro-propagation.*

GENETIC ATTRIBUTES OF YIELD AND ITS COMPONENTS IN TWO DIVERSE POPCORN POPULATIONS

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Abstract

Information about genetic parameters for characters of interest helps plant breeders to plan their long as well as short term breeding endeavours. Grain yield and related traits in popcorn are of prime importance and are given major considerations in breeding programs. In this experiment four popcorn parental lines, their resulting F_1s, F_2s, BC_1s and BC_2s were evaluated at Cereal Crops Research Institute (CCRI), Pirsabak, Nowshehra and at The University of Agriculture Peshawar (Pakistan). At both locations the experiments were replicated thrice in randomized complete block design. The results indicated that in all crosses dominant gene action was important in the inheritance of ear diameter, ear length, percent shelling and grain yield. One of the four crosses revealed duplicate type of epistasis for ear weight, while two crosses revealed complementary epistasis. Duplicate type of non-allelic interactions were predominant for shelling percentage in all crosses. The same type of epistasis was observed in cross, PS- Pop-1-1-4 x BD-Pop-1-2-3-3 and PS- Pop-29-2-1 x BD- Pop-1-2-3-3 for ear length. In the case of grain yield both complementary and duplicate type of epistasis were observed. Additive genetic effects were found significant with positive and negative magnitude attributes in two crosses each. One of the four crosses exhibited positive but non-significant dominant genetic effect for ear weight. It is concluded that crosses with dominant gene manifestations could be effectively utilized in developing popcorn hybrids havingimproved grain yield and accompanied with other desirable grain yield attributes.

Keywords: *Popcorn, epistasis, dominant, additive x additive, grain yield, ear length*

COMBINED CULTIVATION OF EDDIBLE MUSHROOMS AND VEGETABLES

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Abstract

Sustainable crop production nowadays is assumed crucial for agriculture to survive. Not only does it mean environmentally friendly protection or renewal of agricultural-natural resources (no spent substrate, less CO_2 footprint, less water consumption), but also for growers and consumers this means producing foodstuff without chemical inputs. Whenever feasible, sustainable agriculture relies upon crop rotations, crop residues, animal manures, off-farm organic wastes, mechanical cultivation, mineral-bearing rocks, and aspects of biological pest control to maintain the soil and its tillage, to supply plant nutrients, and to control insects and weeds. In this study we evaluated possibility of combined cultivation of edible mushrooms and vegetables as a sustainable, vertical system of growing. Mushroom compost (MC) was spawned with *Agaricus subrufescens*. Overgrown mushroom compost, produced in plastic bags was released, shredded and formed in 20-30 cm high heaps in the cultivation container. Cultivation substrate – garden compost (GC) was placed between rows and on top of MC, and used instead of peat as casing. This prevents MC from drying out and is necessary for fructification as a water holding layer. Cowpea (*Vigna unguiculata)*were planted in between rows. Climbing plants formed shades for mushroom and created specific microclimate. CO_2 produced by mushrooms in respiration process is used by plants for plant tissue production. Results of experiment show the potentiality incorporating plant (legumes) cultivation system with mushroom growing. Yield of cultivated mushrooms was similar to control, however increase in yield of beans compared to control was observed.

Keywords: *Crop growing, parallel cultivation, fungi, substrate, sustainability, legumes*

COMPARSION OF GROWTH OF MYCELIUM OF *PLEUROTUS CYSTIDIOSUS* (MILLER) ON VARIOUS AGAR MEDIA

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Abstract

Pleurotus cystidiosus is occurring in natural areas on all continents except Antarctica and South America. Fruiting bodies of the *P. cystidiosus* are valued as a source of nutrients and biologically active substances. *P. cystidiosus* has antitumor, anti-inflammatory and antioxidant, antihyperglycemic activity. This species is cultivated mainly in North America and Asia. The aim of the study was selection the best agar medium for the fastest mycelium growth and the best mycelium hyphal quality. In the experiment, two cultivars of *P. cystidiosus* from the collection of the Department of Vegetable Crops Poznan University of Life Sciences were used: B1 and B122. Experiment compared growth of mycelium on five agar media: wheat, potato, synthetic Hansen`s, maltose and sawdust. Measure of this parameter was a diameter of the agar medium overgrown by hyphae after 7, 10, 14 and 21 days of incubation. Experiment was conducted in Biological Laboratory of the Department of Vegetable Crops Poznan University of Life Sciences. It has been shown that growth of mycelium of tested strains on different agar media was various. Investigation of mutual dependence between morphological and qualitative characteristics of the type of agar medium allows optimization of the production. Development of low-cost and simple method for production of *P. cystidiosus* can contribute to introduction of this species into intensive cultivation in Poland.

Keywords: *Abalone oyster mushroom, summer oyster mushroom, cultivation of edible mushrooms, medicinal mushrooms, mycelium growth*

PEACH CUTIVARS RESEARCH AND BREEDING IN NIKITA BOTANICAL GARDEN

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Abstract

Peach breeding was focused on obtaining cultivars with high commercial properties, enhanced adaptibility to frosts, drought and fungus diseases. As basis for breeding served gene fund. Owned by Nikita Botanical Garden peach collection on the southern coast of Crimea includes 483 cultivars, 103 elite hybrid forms and above 2000 hybrid seedlings. Gene fund has been formed by means of introduction and inclusion of cultivars and forms from own breeding. Gene fund is systematized on grounds of belonging to certain ecogeographycal groups and ecotypes, among them were recognized carriers of economical valuable features and efficiency of their selection amid diverse cogeographycal groups for use in the breeding. Evaluation of selected varieties and their comparison with the cultivar model based on cluster analysis allowed to determine the degree of similarity between them after a complex of caracteristics. Together with intraspecific (direct, reciprocal and back-crossing as also inbreeding) was effected distant (interspecific, intergeneric) hybridization, with and without dust treatment with mutagens. Clone selection of somatic mutations was effected without and with treatment of vegetative buds and seeds with mutagens. Varieties research and breeding resulted in 28 new peach cultivars, afterwards included into Plant Varieties Register of Russia and Ukraine

Keywords: *Gene fund, ecogeographycal groups, ecotypes, varieties research, hybridization, cultivars.*

Acknowledgements

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VARIABILITYOFGRAINMASS PERSPIKE INCULTIVARS OF TRITICALE (*X TRITICOSECALE* WITTM.)

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Abstract

Triticale is a cereal species created by crossing the wheat and rye species which characterized good quality and high yielding capacity which is specific for wheat and high tolerance to abiotic and biotic stress factors which is specific for rye. The high yield potential of triticale determined by genetics and are influenced by environmental factors. The aim of the paper is to present the results obtained at different triticale varieties under different climatic conditions regarding the grain mass spike^{-1}. Five triticale (*xTriticosecale* Wittm.) cultivars (KG 20, Bolero, Rtanj, Odisej and Bogo) were were investigated in field experiment which conducted as a randomised block design in five replications on 5m^2 size of unit plot, during three years period (2010-2013. In full stage of maturity of 100 plants (20 plants per replication) were used for analysis of grain mass spike^{-1}. Obtained results for grain mass spike^{-1}showed significant differences among studied triticale cultivars, years of experiment and interaction genotype/year. The average value of grain mass spike^{-1} for all three years and all five tested cultivar of triticale was 2.28g. Thecultivar Bolero had the lowest average value (2.15g) and Odisej the highest (2.52g) of grain mass spike^{-1} in average for three years period.

Keywords: *Grain mass, spike, triticale, cultivars*

LONG-TERM EFFECTS OF STRAW INCORPORATION AND INCREASING DOSES OF NITROGEN ON THE WHEAT YIELD

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Abstract

Investigation of the effects of straw incorporation and fertilization with increasing amounts of nitrogen on the yield of three winter wheat cultivars was carried out at long-term stationary field trial, established in 1971 on the experimental field of Institute of Field and Vegetable Crops, Novi Sad, Serbia. It included the following variants: a) treatments with straw incorporation (SI) and application of increasing doses of nitrogen: 0 (Ø; control treatment), 60, 90, 120, 150 and 180 kg of nitrogen per hectare and b) treatments without SI and with application of increasing doses of nitrogen: 0, 90 and 150 kg N ha^{-1}.On average for all fertilization treatments with nitrogen application, grain yield obtained in the treatment with SI (6.49 t ha^{-1}), was for 540 kg ha^{-1} higher in comparison to the average of fertilization treatments without SI. The highest yield on average of all three wheat cultivars (7.15 t ha^{-1}) was obtained with 120 kg N $ha^{-1}$and with the SI. It was significantly higher in comparison to all treatments without straw incorporation. The positive effect of long-term SI on wheat grain yield (at comparable variants of experiment: 0, 90 and 150 kg N ha^{-1}) ranged from 100 to 840 kg ha^{-1},depending on cultivar and amount of nitrogen applied.On average, long-term SI increased yield for 350 kg ha^{-1} (about 6%) of grain (for all three cultivars and the doses of nitrogen applied). Yield increasement by individual cultivars was 350, 390 and 320 kg ha^{-1}, for NS Ilina, Pobeda and Simonida, respectively.

Keywords: *Wheat, straw incorporation, nitrogen, grain yield*

THE EFFECT OF STAND DENSITY ON CONFECTIONARY SUNFLOWER SEED QUALITY

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Abstract

A two year (Y) field plot was conducted on experimental fields of Institute of field and vegetable crops in Novi Sad (Serbia). The effect of stand density on the most important quality criteria in commercial production of confectionary sunflower: oil content (OC) the protein content (PC) and 1000 seed mass (TM) was researched. Three hybrids (H) of NS Seed Company were used (NS-goliat, NS-slatki, NS-gricko). There were six stand densities (D), from 20000-70000 plants per hectare with increasing step of 10000. According to F-test all factors (Y, H, D) and some their interaction had highly significant influence on all quality traits of confectionary sunflower. According to partitioning in total of sum squares off all treatments the most important factor for oil content is hybrid, for protein content is year and for 1000 seed mass is stand density. There were high significant correlations between stand density and OC, PC and TM, +0,99, -0,90 and -0,98, respectively. By increasing stand density by each 10000 plants OC regularly increase by +1,06%, while PP and TM contrary regularly decreases by -0,37% and -8,29g, respectively. Concerning hybrids in average for two years and all stand densities, significantly the lowest OC of 28,03% had hybrid NS-goliat, the highest PC of 16,79% hybrid NS-gricko and the highest TM of 126,03g again hybrid NS-goliat.

Keywords: *Confectionary sunflower, plant density, oil and protein content, 1000 seed mass.*

NOZZLES TRANSVERSE DISTRIBUTION MODEL DEVELOPMENT: EFFECT OF PRESSURE AND ANTI DRIFT NOZZLE

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Abstract

Timely and high-quality application of pesticides contributes to environmental protection, economical production and production of healthy food. The efficacy of pesticide application depends not only on the quality of pesticides but also the quality of the application. One of the factor that most influences on the applications quality, from the standpoint of mechanization, are nozzles. They applied liquid on the surface of the plant which resulting that same volume of pesticide is applied to the entire surface of the plants. To achieve this goal, nozzles must performed uniform application of liquid per unit area, or working width. The variable factor in the application of pesticides may be nozzle and operating pressure. With increasing working pressure it was obtained smaller droplets.The paper presents test of three different nozzles. Each nozzle is characterized by a flat jet with an angle of 110^{o} and a flow rate of 1.6 l / min at a pressure of 3 bar. Differences between each other is the way of jet disintegration. Exactly this characteristic causes that with pressure change coming to changes in the uniformity of nozzles transverse distribution. The best distribution has nozzle with a flat jet. The coefficient of variation is between roughly from 4 to 6% at the pressure application of 2 to 4 bar.Obtained mathematical model that describes changes in the coefficient of variation depending on pressure applications can be a good basis for easy harmonization parameters in the pesticide application.

Keywords: *Nozzle, coefficient of variation, uniformity of distribution, pressure, sprayer, disintegration.*

EFFECT OF MODIFIED ATMOSPHERE PACKAGING ON QUALITY OF FRESH PROCESSED TUNISIAN POMEGRANATE ARILS CV. *GABSI*

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Abstract

Tunisia is a major producer of pomegranate fruit; many varieties are cultivated such as Jbeli, Gabsi, Khalledi, Tounsi, Zaghouani, Zehri. Gabsi is the important commercial variety. The valorization of this type of fruit as fresh cut produce could be an important alternative for many pomegranate varieties. The objective of the present work is to study the aptitude of *Gabsi* variety to be commercialized as fresh cut fruit and to determine the postharvest shelf life. Fresh arils were hand extracted, chlorine disinfected, rinsed and dried then packed in polyethylene bags. Treatments were passive modified atmosphere packaging (MAP), enriched CO_2 MAP and control, each one had three replicates. Quality evaluation was assessed on days 5 and 10. Weight loss, luminosity (L*), redness (a*), chroma (C), Hue angle (H), firmness, titratable acidity (TA), Total soluble solids (TSS), pH and anthocyanins content were determined and a sensorial evaluation was done. MAP treatment reduced significantly arils weight loss, increased C, a* and hue angle (H) parameters compared to control. Arils firmness was not significantly affected by MAP and enriched CO_2-MAP. MAP Treatments had not significant decrease in TSS and pH, an increase of TA and total anthocyanins in MAP. No significant changes were observed for all treatments in sensory analysis and did not affect the eating quality. For an acceptable quality attributes of ready to eat *Gabsi* pomegranate arils a storage conditions with MAP or CO_2-MAP at 4°C and a postharvest shelf life for 10 days were achieved.

Keywords: *Pomegranate arils, MAP, quality, postharvest shelf life*

DETERMINATION OF YIELD AND SOME PLANT FEATURES OF GRAIN CORN VARIETIES

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Abstract

This study was conducted to determine the yield and plant characteristic of 10 (ten) grain in Igdir (Turkey) University Agricultural Research and Application Centre field trial in 2015. The study was established randomized complete blocks experimental design with three replications. The difference between yield and plant characteristic of corn varieties were statistically found. It was found between plant height of varieties 217.0 with 181.0 cm, grain yield 2780.3 with 1589.2 kg/da, the first cob height 125.8 with 77.6 cm, the length of the cob 24.3 with 18.6 cm, cob weight 313.1 with 214.6 gr, grain weight in cob 288.4 with 156.3 g, diameter of cob 50.1 with 45.0 cm and 1000-grain weight 475.1 with 339.2 g. According to research results it was found RX 9292 and TK 6060 varieties of grain yield was higher. It can be recommended for these types of ecology. At the same time, grain yield which is taken from the unit of area will increase the plant height and cob of the grain weight held in breeding studies.

Keywords: *Grain corn, yield, variety, plant characteristic.*

EFFECT OF DIFFERENT DOSES OF NAA (0, 125, 250, 500 AND 1000 PPM) ON MOUNTAIN THYME (Thymus kotschyanus Boiss. & Hohen.) ROOTING

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Abstract

In Mountain Thyme (*Thymus kotschyanus* Boiss. & Hohen.) the mating system is mostly cross pollination which can cause a high level of genetic polymorphism. In terms of uniformity, vegetative propagation as stem cuttings is anaccessible and inexpensive method. Stem cuttings have the ability to form adventitious roots, and root cuttings can regenerate a new shoot system. The aim of this trial was to determine the effect of NAA on rooting of mountain thyme cuttings. The trial was established as a randomized block design with 3 replications during 2015, in greenhouse of the Agronomy Department, Faculty of Agriculture of Urmia University, Iran. At first, one stock plant was selected from Baba Hasan Valley, Sulduz region, West Azerbaijan province. Stem cuttings were taken from the stock plant. Before placing in the media the cuttings were treated with NAA (0, 125, 250, 500 and 1000 ppm).According to the resultsthe average of stem height ranged 4.27-6.17 (cm); number of nods ranged 3.27-5.20 (pcs); number of leaves ranged 6.53-10.40 (pcs); number of roots ranged 7.00-9.47 (pcs); the highest rootlength ranged 2.43-5.70 (cm); root fresh weight ranged 0.007-0.017 (g); shoot fresh weight ranged 0.031-1.106 (g); total fresh weight ranged 0.042-0.088 (g); root dry weight ranged 0.004-0.008 (g); shoot dry weight ranged 0.011-0.033 (g); total dry weight ranged 0.016-0.038 (g); ratio of root fresh weight ⁄ shoot fresh weight ranged 0.119-0.324; ratio of root dry weight ⁄ shoot dry weight ranged 0.154-0.429. In terms of root number, shoot fresh weight, root fresh weight, shoot dry weight and total dry weight, NAA 500 ppm; in terms of leaf number, nod number, stem height and total fresh weight, NAA 125 ppm and in terms of highest root height and root dry weight NAA 125 ppm were the best.

Keywords: *Mountain Thyme, NAA, Propagation, Stem Cutting.*

TEXTURAL AND PHYSICO-CHEMICAL CHARACTERISTICS OF ŞALAK (APRICOSE) APRICOT CULTIVAR

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Abstract

Fruit quality characteristics were studied for two consecutive years in the Şalak (Apricose) apricot cultivar grown in different altitudes regions located in Aras Basin climate conditions. At the study physical attributes (width, length, height, fruit shape index, fruit weight, kernel weight, fresh/kernel ratio), chemical parameters (total soluble solids content, pH and acidity) and textural parameters (hardness, adhesiveness, springiness, cohesiveness, gumminess, chewiness and resilience) were evaluated. These properties are important in the design of the equipment for harvesting, separating, packing processing and transportation. Fruit width, fruit length, fruit height,fruit weight, seed weight and kernel weight of Şalak (Apricose) apricot cultivar collected from four different locations changed between 41.06-48.83 mm, 49.47-56.80 mm, 40.53-47.27 mm,53.42-73.82 g, 2.24-2.72 g and 0.75-0.85 g and respectively. Based on the chemical properties of the Şalak (Apricose) apricot cultivar, it was determined that total soluble solids, pH and acidity contents changed from 13.72 to 16.40 %, from 4.46 to 4.96 and 1.01-1.69 % respectively. In terms of textural properties the average hardness, adhesiveness, springiness, cohesiveness, gumminess, chewiness and resilience were detected as 9.13 N, -27.48 g.s, 0.57, 0.24, 195.88 g, 142.11 g and 0.08 respectively

Keywords: *Apricot, Physical Properties, Texture Properties.*

CHARACTERISATION OF ECONOMICALLY IMPORTANT MEDICINAL AND AROMATIC PLANTS BELONGING TO THE LAMIACEAE FAMILY DISTRIBUTED IN THE RIZE PROVINCE, TURKEY

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Abstract

Regarding biodiversity the Black Sea region belongs to one of the richest regions of Turkey. Totally 2239 species are present in the East Black Sea region, 514 of them are endemic and the endemism ratio is ca. 23 %. More than half of the plants distributed at the East Black Sea region are present in the Rize province. 70 % of the plants are of medicinal and aromatic value. 4 Mentha species, 3 Origanum species, 3 Thymus species, 2 Salvia species, 2 Stachys species and 1 Calamintha species were collected from 19 different localities in Rize during 2015. A field nursery was established using collected material. Traits like plant height, number of branches, stem diameter, leaf area, dry drog weight, fresh drog weight, dry drog yield, fresh drog yield, seed weight and essential oil yield were determined. Principal Component Analysis was performed to assess the diversity regarding with the investigation of characters. Based on obtained data large diversity could be determined. Collected materials can be used as genetic resources for further investigations.

Keywords: *Lamiaceae, medicinal and aromatic plants, characterization.*

TOTAL PHENOLIC CONTENT AND ANTIOXYDANT ACTIVITY OF RHODODENDRON SPECIES COLLECTED FROM THE RİZE PROVINCE

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Abstract

Rhododendron species (mountain laurel) are deciduous or evergreen shrubs commonly used as garden plants worldwide. Six Rhododendron species, one of which (*R. smirnovii*) is endemic, grow naturally in Turkey, especially in the northeastern Anatolia (Black Sea region). Turkish Rhododendron species grow naturally from sea level to altitudes of 2500 (3100) m. They take the form of shrubs (R. luteum Sweet), dwarf shrubs (*R. caucasicum* Pallas) and large shrubs (*R. ponticum* L., *R. ungernii* Trautv., *R. smirnovii* Trautv.). Rhododendron samples obtained from Rize/Turkey were screened for total phenolic content by the modified Folin–Ciocalteu method, for potential antioxidant activity using phospho-molybdenum assay and by the 1,1-diphenyl-2-picryl hydrazyl (DPPH) and FRAP method for antiradical activity. Total phenolic content and antioxidant activity plant parts (flower, leaf) of two Rhododenron sepecies, namely *Rhododendron luteum* L. and *Rhododendron ponticum*L. were determined. The total phenolic content of leaves of *Rhododendron luteum* L. collected from different altitudes ranged between 112,363 and 219,071 mg GAE/gr DW. Total phenolic content of flower parts of the same species ranged between 82,275 and 201,642 mg GAE/gr DW. The total phenolic content of different parts of *Rhododendron ponticum* L. were higher compared with *Rhododendron luteum* L. On the other side, the antioxidant activity values of leaf parts of *Rhododendron luteum* L. were lower compared with flower parts and like the phenolic content the antioxidant activity values of *Rhododendron ponticum* L. parts were higher compared with *Rhododendron lutem* L.

Keywords: *Rhododendron, phenols, antioxidant activity*

MEDİCİNAL AND AROMATİC PLANT POTENTİAL OF RİZE/TURKEY

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Abstract

Rize has a different and special flora because of its geographical position, climate, and topography. The natural plants of Rize have a very big usage potential and value in some sort of industrial branches. In particular, the different activity traits of natural plant oils and extracts have formed the basis of many applications, including raw and processed food preservation, pharmaceuticals, alternative medicine and natural therapies. Rize is located in the northeast Anatolia to the east of coastline of Eastern Black Sea between 40^{o} 22' and 41 ^{o} 28' meridians east and 40 ^{o} 20' and 41 ^{o} 20' parallels of latitude north. Rize is surrounded by District of Trabzon in the west, İspir District of Erzurum in the south, Yusufeli District and Arhavi District of Artvin in the east and Black Sea in the north. It covers an area of 3,920 km2 except lakes. It has a mountainous and rugged terrain. Rize region is highly rich in terms of forested land and plant species diversity. This study gives brief information about medicinal and aromatic plant species in Rize. Our statement is that plants, which are grown naturally in our province represent a potential source of abundance, should be utilized for medical and economic purposes, and also researched for more potential uses in medicine and pharmacy.

Keywords: *Medicinal and aromatic plants, Rize*

EVALUATION OF SOME MORPHOLOGIC CHARACTERISTICS OF *Papaver pseudo-orientale* (Fedde) Medw., IN PIRANSHAHR, WEST AZERBAYJAN, IRAN

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Abstract

Dry latex of *papaver pseudo-orientale* (Fedde) Medw., has iso-thebaine as major alkaloid along with orientalidine and other alkaloids. Studies have shown that iso-thebaine can alter the muscle tonus of intestine; respiration frequency and pulse rate were decreased; moreover, it is well established that iso-thebaine has some anti-inflammatory effects, mainly in the exudative phase of the inflammation. The aim of the present study was to evaluate some morphologic characteristics of *P. pseudo-orientale* and its performance in collecting region. The study has been carried out in Piranshahr, West Azerbayjan, Iran. The Capsules of the 75 plants in the region were collected on August 2015. Furthermore dried plant specimens have been transferred to laboratory and after providing herbarium labels were identified in the Herbariums of Genebank, Agricultural Research center, Ministry of Agriculture, West Azerbaijan, using available literature such as the Colored Flora of Iran. According to the results, the average of plant height, capsule number, carpel number, capsule length, capsule diameter, ratio of capsule length ⁄ capsule diameter, capsule weight per plant, seed weight per plant and ratio of capsule weight per plant ⁄ seed weight per plant were recorded as 74.25 (cm), 5.64 (pcs), 15.85 (pcs), 2.88 (cm), 1.78 (cm), 1.63, 5.98 (g), 1.83 (g), 0.35 respectively. In conclusion, ecological condition of the region is suitable for economic production of the plant as dry farming.

Keywords: *West Azerbayjan, Iso-thebaine, Papaverpseudo-orientale.*

NUTRIENT VALUE AND PHARMACOLOGICAL PROPERTIES OF BLACK CUMIN (*Nigella sativa* L.)

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Abstract

Black cumin (*Nigella sativa* L.) is an annual herbaceous plant that belongs to the family Ranunculaceae. It is reported that origin of the plant would be south Europe and west Asia. Today it has been cultivated especially in eastern Mediterranean countries.The seeds of black cumin plant are used both as spicy and culinary herbs and as medicinal ones. The seeds contain fixed oil (35.4-41.6 %), proteins (22.7 %) and volatile oil (0.5-1.6 %). They also have some minerals such as Fe, Na, Cu, Zn, P and Ca and vitamins such as ascorbic acid, thiamine, niacin, pridoxine, and folic acid. Black cumin seeds have been generally used as diuretic, antihypertensive, antidiabetic, diaphoretic, stomachic, liver tonic, digestive, antihelmintic, asthmatic, antidiarrheal, appetite stimulant, emmenagogue, to increase milk production in nursing mothers, to support immune system, to fight parasitic infections, rheumatism and skin disorders. Theseeds are also used externally in leucoderma, alopecia, eczema, freckles and pimples. Some researchers reported that a mixture of black cumin oil with beewax can be used for burns, skin infections, moisturizers, joint pain reliever or an anti-wrinkle agent. The volatile oil of black cumin and its main active constituent, thymoquinone, are reported to inhibit peroxidation in ox brain phospholipid liposomes and to exhibit renal protective effect in rats through its antioxidant activity. Various studies showed that fixed oil of black cumin seeds has effects on immune system and cancer and gastrointestinal system and that volatile oil of the seeds has effects on cardiovascular system.

Keywords: *Black cumin, Nigella sativa L., nutritional value, pharmacological properties.*

THE EFFECTS OF IRRIGATION ON CORN

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Abstract

Climate change requires the conscious use of water for agricultural production, both in our country and in the world. The most important factor in getting nutrient for a plant is water. Water is the most important factor in the plant's nutrient intake.Therefore, the farmers always irrigate corn field until the harvest. The consist of corn grain is start with fertilization that pollens falling over their stigma of ear. Corn grain formation begins after fertilization of the ear tassel by ear tuft. If plants are exposed to water stress during this period their physiological activities will stop. Therefore, fertilization will not occur and desired grain yield would not be provided. In our study, irrigation termination process was started after tassel emergence 7th day. In our study, the last irrigation is initiated after the 7th day of the tassel formation.Water cut-off operations continued in 7 days interval. The total of irrigation termination consisted of 6 application. Water cutting applications is made 6 times in total. The last time of water cut-off was 42nd day after tassel emergence. In this study, P. T83 hybrid corn was planted in GAP Agricultural Research Institute in Sanlıurfa on 20,June, 2015. The trial was conducted as randomized block experimental design with 3 replications. The effect of last water cut off on plant height, ear length, 100 grain weight, grain/cop rate, grain yield, protein and starch rate of corn plant were investigated.Research results showed statistically significant differences according to the last irrigation on examining all the features of corn.Research results were showed statistically significant differences according to the last irrigation time in terms of plant height, ear diameter, grain yield, protein, starch and fat rate.The values of these parameters have been changed between 213.33 - 226.33 cm, 25.00 - 30.33 mm, 491.93 - 914.36 kg/de, 9.33% - 10.80%, 74.16% – 75.06%, 3.06% - 3.30% respectively.

Keywords: *Corn, irrigation, grain yield*.

EFFECTS OF DIFFERENT ROW SPACING AND SOWING TIME OF FORAGE COWPEA (*Vigna unguiculata* L. Walp.) ON HAY YIELD AND SOME PROPERTIES IN SULUOVA ECOLOGICAL CONDITIONS

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Abstract

Cowpea is often used as human and animal nutrition and green manure. This study was conducted in order to determine the effects of different row spacing and sowing-time on hay yields and some properties of forage cowpea "Ülkem" and a promising genotype in ecological condition of Amasya-Suluova. Different row spacings (30, 45, 60, 75 cm) and planting time (1 May and 1 June) were used according to split split block design. In this study, plant height, main stem width, number of branches, weight of bods, leaf ratio and hay yield were determined.In this study, it was clear that the cultivar ÜLKEM was superior to the promising genotype; higher yields were obtained in sowing date 1st May; larger row spacing caused decreasing hay yields. The highest forage yields were determined at 30 cm row spacing (15.87 and 9.78 t/ha) for both sowing date. Crude protein ratios of hay yields varied from 18.61% to 20.00%. NDF ratios of hay yields of the genotypes sown on 1stMay and 1st June were 33.21% and 32.73% respectively. Average ADF rates of the same genotypes were 30.09% and % 30.81. P, K, Ca and Mg contents were 0.35% and 0.37%, 1.97% and 2.01%, 1.51% and 1.56%, 0.49% and 0.52%, respectively. In conclusion, 30 cm distance, 1th May and Ülkem cultivar has emerged as the most suitable row spacing and sowing date for forage production.

Keywords: *Sowing date, row spacing, hay yield, forage cowpea.*

FIELD SCALE VARIABILITY IN SOIL PROPERTIES AND SILAGE CORN YIELD

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Abstract

Field scale spatial variability of soil properties, crop quality parameters and yield are needed to evaluate the efficiency of management practices in crop production. The purpose of this study was to determine the magnitude of field variability in soil properties, corn (Zea mays L.) quality parameters and yield, and to characterize their spatial structures, and map the stated attributes. The experiment was conducted in an alluvial flood plain of lower Kazova watershed in Tokat province of Turkey. Several physical and chemical soil properties, plant quality characteristics and silage corn yield were determined. Coefficient of variation (%CV) for soil properties varied from 1.02% (pH) to 31.87% (sand). Soil properties of calcium carbonate, organic matter and clay displayed well defined spatial structureprior to the three years of experiment. Sand, pH and electrical conductivity (EC) showed moderate spatial dependency. However silt, moisture content, bulk density, plant available phosphorus and potassium had weak spatial structure. Variability in plant characteristics of corn (except stalk plant diameter) and corn yield within the herbicide applied plots were lower as compared to those plots where herbicide was not applied. Herbicide application lowered the variability in plant characteristics. Spatial dependence of plant properties determined in herbicide applied plots was greater as compared to those where herbicide was not applied. Silage corn yield distribution map successfully distinguished the three corn hybrids planted. The difference in vegetation period among corn hybrids was effective in distinguishing the hybrids. However, the variability in each of the hybrids blocks was assumed to occur due to the difference in short range soil properties. The longest range values were obtained for silage corn yield at both herbicide applied and herbicide unapplied parcels.

Keywords: *Field variability, geostatistics, modeling, corn quality, spatial structure.*

EFFECTS OF MULCH TREATMENTS ON LATERAL BRANCHING OF SWEET CHERRY TREES

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Abstract

In this study, the effects of mulch treatments on branching of cherry trees which treated perlan (GA_{4+7}+BA) were investigated. In sweet cherry cv. 0900 Ziraat grafted on Mazzard, black and clear polyethylene mulch were used as material. Plants were planted as 3 replicates and there were 8 saplings per replicates. Mulch materials were applied at the end of March and perlan was applied when the plants height reached to 50 cm. The data were obtained in November and the results were analyzed with SPSS.Plant height, stem diameter, branching height, numbers, lengths, diameters and angles of lateral branches were investigated and results were found statistically significant. In this study, black mulch+perlan (BM+P) treatment was found the most effective in terms of all features. It was obtained to 4.09 lateral branch, 35.10^{o} branch angle, 27.4 cm in length, 5.36 mm in diameter by BM+P treatment. Althoughclear mulch+perlan (CM+P) treatment and control plants took place in same group (CM+P: 2.50 and C: 2.59 per plant) in terms of the number of branches, CM+P treatment was found outstanding other branching features.As a result, it can be stated that BM+P treatment providing formation of well-developed and a lot of lateral branches may be useful.

Keywords: *Sweetcherry, perlan, lateral branching and mulch*

BIOETHANOL PRODUCTION FROM SUGAR BEET

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Abstract

Today, gradually running out of fossil fuels, the destruction of ecosystems, efforts to avoid depending on foreign countries for energy and to increase energy diversity have increased the importance of fuels such as bioethanol. Biomass production of bioethanol from sugar beet molasses will lead to open a new market for beet producers, to widespread the crop rotation, to create an energy farming culture and lead to an increase in sugar beet growing areas. Bioethanol also contributes favorable support to the ecology by providing diversity in agricultural production and it is important for creating sustainable agricultural structure and supporting rural development. Bioethanol in general is obtained by fermentation of plants containing sugar and starch. Sugar beet molasses is used for the production of bioethanol from sugar beet. Production of bioethanol from molasses is carried out at three stages such as yeast reproduction, fermentation and distillation. The alcohol obtained in 96% purity during ethanol production process is not used as biofuel. In order to be used as biofuel it should be in 99.5% purity. Therefore, in alcohol plants the purification and distillation units are needed in addition to fermentation unit. Attention should be paid to alternative energy sources such as bioethanol since the oil reserves are decreasing and environment problems are increasing.

Keywords: *Sugar Beet, bioethanol, energy, biomass*

İNVESTİGATİON OF YİELD AND YİELD COMPONENTS OF SAFFLOWER (*Carthamus tinctorius* L.) GENOTYPES SOWN AT DİFFERENT SEASONS UNDER YOZGAT CONDİTİONS

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Abstract

This research was conducted during 2013-2014 in different seasons using randomizde block design with three replications aiming to determine the most suitable safflower cultivar for Yozgat conditions and therefore the yield and yield components of three reeased safflower cultivars (Dinçer, Remzibey 05 and Balcı) were detrmined. The variation was determined comparing winter and spring sowings in this three cultivars. According to the results of the study; whereas in spring sowing the obtained values were 51,29 cm for plant height, first height of branching 28,67 cm, number of branches 4,156, number of heads per plant 8,111, thousand seed weight 56,05 g, seed yield 96,44 kg/da, crude oil yield 24,44 kg/da, protein yield 12,86 %, flower yield 9,51 kg/da, oleic acid 17,43 %, linoleic acid 72,68 % and linılenic acid 0,56 %; the values for autumn sowing were 63,74 cm plant height, 32,1 for height of first branching, 8,83 for number of branches, 18,75 for number of heads, 58,73 g for thousand seed weight, 209,37 kg/da for seed yield, 50,44 kg/da for crude oil yield, 33,61 % for protein yield, 16,93 kg/da for flower yield, % 19,93 for oliec acid, 19,93 for linoleic acid and 0,5 % for linolenic acid. The highest yielding cultivar was determined as Dinçer with an seed yield of 310,792 kg/da in winter sowing ranking before teh cultivars remzibey-05 and Balcı.

Keywords: *Safflower, sowing time, yield, quality*

VARIATION IN *Digitalis ferrugineae* L.MULTIPLICATED WITH SEED UNDER THE PROVINCE RIZE CONDITIONS IN TURKEY

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Abstract

This study was carried out to examine the variation of some traits of *Digitalis ferrugineae* L.at Pazar/Rize/Turkey conditions. The experiment was conducted in 2014/2015 in the field trials belonging to the Faculty of Agriculture and Natural Science, Recep Tayyip Erdoğan University. *Digitalis ferrugineae* L. seeds were sown firstly into viols in greenhouse. The seedlings were planted into the field at 5-6 leave stage in 2014. All measurements were done using selected twenty plants in 2015. There were great variation between the plants investigated in the study. The change interval was 68,5-148,5 cm for plant height; 28,0-95,5 cm for spike length; 3,92-10,08 mm for spike diameter just below the first capsule; 5,92-13,5 mm for root collar diameter; 0-14 for number of branches per plant; 0,3-9,4 g for seed yield per plant and 0,31-0,69 g for 1000 seeds weight. The positive corelations were found significant ($P<0.05$) between seed yield per plant and three characters which were spike length (r=0,4890), spike diameter (r=0,5181) and root collar diameter (r=0,5799). In addition, relationship between plant height and spike length was found significant. As a result the plants of *Digitalis ferrugineae* L. multiplicated with seed displayed great variation and could be advantageous for further breeding studies.

Keywords: *Digitalis ferrugineae*, *spike, seed, variation*

GRAIN YIELD AND SOME QUALITY TRAITS OF DIFFERENT OAT (*Avena sativa* L.) GENOTYPES

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Abstract

Oat cultivars should have both high yield potential and some quality criteria in accordance with using targets. Hence, grain yield and some quality traits of 25 oat genotypes grown in two consecutive years were studied. This study was carried out during the 2012–2013 and 2013–2014 growing seasons in Yozgat, Turkey. Grain yield, plant height, hectolitre weight, thousand grain weight, groat percentage and grain composition (protein, fat, ash, acid detergent fiber (ADF), neutral detergent fiber (NDF), β-glucan and starch) were evaluated. Analysis of the combined data for two years showed significant genotypic differences for all traits. According to the average of two years, among the genotypes, grain yield varied from 2432.3 (2 numbered genotype) to 5650.2 (19 numbered genotype) kg ha^{-1}, plant height from 76.3 to 128.3 cm, hectolitre weight from 41.5 to 52.3 kg, thousand grain weight from 24.5 to 41.3 g, groat percentage from 70.4 to 76.6 %, protein content from 11.1to 14.3 %, fat content from 5.86 to 8.47 %, ash ratio from 2.52 to 3.43 %, ADF content from 11.0 to 16.4 %, NDF content from 29.5 to 37.3 %, β-glucan content from 1.33 to 2.58 % and starch content ranged from 34.9 to 47.7 %. Grain yield was significantly and positively correlated with thousand grain weight (r = 0.253**) and neutral detergent fibre (r = 0.160**). However, correlations between grain yield with crude protein (r = -0.216**) and hectolitre weight (r = 0.246) were significantly and negative.

Keywords: *Oat, Genotype, Yield, Quality traits.*

AIRJECTION® INTO SUB-SURFACE DRIP IRRIGATION SYSTEMS AS A TOOL FOR CLIMATE-SMART IRRIGATION

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Abstract

Climate-smart Agriculture (CSA) has been developed as a model to address socio-ecological systems. CSA consists of a suite of tools and methods that, when implemented in a sustainable manner and locally supported, leads to the achievement of three basic objectives; *mitigation* of environmental damage caused by traditional agricultural practices; *adaptation* of farming methods and regimes that cope with the uncertainty and variability of climate change; and *food security* or improved agricultural production and profitability for the grower. Organic agriculture is a framework that integrates the triple goals of CSA but not all tools are appropriate for organic agriculture. Among the recent innovations of CSA that is particular appropriate for organic agriculture is the development of air injection This paper summarizes the work of Goorahoo, et al and presents the results of an 8-year study that satisfies the objectives of CSA and can serve as an important tool for cost-effective agricultural improvement in organic landscapes. The Goorahoo case study provides evidence that injecting air into a sub-surface drip irrigation system creates an aerobic oxygen/nitrogen root environment with no added chemicals or additives, which significantly and positively improves production with no increases in fertilizers, water or fuel. This study evaluates the carbon and nitrogen cycling implications, and cost benefit analysis benefits of the *AirJection*® System on cantaloupes, corn, honeydew and bell peppers in central California.

Keywords: *Airjection, drip irrigation systems, climate-smart irrigation*

THE IMPACT OF TREATMENT DURATION OF SANZA (GENTIANA LUTEA L.) SEEDS ON LOW TEMPERATURE (0 ° C) IN THE ENERGY AND POWER GERMINATION OF SEEDS

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Abstract

Sanza is a typical Albanian plant widespread in the mountainous areas of the Albanian territory, mainly onthe northern position and serpentine soils. For many years it has been accumulated from natural plant growth (bio) and it is been exported. Continuous harvest influences itsproduction decreas, so it doesn't meet the needs of the market. To ensure the requested production for the international marketthe cultivation of this plant has started. During the sowing non-qualitative germination has been noticed as well as the fact that seeds have had the lower germination energy and power. In order to draw a precise cultivation technology several experiments on seedling production have been conducted and the technology of cultivation has been developed. To ensure a better possibility of seeds sprouting,the experimental study of seed treatment with low temperature (0 ° C) with different durationhas been undertaken, and the performance of seed germination have beenobserved. From this experiment it is determined the best duration of the seed treatment with low temperatures, which it is been recommended to the growers of this plant.

Keywords: *Cultivation, low temperatures, germination energy, power energy, technology.*

PHYSIOCHEMICAL CHARACTERIZATION, IDENTIFICATION AND ANTIBACTERIAL ACTIVITY OF THE ESSENTIAL OIL OF *JUNIPERUS COMMUNIS*

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Abstract

The objective of this work was to investigate the physiochemical characterization, identification and antibacterial activity of the essential oil of common juniper *Juniperus communis*, collected from the Chrea National Park in Blida (Algeria). The extraction by training of water steam has allowed us to study the physiochemical and organoleptic characteristics of the essential oil of this plant with a refractive index = 1.479; Density = 0.859; Indicates acid = 1.63; Indicates of ester = 62.57; Indicates of saponification = 64.20 and Indicates of peroxide = 19. The results are consistent with the AFNOR standards. The chromatographic analysis related to the double mass spectrometry, showed all the components of the essential oil (alpha-pinene = 11.2%, beta-myrcene = 4.08%, D-limonene = 9.57 % borneol = 22, 06%, alpha-terpineol = 13.26%, bornyl acetate = 23.08%). Finally, the test of the antibacterial activity of the essential oil on three pathogenic bacteria allowed us to notice that our essential oil has a very interesting activity on all strains tested with zones of inhibition for *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa* of 48,50±0,06 mm, 35,6±0,06 mm and 13,2±0,04 mm, respectively. It is therefore possible that the essential oil of *Juniperus communis* may be used to have an antibacterial effect in various pharmaceutical and cosmetic treatments.

Keywords: Essential oil, *Juniperus communis*, extraction, antibacterial activity, bacterial strains.

EVALUATION OF PHYTOPLANKTON DIVERSITY IN THE HYDROSYSTEM OF THE LACUSTRE DAM HAMIZ (ALGERIA)

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Abstract

Phytoplankton gather photosynthetic unicellular microscopic algae.They constitute a primordial link in a food chain or a trophic network, notably allowing the development of planktonic micro fauna and fish.Our study was conducted for five months (October 2014 - February 2015) in the tank Hamiz dam, the water of this restraint is good.The phytoplankton sample is taken in each campaign in the photic zone. The analysis in this context is in accordance with recommendations from the Guidance standard on the enumeration of phytoplankton using inverted microscopy (Utermöhl technique)(1958).A total of 23 taxa were identified during the study period. These were divided into 8 classes (Chlorophyceae, Bacillariophycées, Conjugatophycées, cyanobacteria, etc.)Regarding abundance, the Conjugatophcées class was the largest class, with the average monthly abundance of 364.783 item/ml, followed by the class of Diatomophyceae with a concentration of 301.661 item/ml. Then it came the Chlorophyceae, with 268.633 item/ml, followed by the Euglénophycées, with a concentration of 16.881 item / ml. The Cryptophycées, Chrysophyceae, dinoflagellates and cyanobacteria had a tiny slice of the algal assemblages.The Bray-Curtis distance helped to classify phytoplankton species in "associated" groups, that is to say the groups that are often encountered together. The structure of the algal assemblage shows that the taxa are divided into five groups based on their vital needs, not on their taxonomic criteria.

Keywords: *Phytoplankton, Hamiz dam, abundance, Bray-Curtis.*

INFLUENCE OF LED LIGHT ON THE GROWTH AND SECONDARY METABOLITE PRODUCTION OF *CATHARANTHUS ROSEUS* PLANTS

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Abstract

Catharanthus roseus G. Don is an important medicinal plant which accumulate pharmacologically significant terpenoid indole alkaloids (TIA). TIA of C. roseus includes more than 130 substances. Major TIA of leaves are vindoline and catharantine. Ajmalicine, serpentine, vinblastine and vincristine are the most valuable among *C. roseus* TIA. Ajmalicine and serpentine are used for arterial hypertension treatment. Vinblastine and vincristine are well known as antineoplastic drugs used in chemotherapy of cancer diseases.

Plant growth and development are strongly controlled by specific light wavelengths. Light-Emitting Diodes (LEDs) are modern sources of energy allowing production of the light wavelengths corresponding to the absorption peaks of plants photosynthesis and photomorphogenesis. LEDs unique spectra could stimulate vegetative growth, flower or fruits formation etc. Influence of LEDs light on the growth and biosynthesis processes in *C. roseus* in closed system was studied. Plants were grown under artificial illumination using LEDs or fluorescent lamps as control.

Our experiments have demonstrated that some LEDs light regimes strongly stimulated plant growth and biomass production. Moreover, we found different effects of LEDs light regimes on TIA and phenolic compounds accumulations in plant tissues. The influence of LEDs light regimes on redox-active compounds content in C. roseus plants was also measured. The interaction of the various cultivation light regimes and the biomass and TIA accumulation in different organs of *C. roseus* is discussed. The results of this work can be used in the creation of techniques for optimization of ornamental and medicinal plants cultivation.

Keywords: *Catharanthus roseus G. Don, Light-Emitting Diode (LED), Terpenoid Indole Alkaloids (TIA)*

VARIABILITY OF YIELD AND QUALITY OF SEEDS OF RED CLOVER (*Trifolium pratense* L.)

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Abstract

Red clover (*Trifolim pratense* L.) is one of the most important forage legumes in areas with acidic and nutrient poor soils. Selection of appropriate varieties that will have a high yield of green mass and seeds on such soils is of particular importance in the growing of red clover. The life duration of red clover is 2-3 years, and seed production is performed in the first and second year. The aim of this study was to determine the productivity of red clover in seed production and quality of seeds in the first harvest of the first year and second harvest of the second year of life. During the two-year period, 2010 and 2011 growing seasons, at the location of Manjača (44° 39' N, 17° 00' E, 533 m) were tested four domestic lines (DS-1, DS-2, DS-3, DS-4) and four varieties (Viola, Kolubara, Start, Nike) of red clover, which are widely used in the production in the Republic of Srpska. In the second harvest of second year the achieved average seed yield was 223 $kgha^{-1}$, and in the first harvest of the first year average seed yield was 205 $kgha^{-1}$. The line DS-2 had the highest average seed yield (234 kg ha^{-1}), and the variety Viola had the lowest yield (184 kg ha^{-1}). The average weight of 1000 seeds of the first harvest in 2010 was 1.67g, and the average weight of the second harvest in 2011 was 1.56g. The line DS-2 had the highest weight of 1000 seeds, 1.75 g, and the variety Viola had thelowest weight, 1.41 g. The lines DS-1 and DS-4had the highest germination energy (64% and 60%, respectively). The genotype, year and time of harvest had the greatest impact on seed yields of red clover. Lines DS-2 and DS-4 represent potential new for Banja Luka varieties of red clover.

Keywords: *Red clover (Trifolium pratense L.), genotype, seed, yield, harvest.*

AGRO-CLIMATIC ASSESSMENT OF SUMMER-FALL DROUGHT FOR FRUIT-TREE NEEDS

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Abstract

Fruit-tree species, have certain requirements to the temperature of the air during the different phases of their development, based on their biological peculiarities. The dynamics of the agro-climatic indexes (absolute maximum temperature, average maximum monthly temperature, air humidity and rainfall, their frequency and continuance, etc.) are of great importance during the period July to September when the fruits grow and in most of the fruit-tree species the fruit buds for the next year start to develop. The agro-climatic indexes for the determination of the temperature and humidity conditions during times of climatic changes for the period 2000-2015 in the region of Plovdiv (Bulgaria) are examined in the current research.

Kaywords: *Agro- climatic indexes, climatic changes, fruit –trees.*

NITROGEN FERTILIZATION, PRODUCTIVITY AND GRAIN QUALITY OF DURUM WHEAT

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Abstract

In field fertilizer experiment, the effect of nitrogen fertilization in rates 0; 60; 120 and 180 kgN.ha^{-1} on the structural elements of the yield, the productivity and quality of the grain in seven Bulgarianvarieties durum wheat Progress, Vazhod, Victoria, Predel, Deana, Zvezdica and Elbrus was studied for three years from 2011to2014.It was found, that the structural elements of the yield total number of tillers, length of the spike, number of spikelets per spike and grains per spike increased with increasing nitrogen fertilization.Nitrogen fertilization proven decrease the indicator 1000 kernel weight and the highest value at 56,2 was found at the variants without fertilization. Nitrogen fertilization hadlow effect on the test weight of grain, which was in the range 79.0 – 79.8. Nitrogen fertilization increased grain yield and grain protein yield, but proven differences between rates $N_{120}$and N_{180}were not found. Grain protein concentration increased in plants fertilized with 120 and 180 kgN.ha^{-1}.Nitrogen fertilization slightly affects wet gluten content, dry gluten content and vitreousness of the grain. Grain yield, grain protein and grain protein concentration strongly and positively associated with total number of tillers, length of the spike, number of spikelets per spike and grains per spike and negatively with 1000 kernel weight and test weight of the grain. Without nitrogen fertilization out of durum wheat may be expected average yield of 3717.7 kg grain and 454.2 kg grain protein per hectare and grain with 12.3% protein content. The possible additional yield for each input kg nitrogen per hectare is 127.6 kg grain and 22.04 kg grain protein. Without nitrogen fertilization structural elements of yield can be with the following values: total number of tillers – 2.26, length of the spike – 5.06 cm, number of spikelets per spike – 16.07 and grains per spike – 24.95.

Keywords: *Nitrogen, durum wheat, yield, quality, relationships.*

DETERMINATION OF SEED YIELD AND SOME AGRONOMICAL CHARACTERISTICS OF SOME CHICKPEA (*Cicer arietinum L.*) LINES AND VARIETIES IN CYPRUS ECOLOGICAL CONDITIONS

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Abstract

Seed yield and some properties (plant height, first pod height, number of branches and 100 seed weight) of 4 lines and 8 chickpea varieties (Menemen, Arda, İlc482, 31, 39, Azkan, CevdetBey, İzmir, Aydın, Çağatay) were investigated in this study under dry conditions of Cyprus province in 2014 growing season. This study was designed in randomized complete blocks with three replications. The highest seed yield (1002 kg/da) was produced by Çağatay variety, the lowest (775.8 kg/da) by İlc482variety. Plant height ranged from 38.4 to 66.5 cm. According to results, Çağatay variety was recommended to the farmers in Cyprus and surroundings.

Keywords: *Chickpea, plant height, seed yield, 100 seed weight.*

COCOA SUPPLY FUNCTION PREDICTION MODEL: AN ECONOMETRIC APPLICATION FOR GHANA

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Abstract

Cocoa remains one of the most important crops regarding agriculture production in Ghana. The contribution of the crop to the revenue of the country has placed it higher than all other tree-crops harvested in the country. Although Ghana has cemented its position as the second largest producer of Cocoa in terms of quantity, there is occasional fluctuation in supply. The correlation between price and output quantities has been estimated using almond Polynomial lag model. A data from 2000 – 2013 from the United Nations Food and Agriculture Organisation (FAO) were used for the study. The estimates were executed using Eview 9.0 SV. The model attempts to predict the best fit for the data. The study showed that output quantities are affected by a 3 year lag value of -1397. This would help policy makers to predict supply response of producers.

Keywords: *Cocoa, Ghana, Econometrics model.*

RADIATION INTERCEPTION AND RADIATION USE EFFICIENCY OF WINTER CEREALS UNDER DIFFERENT NITROGEN AVAILABILITIES

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Abstract

Nitrogen is an important element for leaf development and radiation interception. In order to study radiation interception and radiation use efficiency (RUE) of winter cereals under different nitrogen availability an experiment was conducted during the seasons of 2013/2014 and 2014/2015 in the research field of Gonbad Kavous University, Iran. Treatments included winter cereals [bread wheat (Triticum aestivum L.), durum wheat (Triticum turgidum L.), six rowed barley, two rowed barley, hull less barley (Hordeum vulgare L.), oat (Avena sativa L.), and triticale (Triticosecale wittmack L.)] and nitrogen rates (zero and optimum level). Results showed leaf area index varied from 6.08 in triticale to 3.28 in hull less barley in the first year and obtained from triticale (4.51) and oat (3.38) in the second year. In both years, the most accumulation total dry matter was related to triticale (2054.9 gr.m–2, 2557.05 gr.m–2). The maximum and minimum of extinction coefficient were related to bread wheat (0.86 ± 0.03) and triticale (0.67± 0.03) in 2013-2014 and maximum and minimum of k was 0.86 ± 0.043 in two rowed barley and 0.56 ± 0.036 in hull less barley in 2014- 2015. At the first year RUE varied from 2.02 ± 0.07 gr Mj−1 in durum to 2.78 ± 0.14 gr Mj−1 in triticale and for the second year the maximum RUE related to hull less barley (3.44± 0.25) and minimum related to six rowed barley (2.80± 0.12). K and RUE variation depends on leaf area index and intercepted radiation.

Keywords: *Cereal, extinction coefficient, nitrogen, radiation, wheat.*

PERLIMINARY COMPARISON OF WINTER OILSEED RAPE LINES IN IRAN

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Abstract

In order to study the preliminary yield comparison of oilseed rape lines, 22 winter lines along with Okapi as check variety were evaluated in Karaj, Kermanshah and Hamadan provinces of Iran in 2013-2014, cropping seasons using randomized complete block design with three replications. During the farming season all agronomic traits such as days to start flowering, end of flowering, plant height, number of seeds per pod, number of pods on main stem, number of branches, total pods per plant, maturity were recorded. Based on the results of the three sites of experiment i.e. Karaj, Kermanshah and Hamadan, Lines BAL-92-11, BAL-92-4, BAL-92-6, BAL-92-1, BAL-92-3, HW-92-2, BAL-92-8, HW-92-1 and HW-92-3 with 2429, 2358, 2311, 2247, 2232, 2208, 2158, 2120 and 2058 kg/ha seed yield respectively were superior than check variety Okapi which ranked 21 with 1705kg/ha seed yield. Selected lines with high yield and suitable traits will be evaluated in advanced yield trials in cold and mild cold regions in two years.

Keywords: *Yield comparisin, Winter rapeseed lines, Perliminary yield trial*.

STUDY DIFFERENT TEMPERATURE STORAGE EFFECTS ON VIABILITY OF COTTON SEED WATER STRESSED

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Abstract

This research was conducted on study temperature storage effect on seed vigority and mechanisms of physiology tolerant in seeds. Therefore, two cotton seed genotypes (such as Golestan and Latif) that grown under three levels of irrigation (20%, 40 and 80% FC), were stored in three temperature conditions (4, 20 and 40^0C) completely randomized factorial design for two months. Traits such as seed vigority, germination rate, uniformity of germination, seed morphology, shoot and root length, shoots and root dry weight, oxidative enzyme, gossypol concentration of seed and seed size were studied. Data were analyzed using SAS software. Results showed the seeds that grown under severe and moderate field capacity had maximum vigority, germination rate and uniformity of germination percent. Physiological mechanisms could improve in 4^0C temperature. Gossypol concentration and number of this gland were affected against high temperature of storage. Irrigation 80% FC in 4^0C had normal seed size and appearance, but seeds in 20 and 80%FC at 40^0C reduced seed viability. According to foundation of this research, we concluded the collected seeds from severe and moderate irrigation conditions activate tolerant mechanisms special high temperature storage. Seeds produced in moderate stress, will be able to ameliorate heat stress effects, via increasing oxidative enzyme.

Keywords: *Cotton, seed, viability, physiology traits.*

EFFECT OF PLANT GROWTH-PROMOTING BACTERIA (PGPR) AND ARBUSCULAR MYCORRHIZAL FUNGI (*AMF*) INOCULATION ON SOME PHYSIOLOGICAL TRAITS AND P-UPTAKE IN *EX*-VITRO POTATO PLANTLETS

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Abstract

To evaluate the effects of mycorrhizal symbiosis and phosphate solubilizing bacteria inoculation on phosphorus absorption, chlorophyll index and net photosynthetic rate, plantlets of two potato cultivars (*Agria* and *Sante*) derived from tissue culture were inoculated with two species of mycorrhizal fungi (*Glomus mosseae* and *G. fasciculatum*), two strains of Pseudomonas (*Ps173* and *Ps168*) and two genus of Bacillus (*B. subtilis* and *B.megaterium*). A pot experiment was conducted using a factorial based on completely randomized design with four replications. *AM-fungi* inoculation significantly increased physiological traits and P uptake. *G. mosseae* had more positive effect on net photosynthetic rate, chlorophyll index and phosphorus absorption in comparison of *G.fascisulatum*. P uptake and net photosynthesis showed significant differences between cultivars. Chlorophyll content of cv.*Sante* was 3.17% higher than cv.*Agria*. Leaf SPAD index was similar in both phases by using of *G.mosseae* and it was higher than *G.fasciculatum* inoculaion and control treatment. Overall, chlorophyll index at tuber-inducing stage was lower than stolon initiation stage. P absorption with *Am*-fungi inoculation showed increased in comparison with control treatment, 15.5% and 9.26%, respectively. The highest P absorption was obtained in plantlets inoculated with *G. mosseae* and without PGPR inoculation. *G.fasciculatum* inoculation helped to P uptake increasing in *Sante* and *Agria* cultivars, 27.5% and 6.7%, respectively. Photosynthesis rate of *Sante* cultivar was three times more than *Agria* cultivar. Higher potential of P_n in cv.*Sante* can be related to more P absorption than *Agria* cultivar. Overall, inoculation of potato plantlets with different species of mycorrhiza, Pseudomonas and Bacillus caused noticeable increase in nutrient absorption and physiological indices. In turn, this effect improved the biomass of the plantlets and consequently helped them to acclimate better and be more efficient in minerals absorption.

Keywords: *Solanum tuberosum, SPAD, Mycorrhizal symbiosis, PGPR inoculation, Nutrient.*

EFFECT OF CHEMICAL, ORGANIC AND BIOLOGICAL NITROGEN ON YIELD AND YIELD COMPONENTS OF SOYBEAN CULTIVARS

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Abstract

To study the effect of chemical, organic and biological nitrogen on yield and yield components of soybean cultivars, an experiment was conducted at 2014 on the research field of Islamic Azad University of Bojnourd, Iran. This experiment was included two cultivars i.e. Habbit and L_{17} (Main factor) with six fertilizer treatments i.e. control, seed inoculated with rhyzobium, base nitrogen + top-dress urea at R_2 stage, base nitrogen + seed inoculated with rhyzobium + top-dress nitrogen at R_2 stage, seed treated with humax + top-dress humax at R_2 stage, base nitrogen + seed treated with humax + top-dress humax at R_2 stage (sub factors), as split-plot design on the basis of randomized complete blocks with three replications. Difference between cultivars was not significant. 100 seed weight and economical yield increase high significantly with use fertilizer treatments. Treatment fertilizer of base nitrogen + seed treated with humax + top- dress humax at R_2 stage and base nitrogen + top-dress urea in R_2 stage had a significant superiority than the other fertilizer treatment in biological yield. L_{17} and Habbit with base nitrogen + seed treated with humax + top-dress humax in R_2 stage and yield economical 5600 and 5767 kg/ha respectively, showed the most economical yield and Habbit cultivar with control and economical yield 3085 kg/ha showed the least economical yield among all the treatments. Results showed that fertilizer treatment of base nitrogen + seed treated with humax + top-dress humax in R_2 stage and Habbit variety were suitable in this study.

Keywords*: Soybean, Humax, Rhyzobium, L_{17}, Habbit*

PRODUCTIVITY OF CONFECTIONARY SUNFLOWER IN DIFFERENT PLANTING DATES AND PLANT DENSITIES IN WEST AZARBAIJAN OF IRAN

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Abstract

Confectionary sunflower with a growing area of 25000 ha is the most important crop in west Azarbaijan of Iran. Effect of four planting date (8 and 28 April, 18 May and 7 June) and three plant densities (3.0, 4.5 and 6.0 plant per square meter) were studied on confectionary sunflower Khoy Agricultural Research Station in Iran. The study conducted as a strip plot experiment based on Randomized Block Design with three replications. According to the results planting data and plant density had significant effect on seed yield and its components, growth period and stem and head diameter. The highest seed yield (2832 Kg/ha) was obtained from planting date on 28 April, however its deferens with planting date on 8 April (2593 Kg/ha) was not significant. There was 60% yield lose in final planting date (1091 Kg/ha) which it seems to be resulted by reduction of seed weight and seed number. Planting of 4.5 plants/m^2 had the highest seed yield (2205 Kg/ha) followed insignificantly by 6 plants/m^2 (2123 kg/ha). The results indicated that planting of 45000 plants/ha in late April is recommended for growing of sunflower in cold region of west Azarbaijan in Iran.

Keywords: *Confectionary sunflower, Density, Planting date.*

THE EFFECTS OF CYCOCEL AND BIO FERTILIZERS ON SOME PHYSIOLOGICAL AND BIOCHEMICAL TRAITS OF WHEAT UNDER WATER LIMITATION CONDITION

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Abstract

In order to evaluate the effects of bio fertilizers, cycocel on some physiological and biochemical traits of wheat (*Triticum aestivum* L.) under water limitationcondition**,** a factorial experiment was conducted based on randomized complete block design with three replications in 2015. Experiment factors were included water limitation in three levels [normal irrigation (W_0) as control;moderate water limitation (W_1) or irrigation withholding at 50% of heading stage; severe water limitation (W_2) or irrigation withholding at 50% of booting stage]; four bio fertilizers levels [(no bio fertilizer (F_0), seed inoculation by *Azotobacter chrocoocum strain* 5 (F_1), *Pseudomonasputida strain* 186 (F_2), both inoculation *Azotobacter+Pseudomonas* (F_3)] and four cycocel levels [(without cycocel as control (C_0), application of 400 (C_1), 800 (C_2)and 1200 (C_3)mg/l)]. Results showed that water limitation decreased chlorophyll content, photochemical efficiency of PSII, relative water content and yield of wheat. Whereas, soluble sugars and proline content, the activity of CAT, POD, PPO enzymes were increased with the increase of water limitation, application of bio fertilizers as F_3 and cycocel as C_3 in comparison with control. Application of bio fertilizer and cycocel treatment F_3C_3 increased about 64% and 42% from chlorophyll content and photochemical efficiency of PSII respectively in comparison with F_0C_0 under sever water limitation.

Keywords: *PGPR, Fv/Fm, water deficit*

EFFECT OF ELECTROLYZED WATER, OZONIZED WATER AND CONTINUOUS OZONE EXPOSURE ON APPLE DURING CONSERVATION

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Abstract

In this work, the effect of ozonized water (O_3) and electrolyzed water (EW) as disinfectant of apple washing water of working line was evaluated. Washed fruits were stored at ozone-enriched atmosphere (0.5ppm) to determine the effect of the combination of both methods on the quality of apple fruit during postharvest. The amount of fungi and yeastColony Forming Units (CFUs) present on fruit surface, shelf life (McKinney index) was evaluated after washing and during conservation period. O_3 concentration and EW dose were set in a previous *in vitro* experiment. The results showed that EW was more efficient than ozonized water in reducing the quantity of contaminates present on fruit surface; this effect was more evident in conserved fruits in ozone-enriched atmosphere. Similar reduction was recorded on yeasts, with a difference that ozone gas was less efficient in reducing CFU of yeast. An extension of fruit shelf-life was also evidenced at the end of the trial. The results suggest a correlation between the antimicrobial effect of ozone and electrolyzed water treatment to counteract a pathogenic attack or a stress event in general. .

Keywords: *Electrolyzed water, ozonized water, ozone exposure, apple, conservation*

DISINFECTION EFFECTS OF ELECTROLYZED OXIDIZING WATER ON FRESH APPLE

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Abstract

The effect of electrolyzed water on bacterial count was evaluated on freshly harvested apple fruits and of the washing water of working line. Electrolyzed water (pH 6.8), containing 50 to 400 ppm available chlorine, was generated by electrolysis of a KCl solution using an electrolyzed water generator. Apple fruits were treated with electrolyzed water containing 50-ppm available chlorine by immersion and 400 ppm by spraying. These treatments completely reduced the total microbial count (mesophilic aerobic bacteria) by 0.9 to 1.0 log10 colony forming units (CFU)/g of fruits surface and working line water when compared with untreated samples after 32 days of fruits conserving in controlled atmosphere (T: 1-1,5 °C; CO_2: 1%; O_2: 2%; and 90-92% relative humidity). Electrolyzed water containing 50 ppm available chlorine had a strong bactericidal effect, rinsing with electrolyzed water containing 50 ppm chlorine and stored in the controlled atmosphere, resulted in increasing fruit shelf-life by decreasing bacterial count when compared with the water-rinsed control. Microbial populations increased on untreated fruits stored at 1°C for 7, 14, 21 or 32 days. The electrolyzed water was more effective for removing pesticide residue from apple fruits.It has been reported that a high concentration of chlorine (400 ppm) in water was required to reduce pesticide residue on apple from 50% to 100% after washing the apple comparing with untreated fruits.

Keywords: *Disinfection, electrolyzed oxidizing water, apple*

USE OF ELECTROLYZED WATER, OZONE AND PASSIVE REFRIGERATION IN POST-HARVEST TO PRESERVE THE QUALITY OF CHERRY, TABLE GRAPE AND CITRUS

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Abstract

In this work the effect of ozone (O_3), electrolyzed water (EW) in combination with passive refrigeration conservation system (PRS) on fruit quality was studied during postharvest. The amount of Colony Forming Units (CFUs) on fruit surface, shelf life (McKinney index), firmness and sugar content were evaluated during the conservation period of Citrus (cv. Navel orange and cv. Clementine commune), cherry (cv. Ferrovia) and table grape (cv. Redglobe, Crimson and Italia). O_3 and EW dose and exposure time were set in *in vitro* experiment. O_3 was used in washing water or as gas during storage. Results demonstrate that the combination of O_3, EW and PRS treatments reduce microorganism contamination and increase fruits hardness and sugar content. An extension of fruit shelf-life was also evidenced. This suggeststhat fruit washing with EW storing in PRS under ozonized atmosphere counteract a pathogenic attack or a stress eventin general.

Keywords: *Ozone (O_3), electrolyzed water (EW), passive refrigeration conservation system (PRS),antioxidant compounds, citrus fruits.*

THE FERTILIZATION AND IRRIGATION REGIMES, REQUIREMENT FOR THE PRODUCTION OF QUALITY SEMI ORIENTAL TOBACCO

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Abstract

The aim of the research was to determine the fertilization and irrigation regimes for the producing quality semi oriental varieties Otlja 09-18/2 and Otlja-Zlatovrv produced in agro-ecological conditions of the Prilep region (Republic of Macedonia). Three-year trial was set up on deluvial-colluvial soil type in 12 variants with three replications. The trial was bifactorial, with three rates of nitrogen (25, 30 and 45 kg N/ha), constant amount of phosphorus (80 kg/ha) and potassium (100 kg/ha) and two irrigation regimes (45 and 60% FC). The obtained results confirm that fertilization and irrigation have positive impact on the production properties on the bothvarieties. Compared to the control variety, yield has been increased for 86.89% (Otlja 09-18/2) and 89.98% inOtlja- Zlatovrv variety. The interaction effect of fertilization and irrigation has a positive effect on the quality of tobacco. It has increase of 12.10% (Otlja 09-18/2) to 13.57% (Otlja-Zlatovrv). Fertilization and irrigation have statistically significant impact on reduction of nicotine, proteins and mineral matter and on the increase of soluble sugars. Fertilization and irrigation each individual, and their interaction effects have striking impact on the tested properties, therefore we can conclude that by proper application of agrotechnics we can dictate the yield and quality on semi oriental tobacco.

Keywords: *Semi oriental tobacco, fertilization, irrigation, yield, quality*

IMPACT OF PHYTOHORMONES APPLICATION ON ROOTING OF MATURE BLACKBERRY CUTTINGS (*Rubus fruticosus* L.)

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Abstract

The paper presents the results of the effects of different concentrations (500, 1000, 2000, 3000 *ppm*) indole-3-butyric acid (IBA) and 0.5% and 1% alpha - naphthalene acetic acid (NAA) on rooting characteristics of mature blackberry cuttings in four tested varieties Thornfree, Čačanska bestrna, Black satin and Smutstem. Different effects of exogenous phytohormonal substances IBA (500, 1000, 2000, 3000 *ppm*) and 0.5% and 1% NAA on rooting success of the mature blackberry cuttings, as well as on the root length and vegetative growth of rooted blackberry cutting have been established. The best rooting of mature blackberry cuttings treated with those concentrations of phytohormone indole-3-butyric acids (IBA) was recorded using the IBA at the concentration of 3000 *ppm* and accounted for all the varieties in the trial (83.71%), while the worst rooting was observed in the application of IBA with solution concentration of 500 *ppm* and amounted to 72.91%. Among all cultivars tested and in all applied treatments, cv. Čačanska bestrna has the best rooting (80.02%), while the least was in cultivar Black Satin (75.205%), which is probably a consequence of cultivar genotype. Mature blackberry cuttings were less rooted if they were treated with 0.5% and 1% NAA in relation to the applied IBA concentration. The lowest average value was registered in the variety Black Satin (68.33%), which was treated with 0.5% NAA, while the highest value was in variety Čačnska bestrna (75.83%) treated with 1.0% NAA. The use of phytohormones NAA 0.5 and 1% showed a progressive trend in rooting in all four tested blackberry varieties with increasing of NAA concentrations, where cv. Čačanska bestrna gave the best results of rooting (74.58%). In all tested blackberry varieties, percentage increasing in the mature cuttings rooting, root length and vegetative growth was noted to be in accordance with the increasing of IBA and NAA concentrations, which were used to treat the cuttings of the tested varieties.Analysis of variance and LSD test showed the differences between the four studied varieties of blackberries, where success of rooting depends on exogenous treatment of cutting with different types and concentrations of phytohormones. The concentration of 3000 *ppm* IBA proved to be the best and as such it could be recommended in technology of blackberry plants production on the own roots.

Keywords: *Blackberry, variety, cuttings, phytohormones, substrate, rooting*

STUDY OF SEED GERMINATION OF 5 MOROCCAN MORPHOTYPES CANNABIS (*CANNABIS SATIVA L.*) UNDER VARIOUS ABIOTIC CONSTRAINTS

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Abstract

To control the sector of cannabis Sativa L. in Morocco, from its culture to its marketing as a product of high therapeutic value and food, 5 cannabis morphotypes sativa L. (BT, BK; KHT; KHK; AvoK) from 3 different regions of the central Rif were considered in this study. The seeds were collected during the campaign of 2015 and the sampling was done in a random manner at 2 batches in the morphotype. The choice of this study is twofold: the first objective is to assess the plant material of three contrasting environments and therefore identify the interaction morphotype/environment, especially for quantitative traits. The second objective is to demonstrate the adaptation of the crop to the area of origin, optimization of germination conditions, and study the effects of 3 forced factors in the critical life stage of cannabis (germination). The effect of T ° is studied in degrees (10 °, 15 °, 20 °, 25 °, 30 °, 35 ° and 40 ° C). The effect of salt constraint and drought constraint underlined at 0, -2, -4, -6, -8, -10, -12 and -14 bars induced by sodium chloride (NaCl) and polyethylene glycol (PEG6000) on germination and growth. The estimated effect is shown by measuring the following parameters: final germination rate (TGF); germination kinetics (CG); germination speed (VG); daily average germination (MDG) and length of roots and epicotyls (Lr, Le). The results showed that three factors have a significant effect on all the studied parameters, which allowed us to determine the optimal conditions for germination of the 5 morphotypes and their interactions with their original environment. Then, we used these results in order to evaluate the ability to germination of the species under other various abiotic constraints.

Keywords: *Cannabis Sativa L., germination, stress Sallin, PEG6000, morphotype*

WATER STRESS INDUCED ANTIOXIDANT DEFENSIVE MECHANISM IN PAKISTANI WHEAT (*Triticum aestivum* L.) GENOTYPES

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Abstract

Drought is a complex environmental stress and major constraint to crop productivity. Different cultivars differ inherently in their response to drought. Current research work investigated the relationship between the biochemical indices and drought resistance in different wheat genotypes. The evaluated response parameters were proline, soluble sugar, protein, relative water content, leaf membrane stability index, malondialdehyde (MDA) and enzymes including superoxide dismutase (SOD), peroxidase (POD) and catalase (CAT) in wheat (GA-2002, Chakwal-97, Uqab-2000, Chakwal-50 and Wafaq-2001) seedlings. The seedlings were subjected to five different levels of osmotic stress i.e 0 (distilled water, control), -2, -4, -6 and -8 bars induced by PEG-6000. After two weeks, PEG-6000 solution was supplemented with modified MS medium and data was recorded after two weeks. Elevated osmotic stress resulted in linear increase in proline contents, soluble sugars and proteins. Relative water content and membrane stability index decreased with the increase in osmotic stress. The levels of SOD in seedling leaves were highest in Chakwal-50 and lowest in Uqab-2000. CAT induced well and increased readily in GA-2002 and Chakwal-50 seedling leaves than in Chakwal-97, Wafaq-2001 and Uqab-2000 during drought stress. The levels of POD were similar to CAT. It is well known that SOD, POD and CAT enzymes play a significant role in determining response of wheat genotypes to drought stress. The results of this study suggested that the amount of antioxidant enzymes determine drought stress tolerance in wheat genotypes.

Keywords: *Wheat, osmotic stress, proline, membrane stability index, relative water content, antioxidant enzymes.*

SIMULATION OF AGRONOMIC PRACTICES FOR SOUTHERN HIGHLANDs OF TANZANIAUSING DSSAT CERES-MAIZE MODEL

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Abstract

The productivity of maize in Tanzania is very low (about 1400 kgs/ha) in comparison to developed nations due to adoption of traditional agronomic practices such as the use of low yielding local varieties, low fertilizer dose, broad spacing and use of low fertility soils etc. The objective of this study is to run Crop Environment Resource Synthesis(CERES) maize simulation model of Decision Support System for Agro Technology Transfer(DSSAT) to suggest appropriate agronomic practices to obtain high yield. The simulation study was undertaken with six locations (Ihumbu farm, Mwazye and Nyera Estate-Mbozi, Lupa-tinga tinga, Santilya and Mbinga), five maize varieties (H614, Kitumani Composite I, H511, H626 and H612), five nitrogen doses (0, 50, 100, 150 & 200 kgN/ha) and three spacing (90x50cm, 90x30cm and 60x30cm) and. A total of 450 simulation runs were made to work out the effect of all the treatments. The highest average grain yield was recorded at Santilya (4087 kg/ha), maize cv H614 (4602 kg/ha), nitrogen dose of 200 kgN/ha (4476 kg/ha) and spacing of 60 x 30 cm (3433 kg/ha). However the highest grain yield recorded was10284 kgs/ha at Ihumbu Farm with maize cv H614, 200 kg N/ha and 60 x30 cm spacing. This confirms need of improving agronomic practices to increase maize productivity in Tanzania.

Keywords: *Grain yield, CERES, DSSAT, Prediction of Amount of Nitrogen, Plant spacing.*

GENETIC VARIABILITY, CORRELATION STUDIES AND PATH COEFFICIENT ANALYSIS IN GLADIOLUS ALATUS CULTIVARS

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Abstract

A study was undertaken to find out the estimates of genetic variability, genetic parameters and character association among different flower traits between three gladiolus cultivars viz: Sancerre, Fado and Advanced Red. The experiment was repeated three times by using Randomized complete block design(RCBD) at the Department of Horticulture, PMAS-UAAR, Rawalpindi, Pakistan. The highest GCV and PCV magnitude was observed for spike length (16.00) and number of floret/spike (14.84) followed by number of leaves (10.00). Among the traits studied the highest heritability estimates was recorded in spike length (99.5%) followed by number of floret/spike (99.6%) and lowest in plant height (98.2%). The genetic advance as percent of mean was ranged from 0.42 to 14.9. Genetic advance is highest for spike length (14.9) and lowest for floret length (0.42). High heritability combined with high genetic advance was noticed in spike length and leaf area indicating additive gene action, suggested that improvement of these traits would be effective for further selection of superior genotypes. Plant height and number of floret/spike showed highly positive and significant association with spike length, number of leaves, leaf area, floret length and floret breadth. While spike length registered positive and significant correlation with number of leaves and floret breadth. The path coefficient analysis based on spike length as responsible variable exposed that all of the traits exerted direct positive effect except leaf area and floret length. Spike length imparted maximum positive direct effect in the path analysis result based on number of floret/spike.

Keywords: *Gladiolus, GCV, PCV, Heritability, Genetic advance, Path analysis*

IDENTIFICATION OF QTLS FOR GERMINATION ATTRIBUTES UNDER SALT STRESS IN WHEAT

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Abstract

Identification of genetic factors responsible for controlling germination traits under salt stress condition will enable the development of salt tolerant cultivars. In this paper, we identify quantative trait loci (QTL) related to germination traits using RILs $_{(F7)}$ derived from a cross between Pasban90 (salt tolerant) and Frontana (salt susceptible) wheat cultivars. Composite interval mapping (CIM) was used for QTL analysis of germination percentage, germination index, seedling vigor index, root length, shoot length, fresh weight and dry weight. This analysis resulted in the identification of 26 QTLs under salt stress and 18 QTLs under healthy control conditions. Seven major QTLs (QFW.6A, QDW.6A, QRL.6A, QFW.3B, QFW.6B, QRL.6D and QSL.6D) were mapped on chromosome 6A, 3B, 6B and 6D in control treatment and 11 main QTLs were detected following salt stress. QTL for root length, shoot length and fresh weight on 3D shared location in xgdm8-xgwm314.Shoot length and root length QTL detected in interval xcfd13-xgwm132 on 6D. The result of this study revealed that QTL identified for germination attributes has desirable role in germination performance.

Keywords: *Germination percentage, root length. Quantitative Trait loci, Salinity, Wheat*

ANALYSIS OF MICRO SATELLITE MARKER DISTRIBUTION AFTER INTROGRESSION IN BRASSICA SPECIES

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Abstract

Micro satellite markers are a versatile tool in genomic and population studies. In the present study, micro satellite markers were employed to confirm the process of introgressionin F_2 population of two interspecific crosses of three oleiferous brassica species viz *B. napus*, *B. juncea*, *B. campestris*. Thirty one microsatellite primers were used on introgressed hybrids of brassica from both F_2 populations that amplified 99 alleles, of which 69 were polymorphic. The proportion of polymorphic loci was 69.7%. The number of amplified products per primer set ranged from 1 to 5. Polymorphism information content (PIC) of the primer sets ranged from 0.24 to 0.75. The dendrogram generated from cluster analysis revealed a deviation of more introgressed hybrids towards female *B. napus* parent in both populations suggesting that C genome of *B. napus* has more contribution in the introgression process. Our results confirm the efficiency of microsatellite primers in the assessment of introgression process in brassica species.

Keywords: *Introgression, Microsatellite markers, Oleiferous Brassica.*

IMPROVEMENTS IN GLADIOLUS PRODUCTION TECHNOLOGY; ENHANCED GLADIOLUS PRODUCTION BY TREATING WITH QUORUM QUENCHING BACTERIAL CONSORTIA ONDESCALED AND CUT-HALF GLADIOLUS CORMS

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Abstract

Here, we compared the impact of quorum quenching based bacterial bio-product in combination with three different sowing methods for gladiolus corms: Scale (S), Descale (DS) and Descale and Cut half (DSC) into portions. Data were recorded at 1st, 3rd, 6th leaf stage for flower emergence. Number of corms harvested showed that the quencher bacterial consortia treated with descaled and cut half type corms,produce more flowers and corms.It also showed more variation in terms of flower emergence. Indeed, the treated plants remained healthier and showed lesser disease index. This study proposes an eco-safe novel bio-product and validates an improved sowing method for sustainable gladiolus flower and corms production while keeping the profitability.

Keywords: *Scale (S), Descale (DS), Descale and Cut half (DSC).*

INVITRO ANTIOXIDANT AND ANTIMICROBIAL ACTIVITY OF KICKXIA RAMOSISSIMA (WALL.) JANCHN EXTRACTS

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Abstract

Studies on plants resulted in substential and fruitful contributions in the field of medicines. Plants are the main source for curing bacterial and fungal infections and combating oxidative stress. The present study describes the biochemical exploration of the methanol and chloroform extracts of aerial parts of Kickxia ramosissima (Wall.) Janchn. The crude extracts were subjected to different biological activities to explore the therapeutic potential of this medicinally important herb. The results indicated that both the extracts of aerial parts showed varied degree of antimicrobial, antifungal and antioxidant activities. Overall, the methanol extract showed comparatively better activities in various assays. It revealed the highest activity against all the tested bacterial strains (Pseudomonas spp > Staphylococcus aureus > Staphylococcus epidermidis > Klebsellia pneumoniae > Escherichia coli), and methanol extract had the maximum fungicidal activity (54.84%) against Aspergillus terrus. The highest radical scavenging activity by DPPH method was found in case of methanol extracts (49.83% and IC_{50} 228.53 µg ml^{-1}) at 250 µg ml^{-1}. In phosphomolybdate method the highest activity was shown by methanolic extract (0.459 nm) at the same concentration. Similarly, the highest activity evaluated by reducing power assay was 0.521 nm at the highest concentration of 250 µg ml^{-1}. These findings revealed that Kickxia ramosissima is a potential candidate for further studies to explore active compounds responsible for antibacterial, antifungal and antioxidant activities.

Keywords: *Antibacterial activity, antifungal activity, radical scavenging activity, antioxidant activity, Kickxia ramosissima.*

CELL WALL FRACTIONS IN THE BIOMASS OF *DACTYLIS GLOMERATA* AND *FESTUCA PRATENSIS*

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Abstract

The purpose of this paper is to determine the changes in the concentration of different fractions in the cell wall of *Dactylis glomerata* and *Festuca pratensis*growing onboth mineral and organic soil with different harvesting times. This paper presents the results of two field experiments set up and carried out between 2010 and 2013 by the Research Centre for Cultivar Testing in Słupia Wielka. The experimental plots were sown with varieties of *Dactylis glomerata*: Niva, Tukan, Amila, Crown Royale and with varieties of *Festuca pratensis*: Limosa, Pasja, Anturka, Amelka (d. AND 1009). The experiment in Krzyżewo was set up on mineral soil. In Uhnin the experimental plots were located on peat meadow. The full exploitation of *Dactylis glomerata* varieties was done between 2012 and 2013, whereas for *Festuca pratensis* it was done between 2011 and 2012. In the experimental plots with the varieties of *Dactylis glomerata* the grass was harvested six times a year and chemical analysis of the biomass was done taking dry matter only from five cuts. The varieties of *Festuca pratensis* were harvested four times. Each year in the course of the experiment fresh and dry matter of each cut were weighed. The obtained results showed that the time of the harvest or cut for both of the grass species showed significantly different concentrations of the neutral detergent fiber fraction (NDF), acid detergent fiber fraction (ADF) and different concentrations of lignin and cellulose. For both of the grass species, plants harvested in the fourth cut had the highest content of different cell wall fractions. The location, that is the type of soil, affected the concentration of lignin (ADL), but only in the case of *Festuca pratensis*. A higher concentration of this polysaccharide was in the grass growing on organic soil.

Keywords: *Cell wall, Dactylis glomerata, Festuca pratensis*

INFLUENCE OF TILLAGE TECHNIQUES FOR OLD-AGE GALEGA ORIENTALIS GRASS STAND ON AGRO-PHYSICAL AND MICROBIOLOGICAL INDICATORS OF SOIL IN MIDDLE PREDURALIE (RUSSIA)

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Abstract

The paper presents the results of investigations conducted in 2013 on the experimental and training field of the Perm State Agricultural Academy with the aim to reveal the influence of rejuvenation agro-techniques for perennial grass stands on thickening processes in sod-podzolic soils of Middle Preduralie (Russia). The authors consider dependence of grass stand thinning on different tillage techniques, give data on calculating illumination, light brightness and air temperature in ground surface layer. As investigation object was used partly thinned 13 year old galega orientalis grass stand which is considered to be inapplicable for large scale production. Conducted investigations revealed the dynamics of root system recovery of old-age galega orientalis grass stands for subsequent involvement of degraded grass stands into production with sustainable green mass yield and to produce seeds. Under influence of different rejuvenation techniques the illumination of grass stand changed and as a result growth conditions altered. That leads to alterationin agro-physical and agro-biological factors that favor yield formation. Implemented techniques improved illumination and permeability of sun radiation to the soil surface that increases soil temperature and favorably influences the symbiosis of legumes with resistant microorganisms and root system growth. Root system entirely covers arable layers tructuring it, increases the area for nutrition as well as decreases heavy clay soils over crust creating optimal conditions for growth of nitrogen fixing microorganisms and development of perennial legume grasses.This technology is energysaving and leads to cost reduction and increase of profitability.

Keywords: *Old-age grass stands, galega orientalis, rejuvenation, illumination, soil temperature*

THE TECHNOLOGICAL QUALITY OF WHEAT GROWN IN SLOVAK REPUBLIC

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Abstract

The wheat is the most frequently grown farm crop in Slovak Republic. The crop area of wheat is about 380 000 hain the last five years. Since 2010, it has been monitored and evaluated regarding the technological quality of wheat grown in Slovak Republicregularly every year. In monitoring qualitative parameters as volume weight, protein content, wet gluten content, gluten index, falling number and sedimentation indexhave been evaluated. Except for the technological quality of wheat wheat genotypes which arethe most often grown in Slovakiahave been detected. The samples of wheat are collected from farmers coming from all regions of Slovakia. In this study we present results from the last three years yield 2013, 2014 and 2015. The results are evaluated according to Slovak technical standard for wheat, where wheat can be divided into four quality classes. The baking quality appropriates to class A – standard and class E - elite. In average, the highest quality was determined in the year 2013, when in average wheat satisfied criteria for class E.In 2014 and 2015 wheat satisfied criteria for class A.The average yield of wheat was achieved from 4,62 to 5,49 $t.ha^{-1}$. The highest average value of volume weight (810 $g.l^{-1}$) and falling number (334 s) were determined in 2015, The highest average value of protein content (13,0 %) and wet gluten content (30,1 %) were determined in 2013. The most frequently grown wheat genotypes in Slovakia were IS Agape, Alacris, Antonius, Bohemia, Capo, Estevan, IS Karpatia, Karolinum, Lukullus, Ludwig, Magister, Mulan and Genius. The highest technological quality was determined in genotypes IS Agape, Estevan and Antonius.

Keywords: *Wheat, Technological quality, Wheatgenotypes*

INFLUENCE OF N-FERTILIZATION AND IRRIGATION IN GROWTH OF GIANT REED (ARUNDO DONAX) IN SEMIARID CONDITIONS

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Abstract

The aim of the present study was to assess the effect of irrigation and nitrogen fertilization on growth of giant reed (Arundo donax) in semiarid conditions. Irrigation and N-fertilization management is the key factor for optimalbiomass production in semiarid areas where water is limited during summer period. In order to investigate the influence of irrigation and N-fertilization on growth of giant reed, a field experiment was conducted in Magnesia, in central Greece during 2015-2016 period.The experiment had a split plot design with irrigation being the main factor, consisting of three levels, I0: zero irrigation, I50: 50% of max. evapotranspiration and I100: 100% of max. evapotranspiration and N-fertilization being the sub factor, consisting of three levels as well, N0: no N-application, N50: 50 kg N ha^{-1} and N100: 100 kg N ha^{-1}. During growth period in periodic intervals a) leaf, b) stem and c) total biomass were registered, both fresh and dry. Irrigation significantly differentiated both fresh and dry biomass production with the biomass of I100 being higher than I50 and I0 producing the least of three. Nitrogen fertilization did notshow any effect during the growing period probably due to soil fertility.

Keywords: *Arundo donax, Giant reed, Biomass, Nitrogen fertilization, Crop irrigation, Crop growth, Greece.*

RESPONSE OF THREE VARIETIES OF BASIL (*OCIMUM BASILICUM* L.) TO SALT STRESS

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Abstract

A pot experiment was carried out during two successive seasons to study the effects of basilvarieties (Ocimum basilicum var. Grand Vert (GV), Ocimum basilicum var. Fin Vert (FV), Ocimum basilicum var. Grand Vert Sweet (GVS)). Under salt stress, photosynthesis parameters (chlorophylls, photosynthetic active radiation, net photosynthesis, conductance, CO_2 and the temperature of leaf) were affected. Faced to salt stress (NaCl), variety "Fin Vert" was more tolerant thanks to large amounts of proline, synthesized and accumulated in stressed plants which had 13 times more than control plants which allowed probably their osmotic adjustement with culture medium.

Keywords: *Basil (Ocimum basilicum L.), NaCl, Photosynthesis Parameters, Proline.*

APPLICATION OF DIFFERENT CONTAINER SYSTEM ON BASIL (*Ocimum basilicum* L.) SEEDLINGS PRODUCTION

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Abstract

Basil is cultivated throughout Serbia, mostly in home gardens. Container production of seedlings of medicinal, aromatic and spice plants is widely accepted and has a number of advantages over classical. In the production of seedlings a number of different container systems is use. Basil (*Ocimum basilicum* L.) is a medicinal, aromatic and spice plant mainly produced from seedlings in Serbia. Basil seedling was produced in 13 (thirteen) of containers which vary in volume of container cells, the materials of construction and the number of plants per unit area. The experiment was conducted in a greenhouse of Faculty of Agriculture in Belgrade. The aim of the experiment was to test different containers in the production of basil and determine the impact of each, individual container system on the quality of basil. From seedling quality parameters the following was monitored: plant height, plant weight, number of leaves, stem diameter, root weight, root length and root volume. The research results show that, depending on the system used, container plant height amounts 8.15 to 23.52 cm, plants weight from 0.40 to 3.67 g, the number of sheets from 4.4 to 7.44, the diameter of the tree from 1.14 to 2.20 mm, root mass from 0.27 to 1.11 g, root length from 5.72 to 13.44 cm and root volume of 4 to 12.8 ml. The results show the advantages and disadvantages of individual container systems in the production of basil seedlings. Also, based on the research results the selection of a particular container system in the production of basil seedlings can be facilitated.

Keywords: *Basil, container system, seedlings production*

APPLICATION OF DIFFERENT SUBSTRATE ON SAGE

(*Salvia officinalis* L.) SEEDLINGS PRODUCTION

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Abstract

Container production of seedlings, with the use of different substrates, has a number of advantages in comparison to classical production and it found its application in the vegetable and fruit production a long time ago. In Serbia, seedlings of herbs and spices are still produced in a classical way; - the so-called bare root plantlets (unprotected root system) are used for production in cold and warm seedbeds, and garden soil is most frequently used as a substrate. In such production, plantlets undergo stress during transplantation, and consequently, need longer time for rooting which further disturbs their growth and development.In this research, the influence of ten different substrates in the production of sage variety *Primorska* has been investigated. The predominant component of the studied substrates was the dark peat originating from Gaj, which was improved by adding the white peat, zeolite and the two water soluble mineral fertilizers, FitoFert Humistart (4:12:5) and FitoFert Crystal (10:40:10). The control variants were two commercial substrates, FloraGard and Humate substrate. The obtained results shows that sage seedlings produced on such enriched substrates achieved better results (better quality seedlings) in relation to production on a commercial substrate FloraGard and Humate substrate. In addition, the best quality sage seedlings produced in containers are obtained with the use of substrates with the following mixture ratio: dark and white peat (75%) + zeolite (25%) + Crystal water soluble mineral fertilizer.

Key words: *Sage, substrate, seedlings production*

EFFECT OF FERTILIZATION ON THE DEVELOPMENT AND PLANTING OUT PERIOD OF CUCUMBER SEEDLINGS

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Abstract

The experiment has been made at the Faculty of Agriculture, University of Belgrade, Serbia. Plants of the examined cucumber are grown under artificial lighting (MH 600W). In addition to the lighting, temperature was also controlled, as well as air humidity. Examinations were carried out on a hybrid cucumber Caman RZ. The experiment included three variants (3x30 pots). In the first variant (control) the plants grown without fertilization. The second and the third phase plants were top dressed by watering using particularly fertilizers Fitofert kristal (10:40:10), i.e. Fitofert humistart. Planting period (sowing-planting) lasted from 22 to 35 days. The paper indicates the plant height (cm), number of leaves per plant, relative chlorophyll content (SPAD), whole-plant weight (g), stem weight (g) and leaf weight (g). Fertilization considerably influenced development of the cucumber seedlings. Plants falling within fertilization variants considerably differed from the controlled ones in all parameters. These differences were all the more prominent as the plants grew old. Within the fertilization variant, observed parameters in the plants watered using Fitofert humistart were considerably higher.

Keywords: *Cucumber, fertilization, seedlings, SPAD.*

THE EFFECT OF APPLICATION OF GROWTH REGULATOR ON ALFALFA YIELD COMPONENTS AND SEED YIELD

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Abstract

Yields of alfalfa seed in Serbia vary widely depending on the year and range from 50 kg ha^{-1} to over 1000 kg ha^{-1}. In order to realize high yields of alfalfa seed it is necessary to achieve the optimal balance between vegetative and generative stages of development. One of the factors that has adverse effect on the production of alfalfa seed is flattening. To ensure successful seed production it is often necessary to implement agro-technical measures to prevent growth of alfalfa in the seed harvest. It is possible to influence the growth of plants by using the growth regulators. The aim of this research was to investigate the influence of the application of growth regulators (*daminozide*) on alfalfa seed yield.

The growth regulator exerted impact on the height of the plants. In all the years, lower height was recorded in the variant treated with growth regulators. The greatest impact of growth regulator on plant height was recorded in the year with higher precipitation (89.4 cm on the treated variant and 94 cm in the control). In years with less rainfall, the impact of the application of growth regulator on plant height was lower. With the application of growth regulator, on average by approx. 4% more stems per plant was formed, by approx. 5% more branches and number of pods increased by about 2%, but these difference were not statistically significant in all years. In the year with the higher precipitation, growth regulator has contributed to an increase in yield of the seed (about 5%). In other years, the values were very close to the control and were not statistically significant.

Keywords: *Alfalfa, seed, growth regulator, yield components, yield*

.THE EFFECT OF THE APPLICATION OF DIFFERENT COMPOUND FERTILIZERS ON WHEAT YIELD AND SOIL FERTILITY STATUS OF LAND

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Abstract

By field experiment on the soil types pseudogley, wheat as cultivated crops, it was shown in which way the distribution of different compound fertilize affected their total fertilization effect, and if the soil treated by mixed fertilizers could get the necessary nutrient amount and formulation uniformly throughout the area.

The research shows that there are no statistically significant differences in the total effect on the yield between complex and mixed fertilizers, as well as between different mixed fertilizers, applied manually in the same quantity of water-soluble NPK nutrients.

The effect of compound fertilizer distribution, method on total fertilization effect was significant. Manual handling of mixed fertilizers, thanks to the more homogeneous spreading of nutrients, compared to the mechanized cyclone spreading, showed a better fertilization effect. Also, mechanized application of complex fertilizers showed a statistically significantly better effect on the yield compared to the application of granular mixed fertilizers of the same nutritive NPK composition. By machine spreading of mixed granular (NPK) fertilizers, the formulation of nutrients (NPK-15:15:15) was not uniformly applied over the area.

After three-year application of complex and mixed fertilizers in the experimental soils (pseudogley and eutric cambisol), there were no statistically significant differences in the contents of the applied NPK nutrients in the soil, and in the homogeneity of their distribution.

Keywords: *Compound fertilizers, mixed fertilizers, formulation of nutrients.*

THE YIELD OF SOYBEAN IN DEPENDENCE OF THE MOST IMPORTANT METEOROLOGICAL ELEMENTS IN THE AREA OF SREM

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Abstract

During the three-year research period from the year 2013-2015 on the influence of the three the most important meteorological elements such as temperature, precipitation and relative humidity in the vegetation period, on the yield of soybean. The subject of research were 16 varieties and two hybrids of the three maturity groups (0, I, II), which is usually grown in the area of Srem (Serbia).

In this study, we used data from a macro experiment of Agricultural Advisor Service from Ruma and the nearest meteorological station. During the period of research on the effect of weather conditions, were determined very significant differences in the observed meteorological elements. Particularly they differed according to the schedule and amount of rainfall during the growing season. The results showed that the yield of soybeans primarily depended on the weather conditions, because highest yield was achieved in 2014 when weather conditions were most favorable. There were also differences in yield depending on the maturity group varieties, and choice of varieties, but in a significantly smaller extent.

Keywords: *Rainfall, Temperature, Yield, Maturity groups, Soybean.*

EFFECT OF 'LYRE' TRAINING SYSTEM ON YIELD AND GRAPE QUALITYOF CV. PROKUPAC (*VITIS VINIFERA* L.)

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Abstract

The spur pruned Župski (Goblet) and Cordon Royat are commonly used training systems for quality red wine cultivar Prokupac (*Vitis vinifera* L.) in Serbia. We investigated effects of Lyre as non-typical training system in our viticultural practices in comparing to the Župski, Guyot and Cordon Royat on yield, grape structure and quality. Our study demonstrated that the spur pruned Lyre had advantages compared to the investigated training systems, especially in obtaining of higher number of cluster per shoot (1.96), higher yield per vine (4.50 kg) with higher dry matter content in the must (22,3%). Content of total anthocyanins (5.69 mgg^{-1} FW) and phenols (518.13 mgl^{-1} GAE) in the berry skin were higher on the Lyre in comparing to other training system. These results showed that the Lyre as a divided and open canopy has improved microclimate condition which lead to yield and quality improvements. Lyre training system had a potentialfor improving grape quality in Serbian conditions of the moderate temperate climate.

Key words: *Lyre, yield, dry matter, total acids*.

EVALUATION OF SEED YIELD AND SOME AGRONOMIC CHARACTERS OF SOME COMMON VETCH (*Vicia sativa* L.) GENOTYPES

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Abstract

This study was conducted to determine seed yield and some agronomic characters of some common vetch genotypes under Kahramanmaraş conditions for two cropping years (2010 and 2011). In the research, 3 common vetch cultivars and 10 lines obtained from various sources were used and the experiment was arranged in a randomized complete block design with four replications. In the research, significant differences among genotypes were found according to the variance analysis in terms of investigated 12 traits. The earliest 50% flowering and physiological maturity of genotypes were Cumhuriyet-99, TA-17 and TA-11. Based on two years data, the highest grain yield was obtained from IC-11, TA-11 and IC-1, while the highest biomass was obtained from Karaelçi, TA-16 and IC-11 cultivars and lines.

Keywords: *Common vetch, Vicia sativa L., Seed yield, Physiological maturity, Biological yield.*

ANTIMICROBIAL AND ANTI-METHICILLIN RESISTANT *STAPHYLOCOCCUS AUREUS* (MRSA) ACTIVITIES OF *PHLOMIS PUNGENS* WILLD *VAR. PUNGENS* WILLD EXTRACTS

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Abstract

Plants are permanent sources of biologically active compounds, used by about 80% of the world population as manufactured drugs. Due to the indiscriminate usage of commercial antimicrobial drugs, multi-drug resistance in both human and plant pathogenic microorganisms has developed. So plant metabolites are in the center of the researches aiming to discover new antimicrobial substances from various sources including plants. The objectives of this study are to determine the antimicrobial, and anti-methicillin resistant *Staphylococcus aureus* (MRSA) activities of methanol, ethyl acetate and water extracts from *Phlomis pungens* wild plants distributing in Turkey. Antimicrobial activity of the tested *Phlomis* extracts was studied by the broth microdilution method. It was determined that ethyl acetate extracts were the most effective extract against all standard bacteria strains and *Candida albicans* at a dose of 0.625 mg/ml. Methanol extract of the plant revealed MIC values ranging between 12.5-6.25 mg/ml. Especially, ethyl acetate extract of *P. pungens* exhibited significant anti MRSA activity at doses of 0.625 mg/ml against MRSA isolates 1, 2, 3, 4, 7, 8, 11, 12, 13 and 14. It was concluded that *P. pungens* methanol and ethyl acetate extracts have weak to moderate antimicrobial activity, although water extract manifested no antimicrobial and anti-MRSA activity.

Keywords: *Phlomis pungens var. pungens, antimicrobial, anti-MRSA, Turkey*

EFFECTS OF DRIP IRRIGATION ON MAIZE (ZEA MAYS. L.)

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Abstract

Maize is an important cereal in human nutrition and in animal food production. It is a very good protein source. It can be used as flour, corn oil, glucose and starch. Maize is a strategic crop to meet the growing population's food needs. In recent years, drip irrigation method has been disseminated among maize producers. Early adapters have been very interested and began to use drip irrigation in their fields. With this method, irrigation and fertilizer use became intense. The implementation of drip irrigation and fertilization have been carried out effectively and high yields have been obtained. Maize through effective fertilization ıt is known that at least 25% more yield to. In addition to the deployment of these systems close to plant soluble nutrients can be sent to the desired point. Plants that will be used so that food costs will also be reduced. In particular deformity in which land and reduce the use of farm inputs to ensure equitable distribution of water by the end. During irrigation be affected by weather events, such as the wind allows irrigation desired time. Also as the plant is a maize less weed problems as seen in between and is reduced leaf diseases occurring in plants. Drip irrigation not only decrease water use but also reduces energy costs.

Keywords: *Zea mays, yield, drip irrigation, efficiency.*

MANAGEMENT OF NATURAL RESOURCES TOWARDS AGRICULTURAL ENVIRONMENTAL PROTECTION

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Abstract

All living things require tocontinue their life. Especially agriculture producers want to have higher yields with irrigation and they see water as an unexpended asset. This leads to unconscious consumption of groundwater and surface water resources. Apparently, if water resources are exhausted,this situation pose a threat on agriculture and also on industry. Furthermore, unconsciously irrigation causes salination and reduction on agricultural lands in Turkey. Also it leads to many environmental problems. Therefore, water is very important in every aspect. In order to use water effectively, producers have been informed and educated to use modern irrigation methods, such as drip irrigation, instead of primitive irrigation method. In certain countries, in order to meet the rapidly growing population's demand for food, the income derived from agricultural production by providing sustainable terms of production ensuring sustainable development of natural resources should be pointed out as well as the effective use and development. Also increasing in the income derived from agricultural production, underground and surface water resources, organized policies contributing more to the national economy should be accelerated towards agricultural development. Efficient use of available water resources and studies for development of sustainable irrigation projects should be carried out. In this paper, the effects of different irrigation methods are explained to protect the natural resources.

Keywords: *Water resources, agriculture, sustainability, environment.*

EFFECTS OF N AND P FERTILIZATION OF TRITICALE AND COMMON VETCH PLANTS IN PLANT HEIGHT WITH PLANTS DRY-FORAGE YIELD

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Abstract

This study was conducted to determine the effects of Nitrogen and Phosphorus fertilizers on plant height and plants were ranged in Dry-forage yield of intercropped common vetch and triticale in Şanlıurfa province (Turkey) in 2010 and 2012. The study was designed as split-plots where main plots were treated with different levels of phosphorous while split-plots (sub-plots) were treated with different levels of Nitrogen with three replications. 40% and 60% seed ratio for triticale and common vetch was respectively determined and based on the available literature. Seed amount in the mixture of individual plants were determined as considering their sole crop seed amount which are 20 and 10 kg/da for triticale and common vetch respectively. Pure Nitrogen and Phosphorous were applied at rate of 0, 3, 6, 9 and 12 kg/da by using fertilizers in the forms of ammonium sulphate and triple super phosphate fertilizers. In the study, 5 different characteristics were investigated.

Application of nitrogen and phosphorous fertilizers caused a significant increase in dry forage yields.The highest Tritacale 136.40 cm. 6 kg/da Nitrogen and 6 kg/da phosphorous were applied.The highest common vetch99.45 cm. 3 kg/da Nitrogen and 3 kg/da Phosphorous were applied.Dry-forage yield ranged from 762.81 to 1478.8 kg/da. The highest dry yields were 1545.3 kg/da when 9 kg/da Nitrogen and 6 kg/da Phosphorous were applied.

Keywords: *Common vetch, Triticale, Nitrogen, Phosphor, Fertilizing, Yield component.*

THE EFFECT OF DIFFERENT pH LEVEL AND SOAKING TIME ON GERMINATION OF OATS TYPES

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Abstract

Oats (*Avena sativa* L) is an important grain crop in the world and it is used in human nutrition and animal feeds frequently. Oats could be grown in cool, wet climate and low fertile soil. Within the grains group, barley and oat crops are husk containing plant. Compare to barley, the oat husk structure is relatively more woody. So receiving convenient water and germination of oat seeds under field conditions is not proper by cause of woody structure. The pH value of our country irrigation water is high and the effect of high pH on oat seed germination was not studied comprehensively. In this research, the effect of four different pH levels (pH 7, 7.5, 8 and 8.5) and two different exposure time (12h and 24h) were tested on four oat cultivars (Faikbey, Checota, Sebat and Seydişehir). The treatment affects were observed with 6 germination criteria (germination rate (%), germination power (%), radicle length (mm), coleoptile length (mm), plumule length (mm) and shoot length (mm) measurement. Research result showed that oat seed germination was a serious problem but germinate in performance is vary oat varieties. Also following results, appropriate oat germination need long time, significant differences between germination rate and germination power performances and increasing of germination performance with the germination time are revealed. This work was set on a limited number of oat varieties so, expanded number of varieties and longer-term research would make more contribution on problem and would confirm our results.

Keywords: *Oats (Avena sativa L), native oat varieties, germination criteria, pH*

EFFECT OF DIFFERENT STRAWBERRY POLLINATORS ON FRUIT PROPERTIES OF OSMANLI STRAWBERRY CULTIVAR

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Abstract

In this study, impact on the fruit characteristics of different pollinators used on the Ottoman strawberry cultivar, which is male sterile and therefore necessarily needs foreign pollination, were studied. In the trial, three local varieties obtained from farmers in Ereğli district of Zonguldak, where these varieties are local, as well as three foreign cultivars, were grown with the Ottoman strawberry and have been used as pollinators on Ottoman strawberry cultivar. Before pollination, pollen viability and pollen germination power of pollinator cultivars were determined; and then, the physical properties, photochemical and aroma components of the hybrid fruit of Ottoman strawberry, as well as the fruits of six parent cultivars used as pollinators, were analyzed. In the experiment, the highest live pollen ratio was obtained from Kabarla cultivar(74.4%). For other fruit characteristics analyzed, the highest scores were as followed; the highest average fruit weight (4.1 g / fruit) in Ottoman x Karaçilek hybrids, the hardest fruits (0.89 kg) in Ottoman x Tüylü hybrids, the maximum number of seeds per fruit area (177.66) in Ottoman x Kabarla hybrids, the highest soluble solid ratio (12.1%) in Ottoman x Tüylü hybrids, the highest ascorbic acid (24.44 g / kg) in Ottoman x Karaçilek hybrids, the highest number of flavor compounds(9) in the Ottoman x Sweet Charlie hybrids.

Keywords: *Fruit, Male Sterility, Osmanlı Strawberry Cultivar, Phytocemicals, Pollinator, Pomology*

LEAF SPOT DISEASE OF OLIVE TREE (*Olea europaea* L.) CAUSED BY *Alternaria alternata* (Fr.) Keissler IN TURKEY

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Abstract

The olive (*Olea europaea* L.)is an important cultivated plant in Turkey. Turkey is one of the olive oil producing country in the world accounting for about 5.7% of the world production. Olive production among other things is affected by many pest and diseases which reduce fruit yield quantity and quality.Among such diseases is *Alternaria alternata*. This pathogen was observed on olive leaves in Antalya-Döşemealtı of Turkey in spring, duringthe 2015-2016growing seasons. The fungus was isolated from the infected leaves and cultured *in vitro*. The pathogen was examined under the microscope. The conidia was typically ovoid in shape, pale brown to light brown with the development of both short and long conical beaks at the tip. The surface of the conidia was smooth to verruculose, with 3-6 transverse septa and one or two longitudinal septa and ranging from 7 to 45.9µm in sizes. The PCR analysis of the isolates was conducted using ITS1/ITS4 primer pair which produced fragment size of~560-bp, confirming the pathogen as *Alternaria alternata*. Pathogenicity test result showed positive result on the plant, thereby confirming their pathogenic status on olive plant in Turkey.

Keywords: *Olea europaea, Alternaria alternata, Conventional PCR,Olive Leaf Spot.*

EFFECTS OF DEFICIT IRRIGATION ON SOME PHYSIOLOGICAL PARAMETERS OF PUMPKIN SEED

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Abstract

The present study was conducted to investigate the effects of different irrigation water levels on some physiological parameters (leaf water potential, chlorophyll content, carotenoid content, leaf water content, leaf relative water content) of pumpkin seed. Experiments were carried out over the experimental fields of Erciyes University Agricultural Research Center in 2015. Six different irrigation water levels based on supply of deficit water (I_{100}, I_{80}, I_{60}, I_{40}, I_{20} ve I_0) were applied in experiments. Leaf water potential (LWP) seasonally varied between 1.3-2.7 bar. The differences in chlorophyll contents of the treatments were found to be significant ($P<0.05$). The lowest chlorophyll content was obtained from I_0 treatmentwith 1229.15 mg g^{-1} KDA and the greatest value was obtained from I_{100} treatment with 1550.85 mg g^{-1} KDA. Significant differences were also observed in carotenoid and leaf relative water content (LRWC) of different irrigation treatments ($P<0.01$). The lowest carotenoid content was observed in I_0 treatment with 341.08 mg g-1 KDA and the greatest value was observed in I_{100} treatment with 412.52 mg g-1 KDA. LRWC varied between 119.30-128.58% and leaf water content (LWC) varied between 59.55-78.13%. The differences in LWC values of the treatments were not found to be significant.

Keywords: *Deficit irrigation, drip irrigation, pumpkin seed.*

GUMMY SPOT BLIGHT DISEASES OF WATERMELON (Citrullus lanatus (Thunb.) Matsum. & Nakai) CAUSED BY Didymella bryoniae (Fuckel) Rehm. IN TURKEY

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Abstract

There are nearly about hundred vegetable seedling companies in Turkey. About 70% of these companies activities found in western Mediterranean region are located in the Antalya Province. Yearly vegetable seedling production in Turkey is about 4 billion. Within this production rate both normal and grafted watermelon seedlings are included. The production rate of the normal and grafted watermelon seedlings is 68 million and 45 million, respectively. The most important pathogenic constraints to watermelon seedling production include mildew, bacterial fruit blight and gummy spot blight diseases. The causative agent of gummy spot blight disease is *Didymella bryoniae*. In the period 2015-2016, the yield loss due to this disease recorded by the watermelon seedling companies in Turkey was 20%. The disease symptoms on leaves include round lesions, water-soaked and gummy exudates. Morphological identification of the fungi was carried out under microscope. The conidia were cylindrical with round ends. The conidia size range from 4.3 to 13.6µm. Molecularly, complete detection of the fungal isolates were carried out by conventional PCR using ITS1/ITS4 primer pair to confirm the true identity of the suspected pathogen. Pathogenicity test was conducted on watermelon seedling and was confirmed to be the causal agent of the gummy spot blight disease thereby satisfying the Koch's postulates.

Keywords: *Didymella bryoniae, Gummy spot blight, Watermelon, PCR.*

EFFECTS OF CENTRAL LEADER SYSTEM ON GROWTH, YIELD AND FRUIT QUALITY IN PEACH

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Abstract

The study was carried out at Karadeniz Agricultural Research Institute (Turkey) in 2014-2015. In the experiment, Redhaven and Elegant Lady peach cultivars and peach seedling as rootstock were used as material. In the research, central goblet and leader systems in peach were compared regarding performances of tried peach cultivars in terms of some tree and fruit characteristics, and yield. For this reason, tree characteristics such as tree trunk, tree length, canopy length of tree, canopy volume, some fruit properties such as fruit weight and also yield per tree were determined. According to the trial results, Central leader system was better than Goblet in terms of tree properties, fruit weight, soluble solids, and yield.

Keywords: *Peach, training system, central leader, goblet*

YELLOW RUST REACTIONS OF A BARLEY ADVANCE YIELD TRIALS NURSERY

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Abstract

Rusts (caused by *Puccinia* spp.) are the principal yield limiting factor for barley production in epidemic condition. Warrior race (yellow rust race) was detected for the first time in 2014 in Turkey. The aim of this study was to identify the reactions of 24 barley (19 Advance yield trials and standard cultivars; cv. Tarm-92, cv. Burakbey, cv. İnce-04, cv. Larende, cv. Bolayır) to yellow (stripe) rust. Test materials were planted in 3 replications each repetition by hand with 7-10 plants per genotype in 7x7x9 cm pots and were kept in 15-25 ^{o}C in the greenhouse. Test materials were inoculated with suspension of urediniospores (virulent on *Yr1, 2, 3, 4,-, 6, 7, -, 9, -, -, 17, -, 25, -, -, 32, SU, SP, SD*) in mineral oil at the Zadoks growth stage-11-12 stage. Inoculated plants were incubated for 24 h in an incubation chamber at 9±1 ^{o}C in complete darkness at 100 % relative humidity, and then moved to a growth chamber at 15-25 ^{o}C. Reactions were scored 14 days post-inoculation on 0-9 scale. The results indicate that 24 (100%) lines were resistant to yellow rust at the seedling stage.

Keywords: *Barley, yellow rust (Puccinia striiformis), reaction test*

EFFECTS OF INDOLE BUTYRIC ACID AND PAINT APPLICATIONS ON ROOTING, GROWTH AND DEVELOPMENT IN DIEFFENBACHIA PROPAGATION

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Abstract

This study was carried out to assess the effect of indole butyric acid (IBA) (0, 100, 300, 500, 700 ppm) and water base paint applications on rooting, growth and development of cuttings of *Dieffenbachia amoena*, most important ornamental plant grown for foliage beauty. Both IBA and water base paint applications are determined to accelerate rooting time when compare to control. IBA applications significantly increased rooting ratio of cuttings. The highest rooting ratio (94.0 %) was obtained from 100 ppm IBA/paint application. The lowest rooting ratio (43.0 %) was obtained from unpainted/0 ppm IBA application. The following treatments100, 300 and 500 ppm IBA treatments yielded significantly higher root number than control. Largest root length was obtained (6.3 cm) from paint/300 ppm IBA treatment. The smallest root length was obtained from painted and unpainted Control applications, 3.9 and 3.5 cm respectively. Although the effects of applications on shoot length were significant, their effects on leaf number were not significant. The longest shoot lengths were detected in 300 ppm*paint, 300 ppm/unpainted and 500 ppm/unpainted applications. Paint applications prevented rotting on the surface of cuttings, which reduced the loses in cuttings due to decaying.

Keywords: *Diffenbachia, IBA, Paint, Propagation, Rooting.*

THE COMPARISON OF ESSENTIAL OIL CONTENT OF *MARRUBIUM VULGARE* L. (LAMIACEAE) SAMPLES COLLECTED FROM TWO DIFFERENT LOCALITIES

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Abstract

Marrubium L. genus belonging Lamiaceae family is represented by about 40 taxa in the world. Out of 20 species which are endemic plants, 11 of them are spread naturally in Turkey. *Marrubium vulgare* L. having 'Karaderme' in Turkish name was known particularly as an herbal tea due to such effects as diuretic effect, antispasmodic effect, sedative effect, etc. and traditional medicine in many countries. *M. vulgare* was collected from surrounding of Lake Tuz (Konya) and Ermenek (Karaman) in flowering period in July 2012. Collected samples were dried in the shade. The essential oil is obtained by water distillation method with Clevenger apparatus using 100 g from aboveground parts of dried samples. HP-Agilent 5973 N GC- FID and GC-MS (Gas Chromatograph- Mass Spectrophotometer) 6890 GC systems were used for Chromatographic processes. The characterization of essential oil components was done by using electronic libraries (WILEY, NIST and essential oil library). Result of this research showed that 26 and 13 components were obtained from Ermenek and Lake Tuz samples having total oil amount 99.8 % and 84.0 %, respectively. It was found that Hexadecane (40.1%), germacrene D (8.5%), Terpinen-4-ol (7.4%) and camphor (6.4%) were major components of samples collected from Lake Tuz, and Trans-β-farnesene (34.2%), tricosane (11.9%), germacrene D (7.9%), caryophyllene (7.7%), 2,10-epoxypınene (5.7%), isophytol (5.5%) and selın-11-en-4-alpha-ol (5.1%) were major components of samples collected from Ermenek. According to the results obtained from analyses performed with both samples collected Ermenek and samples collected Lake Tuz, it was found that there were differences in terms of both major components and amount of essential oil in this study..

Keywords: *Endemic plant; Essential oil; GC-MS; Major components; Marrubium spp.*

THE EVALUATION OF NEW WALNUT GENOTYPES WITH LATE LEAFING AND LATERAL BUD FRUITFULNESS IN TURKEY

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Abstract

This research has been implemented to select late leafing and laterally fruitful superior walnut seedling trees for 3 years between 2004 and 2007 from the population of Niksar district which is an important walnut production area of Turkey. 93 walnut types were preselected among 12000 seedling trees those are grown at altitude between 290 and 1300 m. A late spring frost occurred at 4 April 2004 which had proved an opportunity to select late leafing trees. Preselected types were propagated by grafting and planted the breeding orchard with Payne and Franquette cultivars. Pre-selections were evaluated by Weight Ranked Method and 12 of them found promising by their late leafing, laterally fruitful and good fruit quality characteristics. Detailed pomological, phenological and tree features were observed and recorded according to UPOV criterions. Fruit weights of selected types were found between 7.05 and 12.30 g, kernel weights between 3.67 and 6.71 g, kernel percentages between 42.25 and 61.39 %. Fruit thickness of selected types were found between 26,64 and 34,45 mm, fruit width between 24.98 and 31.83 mm, fruit height between 30.61 and 39.75 mm, shell thickness between 0.82 and 1.61 mm. Ease of kernel removal of selected types were found generally easy and medium and intensity of kernel color were generally found light. Percentages of lateral fruitfulness of selected types were found between 20 % and 85 %. Selected types were leafed out 6 and 15 days before Franquette cultivar at breeding orchard. The time and rank of leafing out dates of selected types in breeding orchard have been found different from their origins.

Keywords: *Walnut, breeding, late leafing, lateral fruitfulness*

EFFECTS OF ZN TREATMENTS ON GROWTH AND BIOCHEMICAL COMPOSITION OF LETTUCE (*LACTUCA SATIVA L. VAR. CRISPY*) IN STATIC SOLUTION CULTURE

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Abstract

In hydroponic cultures, alkaline water solution may hinder plant nutrient uptake. This study was conducted to investigate the effects of zinc (Zn) treatments on growth parameters of lettuce in alkaline water solution (Ca content of water: 50 ppm). Zn was applied to nutrient solution from Zn-EDTA (14% Zn) source in 0, 0.3 and 0.6 ppm doses and Hoagland nutrient solution was used in other nutrient solutions. Experiments were conducted in an unheated greenhouse in fall season within 1 x 2 m metal boxes. Experimental design was randomized blocks with three replications. The highest vegetative growth and fruit yield was observed in 0.6 ppm Zn treatments and plant root development was improved with Zn treatments. Plant vitamin C contents, titratable acidity, water soluble dry matter content and leaf nitrate concentrations were also investigated, but all these values were not significantly affected by Zn treatments. The lowest chlorophyll content was observed in plants without Zn treatments and the highest chlorophyll content was observed in plants with 0.6 ppm Zn treatments. Root and leaf Zn concentrations significantly increased with Zn treatments ($p<0.05$). Again, root and leaf N, P, K, Ca, Mg and S concentrations also increased with Zn treatments. Current findings revealed that increasing in Zn treatments increased plant performance in alkaline water solutions.

Keywords: *Static water culture, zinc, lettuce, hydroponics.*

BIOETHANOL PRODUCTION FROM SUGAR BEET

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Abstract

Today, gradually running out of fossil fuels, the destruction of ecosystems, efforts to avoid depending on foreign countries for energy and to increase energy diversity have increased the importance of fuels such as bioethanol. Biomass production of bioethanol from sugar beet molasses will lead to open a new market for beet producers, to widespread the crop rotation, to create an energy farming culture and lead to an increase in sugar beet growing areas. Bioethanol also contributes favorable support to the ecology by providing diversity in agricultural production and it is important for creating sustainable agricultural structure and supporting rural development. Bioethanol in general is obtained by fermentation of plants containing sugar and starch. Sugar beet molasses is used for the production of bioethanol from sugar beet. Production of bioethanol from molasses is carried out at three stages such as yeast reproduction, fermentation and distillation. The alcohol obtained in 96% purity during ethanol production process is not used as biofuel. In order to be used as biofuel it should be in 99.5% purity. Therefore, in alcohol plants the purification and distillation units are needed in addition to fermentation unit. Attention should be paid to alternative energy sources such as bioethanol since the oil reserves are decreasing and environment problems are increasing.

Keywords: *Sugar Beet, bioethanol, energy, biomas.*

DETERMINATION OF THE RELATIONSHIPS BETWEEN ROOT WEIGHT AND SOME YIELD CHARACTERISTICS OF CHICKPEA PLANTS IN GROWING A DIFFERENT TIME AND FREQUENCY

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Abstract

This study was carried out at research and practice areas of Ahi Evran University (Turkey) between 2012-2013 years. This study was conducted in Randomized Blocks split-plot design with 3 replications. The Azkan chickpea cultivar was used as material. Trials were carried out three different sowing time (November, February and March) and row spaces (28, 42, 56 cm). Sowing time was located in main plots. Row spaces were located in sub-plots. In study, flowering time, bean hold time, maturation time, root weight, number of pods per plant, pods per plant, number of seed per pod, pod weight per plant, hundred weight, biological yield and yield characteristics were taken.As a result of all studied, the highest yield was obtained from first planting time. On the other hand, the lowest yield was obtained from third planting time. This difference was significant ($p < 0.05$). As row spaces were increasing the biological yields increased but the yield is low. When the highest yield was obtained with 124.7 kg first sowing time, the lowest yield was obtained 105.3 kg of third sowing time. In addition, a negative correlation was observed between root weight and the time of sowing significant relationship (r = -0 836 **). Between root weight and yield significant were observed positive and significantly relations. (r = 0.671 **).

Keywords: *Root, sowing time, row space, yield, chickpea.*

DETERMINATION OF THE GROWTH DEGREE DAY VALUES AND THEIR COUNTS IN DIFFERENT GROWTH STAGES FOR SIIRT PISTACHIO

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Abstract

Cultivation of Siirt pistachio has an important economical potential in region's agriculture. Recent works accomplished by governmental and private bodies has caused an important increase in pistachio harvest, 2000 tons of products from the 4554.3 hectare in 2002 and reached about 11000 tons of products from 25000 hectare by the end of 2014.Despite the fact that it is an important product for the region, not enough research work has been found on the main climatic requirements and modelling of the climatic needs of the pistachio. In this study, based on the daily max.and daily min. temperature, statistics recorded for years long by meteorology office in the region, growth degree day (GDD) and the number of growth degree day (NGDD) parameters were determined by using the method of growth-degree-day. For new and existing plantation areas in the region, based on the GDD and NGDD parameters just determined and also the base temperatures (TB) suggested for diferent phenological seasons, following extra parameters could also be determined for economical and effective agrıcultural activities; regional plant growth period and speed, critical times (like freezing) which may effect the plant growth, irrigation time and rate, disinfestation time, pruning and harvesting time etc.

Keywords: *Siirt Pistachio, Growth Degree Day (GDD), Number of Growth Degree Day (NGDD)*

INVESTIGATION OF ANTIFUNGAL ACTIVITY OF *SIDERITIS GERMANICOPOLITANA* BORNM. METHANOL EXTRACTS AGAINST *VERTICILUM DALHIA*

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Abstract

This study was performed to identify the effects of Sideritis germanicopolitana BORNM plant fungi Verticilum dalhia.In vitro antifungal activity studies of pre-potato dextrose agar (PDA) was closed to lots of styles of 40 ° C.Plant extract which was obtained final concentrations of 50, 100 and 200 mg / ml to be admixed with sterile PDA was dissolved. PDA was poured into 60 mm petri dishes (as 10 mm). The PDA plates were incubated (in the centre of PDA) with 5 mm plugs from 7-day-old cultures. After inoculation, fungus culture was left for incubation at 25±2 ^{o}C for 7 days.Tests was set up 4 replicates and repeated 2 times.The study of plant extracts that are used as a result of 50, 100 and 200 mg/ml doses of the pathogen *Verticillium dahlia* plant the development of the mycelium has been identified to inhibit as 14,01%, 26,54%, and 40% respectively. As a result, nowadays the natural bio-pesticides used are cheap and eco-friendly; therefore they have potential in the control against plant pathogens.

Keywords: *Antifungal, V. Dalhia, plant extract, plant pathogen, Sideritis germanicopolitana BORNM*

THE EFFECTS OF GIBBRELLIC ACID (GA) ON THE SEED SURVIVAL OF PISTACHIA SPECIES AND CULTIVARS IN DIFFERENT ENVIROMENTS

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Abstract

Pistacia species and cultivars have been placed among the important fruit trees of the world for consuming their nuts and using them as rootstocks. Along with the ecological factors, several practices performed during the plant growing causes a positive and sometimes negative effects The purpose of this study is to hasten the growth of seedlings derived from the seeds of several *Pistacia* species and cultivars for a better growth in order to study their developments in different ecological conditions. In the experiment, the seeds of *P. khinjuck*Stock.,*Pistacia atlantica* Desf., *Pistacia terebinthus* L. and of three cultivars of *P. vera* L.. (Ohadi, Siirt, Kırmız) were used. Seed vitality tests were performed using Triphenyl Tetrazolium Chloride (TTC). The vital seeds were kept in GA3 solutions prepared with three concentrations (0-250-500 ppm) for 24 hrs. Then the seeds were divided into three groups. First group of seeds were sown in pots (8x8 cm in height and diameter) in a heated greenhouse; second group of seeds were sown in pots with the same size which were placed on the steel shelves in outdoor condition; third group seeds were sown into soil outdoor. The decrease in air temperature to -2 degree C in mid-February damaged newly germinated seedlings. This damage was exaggerated with the increase in the concentration of GA3.

Keywords: *TTC (2,3,5- Triphenyl Tetrazolium chloride), GA3 –Gibbrellic acid, Scarification*

CHARACTERIZATION OF GROUNDNUT GENOTYPES FOR RESISTANCE TO GROUNDNUT ROSETTE VIRUS DISEASE AND ITS APHID VECTOR

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Abstract

The major constraint in increased groundnut production in Uganda is the groundnut rosette virus disease and its vector, the aphids. These have led to tremendous yield losses of groundnuts among most farmers and therefore appropriate strategies have to be developed in order to reduce these economic losses caused by the disease. Use of resistant groundnut genotypes has been the most appropriate control strategy for most of these farmers and therefore there is need to identify these resistant genotypes.The main objective of this study was to evaluate and identify the groundnut genotypes in advanced stages of breeding for resistance to rosette disease and its aphid vector.The experiment was carried out at National Semi-Arid Resources Research Institute (NASARRI) during 2013 season and a total of 32 genotypes were evaluated. The experiments were arranged in a completely randomized block design and replicated three times. Disease incidence was accessed on groundnut genotypes based on visual symptoms of the disease and the aphid counts were taken on each plant at the green house and their mortality rate was determined.Substantial variation on the reaction of rosette disease and its aphid vector among the genotypes was revealed. Most materials were found to be resistant to rosette disease only, some were resistant to the aphid vector alone and others were identified to be resistant to both the disease and its vector and these can be considered as suitable groundnut planting material options for farmers. Also groundnut breeding programs can focus on incorporating resistance into local and elite genetic materials.

Keywords: *Groundnuts, Rosette virus disease, Aphid vector, Genotype*

EXPLOITING PROGRESS IN SEQUENCING THE WHEAT GENOME TO LOCATE CANDIDATE GENES FOR YIELD UNDER STRESSED CONDITIONS

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Abstract

A major objective for wheat breeding is improving drought resistance. The widespread use of molecular markers and sequencing technologies have allowed major progress in identifying regions of the wheat genome regulating responses to drought, and current efforts to sequence the wheat genome will lead to the physical location of many genes. Challenges will then be to associate those genes with functions and to determine a phenotype for allelic variation in those genes. Large-scale and rapid phenotyping platforms are becoming widespread to study the association of phenotypes with genotypes. A population of 95 bread wheat doubled haploids from the cross Chinese Spring x SQ1 has been used for 25 years to locate quantitative trait loci (QTLs) for yield and many other traits in a wide range of environments. The genetic map contains over 800 informative markers distributed on the 21 chromosomes. Current work aims to dissect QTLs for yield responses to drought into component plant traits likely to be causally-related, working back from QTLs determining yield in particular environments, through yield components, biomass productivity traits, individual organ traits, to plant anatomy, and developmental processes associated with the timing of cell division and expansion. This strategy is revealing candidate functions for gene(s) underlying QTLs. In experiments in Serbia and Poland, drought-induced QTLs for yield/ear on chromosome 3B frequently coincided with QTLs for flag leaf width, and leaf width was highly correlated with tracheid size in leaf main veins. Our approach complements major programmes sequencing the wheat genome and associating phenotypes to genotypes.

Keywords: *Wheat, Chromosome 3B, Candidate genes, Yield.*

LIQUID MANURE APPLICATION TO A NO-TILL CORN, WHEAT, AND SOYBEAN

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Abstract

Atlantic Canada has well-developed dairy industry that generates a significant amount of liquid dairy manure (LDM). A two-year field study was conducted on silt loam Timberland soil to determine the effects of crop rotation and fertility on no-till corn (*Zea mays* L), wheat (*Triticum aestivum* L.), and soybeans (*Glycine max* (L.) Merr.) yields and quality and on soil residual NO_3^--N (nitrate N), and NH_4^+-N (ammonium N) in 0-80 cm soil profile. The rotations included all six possible combinations of corn, wheat, and soybean in the first two years. The fertility treatments consisted of three rates of LDM (1-3) at 32.1, 48.1, and 64.3 t ha^{-1} (with 77, 116, and 155 kg of total N, respectively), a mineral fertilizer treatment (NK), and a control (no fertility applied). The application of LDM at 64.3 t ha^{-1} suppressed yields in all three crops in 2001, but not in 2002. Soybean seed size was improved by LDM application in comparison to the inorganic fertilizer. However, wheat yield and crude protein was higher in the inorganic fertilizer treatment compared to LDM treatments. In addition, fertility and rotation interaction was significant in wheat grain yield, where grain responded well to manure when grown after corn, but had a variable response to fertility when grown after soybean. Low levels of residual soil NO_3^--N at harvest and in early spring within the 30-80 cm depth indicated that the risk of nitrate leaching was low even at highest LDM rate. In corn, the apparent N recovery (ANR) of applied N was 22-33% for LDM1, 17-20% for LDM2, 6-16% for LDM3 and 17-20% for chemical fertilizer N. In soybeans, ANR was 42-66% for LDM1, 39-41 for LDM2, 8-28 for LDM3 and 107-151% for chemical fertilizer N. In spring wheat, the ANR of applied N was 20-39% for LDM1, 9-25% for LDM2, 0-20% for LDM3 (due to lower yields) and 16-40% for the chemical fertilizer N. Our results indicate that pre-plant surface applied LDM at 31 t ha^{-1} (77 kg of total N) is sufficient to supply the necessary nutrients for soybeans and LDM at 48 t ha^{-1} (116 kg of total N) is sufficient to supply the necessary nutrients for silage corn on silty loam soils under no-till system in humid climate. However, LDM of up to 64 t ha^{-1} (with 155 kg of total N) without incorporation may not be sufficient for spring wheat under no-till systems in the cool wet climate of Atlantic Canada.

Keywords*:* Glycine max (L.) Merr. Triticum aestivum L.; Zea mays. L.; Liquid Dairy Manure; Rotation; Nitrogen; Leaching

THE CHEMICAL COMPOSITION OF SANZA (GENTIANA LUTEA L.) ACCORDING TO THE PLANT AGE

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Abstract

Sanza is used in Albania since ancient times for medicinal purposes. In many cases, this plant is used for curative purposes in calming of the stomach, to increase the appetite, as well as to produce the beverages of high quality and curative. The chemical composition of Sanza is very important in determining the values of its use and curative effects. The determination of chemical composition by age of the plant affects the timing of collection and quality of production of the plant.Besides the requirements for the quality of the root and its processing, it is very important the time of harvest and the age of the plant to ensure the highest contents of essence and its chemical composition. Therefore,they are taken root samples of different ages (1-7 years old plants), which are analyzed in the Laboratory of the Faculty of Pharmacy in Skopje, Macedonia.

Keywords: *Sanza, chemical composition, essence, composition, the plant age, curative, samples, roots.*

THE STUDY OF THE CHEMICAL COMPOSITION OF PLANT ORGANS OF UVA URSI (ARCTOSTAPHYLOS UVA-URSI (L.) SPRENG) IN KORAB MOUNTAIN.

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Abstract

The chemical composition of uva ursi is different, depending on the zones and the chemical composition of the soil. The plant organs present different chemical composition. The value of the use of uva ursi is determined byits chemical composition. The samples are taken from the organs of the plant: the leaves, the stalk, the roots in different time periods and in accordance with phases of plant development, in some countries of natural growth of uva ursi. Through analysis and comparison of chemical compounds data it will be defined curative values and the values of the use of plant organs, as well as the most appropriate stage of uva ursi harvest and for each plant organs.

Keywords: *Uva ursi, Chemical composition, plant organs, curative, samples*

THE EFFECTS OF THE STRUCTURE AND THE MICRO-MORPHOLOGY OF THE LEAF ON TRANSPIRATION IN DURUM WHEAT (*Triticum durum* Desf.)

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Abstract

Transpiration is defined as the rate of transpiration in equal to the sum of cuticular transpiration and stomatal transpiration, Various physiological characteristics, morphological and anatomical micro-related sweating durum wheat genotypes On Some durum wheat genotypes (*Triticum durum* Desf.), The experimental work was conducted under field conditions.The results obtained show that the wheat has an intra-specific variability visible morpho-physiological and anatomical parameters, and the preservation of internal moisture of wheat plant and better development are closely conditioned by the manifestation of the mechanisms related to them.However, changes in perspiration levels remain significantly influenced by variability associated with the micro-anatomical and morphological characteristics of the leaf, Stomatal transpiration is closely dependent on the stomatal density on the scale of both sides of the leaf blade. Any reduction in this density allows genotypes involved minimize this path loss of water. The results confirm that genetic variability is ensured by differing protective tissue changes. Indeed, the thickening of the outer walls of the lining cells of the ventral and dorsal epidermis, obviously such a ransformation based on a deposit, and cellulosic cutineux, turn, strengthens the shield internal leaf tissues by limiting the evaporation of water.

Keywords: *Durum wheat, sweating, anatomy, structural leaf stomat, genetic variability.*

THE EFFECT OF VARIETY AND WATER DEFICIENCY ON PRODUCTIVE QUALITIES OF POTATO

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Abstract

As a result of global climate changes, in the past years, during summer months, more or less expressed rainfall deficit is occurring, which has negative effects on potato production. Some varieties, thanks to their ability of fast growth, good land coverage and early tuber seeding, endure some of the stressful situations easier than others. The goal of this paper was to examine, in controlled environment, the reaction of five varieties on moisture deficit, and also to determine if the productivity of potato will be affected by application of biostimulators. Three factorial experiments were set on 02.04.2016. in the greenhouse of the Faculty of Agriculture in East Sarajevo. The research included variety reaction (factor A – five varieties: A_1 - Agria, A_2 - Faluka, A_3 - Kenebek, A_4 - Kurada and A_5 - Dezire) and biostimulators (factor B: B_0 – without foliar top dressing and B_1 – foliar top dressing – three treatments with Isabion) on moisture deficit in the soil (factor C water deficit –C_0 – draught was created by stopping the substrate irrigation in the phase of tuber seeding and C_1 – optimal irrigation during the vegetation – substratewas watered every day until optimal water capacity, until water content in substrate was in field water capacity of 36%) on potato plant productivity. Faluka variety had the largest percentage of small and the smallest percentage of large tubers, while the Kenebek variety had the largest percentage of large and the smallest percentage of small tubers. The application of Isabion positively affected on yield increase at varieties: Agria, Kenebek and Dezire, as well as its application in varieties where there was a brake in irrigation during the phase of tuber seeding. The drought effect influenced the process of organic compounds synthesis and their translocation, which was notable for understanding the effect of drought on potato yield.

Keywords: *Variety, foliar top dressing, irrigation, yield, tuber*

EFFECTS OF TEMPERATURE, SALT STRESS AND WATER STRESS (ABIOTIC CONSTRAINTS) ON SEED GERMINATION OF 5 MOROCCAN MORPHOTYPES CANNABIS (CANNABIS SATIVA L.) STUDY OF SEED GERMINATION OF 5 MOROCCAN MORPHOTYPES CANNABIS (CANNABIS SATIVA L.) UNDER VARIOUS ABIOTIC CONSTRAINTS

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Abstract

To control the sector of cannabis Sativa L. in Morocco, from its culture to its marketing as a product of high therapeutic value and food, 5 cannabis morphotypes sativa L. (BT, BK; KHT; KHK; AvoK) from 3 different regions of the central Rif were considered in this study. The seeds were collected during the campaign of 2015 and the sampling was done in a random manner at 2 batchs in the morphotype. The choice of this study is twofold: the first objective is to assess the plant material of three contrasting environments and therefore identify the interaction morphotype/environment, especially for quantitative traits. The second objective is to demonstrate the adaptation of the crop to the area of origin, optimization of germination conditions, and study the effects of 3 forced factors in the critical life stage of cannabis (germination). The effect of T ° is studied in degrees (10 °, 15 °, 20 °, 25 °, 30 °, 35 ° and 40 ° C). Theeffect of salt constraint and drought constraint underlined at 0, -2, -4, -6, -8, -10, -12 and -14 bars induced by sodium chloride (NaCl) and polyethylene glycol (PEG6000) on germination and growth. The estimated effect is shown by measuring the following parameters: final germination rate (TGF); Germination kinetics (CG); germination speed (VG); daily average of germination (MDG) and length of roots and epicotyls (Lr, Le). The results showed that three factors have a significant effect on all the studied parameters, which allowed us to determine the optimal conditions for germination of the 5 morphotypes and their interactions with their original environment. Then, we used these results in order to evaluate the ability to germination of the species under other various abiotic constraints.

Keywords: *Cannabis Sativa L., germination, stress Sallin, PEG6000, morphotype*

PRODUCTIVITY OF SOME DUTCH POTATO VARIETIES IN THE MOUNTAIN REGION OF MONTENEGRO

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Abstract

This paper presents the results of a two-year study of six Dutch potato varieties in agroecological conditions of northern Montenegro.The two-year average of the highest number of tubers were found in the variety Arnova (8.4), while the lowest tuber number was obtained in varieties Arrow (6.8), Rudolph (6.8) and Riviera (6.9). Increasing the number of tubers in the variety Arnova compared to other varieties was statistically significant.Varieties Rudolph (116.5 g) and Kuroda (100.5 g) gave averagely biggest tubers. The average weight of tuber of other varieties studied was approximately at the same level, and ranged from 80.4 g, for the cultivar Arrow to 88.6, for the Arnova. Rudolph and Kuroda were, compared with all other varieties, had significantly larger tubers.The highest yield in trials was on plots planted with varieties Rudolph - 33.7, Kuroda - 32.0 and Arnova -31.5 tha^{-1}. The lowest yield was measured at variety Arrow - 23.2 tha^{-1}. Yields of varieties Rudolph, Kuroda and Arnova were compared to all other investigated varieties statistically significant.This research showed that the highest yields of tubers in agroecological conditions of mountain climates are achieved by growing medium late and middle early varieties of potatoes.

Keywords: *Potato, tuber number, tuber weight, yield*

SELECTION OF WHEAT SUPERIOR GENETIC VARIATION FOR GROWING IN HALOMORPHIC SOIL CONDITIONS

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Abstract

With increasing human population, demand for food will increase significantly. In order to enhance food amount, there is a need for utilization of all available ways to produce food. One of those ways is the exploitation and utilization of production unsuitable and less productive soil. Solonetz is a type of soil characterized by increased alkaline reaction, high sodium content and unfavorable water-physical characteristics. Solonetz is mainly used as a destitute pasture, covering about 135 million hectares, about 20 million hectares in Europe, while in Serbia occupies about 80000 hectares, mainly in Vojvodina. Trials were set up at two localities that differ in agro-ecological conditions, especially in terms of land. The experimental field of the Novi Sad's Institute of Field and Vegetable Crops has been used as control part of the trial having normal growth conditions on chernozem soil. The other locality is in the village of Kumane in Banat. The aim of perennial trials conducted on chernozem and solonetz types of soil is to select usable genetic variation from the existing wheat genepool and to create a novel genetic variability for the halomorphic soil growing conditions. Multiyear results show that desirable genetic variability could be selected within the existing genetic variation and that novel genetic variability of the enhanced tolerance to abiotic stress conditions of high sodium content and higher alkalinity could be selected in progenies of suitably chosen parents.

Keywords: *Wheat, abiotic stress, solonetz, breeding, genetic variation*

EVALUATION OF SOME SPRING BARLEY (HORDEUM VULGARE L.) GENOTYPES IN TERMS OF YIELD AND QUALITY

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Abstract

This study investigation was carried out to determine the properties of some of barley genotypes on the yield and quality of in different ecological conditions in 2011-2012 growing season in Diyarbakır. In the study, it were used total of five varieties consisting of twenty line which obtained from ICARDA. Experiments were randomized complete block design with replications and conducted in GAP International Agricultural Research and Training Center field trial. In the study, heading date, plant height, thousand grain weight, test weight, protein content, starch content, lodging, grain of humidty and grain yield were investigated.According to the results obtained from the analysis, The average values among the spring barley genotypes, heading time was changed betwen 112.0 -117.5 day, plant height betwen 90-117 cm, thousand grain weight between 32.0 and 46.4 g hectoliter weight between 65.1 and 73.5 g, protein content between 14.0 - 17.2 %, humidity between 68.6 – 70.5 %, starch content between 8.0 - 8.4 %, grain of humidty between 0 – 60 % and grain yield changed between 6092 and 7870 kg/ha. In terms of grain yield lines 2, 16 and Lignee 131 varieties, In terms of quality, the Salmas varieties and lines 17, came to the fore and while some genotypes were tend to more litle others were. Depending on the results of a top-performing lines and varieties moved forward step.

Keywords: *Barley, develop cultivar, medium rainy area*

EFFECTS OF HYBRIDES AND SALT CONCANTRATION ONTO GROWTH AND DEVELOPMENT OF SPROUTING EMBRYO

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Abstract

Salinity of soil has adverse impact on germination, growth and yield of maize. Hybrids show larger or smaller tolerance onto saline stress. Thus tests were conducted in laboratory of Faculty of Agriculture, University of East Sarajevo, to examine tolerance of four hybrids (BL-43, ZP- 427, Cisco and Maverick) maize (*Zea mays L.*) to different concentration of NaCl (0, -0,3 i -0,6 MPa). The tests included % of germination energy, % of seeds' germination, cotyledon and coleoptile length, fresh mass of cotyledon and coleoptile, dry mass of cotyledon and coleoptile, ratio of dry mass of the root and coleoptile. Based on statistically processed results the significant differences between the hybrids were determined in stress level as well as their interaction for most of the tested characteristics and the most resistant and most sensitive hybrid to saline stress. For the most of tested features, the most resistant hybrid determined is Cisco and the most sensitive is Maverick.

Key words: *Maize, hybrid, stress, salt, germination, root, coleoptile.*

EFFECTS OF SALT AND OSMOTIC STRESS ON GROWTH AND GERMINATION OF DOMESTIC WHEAT CULTIVARS (*Triticum aestivum L.*)

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Abstract

Three winter-type cultivars of wheat (Jelena, Bosanka and Nova bosanka), selected in the Agricultural Institute of the Republic of Srpska in Banja Luka, were examined for resistance to osmotic and salt stress in the period of early germination. The trial was set up in the laboratory of the Faculty of Agriculture in East Sarajevo. The seeds were sterilized in 96 % alcohol and 50 uniform and healthy seeds for each type and treatment were put into Petri dishes. Filter papers soaked in the solution of a certain concentration (of mannitol and salt) and water potential of 0, -0.3 and -0.6 MPa, were put into the dishes. The seedlings were incubated for 7 days at a temperature of 20°C, or until the first leaves appeared. On the seventh day of the trial, or when the first leaves appeared, the measurement of a fresh coleoptile and root mass was conducted by an analytical balance (Adventurer). By drying the samples in a drying oven (Memmert) for 24 hours at 80°C and by weighing them, dry root and shoot weight was specified as well. The calculated dry root/shoot weight ratio is a significant indicator for the screening of genotypes for the resistance to drought-stress in the germination stage. Examination of germination in different conditions (concentrations of salt and mannitol) showed that the type Nova Bosanka is the most resistant to stress conditions. Stress conditions affect coleoptile forming in type Bosanka, and root forming in type Jelena. The usual border line of mannitol and salt concentration for germination is at -0.3 MPa.

Keywords: *Type, resistance, mannitol, salt, root, coleoptile*

THE EFFECTS OF DIFFERENT IBA APPLICATIONS ON THE ROOTING OF WOOD-CUTTINGS OF BLACK MULBERRY

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Abstract

In this study, the effects of different IBA applications on rooting of black mulberry cuttings taken from black mullberry trees grown in Tokat-Turkey were evaluated. After dilute soak applications (200 ppm and 300 ppm for 8 hour), foliar spraying applications (four times 1000 ppm and 2000 ppm doses at intervals of three or six days spraying) and quick dip applications (four times 6000 ppm doses upper and under dip applications for 5 seconds at three days intervals) of IBA treatments as well as no treatments as control, 10 wood cuttings for each replication were placed on rooting condition using fully randomized plot design. Perlite was used as rooting medium kept at 22±2 °C by floor heating system. Callus rate, rooting rate, root number, root length and diameter values of cuttings kept three months in rooting medium were determined. Although the highest rooting ratio with % 80 was obtained from cuttings for upper foliar application, the lowest rooting ratio with % 33 was obtained from cuttings for under foliar application treated.

Keywords: *Dilute soak, foliar application, mulberry, spraying*

EFFECTS OF TWO ANTITRANSPIRANTS (LINSEED OIL AND GREEN MIRACLE) AND SEVEN ADJUVANTS ON SOME PHYSIOLOGICAL TRAITS OF DURUM WHEAT AND BARLEY UNDER GLASSHOUSE WATER DEFICIT STRESS

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Abstract

Water is the primary factor limiting the production of cereals in arid environments. Indeed, 99% of the water absorbed by plants is lost in the atmosphere by transpiration. In trying to limit the impact of water deficit on grain farming and reduce the potential of plant transpiration, the opportunity to use antitranspirants proves interesting. Antitanspirants are known to form films that reduce stomata and cuticule transpiration without greatly affecting photosynthetic activities. Experiments were carried in 2009/10 out in a glasshouse to study the effects of two antitranspirants (Linseed Oil and Green Miracle) and seven adjuvants (Adjuvant Biol, Codacide, Arado, Phydeal, TRS2, Atonik and Liberate) on some physiological traits of durum wheat and barley. The two cereals were grown under water deficit stress (50 and 100% field capacity) and the antitranspirants were sprayed two times at 10%, at the tillering and the stem elongation stages. Measures of water potential, chlorophyll content and *chlorophyll fluorescence in greenhouse experiments have showed that treatment with Linseed oil and Green miracle mixed with Atonik and* Liberate has improved water retention without affecting the photosynthetic activities. Addition of Atonik and Liberate has strengthened significantly the antitranspirants role.

Keywords: *Adjuvants, antitranspirants, barley, durum wheat, Green miracle, Linseed oil, physiologic behaviour, Atonik, Liberate.*

BIODIESEL PRODUCTION FROM ROADSIDE PENNYCRESS (*Thlaspi alliaceum* L.) OIL

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Abstract

Non-edible oils are a promising alternative feedstock for biodiesel production due to low cost and easy cultivation on marginal land. In line with this, roadside pennycress oil (RPO) was used as a feedstock for making fatty acid methyl esters (FAMEs), known as biodiesel. The synthesis of FAMEs was performed in two steps: the H_2SO_4-catalyzed esterification of free fatty acids present in the oil and the base-catalyzed methanolysis of the treated oil. The aim of the study was to evaluate the applicability of RPO as a feedstock for biodiesel production. Roadside pennycress seeds were collected on Pasjača Mountain, in Southeast Serbia. The oil was obtained from the seeds by cold-pressing. Acid-catalyzed pretreatment of RPO with an initial acid value of 1.84 mg of KOH/g was accomplished at the methanol:oil molar ratio of 8:1, H_2SO_4 amount of 0.4 wt% (to the oil) and at 60^{o}C. The esterified oil, after washing and drying, was subjected to the homogeneous base-catalyzed methanolysis under the following reaction conditions: methanol:oil molar ratio of 6:1, the KOH amount 1 wt% to the oil and 60 ^{o}C. The FAME yield of 98.5 % was achieved in 15 min of reaction. Once the reaction was completed, the FAME phase was washed with distilled water and dried with anhydrous Na_2SO_4. The physio-chemical properties of the purified FAMEs were determined by using the standard methods. The obtained RPO biodiesel had the fuel properties within the EN 14214 standard limits. Hence, RPO might be a valuable raw material for biodiesel production.

Keywords: *Biodiesel, esterification, methanolysis, Thlaspi alliaceum L.*

2. PLANT PROTECTION AND FOOD SAFETY

DETERMINATION METHODOLOGY OF PENCONAZOLE AND MYCLOBUTANIL RESIDUES IN APPLES

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Abstract

Among many fruit trees, apples are the most cultivated trees in Albania, and the region of Korça is the main market supplier with apple fruits. This specie represents around 70% of total fruit trees. The increase of production and the quality of this fruit are related not only with Good Agricultural Practice but even with use of pesticides. The fruit trees are in the second place regarding to the used amount of pesticides per hectare. In this study we have been focused on the evaluation of penconazole and myclobutanil residues in apple based on QuEChERS method. The experiments are performed with two types of apple cultivars (Golden Delicious and Starking). The apples trees were treated with the minimum and maximum doses of pesticides penconazole and myclobutanil that are required. The number of treatments according to European Union (EU)did not exceed 4/season. For determination of penconazole and myclobutanil residues from each apple variety 10g homogenated sample were weighted. Then, the sample was placed in a centrifuge tube test 50mL, when 10 ml acetonitrile and 100µl solution of 20ppm TPP was added. The centrifuge tube test was closed and mixed in a vortex. After that, a mixture of magnesium sulfate anhydrous, sodium chloride, trisodium citrate dehydrates and disodium hydrogen citrate sesquihydrate was added. Then, extract was centrifuged for 5 minutes in a centrifuge with speed 3500rpm. A small quantity of supernatant was added in e centrifuge tube that contained 150 PSA and 900 mg magnesium sulfate anhydrous and undergoes the mixture with vortex and centrifugation. The supernatant was placed in a vial and kept in refrigerate to be ready for chromatography analyses.

Keywords: *Apples, pesticides, residues, penconazole, myclobutanil.*

NITROGEN CONTENT IN VEGETABLES AND NITROGEN EFFECT ON THEIR NUTRITIONAL VALUE

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Abstract

Nitrogen plays an important role in nutrition and functions in plants, but because of environmental pollution and uses of organic and inorganic liquid fertilizers it can be accumulated in edible parts of vegetables particularly if excessive nitrogen fertilizer has been applied. Nitrogen content in vegetables has always been a matter of interests. In our study we were focused on evaluating nitrogen content in some vegetables, specifically in tomatoes, cucumber and pepper grown in a glasshouse, without applying specific amounts of nitrogen fertilizers, but just the normal rate used by the farmer. Nitrogen content was assessed by combustion. In most cases, nitrogen content in tomatoes and pepperwere in normal range from 1.12 to 4.49 % N and 1.08 to 4.6% N respectively. Even if these vegetables must contain 2.5-3% N, we also meet cases of high nitrogen content. Cucumbers generally contain up to 2.5-5% N and the data showed a low content of nitrogen varying form 0.9 - 5.65% N.

Nitrogen cannot be dangerous by itself, but its metabolites and reaction products e.g., nitrate, nitrite and N-nitroso compounds are of a great concern because they are converted in more toxic forms. Nitrogen sources are air, soil, water and food (especially vegetables) so consuming these crops can harm human health; that is why it is important to control rates of nitrogen fertilizers used in agriculture, in order to have safe products since a reduction in nitrogen forms content can represent added value for vegetable products.

Keywords: *Nitrogen content, vegetables, nutritional value, nitrogen fertilizers*

BIOLOGICAL CONTROL AGAINST DATE MOTH ECTOMYELOIS CERATONIAE ZELLER. (LEPIDOPTERA, PYRALIDAE) BY SPINOSAD

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Abstract

Currently, chemical control is the only means used to control populations of the date moth (*Ectomyelois ceratoniae*) which is the most important and dangerous pest to palm groves in Algeria, conventional insecticides act faster, but their main drawback is it can't be destroyed or degraded. In this context we conducted our work to explore the insecticidal activity of Spinpsad which is a bio-pesticide on the larval stages of *Ectomyelois ceratoniae*.

The study of the effect of Spinosad on the mortality of different larval stages revealed that the doses used were significantly and positively correlated with mortality adjusted for different durations of exposure of larvae bio- pesticide. Lowest corrected mortality was observed in a short time and lethal in older larvae treated with the lowest concentration. While the higher mortality was observed in a longer duration of exposure in younger instars treated with the highest concentration.

Keywords: *Date palm, Ectomyelois ceratoniae, Spinosad, Biological control, toxicology.*

IDENTIFICATION OF CITRUS PSOROSISOPHIOVIRUS (CPSV)BY DAS-ELISA IN ALGERIA

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Abstract

Psorosis is one of major graft-transmissible diseases of *Citrus* and its occurance was firstly reported in Florida (United States of America), then it was announced in several countries of the world. The main objective of this study was to detect and identify *Citrus PsorosisVirus*(*CPsV*). In 13 *Citrus* varieties: *Washington navel*, *Washington navel 251, Thomson, Thomson navel 215*, *Citronnier*, *Citronnier Eureka*, *Clémentine 63*, *ClémentineDouble fine*, *Valencia Late, Valencia Late 248, Avana apirino*, *Ortanique*, *Carvalhal*, experiment was carried out through 6 pilot farms: Benkhellil, Chebli, Experimental station of Department of biotechnology Blida 1, Boufarik 1, Boufarik 2, Hadjout. The controls by biological test and double antibody sandwich-enzyme linked immuno sorbent assay (DAS-ELISA) have been done in laboratory station on all taken samples. The results of serological test DAS-ELISA was positive in the different prospected farms with an incidence of 59%-74% confirming the *Psorosis* presence in Algeria. Symptoms of *Psorosis* have been confirmed by the indexed seedling and grafting. The results also showed that the serological analysis of the biological test (indexing and grafting) was positive and that confirms the graft drive.

Keywords: *Ophiovirus, CPsV, indexing, graft, DAS-ELISA*

STUDY OF LEVEL FLUCTUATIONS OF THAUMETOPOEA PITYOCAMPA AND A BIOLOGICAL CONTROL TEST

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Abstract

This study was performed in the national forest of Nador (Tiaret west of Algeria) on the population of pine processionary. It highlighted infection rates by this pest because it varied greatly from one locality to another. It depends on several factors, among others, the forest structure and exposure. Three plots were established with an area of 1are for each. They were exposed to different altitudes ranging from 1050m to the Ez Zeg station and 1250m of Chemekh station and 1150 m from the Hassi El Hadjel station. The emergence began on August 7 and was conducted over one month; the laid of the eggs start in late August to early September. Their incubation bas been 30 to 45 days, the hatching occurred during the first decade of October.The damage to leaves increase with larval growth. The caterpillars of the fourth and fifth instars are the most dangerous and cause more damage. The last instar larvae leave in procession to the end of March and burrow in early of April.

A biological control test by application of *Bacillus thuringiensis* seems to be promising indeed, because recorded mortalities exceeded 32%.In the El Hassi Hadjel station, the weight of live caterpillars is 0.15 g, while for dead caterpillars is 0.1g. While the measures of the lengths of live and dead caterpillars is almost the same is 2,3cm. However, in the station Chemekh we notice a clear difference in weight between the living and the dead caterpillars (0.5g to 0.1g for live caterpillars and dead caterpillar) and a variation between the measurement lengths are dead and live caterpillars which is respectively 2,7cm to 2,4cm.

Keywords: *Thaumetopoea pityocampa, population dynamics, Nador forest, Bacillus thuringiensis.*

MONITORING *LOBESIA BOTRANA* WITH PHEROMONE SEX TRAP AND DAMAGE SCORE AT MITIDJA VINEYARDS (ALGERIA)

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Abstract

The spatiotemporal dynamics of *Lobesiabotrana*was studied in the years 2006 at 2008 in the vineyards of the Mitidja. The samples were collected on three wine varieties (Cinsault, Carignan, Grenache) and three table grape varieties (Muscat of Alexandria, Beirut, Date Palm Cardinal). The establishment of four pheromones and alimentary traps per varieties implemented the monitoring system. The dynamics of adult male populations relatively similar between varieties, years and generations. Fluctuations in the butterflies were recorded from the very first statement for both traps installed. In total, four peaks were observed for all the tanks of grapes and/or tables.

The first flights started from the beginning of March and were spread out until mid-May, from more than two months. The second flight began in late May and was spread until the end of June, the number of males captured in pheromone traps being greater than that of alimentary traps. The third flight will start the last week of July and appears to be very short, with peaks usually experienced during the first decade of August. A month later, the start of the fourth flight were reported coinciding with the first decade of September, with relatively large numbers and this for both types of traps used. This flight continues until the stop of the harvest, in late October. This dynamic is relatively similar for all varieties.

Keywords: *Lobesiabotrana,monitoring, traps, damage, Mitidja vineyards.*

SEASONAL OCCURRENCE OF*THRIPS* ON TABLE GRAPES IN NORTHERN ALGERIAN VINEYARDS

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Abstract

A survey of thrips on vineyards cultivars was conducted since 2013 season on four table grape cultivars. Sampling of this pest was carried out on leaves, flowers and grapes in two locations West of Mitidja plain near Tipaza gouvernorate and Isser Valley near Bordj Manail, Boumerdes governorate ((Eurl Kerfah, Eurl Zerdali, Guesmia Exploitation and Annane exploitation). The inventory analysis revealed four species namely *Frankiniellela occidentalis, Drepanothrips reutei, Aeolothrips fasciatus* and *Liothrips sp*. The first two species are very common species in vineyards.

Monitoring seasonal fluctuations and their dynamic shows a net variability of abundances of these main Thrips based on periods of catch and catch methods, populations are maintained at relatively low levels in early spring, while a outbreaks more or less modest was observed in summer (June and July) relatively large populations have been captured (13 invidious by traps). The comparison of two methods to capture highlights blue water traps as type traps to capture a greater number of individuals during the whole cycle of the vine from the technical hype that has been effective only during flower period.

Keywords: *Seasonal occurrence, thrips, Mitidja, table grapes.*

STUDY OFINSECTICIDAL AND BEHAVIORAL EFFECTS OF FEW MEDICINAL PLANTS EXTRACTS OF *DROSOPHILAMELANOGASTER*

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Abstract

Two main objectives guided this study. The first focuses on the study of insecticidal powders leaves effect of : *Nerium oleander, Schinus molle, Eucalyptus camaldulensis, Urtica dioica, Olea europea* and *Myrtus communis* on adult *Drosophila melanogaster*.The second is to study the feeding behavior of *Drosophilamelanogaster* onaqueous extracts of these plants, expressed by the extension of the Proboscis. Five doses of leaves of these plants in powder form were tested12,14,16,18and20g. *Nerium oleander, Schinus molle, Eucalyptus camaldulensis, Urtica dioica* showed appreciable toxicity against *Drosophila melanogaster* with high mortality as a function ofdoses and exposure time. However,Myrtle powder and olive have been ineffective at the doses tested, but on the contrary, we note multiplication and proliferation of the species. The value ofthe shortest LT50 is registered with powder *N.oleander* is 14.21hours.Concerning taste response of*Drosophila melanogaster* to aqueous extracts, three doses were tested, 0,4,0,9 and 1,4mm. We note that all extracts almost completely inhibit the detection of sugar in doses 0,9 and 1,4mm, while the 0.4 mmdose had no effect on the detection of sugar by the insect. The dose of 0.4 mm in the presence of sucrose has a very highly significant effect on the extension of the Proboscis with attraction rate of 100% for whole aqueous extracts. As for 0,9 and 1,4mm doses, these have an antifeedant effect, inasmuch as the perception of sucrose mixed with different concentrations of extracts was null. (No response PER).

Keywords: *Médicinal plants, Drosophila melanogaster, Toxicity, TL50, PER.*

STUDY OF THE LARVICIDAL ACTIVITY OF HYDRO-ALCOHOLIC EXTRACTS *NERIUM OLEANDER* L. AND *RICINUS COMMUNIS* L. ON *TUTA ABSOLUTA*M.

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Abstract

The use of synthetic pesticides is now in frequent use in crop protection. But they are considered as a major problem on the environment, the flora and fauna or human health. Biopesticides of botanical origin are a good alternative to remedy this evil. Our study aimed at assessing the toxicity of hydro-methanoic, hydro-ethanoic and synergistic extracts of two toxic plants, including *Nerium oleander* and *Ricinus communis* growing spontaneously in the province of Mostaganem, on larvae of the tomato leafminer *T. absoluta.* (Meyrick), which is considered as a serious pest on tomato crop in Algeria. The extraction yields (Method of Soxhlet) obtained by the two hydro-methanoic and hydro-ethanolic extracts are (26%, 18%) for *N. oleander* and (35%, 29%) for *R. communis* respectively. However, the hydro-methanoic extract remains the most effective. These extracts were tested adopting the method of toxicity by direct contact or spray". The biological tests on the larvae of *T. absoluta* have shown that there is a difference between the toxicity of hydro-méthanoic and hydro-ethanolic extracts within the same plant. The synergistic extract caused a remarkable mortality rate that exceeded 90%. *N. oleander* et *R. communis*presented a low toxicity not exceeding 30% for the hydro-ethanolic extracts and 40% for the hydro- methanoic extracts. After 24 hours of exposure to the test, the LD50 values were very high (above 50%) for hydro-ethanolic and hydro-méthanoic extracts for the two plants used. However, the LD50 values were relatively low for the synergistic extract (19%).The results showed that L2 and L1 larvae are most sensitive to all extracts used. The L3 and L4 are the most resistant, except for the synergistic extract.

Keywords: *Bioinsecticides, Tuta absoluta, Nerium oleander, Ricinus communis, Toxicity, Hydro-alcoholic*.

QUANTITATIVE ANALYSIS OF PROTEINS AT SOME SPECIES OF INSECTS OF THE ORDER ORTHOPTERA

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Abstract

This study was carried out in the gardens and the experimental station of the Agronomic National School of El Harrach (36 ° 43 'N.; 3 ° 08' E.). The station is a collection of decorative plants divided into three layers, an arborescent layer, a shrubby layer, and a herbaceous layer. The station accounts for 50 Mr. with the top of the sea level. It presents a pluviometry of 590,1mm in 2010; 683.5 mm in 2011.and 836.2 mm in 2012. It belongs on the sub-wet bioclimatic floor at mild winter. The technique of sampling used for the capture of Insecta is that of the net to fauchoir at a rate of once per week. The selected biological models belonged to the order of Orthoptera and to the family of Acrididae For each analyzed species, the dry matter rate is conventionally given by the weight of these species after desiccation in a drying oven with circulation of air (JARRIGE, 1989).For each of the species analyzed, the dry matter content was conventionally determined by the weight of these species after drying in an air circulating oven (JARRIGE, 1989).Total nitrogen was determined by the Kjeldahl method. Organic nitrogen of the substrate to be analyzed was digested with concentrated sulfuric in the presence of an acid catalyst. Ammonia nitrogen formed was di splaced by sodium hydroxide and assayed by titration (JARRIGE 1989). The crude protein content was determined by the formula (JARRIGE, 1989): MAT% = N (%) x 6.25.The analyzes concerned both adults and larvae. Water contents recorded for all species tested ranged from 74.7% for the larvae *Aiolopus strepens* and 52.3% for the species *Oedipodacoerules censsulfurescens*. The ash rate for calcined species ranged between 3.5% and 9.7%. Protein levels found in different species waried between 11:0 and35:1%. The results obtained show that the protein content in larvae was more important compared to the adult stage except for *Euprepocnemis plorans* (35.1%) and males *Aiolopus strepens*24,9%). Apparently the males seem richer in nitrogenized matters than the females safe for Aiolopus thalassinus but with weak variations.

Keywords: *Insecta, Orthoptera, adult; larvae; Kjeldahl, total nitrogen*

THE ALLERGENIC POTENTIAL CHARACTERISTIC OF BELARUS APPLE CULTIVARS

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Abstract

Apples consumption can cause the allergic reactions due to presence ofvariety of allergenic proteins in fruits (the major apple allergens are: Mal d 1, Mal d 2, Mal d 3 and Mal d 4) and their cross-reactivity with other sensitizing allergens.

Some apples are high allergenic (Granny Smith and Golden delicious), the others – hypoallergenic (Jamba, Gloster, Boskop) due to the different content of allergens in the skin and pulp. Allergenicity of Belarusian apple cultivars has not been evaluated yet and the proteomic analysis for the allergen's detection still has not been applied.

Currently, we are carrying out the study of changes in the major apple allergens characteristics. These characteristics depend on the genotype and on the conditions of fruits storage and processing (drying).

On the basis of available datawe had completed the composition of the extraction buffer to obtain a protein preparation from the apple fruit pulp. We had substantially modified the technique for electrophoretic analysis.

The primary proteomic analysis of the major allergens content in Belarusian apple cultivars during a storage period and after drying has been carried out.

So, it is the first time in Belarus when the allergenic potential of domestic apple cultivars is being investigated by means of proteomic analysis in order to reveal the least allergenic genotypes.

On the basis of genomics and proteomics methods the cost-effective methodological approaches to apple allergens accumulation for practical use will be elaborated.

Keywords: *Apple cultivars, allergenic proteins, proteomic analyses.*

COMPARATIVE TESTING OF STOMP 33 EC AND WING P IN VINE NURSERY

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Abstract

The impact of Stomp 33 EC (330 g/l pendimethalin) and Wing P (pendimethalin 250 g/l + dimethenamid P 212.5 g/l) on the vegetative growth of grafted vine cuttings of Bolgar X CO4 variety during their rooting was studied during 2011-2013 at IVE – Pleven(Bulgaria).Comparing the impact of Stomp 33 EC and Wing P, both on the annual weed species, infesting the nurseries, as well as on the grafted vine cuttings, the objective of this study was to establish the applicability of Wing P for maintaining the soil surface in the propagation material production.

The trial was conducted on leached chernozem soil type. The herbicides were introduced once, immediately after planting of the cuttings in the nursery.. Stomp 33 EC and Wing P were introduced in two doses and the trial variants were as follows: V1 Stomp 33 EC (4 l/ha), V2 Stomp 33 EC (6 l/ha), V3 Wing P (4 l/ha), V4 Wing P (6 l/ha) and an untreated, weeded out control - K.The tested herbicides reduced the germination rate in the first ten-day period after treatment. However that effect was overcome and it did not affect negatively the final value of that indicator. Contrary to Wing P, Stomp 33 EC caused specific symptoms of phytotoxicity. It was accounted minimal decrease in the yield of grafted rooted vines.The rate of obtained premium vine propagation material after treatment with Wing P was equal to the manually weeded out control. Stomp 33 EC and Wing P efficiently controlled the available annual weed species except *Solanum nigrum* and *Xanthium strumarium*.

Keywords: *Germination, herbicides, phytotoxicity, vine cuttings, vine propagation material*

BIOLOGICAL AND BIOCHEMICAL EFFECTS OF LEMON AND ORANGE PEEL EXTRACTS ONBLACK CUTWORM*AGROTIS IPSILON* (HÜFN.)

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Abstract

The biological and biochemical effects of lemon and orange peel extracts were studied on the black cutworm *Agrotis ipsilon*. For the biological studies, 2nd instar larvae were treated by series concentrations of each tested extract (0.25, 0.50, 1, 2 and 4%). To determine the aspartate aminotransferase (AST), alanine aminotransferase (ALT), total protein and total lipid contents in 4thinstar larvae, the 2nd instar larvae were treated with the LC50 concentration of each extract. Results showed that the lemon peel extract was effective (85.40% larval mortality) than orange peel extract (74.97% larval mortality) after 2 days at 4% concentration. The two tested extracts caused a significant increase in duration of larval and pupal stages with (27and12.25 days, respectively in lemon extract) and (26and11.75 days, respectively in orange extract) at 4% concentration compared to 23and9.75 days, respectively in the control, while induced a significant decrease in the pupation, fertility and adult longevity with (44.38%, 44.75% and 3.25 days, respectively in lemon extract) and (50.35%, 49.22% and 6 days, respectively in orange extract) at 4% concentration compared to 90.83%, 89.25% and 12 days, respectively in the control. Also, the two tested extracts reduced the activity of AST and ALT enzymes showing 19.46 and 29.18%, respectively for lemon extract and 14.85 and 16.24%, respectively for orange extract compared with untreated larvae. While, decreased in content both of total protein and total lipid indicating 57.47 and 41.46%, respectively for lemon extract and 55.27 and 29.26% for orange extract compared with untreated larvae.

Keywords: *Lemon, orange, Agrotis ipsilon, biological, biochemical.*

THE EFFICIENCY OF *BT* CORN EXPRESSING ENTOMOCIDAL PROTEIN CRY1AB ON BIOCHEMICAL PARAMETERS OF *SESAMIA CRETICA* (LEDERER) (LEPIDOPTERA: NOCTUIDAE)

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Abstract

Corn is the second most plentiful cereal grown for human consumption, and many cultures around the world have lived on this grain. Chemical insecticides are an effective mean for the control and prevention of major damage caused by insect pests. However, the extensive and continuous use of traditional insecticides creates environmental contamination and could lead to development of insect resistance. Reduced pesticides risks are considered to be safer for human health and the environment and therefore are in constant demand as new control agents. The pink stem borer *Sesamia cretica*is considered the most serious corn borer in Egypt.The present investigation aims to throw a light on the efficiency of *Bt* corn on biochemical parametersof 4th larval instar of pink corn borer *Sesamia cretica* (Led.) under laboratory conditions. The resultsshowed that 24 h post feeding on *Bt* corn, caused a 36.05% increase in the larval protein content than their value in the control. Although, total carbohydrates were decreased by 49.13% in larvae comparing with their value in the control. The disturbance in the carbohydrate level was expressed by impairment in the activity of carbohydrate enzymes in treated 4th instar larvae. In treated instar larvae there was a significant increase in the enzyme activity of alpha and beta esterase as well as in acetyl choline esterase. Also, a significant increase in the enzyme activities of both Glutamic pyruvic transaminase and glutathione S-transferase was recorded in treated larvae the values were 24.68% and 69.78%, respectively. Meanwhile, there was no significant in Glutamic oxaloacetic transaminase level in treated larvae.

Keywords: *Bt corn, biochemical parameters, pink corn borer Sesamia cretica, larval protein content, carbohydrate level, carbohydrate enzymes.*

SUSCEPTIBILITY OF ONION THRIPS, THRIPS TABACI LINDEMAN (THYSANOPTERA: THRIPIDAE) TO OLD AND NEW GENERATION OF SPINOSYN PRODUCTS UNDER LABORATORY CONDITIONS

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Abstract

The spinosyn products are large family that shows potent insecticidal effects against large scale of insect pests .Rapid development of resistance to old generation of insecticides has been established inOnion thrips, *Thrips tabaci* production areas and being a key problem. Testing a new and relatively safe products may facilitate and help to find the best effective product.

The lethal effects of spinosad and spinetoram against nymphs and adults of onion thrips, *Thrips tabaci* Lindeman (Thysanoptera: Thripidae) were doneunder laboratory conditions, utilizing IRAC method no.10a and10 b.The results revealed that nymphs were more susceptible than adults. Further, spinetoram (new generation) was 8.3- and 9.3- fold stronger than spinosad (old generation) against nymphs and adults, respectively. Application of spinetoram in conjunction with naturally occurring beneficial arthropods are an excellent example of a functional onion integrated pest management (IPM) program. Spinetoram will be an excellent and promising tool to the integrated pest management (IPM) programs and insect resistance management (IRM).

Keywords: *Spinosyn products, Thrips tabaci, efficiency, toxicity.*

IN VITRO INTERACTION BETWEEN FUMONISIN B1 AND THE CAECAL MICROBIOTA OF PIGS

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Abstract

The *in vitro* study was conducted to determine the interaction between the mycotoxin fumonisin B1 (FB1) and the caecal microbiota of pigs. The caecal chyme was incubated anaerobically in McDougall buffer with and without FB1 (5 µg/ml) for 0, 24 and 48 h. The plate count agar technique on selective media was applied for enumerating amount of bacteria including aerobic, anaerobic bacteria, coliform, *Escherichia coli* and *Lactobacillus sp*. No significant differences in the amount of bacteria between the experimental (buffer, caecal content and FB1) and control groups (buffer + caecal content) were observed. The logarithmic number of *Lactobacillus sp.* did not change in the control group while it was increased from 7.76 ± 0.04 to 8.01 ± 0.11 during the incubation time in experimental group.

The FB1 and hydrolysed FB1 (HFB1) concentration were analysed by LC-MS. There was no significant difference in FB1 concentration between the experimental and the control group (buffer and FB1) at 0 h incubation, 5.185 ± 0.174 µg/ml compared with 6.433 ± 0.076 µg/ml. FB1 concentration in the experimental group was reduced to 4.080 ± 0.065 µg/ml at 24 h and to 2.747 ± 0.548 µg/ml at 48 h incubation and were significantly less than that of in the control group. HFB1 was detected after 24 h incubation (0.012 ± 0 µg/ml). At 48 h incubation time HFB1 concentration was doubled to 0.024 ± 0.004 µg/ml. These results indicate that FB1 can be metabolized by caecal microbiota in pigs though the number of studied bacteria did not change.

Keywords: *Fumonisin B1, Microbiota, Caecum, Pig*

BIOLOGICAL CONTROL OF THE DATE PALM TREE BORERS, *ORYCTES* SPP. (COLEOPTERA: SCARABAIDAE: DYNASTINAE)

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Abstract

The efficacies of the entomopatogenic nematodes (EPN), *Rhabdits blumi*, and the entomopatogenic fungi (EPF), *Beauveria bassiana* as a biocontrol agents were determined for the date palm tree borers, *Oryctes* spp. (Coleoptera: Scarabaidae: Dynastinae) in laboratory and field trials, during 2015 season. Laboratory results demonstrated that direct spray of 1000 infective juveniles (IJs) per mL of *R. blumi* on Arabian Rhinoceros Beetle (ARB), *Oryctes agamemnon arabicus* caused 71.67% and 15% mortality in the larvae adults respectively. Treating the food source of the larvae (pieces of fresh tissue of the frond bases) with the same dose and period resulted in 48.33% mortality in larvae and 10% in the adults. Laboratory results also showed that using concentration 1×10^{9} conidia/mL^{-1} of *B. bassiana* as direct spray of the ARB larvae, led to 66.7% and 60% as treatment of the food source. Field experiments results showed that injection of 50 mL per palm tree with a concentration of 1000 IJs/mL of *R. blumi* inflected about 42% mortality in ARB larvae infested the tree. Meanwhile, injection 50 mL of 1×10^{9} conidia/mL^{-1} of *B. bassiana* imposed 50% mortality in larvae. Results of this investigation illustrate the possibility of using *R. blumi* and, *B. bassiana* as a bicontrol agents against palm borers in IPM programs.

Keywords: *Biocontrol, Endophyta, Palm borers, Oryctes spp.*

FLAME TREATMENT FOR POTATO HAULM DESTRUCTION IN ORGANIC PRODUCTION

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Abstract

The timely destruction of the potato haulm is required to anticipate skin-set and stolon separation ahead of natural maturity, reducing tuber damage and scuffing during harvest. The complete desiccation of leaves and stems must be assured to prevent re-growth. Chemical or mechanical methods or a combination of both are available for desiccation, but only non chemical methods are available for organic potatoes. An option is the application of a physical treatment based on the use of instant heat. The technology uses Liquefied Petroleum Gas(LPG) for generating the open flame to rupture plant cells and dehydrate the canopy effectively, avoiding the use of herbicides. Two different treatment methods were tested with specifically designed flaming machinery. The first models performs the broadcast flame treatment over two rows at once, coupled with two rear rollers that mechanically bend over the flamed stems and close soil cracks so that tubers are not exposed to sunlight. The second model is a combined machine assembly, with a flail shredder and a broadcast flamer. In a single pass the canopy is shredded and the flame subsequently impacts directly on the base of the potato stems. The two treatments were compared for effectiveness in relation treatment speed and to thermal dose. Operative parameters were adjusted for optimal exposure time and appropriate forward speeds. The first machine is slower and consumes more gas (3÷4 km h^{-1}, 35÷45 kg ha^{-1} LPG consumption), the combined increases hourly working capacity by 25%, reducing fuel consumption (25 kg ha^{-1}).

Keywords: *Solanum tuberosum, flaming, mechanization, flailing, instant heat, operative parameters*

DETERMINATION OF NATURAL RADIONUCLIDE IN PIG PRODUCTION CHAIN IN MACEDONIA BY GAMMA SPECTROMETRY

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Abstract

Exposure of animals to ionizing irradiation may be a significant pathway for transfer of radionuclides to human food chain, thereby adding to the exposure burden. Therefore, radiation control of animal feeds and animal products will reduce risk for radioactive hazards to human health. The study was carried out in order to detect the natural radioactivities in edible parts of pigs, excrements and feeds in one commercial pig breeding farm in Macedonia. Therefore, ^{40}K, ^{212}Pb, ^{214}Pb, ^{228}Ac, ^{235}U, ^{241}Am, ^{212}Bi, ^{214}Bi, ^{232}Th, ^{7}Be and ^{226}Ra were measured using gamma spectrometry. Gamma spectrometer Canberra Packard with a high-purity germanium detector and Marinelli beakers (1 l capacity) were used for the samples measurement. The most prominent gamma energies observed in the spectra belonged to the naturally occurring radionuclides ^{40}K,^{235}U and ^{232}Th. Other nuclides if present occurred infrequently at low levels. The result show that ^{40}K made the largest contribution to the specific radioactivity in all the samples. The mean activity concentration of the ^{40}K in edible organs (kidney and liver), muscle, excrements and feeds was: 73.39±9.109 Bq/kg; 111.26±3.88 Bq/kg; 298.80±38.51 Bq/kg; 83.60±10.279 Bq/kg, respectively. The ^{235}U and ^{232}Th were detectible only in feed samples (0.53±0.293 Bq/kg; 163.69±23.791 Bq/kg, respectively) and samples from excrements (0.25±0.021 Bq/kg; 58.17±1.062 Bq/kg, respectively). The other radionuclides were detected only in few samples and the measured activities were below the detection limit. If we take in consideration the activity concentration of the most frequently occurred ^{40}K found in all samples, than there was statistical significant difference between radioactivity concentration in organs, muscle, excrements and feeds ($p<0.001$).

Keywords: *Gamma spectrometry, pig production, radioactivity*

DETERMINATION AND MANAGEMENT OF QUORUM SENSING SIGNALS PRODUCED BY *PECTOBACTERIUM*, A BLACKLEG PATHOGEN

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Abstract

Blackleg, a bacterial disease caused by *Pectobacterium atrosepticum*(*Pba*) inflicts incredible losses to potato crop in fields. In Pectobacteria, pathogenicity and virulence is regulated through quorum sensing (QS) in a density dependent manner utilizing N-acyl homoserine lactones (NAHLs) as QS signaling molecules. Interference with QS through Quorum quenching (natural or engineered) is a demonstrated biocontrol tool. In this study, potato plants with characteristic blackleg symptoms from Okara district of Punjab were investigated and the pathogen responsible for the disease was identified as *Pba* through pathogenicity, biochemical (Crystal Violet Pectate) and tuber assays. PCR analysis of *pectobacterium* were also done by using gene specific primers. NAHLs produced by the local *Pba* strains were determined and evaluated through biosensor based plate assays using *Chromobacteriumviolaceum* (Cv026) and *Agrobacterium tumefaciens* (NTLR-4) biosensors. Also, several NAHL degrading strains were sorted out from rhizosphere soil and their ability to degrade exogenous NAHLs was evaluated. Out of thirty eight bacterial isolates, eight effective quenchers were then trialed against *Pectobacterium* under plate and tuber assays that effectively reduced *Pectobacterium* based infections.

Keywords*:* *Pectobacterium, Quorum Sensing, Quorum Quenching, Biosensor and Rhizosohere*

MOLECULAR DIVERSITY ANALYSIS OF BEGOMOVIRUSES IN CAPSICUM ANNUM

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Abstract

Chili plant (*Capsicum annum*) is an important vegetable crop and famous for its pungency around the world. Chili is the rich source of proteins and vitamin A, B, C, E and P. It belongs to family *Solanacea* and grown worldwide. Chili Leaf Curl Disease (ChLCD) is the major disease of chili which is caused by begomoviruses and cause upto 100% yield losses. *Chili Leaf Curl Virus* (ChLCV) is the monopartite ssDNA *Begomovirus* having DNA-A which comprises of 2754 nucleotides having six ORFs and betasetallite of size 1.3kb. Samples of infected chili leaves were collected from different fields of Faisalabad, Pakistan. Genomic DNA was extracted by CTAB method. Circular molecules from genomic DNA were amplified by using Rolling Circle Amplification (RCA). Three samples showed successful RCA which further used in PCR amplification. For amplification of full length *Begomovirus* from RCA product universal primers were used. Betasatellite component associated with ChLCD was amplified with the help of PCR by using full length universal primers (β01 and β02).PCR products were digested with common restriction enzyme for diversity analysis. RFLP analysis showed that single type of *Begomovirus*and diverse type of betasatellite molecules are prevailing in infected chili samples.

Keywords: *Chili Leaf Curl Disease, Begomoviruses, Chili Leaf Curl Virus, Betasatellite.*

INVASIVE WEEDS: THE POSSIBLE THREATS TO BIODIVERSITY AND LIVELIHOOD IN NORTHWEST PAKISTAN

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Abstract

Invasive weeds are posing the major threat to the biodiversity and crop production globally, including Pakistan. These weeds are mostly alien, however, some of the local ones have become invasive due to ecotypic changes in their micro-habitat due to climatic changes. Moreover, after the 2010 floods, some of the plants of higher altitudes in Himalya-Hindikush range have become invasive in the plains. These invasive weeds are successful due to their compatibility with a number of biotic and abiotic stresses. In Northwest Pakistan, *Silybummarianum*is native for decades and has become invasive, while *Partheniumhysterophorus*in anexotic invasive weed species and has invaded agricultural and non-agricultural lands, like roadways, railway tracks, waste lands, grazing pastures.The favourable climatic factors have enabled these two weeds to invade, establish, spread and displace native plant species and also associated native fauna. However, there are several uses of these weeds in a variety of ways, including use of *Silybum marianum* seeds in hepatitis in powder form and also extraction of silymarin for use in liver diseases, including chronic hepatitis and cirrhosis and similarly use of dried Parthenium as fuel. But the known deleterious effects are threatening the overall biodiversity of northwest Paksitan, including mouth sours of some grazing animals. In addition to the fore-mentioned uses and abuses, both weeds are threat to biodiversity and will replace our indigenous flora and associated fauna. Experimental data and survey suggest that the spread of these plants should be prevented and farmers should be made aware of the threat posed by such weeds.

Keywords: *Weed, Parthenium hysterophorus, Silybum marianum, Biodiversity*

RISK ASSESSMENT OF GENETICALLY MODIFIED CROPS: CURRENT STATUS IN PAKISTAN

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Abstract

The rapid progress in biotechnology has significantly promoted the development and production of Genetically Modified (GM) plants. The extensive global cultivation of GM crops has generated greater benefits that might provide opportunities for solving problems related to food security. However, it has also raised considerable biosecurity concerns worldwide. Major concerns from genetically modified crops are on natural environment, human and animal health andsociety. The potential environmental consequencesdue to transgene escape from a GM crop to its non-GM crop counterparts (crop-crop) and weedy or wild relative (crop-weed) via gene flow are the most debated biosafety issues internationally. GM crops are truly biological novelties. Their release into the environment poses concerns about the unpredictable ecological and evolutionary responses that GM species themselves and the interacting biota may express in the medium and long term. One of the consequences of GM crop may be a generalized contamination of natural flora by GM traits and a degradation and erosion of the commonly owned genetic resources available today for agricultural development. GM plants carrying pharmaceutical and industrial traits will pose even more dangerous risks if released in the environment.These concerns can be resolved by developing efficient investigation techniques via modern biotechnology and genetic engineering.A systematic risk assessment will facilitate the appropriate prediction of potential environmental consequences caused by GM crops.

Keywords: *Biosafety, GM crops, environmental issues, biotechnology, gene flow*

EFFECT OF CLIMATIC FACTORS ON GROWTH, COMPETITIVE ABILITY, DISPERSAL, AND SEED PRODUCTION POTENTIAL OF WEEDS AND NUTRITIONAL STATUS OF WHEAT

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Abstract

Investigating the relationship between weeds and environment is the focus of researchers for sustainable weed management. The global issues of herbicide resistance and other related problems due to herbicide application have diverted the thinking of researchers to find better understanding of weeds-environment interactions. As per estimated losses due to weeds in Pakistan, the losses are in billions of rupees each year. Studying the effects of environmental factors, it was observed that light, temperature and salinity under lab condition can affect the growth and development of major weed species found in Pakistan. The field observations have verified that changing environmental factors have accelerated the growth and seed production potential of major weeds. Similarly, the competitive index of weeds with the crop is also different under different ecological zones. The plants which were restricted to one type habiatat have now escaped to other parts or are becoming extinct due to various pressures, including climatic factors. Therefore in light of the several studies, it is suggested that integrated efforts of ecologists, agriculturists, botanists and environmentalists are needed for the effective management of major weeds in the country.

Keywords: *Environment, climate, growth, weeds, competition*

PCR AMPLIFICATION AND CLONING OF BEGOMOVIRUS ASSOCIATED WITH COTTON LEAF CURL DISEASE

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Abstract

Cotton (*Gossypium hirsutum* L.) belongs to family *Malvaceae*, is mostly used in textile industry. Cotton plays important role in the world's economy. Cotton leaf curl disease (CLCuD) is serious threat in Asia to cotton crop. Monopatite begomovirus is associated with CLCuD and transmitted by Bemisia tabaci. Monopartite begomovirus consists of DNA-A component and betasatellite. DNA-A component of begomovirus plays key role in insect transmission, replication and coat protein synthesis while betasatellite is symptom modulating molecule which dependent on helper component for their replication and movement within and between plants. During this study, young infected leaves were collected from different fields of district Kasur (Punjab). Total DNA was isolated by CTAB method. DNA-A and betasatellite component were amplified through PCR by using universal primers. Amplified product was ligated in pTZ57R/T vector using ligase enzyme. Clone was confirmed through restriction enzymes KpnI. Further in silico analysis of different viruses with the help of Restriction Fragment Length Polymorphism (RFLP) was done. These analyses revealed that CLCuD in district Kasur is due cotton leaf curl Multan virus (CLCuMV).

Keywords: *Cotton leaf curl virus, Cotton leaf curl disease, DNA-A, Betasatellite, Restriction enzymes.*

EVALUATION OF LOCAL GERMPLASM OF UPLAND COTTON AGAINST *XANTHOMONAS CAMPESTRIS PV. MAVACEARUM*

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Abstract

Bacterial blight (BLB), of cotton is caused by *Xanthomonas campestris* pv. *malvacearum* (*Xcm*) which is a common disease affecting the growth, development and yield of cotton cultivars in all cotton growing areas of the world. The experiment was conducted in University of Agriculture Faisalabad Pakistan. For the experiment survey was conducted in major cotton growing areas of Punjab (Multan, Bahawalpur, Vehari, Chiniot, and Faisalabad) for the collection of diseased samples. The samples were brought into laboratory in Plant Pathology Department and *Xcm* was isolated and purified. For the confirmation of bacteria gram staining and KOH test were performed. The bacterial suspension was prepared for the inoculation of *Xcm* into field for pathogenicity test. Fifty different Bt and non-Bt cotton commercial cultivars were grown and screened against *Xcm* under natural and artificial conditions on the basis of morphological and physiological parameters.

After inoculation number of bolls and number of flowers were counted on both control and artificially inoculated verities. Chlorophyll meter was used for the evaluation of chlorophyll contents in plant leaves both in inoculated and control replications. Out of 50 verities there were 0 immune, 23 were tolerant, 21 were susceptible and 6 were highly susceptible. Relative membrane permeability (RMP) and relative water content (RWC) analysis shows that *Xcm* effect both RMP and RWC of inoculated varieties. Yield data was recorded which clearly indicate that *Xcm* highly affect inoculated varieties yield as compared to control.

Keywords: *Bacterial blight (BLB), Xanthomonas campestris pv. malvacearum (Xcm).*

REASONS FOR LOW EFFICACY OF SYNTHETIC AGROCHEMICALS AND THEIR HARMFUL EFFECTS ON HUMAN HEALTH: WITH PAKISTAN AS A FOCUS

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Abstract

Humans depend on plants and plant products for food and shelter. Numerous insect, pests and many other abiotic factors significantly deteriorate quality and quantity of the products. Agrochemicals are widely used in managing these fatal diseases as these chemicals are active in their mode of action. Farmers in most of the cases don't follow the instructions as directed by the Agrochemical companies, thus failing to get significant results and also receive harmful effects on their health. Due to injudicious use of Agrochemicals unconsciously, farmers get exposed directly or indirectly to the pesticide toxicity thus suffering from various acute and chronic ailments and also results into environmental pollution. According to WHO, it was estimated that in developing countries 18,000 people die every year due to mishandling of pesticides. Field survey was conducted in various, cotton, wheat, rice, maize, sugarcane and vegetable growing fields in Lahore, Okara, Sahiwal, Multan and Faisalabad districts in Punjab, Pakistan. Data collected from 50 farmers from each region indicates that low chemical efficacy, phytotoxicity and harmful effects on human health are the results of ignorance and lack of information regarding pesticide application.

Keywords: *Agrochemicals, efficacy, health hazards, toxicity, pollution.*

YOGHURTS MADE FROM ECOLOGICAL MILK OF GOATS AND COWS – SELECTED QUALITATIVE FEATURES DURING COOLING STORAGE

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Abstract

The goal of this analysis was the assessment of selected qualitative features of yoghurts made from goat's and cow's milk during cooling storage (5±0.5°C). Two variants of yoghurts from cow's and goat's milk were produced. The differentiating factor was the type of used yoghurt culture. Two cultures of Chr. Hansen's YC-X16 and YF-L811 were used. They both do not differ with respect to the qualitative composition of starter bacteria (they consist of *Streptococcusthermophilus* and *Lactobacillus delbrueckii* subsp. *bulgaricus*), however, their use allows to obtain products with slightly different qualitative features.

Test drinks were analysed microbiologically, physiochemically (titratable acidity, pH) and rheologically (hardness). Microbiological analysis consisted of the number of yoghurt microflora cells using MRS and M17 agar (Merck). Additionally, yoghurts were the subject of team sensory assessment with respect to their look, taste, scent and consistence [ISO 6658:1998]. The storage of yoghurts significantly influenced the viability of starter bacteria, independently from the kind of applied milk. The differences in titratable acidity, pH, hardness and sensory features with respect to applied culture and the time of cooling storage were observed. Also the changes of some toxic organochlorine pesticides (OCPs - αHCH, βHCH, δHCH, γHCH, aldrin, dieldrin, heptachlor, pp'DDT, op'DDT, pp'DDD, op'DDD, pp'DDE) residue during yoghurts cooling storage were examined. The health hazard assessment was also carried out. During the cooling storage of yoghurt the changes in the content of some OCPs were observed. It confirms the influence of yoghurt starter cultures on changes in organochlorine pesticides content during storage.

Keywords: *Starter cultures of yoghurt, cooling storage, goat's and cow's milk, organochlorine pesticides*

THE EFFECT OF WATER EXTRACTS FROM *ARTEMISIA DRACUNCULUS* L. ON COLORADO POTATO BEETLE LARVAE FEEDING

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Abstract

Effective protection of plants against pests has become very difficult in recent years. The chemicals do not provide adequate level of plants protection because pests are more often able to immunize to these substances. Moreover, pesticides often have a negative effect on all elements of the environment. One of biological plant protection methods is the use of plant extracts that may reduce pests feeding effectively. The aim of this study was to determine the effect of water extracts prepared from dry and fresh matter of *Artemisia dracunculus* L. on feeding of Colorado potato beetle L2, L3, L4 stage larvae. Dried extracts were prepared at concentrations of 2%, 5% and 10%, while the fresh plant at concentrations of 10%, 20% and 30%. Larvae feeding intensity assessment was conducted by dipping leaves of potato in respective solutions of the extracts, and determining the mass of food consumed by larvae, and changes of larvae body weight once daily. In addition, absolute deterrence index and palatability index were calculated. The results of the experiment showed that L2 stage larvae are the most vulnerable to the effects of extracts. Extracts prepared from both dry and fresh matter at two highest concentrations contributed to the greatest reduction of these larvae feeding and decreased their body weight. Extract from dry matter at concentration of 10% reduced the feeding of L3 and L4 stage larvae. With increasing concentrations of extracts their deterrent effect on the tested larvae was usually increasing while the value of palatability index was decreasing.

Keywords: *Biological control, water extracts, Artemisia dracunculus L., Colorado potato beetle*

THE IMPACT OF BACTERIAL CULTURES ON PCB CHANGES IN YOGHURT- ALTERNATIVE METHODS OF REDUCING TOXIC COMPOUNDS IN DAIRY PRODUCTS

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Abstract

Dairy products are valuable components of human diet, constituting 27—30% of total foods, but they have a tendency to accumulate harmful compounds. Persistent Organic Pollutants (POPs), including polychlorinated biphenyls (PCB), may create serious health hazard for consumers due to their lipophilic character, high stability and toxicity. These compounds are common in raw milk and milk products. Therefore, to supply the consumers with food of the lowest possible level of pollutants, it is important to estimate the influence of dairy production technological processes on changes in toxic PCB congeners contents. Yoghurt starter cultures occurred effective tools in decreasing the toxicity equivalent of yoghurts. The presence of two probiotic starter cultures*: Lactobacillus acidophilus* and *Bifidobacterium sp*., in A.B.T Abias yoghurt starter culture was likely the reason of its highest efficiency to reduce the toxicity equivalent (TEQ PCB) in yoghurts by nearly 50%. However, the use of any of the four tested milk fermentation cultures for the production of yoghurts and probiotic drinks does not ensure a complete biodegradation of any of the tested PCB congeners. They contribute to a distinct reduction in the PCBs content in the end products, with simultaneous distinct increase in PCB 28 and PCB 77, which may result from degradation of more chlorinated congeners. These results should be treated as a pilot study, showing a new direction of research, leading to an improvement in the quality of fermented dairy articles in the area of exposure hazard to long lasting POPs.

Keywords: *PCB congeners, toxic equivalent, yogurt starter cultures*

CHARACTERISTICS OF CAUSAL AGENT OF VALDENSIA LEAF BLIGHT ISOLATED FROM HIGHBUSH BLUEBERRY PLANTS IN POLAND

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Abstract

Valdensia leaf blight is caused by *Valdensia heterodoxa*. This fungus is classified in the phylumAscomycota and familySclerotiniaceae. For the first time pathogen was observed and described in 1953 by Peyronel in Italy on bilberry plants (V*accinium myrtillus* L.). Since that time fungus has been noted on a few common plants species in North America, Asia and Europe. Majority of host plants of this pathogen belongs to Ericaceae family. In Poland this polyphagous has been observed on tree and herbaceous plants growing in the Białowieża since the beginning of the 20th century. In 2011 symptoms of this disease were also observed on highbush blueberry plants (*Vaccinium corymbosum* L.) grown on one nursery plantations in Mazovia province. The aim of the study was to determine the occurrence of *V. heterodoxa* in Poland and characterise its isolates using traditional and molecular methods. From leaves of highbush blueberry plants with visible symptoms of valdensia leaf blight isolates were obtained. Growth dynamics of some isolates were measured on four media: PDA, OA and SNA in laboratory. Culture morphology and isolate ability to produce conidia were examined as well. Size of conidia obtained from leaves and those from media were compared. Fourteen-day cultures of *V. heterodoxa* grown on PDA were used to extract fungal DNA. Amplification of selected parts of rDNA (18S-ITS1-5.8S-ITS2-28S), β-tubuline and 1-alfa elongation factor (EF-1) genes was performed in PCR.

The best daily rate growth of culture area of all selected isolates was noted on PDA medium and theweakest on SNA. Only on OA medium conidia was observed. First ones appeared after 8 days. No difference was noted between size of conidia from leaves and those from media. Bioinformatics analysis provided for three genes (ITS fragments, β-tubuline and EF-1α)exhibited 100% similarity between sequences obtained from all isolates of *V. heterodoxa.* ITS fragment was similar in 99,9% to other sequences of this fungus deposited in GenBank from other country. Based on sequences of β-tubuline gene revealed closely molecular relation between obtained isolates and other fungi from *Sclerotiniaceae* family.

Keywords: *Vaccinium corymbosum, β-tubuline, elongation factor, ITS.*

ASSORTMENT OF EASTERN PERSIMMON AND THE WAYS OF ITS IMPROVEMENT

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Abstract

High-productive, frost-resistant, immune cultivars with different ripening periods have been selected in the result of the researches on determination of biological potential for eastern persimmon in the conditions of South Coast of the Crimea (Russia). The best cultivars of Nikita Botanical Gardens were obtained as a result of inter-species and intra-species crossings. The detailed study of this gene fund allows to classify the persimmon cultivars and select the most perspective ones according to their characteristics (productivity, fruit quality, resistance to diseases). The specification of biological and morphological characteristics of cultivars has been summarized. The data on phenological observations and evaluation of cultivars on fruits quality have been given. The most promising cultivars for using in breeding processes and laying of industrial plantations of intensive type have been selected.

Keywords: *Persimmon, cultivars, group, crop, fruit quality*

Acknowledgements

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THE POTENT OF DIFFERENT *TRICHODERMA* SPECIES AS BIOCONTROL AGENTS AGAINST *MELOIDOGYNE JAVANICA* ON TOMATO

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Abstract

Three Saudi isolates of *Trichoderma* sp. were assessed for their potential biological control against *Meloidogyne javanicain vitro* and under greenhouse conditions. The fungal isolates were morphologically and molecularlyidentified as *H. harzianum*, *H. hamatum* and *H. atroviride*. The granular nematicide, fenamiphos 10G, was used for comparison. Results of the *in vitro* test showed that the mortality of second-stage juveniles(J_2s) increased ($P \leq 0.05$) proportionally to both time increase (2 to 4 to 6 days after exposure) and the concentration of fungal filtrates (25 to 50 to 75%). In greenhouse (two tests), tomato plants were treated with three dosages of fungal-colonized wheat grains of each fungus (5, 10 and 15 g/pot) before inoculation with *M. javanica*. Sixty days after nematode inoculation, fenamiphos was the most potent treatment where it reduced the root damage up to 99.5% and the nematode reproduction up to 99.0%. The most efficient fungal treatment was *T. atroviride* @ 15g/pot which provided about 74% reduction in root damage and 71% reduction of nematode reproduction.All fungal treatments enhanced tomato growth parameters, but fenamiphos was also the most potent treatment in this respect. These Saudi local isolates of *Trichoderma* might rise asreasonable options of biological control agents in the integrated management programs of *M. javanica* on tomato.

Keywords: *Biological control, root-knot nematode, Saudi Arabia, Solanum lycopersicum.*

RESISTANCE OF SOME WHEAT VARIETIES TO *BLUMERIA GRAMINIS TRITICI* IN SERBIA

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Abstract

This paper presents the results of study on the resistance of wheat varieties to *Blumeria graminis tritici*.During the 2010-2011 period, in the Small Grains Research Centre in Kragujevac, investigations were performed of resistance at 140 commercial wheat varieties in the field conditions. Sowing was carried out in rows length of 1 m, catch variety in one row, with distance of 20 cm. In the period of maximal development of parasites estimations of reaction of investigated cultivars were carried out by determination of types of infection from 0 to 4 and intensity of infection from 0 to 100%.

Majority of them belong to average susceptible category (60.35%), than to susceptible (23.92%) and intermediate (9.64%). Consideration of results demonstrated that mayority of varieties were susceptible to *B. graminis tritici*(84.22%), while limited number of varieties were resistant (5.73%). In season 2010, varieties Jasenica, Fortuna and Nera were very resistant, while in 2011 the most resistant were varieties Fortuna, Pesma and Dina, with coefficient of infection 0. At some varieties (Fortuna, Dina and Pesma) differences in resistance were established depeding of season of investigation.

These investigations underlines the importance of work on creation of new wheat cultivates.

Keywords: *Blumeria graminis tritici, resistance, variety,wheat, Serbia*

THE VIRULENCE SPECTRUM OF *PUCCINIA GRAMINIS TRITICI* FROM DIFFERENT *BERBERIS* SPECIES

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Abstract

The paper presents the virulence spectrum of the *Puccinia graminis tritici* populations from *Berberis* spp. The investigations were carried out at the Small Grains Research Centre in Kragujevac over 2011 and 2012. The aecidiospore samples were collected from 24 species of *Berberis* spp. from the Kragujevac collection. Then most widespread was the pathotypes with virulence's formula (V/A): / 5, 21, 9e, 7b, 11, 6, 8a, 9g, 36, 9b, 30, 17, 13, 22, 24, 25, 26, 27, 29, 31, 32, 33, 37 (50%) that did not contain virulence alleles for the Sr wheat resistance genes studied. The maximum total number of spots with aecidia on the leaf was recorded on May 14, 2011 and on May 18, 2012, being 2053 and 2322, respectively. The aecidia formation rhythm differed between the years.

Pathotype BBB was the most widespread (50%) whereas the rest of the pathotypes were present at considerably lower level (4.55-18.19%). Twelve virulence formulas were identified and the highest frequency was recorded with the virulence genes V5, V7b and V6 (45.46%). Resistance genes Sr36, Sr31 and Sr33 were 100% effective.

Although *Berberis* spp. Is not a necessary precondition for the rust incidence and spreading, the intensity of the disease is known to be higher in the presence of this intermediate host.

Keywords: *Berberis* spp., *Puccinia graminis tritici, virulence spectrum*

DETERMINATION OF CYPRODINIL AND FLUDIOXONIL RESIDUES IN LETTUCE BY LIQUID CHROMATOGRAPHY/DIODE ARRAY DETECTION

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Abstract

The objective of this study was to develop and validate analytical method for simultaneous determination of cyprodinil and fludioxonil residues in lettuce, based on QuEChERS sample preparation procedure and high performance liquid chromatograph (HPLC) equipped with diode-array detector as detection device. The validation of method was carried out in accordance with SANTE/11945/2015 guidelines.The accuracy of the method, evaluated by recovery studies at three fortification levels (0.1, 15 and 40 mg/kg) in blank lettuce samples, were 87.1% and 85.9%, with relative standard deviations (RSDs) of 1.1% and 2.4%, for cyprodinil and fludioxonil, respectively. Within a concentration range from 0.02-40.0 µg/ml, cyprodinil and fludioxonil showed linear calibration with correlation factor (R^2) of0.994% and 0.995%, respectively. The detection and quantification limits of 0.02 and 0.05 mg/kg are below MRLs for cyprodinil and fludioxonil residues in lettuce, set by Serbian (15 mg/kg) and EU (15 mg/kg and 40 mg/kg) legislation. The results obtained in this study confirm that proposed method is easy and reliable for the determination of the analyzed fungicides residues in lettuce.

Keywords: *Cyprodinil, Fludioxonil, Lettuce, Residue.*

CONTENTS OF COPPER AND ZINC IN SOME TYPES OF FRUIT BRANDIES

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Abstract

The aim of this paper is to analyze the content of copper and zinc in eight samples of fruit brandies made from pears, apricots, plums and grapes. The brandies produced in the traditional way (homemade) and produced industrially (commercial). The samples were taken from different markets of Serbia and Bosnia and Herzegovina.The largest content of copper is registered in plum brandy of homemade production (8,654-9,250 mg/kg) and industrial production (4,425-5,208 mg/kg). Higher concentrations in homemade brandy may be the result of production in copper stills, improper use of fungicides, high content of organic acids and other agents. The sample of pear brandy was produced in the Sarajevo valley had elevated levels of zinc (0,763-0,913 mg/kg). The elevated levels of zinc in this brandy may be the result of improper application of pesticide with this element or due to production in the stills that are not made of pure copper, but include brass ingredients. The contents of copper and zinc in analyzed fruit brandies are within the maximum allowed concentration, which indicates their satisfactory quality with respect to these parameters.

Keywords: *Copper, zinc, fruit brandies*

LEVEL OF LARVAL ATACK ON MAIZE ROOTS AS A CONSEQUENCE OF ARTIFICIAL INFESTATIONWITH WESTERN CORN ROOTWORM EGGS

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Abstract

The Western corn rootworm (WCR), *Diabrotica virgifera* sp. *virgifera* (Col., Chrysomelidae), is an oligophagous pest native in America. WCR is a maize pest present in all regions of the Corn Belt. It is an invasive species which was, in Europe, first identified in Serbia, in 1992, near the Belgrade airport. The presence of this pest in maize field can cause losses and plant damages up to 100%. A field experiment was carried out in Bečej, Vojvodina province (Serbia), during 2014 and 2015. In the field, 96 plants (maize cultivar NS 640), arranged in 48 pairs were selected. Each pair consisted of one plant artificially infested with WCR eggs (D plant) and the control plant (C plant). In both years, the experiment in the field was regularly inspected, once a week. During each observation, the presence of "goose neck" symptoms was recorded, and the number of plants damaged by the most important stem boring and leaf feeding insects (*Ostrinia nubilalis*, *Helicoverpa armigera*, *H. zeae*, aphids, mites, cicadas, etc.) was counted. Root damages were assessed at the end of the experiment (September), according to Ostlie and Notzel (1987), on scale 1-6. Comparing the root damages on C and D plants, less root damages were established on C plants. Only six i.e. four D plants had healthy roots (rate 1) during 2014 and 2015, respectively. Between D plants in 2014, the most damaged were14 plants, with the rate 3 (least one root chewed to within 1½ inches (3.8 cm) of the plant). In 2015, severe damages were registered on 18 plants, which were ranked as level 6 (with three or more nodes destroyed). Only two C plants during vegetation 2014-2015were registered with damages with rate 5 (two nodes destroyed) and rate 6 (three or more nodes destroyed), respectively.

Keywords: *Maize, WCR, Artificial infestation, Root inspection, Damages.*

HARMFUL ORGANISMS OF GRAIN AS POTENTIAL RISKS TO HUMAN HEALTH

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Abstract

One of the main imperatives of agriculture and processing industry is the production of safe food of high nutritional quality free of biological, physical and chemical contaminants. Cereals are an essential partof human nutrition.Microorganism represents permanent microflora elements of cereals and fruits. The most frequent moulds are *Aspergillus, Penicillium, Fusarium, Claviceps* and *Alternaria*. Some of them biosynthesizes and excrete mycotoxins (aflatoxins, ochratoxins, sterigmatocystin, zearalenone, fumonisin, deoxynivalenol, ergot alkaloids). Data testify that about 25% of the total world production of grain is contaminated with at least one mycotoxin. Among the raw materials that are usually contaminated with mycotoxins are cereals, maize, oilseeds, dry and stone fruits. Mycotoxins in humans and animals cause mycotoxicosis and manifest mutagenic, teratogenic, embryo-toxic, hepatogenic, nephrotoxic, dermatogenic and carcinogenic effect. Stored products are also attacked by storage pests. The most important insect storage pests are *Sytophilus granaries*, *Rhyzopertha dominica,Tribolium* sp., *Pyralis farinalis,Sitotriga cerealella*, *Plodia interpuctella*, *Ephestiakuehniella* and *Tinea granella*. Contamination by insects, their metabolites and excrements reduces the quality of the food and makes it unsuitable for consumption. Many insect species are hosts and vectors of pathogens of man and/or animals. Carcinogenic and teratogenic substances are produced only by *Tribolium* sp. Professional exposure to the infested dust of grains is associated with changes in the type of allergic conjunctivitis, dermatitis or asthma. From rodents as storage pests and vectors of infectious diseases emphasize *Ratus norvegicus*, *Mus musculus* and *Rattus rattus*. Contaminants of food are global problem, they cause economic damage and have a negative impact on food and feed i.e. human and animal's health.

Keywords: *Mycotoxins, insects, health risks.*

COMPARASION OF ANTIOXIDANT AND ANTIBACTERIAL ACTIVITIES OF ALCOHOLIC LEAF EXTRACTS OF LOCAL OLIVE VARIETIES IN SYRIA

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Abstract

The aim of the current study was to investigate the antioxidant activity, expressed as Gallic Acid Equivalent (GAE) and antibacterial activity, expressed as Minimal Bactericide Concentration (MBC) of the olive leaves of Syrian local varieties. The research was conducted in The National Commission for Biotechnology (NCBT), Damascus, Syria in 2014.

Thirteen samples of olive leaf from different local varieties (Abou-Shouki, Dan, Gilit, Istanbouli, Nibali, Toufahi, Touliani, Arabquine, Sourani and Vilamatia) were collected in July 2014 from Qunitera, Syria. In the first part of the study, relative antioxidant capacity expressed as total phenol contents of the olive leaves were determined as GAE (g/100 g dry weight). In the second part, ethanolic extracts (ethanol: water, 70: 30) of olive leaves were prepared and were examined for they antimicrobial activity. The alcoholic extracts were applied on 4 Gram positive bacteria (*Staphylococcus aureus*, *S. epidermidis*, *Bacillus subtilis*, *B. cereus*) and 4 Gram negative bacteria (*Enterocobacter cloacae, Eschrichia coli*, *Proteus mirabilis*, *Salmonella enterica*) to determine the antibacterial activity.

Results revealed that the high antioxidant activity of local olive oil leaves (1.10-1.69 g/100 g of dry weight). The MBC values ranged from 10 to >200 mg/L, and the most resistant bacteria were *Bacillus subtilis* (MBC >200 mg/mL) and *Eschrichia coli* (MBC=200 mg/mL), whereas *Enterobacter cloacae* and *Staphylococcus epidermidis*were the most sensitive species among the negative and positive Gram species (MBC=10-200 mg/L). The varieties Sourani and Vilamatia cultivated in Damascus had the highest antibacterial activity.

Keywords: *Olive leaves, antioxidant activity, antibacterial activity, Gram-negative bacteria, Gram-positive bacteria.*

UNDERSTANDING THE EFFECTS OF ISOTHIOCYANATES AND BIOFUMIGATION ON POTATO CYST NEMATODES (PCN)

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Abstract

Globodera pallida and *Globodera rostochiensis*, the potato cyst nematodes (PCN), are major potato pests. Management of PCN is becoming progressively more challenging due to increased restrictions on nematicide use.Biofumigation is an alternative pest control method in which *Brassica* cultivars containing glucosinolates are broken down and incorporated into the soil to produce toxic isothiocyanates (ITCs). ITCs are thought to have nematicidal activity but due to a lack of broad range control their effectiveness depends on the type and concentration of ITC released as well as the target species. The aim of this study was to determine if biofumigation has the potential to be used as part of an integrated biological control system for PCN. This involved identifying and assessing;ITCs that were able to cause PCN juvenile mortality, ITCs that could inhibit juvenile hatch from cysts, and biofumigant*Brassica* cultivars which were able to reducePCN populations.Several ITCs were able to cause *G. pallida* mortality under *in vitro* conditions however the most effective was allyl ITC (AITC) which led to 100% mortality at high concentrations after 3 days exposure. ITCs were less effective at decreasing juvenile hatch from cysts and only AITC could significantly reduce juvenile emergence. Of several *Brassica* cultivars screened, two were able to reduce hatch under glasshouse conditions. This research will contribute towards furthering knowledge on biofumigation that will lead to the development of an effective biofumigation strategy desirable to both growers and environmentalists.

Keywords: *Globodera pallida, PCN, biofumigation, isothiocyanates, Brassicas.*

SCREENING OF SEED-BORNE FUNGI OF VEGETABLES CROPS AND THEIR EFFECT ON ORGANIC GROWING PLANTS IN TUNISIA

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Abstract

Seed borne pathogens were isolated from vegetable crops (melon, cucumber, tomato and pepper) and their impact on organic farming was evaluated.A direct confrontation of each pathogen and antagonist collected from the same plantwas performed. For melon, *Macrophominaphaseolina, Rhizoctoniasolani, Cladosporium* sp., and *Trichotheciumroseum* were confronted against *Aspergillus niger, Aspergillus terreus, Penicilliumdigitatum, Trichodermaharzianum, Trichodermaatroviride*and *Aspergillus flavus*. The highest inhibition rate was recorded by *T. harzianum* and *T. atroviride*with 60%.For tomato, only *T.harzianum*has reduced the mycelial growth of *Fusariumoxysporum* f. sp.*lycorpersici* (51.80%). Concerning pepper, mycelial growth inhibition rate of *Phytophthoraparasitica* was performed by *A.niger*(44.23%)and*T. harzianum (*43%). Forcucumber,*Alternaria alternata*wasconfronted with *T.harzianum, P.digitatum*, and *P.italicum* and showed an inhibition rate of 77.65%, 79.37% and 6.6%, respectively. *In vivo* essay, a disease severity index caused by various pathogens alone and combined with antagonists compared with control plants was made. The pepper plants inoculated by *Ph. parasitica* and treated curatively by *T. harzianum* have recorded a low index (0.26). Improvement rate was measured according to the fresh and dry weight of plants treated with only antagonists, and the results showed a significant enhancement of the vegetative biomass when plants are treated with *A. niger*. Indeed, melon plants inoculated with *M. phaseolina* and treated by this antagonist exhibited the highest rate (31.07%). The presence of antagonists with pathogens have been implemented a significant reduction of the disease according to dry weight of melon plants inoculated with *M. phaseolina* and treated curatively by *A. terreus*(21.95%) and fresh weight of plants inoculated with *R. solani* and treated with *P. digitatum*(22.96%).

Keywords: *Biological control, in vitro, in situ. seedborne fungi.*

DETERMINATION OF SOME BIOLOGICAL PROPERTIES OF CORN BORERS (*SESAMIA NONAGRIOIDES* LEFEBVRE AND *OSTRINIA NUBILALIS* HÜBNER) IN ÇANAKKALE (TURKEY) MAIZE PLANTING AREAS

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Abstract

Maize (*Zea mays L.*) is one of the important crops in cereal production for Turkey. In recent years, it was grown for seed production in Çanakkale province of western Turkey. One of the most important problems of production is corn borer that causing crop losses. For this purpose, it was conducted to determine the some biological properties of corn borer in maize fields during 2012-2013. Pheromone traps were used to determine the population of *Sesamia nonagrioides* Lefebvre (Lepidoptera: Noctuidae) and *Ostrinia nubilalis* Hübner (Lepidoptera: Crambidae) during two maize growing periods. Traps were weekly checked, and number of adults was recorded. At the same time, 100 plants were randomly selected to examine pest infestation. In addition, the maize stems in fields infested with pests from the previous year were investigated to determine the hibernation of both pests. The infested stems with larvae were also collected and later placed in cages to determine first adult flights. As results, *S. nonagrioides* and *O. nubilalis* adults are caught in pheromone traps in all the sampling plots. At the same time, 27.48% of the plants in 2012 and 8.4% in 2013 were infested with corn borer. In 2012, *O. nubilalis* larvae were obtained in the most of infested plants. The number of adults captured in all traps was low for both species. Thus, adult flight number has not been established during growing periods. It was determined both pests hibernates in larval stage. The first flight of adults of *S. nonagrioides* was started at mid-April that after 20-25 days *O. nubilalis* were flew.

Keywords: *Maize, Sesamia nonagrioides, Ostrinia nubilalis*

GENETIC DIVERSITY ANALYSIS ON SOME SPECIES OF *SILENE* L. (CARYOPHYLLACEAE) FROM TURKEY BY USING RAPD-PCR

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Abstract

Turkey has a wealth of plant diversityand hasratio of endemism. The family Caryophyllaceae has 32 genera containing over 470 species in Turkey. *Silene* L. is the largest genus of flowering plants in the family Caryophyllaceae, comprising of some horticultural and medicinal plants. Taxonomy is the science of describing, naming and classifying biological organisms according to shared characteristics. Molecular genetic methods provide to establish genetic relationship between the members of different taxonomic characters. In the present study, genetic variation of four endemic taxa of *Silene* L. from Turkey were investigated by using RAPD-PCR (Random Amplification of Polymorphic DNA-Polymerase Chain Reaction). This technique was applied by using 10 different random primers (OPA-01, OPA-02, OPA-03, OPA-04, OPA-05, OPA-06, OPA-15, OPA-16, OPA-17, OPA-18) that generated fragments ranging from 75 to 3000 bp. In RAPD-PCR analysis, the percentage of polymorphism ranged from 84% to 100%, with an average 95.52%. OPA-04, OPA-05, and OPA-16 primers yielded a total of 81 scorable bands, which were all polymorphic. The genetic distance of the *S. capillipes* Boiss. & Heldr., *S. duralii* Y. Bağcı, *S. nuncupanda* Coode & Cullen species belonging to Macranthae section and also *S. bayburtensis* Hamzaoğlu & Aksoy which is not closely related to Macranthae section, belonging to Caespitosae section were used to generate a dendrogram. *S. duralii* was found closely related to *S. capillipes* as described morphologically before. *S. bayburtensis* and S. *nuncupanda* were found related, although both species were classified in different sections. This research pointed out that morphologycal studies need to be supported by molecular techniques.

Keywords: *Silene, RAPD-PCR, polymorphism,genetic distance*.

THE SOLUTION OFFERS OF ENTOMOLOGICAL PROBLEMS OF CEREALS IN TURKISH REPUBLIC OF NORTHERN CYPRUS

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Abstract

Cyprus Island which is located in Eastern part of Mediterranean has a semi-arid climate. Therefore, field cereal cultivation has been made intensively. in the cereals, barley and wheat have been chiefly produced. At the various development periods of the cereals in field conditions, they are attacked and incurred economic losses by many pests. At the end of the surveys conducted at cereal planted fields of Northern Cyprus, many pest species and their natural enemies were determined. Among the pests, Hessein fly, *Mayetiola destructor* (Say), Cereal leafminer, *Syringopais temperatella* (Lederer), Cereal weevil, *Pachytychius hordei* (Brulle), Sunn pest, *Eurygaster integriceps*Put., Cereal tortrix, *Cnephasia pasuiana*(Hübner), cereal aphids, *Rhopalosiphum maidis* (Fitch), *Rhopalosiphum padi* (Linnaeus), *Sitobion avenae* (Fabricius), *Anoecia corni* (Fabricius), and *Tetraneura ulmi* (Linnaeus) were found as significant insect pest species. It was understood when North Cyprus farmers were interviewed, they partially knew only *S. temperatella* and *M. destructor* by name within these pests, and chemically struggled against merely *S. temperatella.* It was understood that insecticide were made unconsciously against *S. temperatella.* From this point forth, it was revealed that the biggest entomological problems were insufficient equipment, the insecticides, and incorrect insecticide-equipment applications. It is important to solve the problems that farmers should be informed on insect pests, chemical control times, and insecticide-equipment topics to be used in the direction of integrated struggle principles.

Keywords: *Northern Cyprus, entomological problems, cereals, solution offers*

DETERMINATION OF SOME FACTORS AFFECTING POPULATION INTENSITY AND SPREAD OF *SYRINGOPAIS TEMPERATELLA* LEDERER, (LEPIDOPTERA: SCYTHRIDIDAE) IN NORTHERN CYPRUS

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Abstract

This study was conducted with the objective to determine some factors affecting population intensity and spread of Cereal leafminer, *Syringopais temperatella* Lederer (Lepidoptera: Scythrididae), which is a primer pest for cereals cultivated in Lefkoşa, Gazimağusa, Girne, Güzelyurt and İskele districts of Turkish Republic of Northern Cyprus during the years 2012-2015. The pest was seen in all the areas where cereals were cultivated, and it was observed more densely in especially Meserya lowland. In the studies, many factors affecting the population of the pest were available. In years when the project was conducted, rainfall was one of the effective factors. it was determined that rainfall in especially November-December months had a significant impact on the population of *S. temperatella*. It was determined that averages of rainfall in the years 2011, 2012, 2013, 2014 and 2015 were 157.2, 187.4, 69.7, 111.2 and 61.4 mm in these two months. It was found that in the rainfall average of 157. 2 mm in the years 2011 and 2012, the population of *S. temperatella* increased; in this case, the application of chemical control for preventing the population was indispensible. When average rainfall less than 72.5 mm occurred in some years, application of the chemical control was not necessary. It was determined that the population of the pest from dry year to next year did not occur insufficiently. Besides, it was determined that other factors influencing the population intensity of the pest were sequential application of cereal cultivation in dry land, superficial tillage, non-crop rotation, and adverse effects of the wide spectrum insecticides to natural enemies, respectively.

Keywords: *Cereal, cereal leaf miner, Syringopais temperatella, distribution, population density, Northern Cyprus*

CONTRIBUTION TO THE ASILIDAE (DIPTERA) FAUNA OF SOUTHEASTERN ANATOLIA, TURKEY

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Abstract

The robber flies (Diptera, Asilidae) are a predators which have an important place at preservation of the natural balance and sustain. This study was carried out to determine the belonging to species of Asilidae family in cereal fields of Adıyaman, Diyarbakır, Şanlıurfa and Mardin provinces of Southeastern Turkey from 2006 to 2009. In surveys, Asilidae species were collected with sweep net and preserved withintubes being 70% alcohol. As a result of study, *Habropogondecipiens* Theodor 1980, ve *Machimus* sp. in Adıyaman, *Stenopogon sabaudus* (Fabricius 1794), *Triclis olivaceus* (Loew,1851) in Diyarbakır, *T. olivaceus, Neomochtherus mundus* Loew, (1849), *H. decipiens, Dioctria* sp., *Machimus* sp. and *Holopogon* sp. in Şanlıurfa, *T. olivaceus* in Mardin were determined. These species were recorded for the first time in these provinces

Keywords: *Asilidae species, cereal fields,Souteasthern Anatolia, Turkey*

FIRST RECORD OF AN EGG PARASITOID FOR IGDIR PROVINCE, TURKEY: ELM LEAF BEETLE, XANTHOGALERUCA LUTEOLA (MULLER 1766) (COLEOPTERA: CHRYSOMELLIDAE)

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Abstract

The Elm tree (*Ulmus* spp.), is a tree which grows as both natural and ornamental in warm regions of Europe and Asia. Itgrowsnaturally and is also grown as ornamental plant in Iğdır province. This study was conducted to determine egg parasitoids and parasitism rates of Elm Leaf Beetle,*Xanthogaleruca luteola* (Müller 1766) (Coleoptera: Chrysomellidae) feeding on Elm leaf (*Ulmus* spp.) in Central, Aralık, Karakoyunlu ve Tuzluca districts of Iğdır provinces in the Eastern Anatolia region (Turkey) in the years 2013-2014. In each two years, the total 12.697 eggs were collected and cultivated at 25±1◦C and 65±5% RH in glass tube (2x10 cm) in the laboratory. As a result of study, *Oomyzus gallerucae* (Fonsocolombe, 1832) (Hymenoptera, Eulophidae) was obtained. This species was recorded for the first time for the fauna of Iğdır province, East Anatolia, Turkey. The average parasitism rates in elm plantations were 39.9% and 48.3% in Iğdır provinces in 2013-2014 years, respectively.

Keywords: *Elm,Ulmus spp., Xanthogaleruca luteola, Egg parasitoid, Oomyzus gallerucae, Parasitism rates*

DETERMINATION OF DAMAGE STATUS AND MAIN STRUGGLE FOR BIOLOGICAL CRITERIA OF *HAPLOTHRIPS TRITICI* KURDJ. (THYSANOPTERA: PHLAEOTHRIPIDAE) ON WHEAT IN SOUTHEAST ANATOLIA, TURKEY

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Abstract

This study was conducted in order to determine damage status and main struggle for biological criteria of *Haplothrips tritici* Kurdj. (Thysanoptera: Phlaeothripidae) which is a considerable pest for wheat fields of Sanliurfa and Mardin provinces in Southeast Anatolia Region of Turkey during the years 2011-2012. The present studies have been conducted and evaluated at three stages of the wheat. In the light of the current findings, the peak intensity of larvae was observed at dough stage of the wheat, but the intensity decreased as the wheat grain became though. At milk and dough stages, the weight losses of wheat caused by *H. tritici* with 23.8 larvae/spike and 14.3 larvae/spike per spike in Alakus and Ortakoy locations was 0.06 g and 0.02 g, respectively. At the dough and/or the ripening stage, it was determined that the values of the spotted grain rate, gluten index rate (%), sedimentation resulted from *H. tritici* with the average of 20.6 larvae/spike in Alakus location were found as 71.0%, 92.5% and 68.6 ml, respectively, but corresponding values in Ortakoy location with the average of 11.8 larvae/spike were recorded as 56.5%, 93.6% and 67.0, respectively. At the end of the present study, it was understood well that *Haplothrips tritici* did not adversely influence the flour quality of the wheat, but spots on the wheat grain reduced its virtuousness feature. At the beginning of the bloom, damage of thrips was more important, and economic losses were determined when the intensity of thrips in spike was 12 adult+larvae/spike.

Keywords: *Wheat, Haplothrips tritici, Biological criteria,damage, Southeast Anatolia, Turkey*

DETERMINING EFFICIENCY OF ADDITIVE ADDITION ON PERFORMANCE OF GRANSTAR

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Abstract

The purpose of this study is to determine efficiency of effective minimum rates of Tribenuron methyl with addition of different additives and to investigate practicability of these doses. *Matricaria chamomilla* L.,*Melilotus officinalis* (L.) Desr.,*Sinapis arvensis* L. and *Galium tricornutum* Dandy were used as model weed species. Sun flower oil, motor oil, and Ammonium sulfate fertilizer at the rate of 1% were added into herbicide solution. Innogard 309 25 ml/100 l was also used with application dose in the study. ED_{50}, $ED_{90,}$ andrecommended doses of herbicide (Granstar %75 Tribenuron methyl) were applied alone and with additive as 200 1/ha spraying volume. Results of the study showed that the herbicide tribenuron-methyl was found to have low effects in *S. arvensis* control in all aplications. It was determined that while the effect obtained in ED_{90} dose of herbicide was at lower levels in MATCH control, the efficiency increasing with addition of additive was 90 % when the dose ED_{90} was applied with A.S. fertilizer. Although sufficient efficacy was not obtained even with recommended dose of herbicide in control of MATCH, an efficacy of 90 % was achieved from addition of herbicidewith Motor oil, A.S. fertilizer and Innogard 309. Herbicide ED_{90} dose show more than 90% effect by adding A.S. fertilizer and Innogard 309 for the control of MELOF. With the motor oil and A.S. fertilizer added to herbicide provided enhancement at control of GALTR. Consequently, it was specified that addition of additives was a very significant factor affecting practicability of minimum doses of herbicide.

Keywords: *Granstar(Tribenuron methyl), Matricaria chamomilla, Melilotus officinalis, Sinapis arvensis, Galium tricornutum, Additives*

EFFICACY OF A ZW FORMULATED INSECTICIDE ON DIFFERENT SURFACES AGAINST SOME STORED PRODUCT PESTS

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Abstract

Stored product pests depreciate economically the quantity and quality of the products. One of the methods to control the pests is using of chemical pesticides. Insecticidal efficacy can be varied on different warehouse grounds. In this study, knockdown and residual efficacy of Ladex 350 ZW (Lambda cyhalothrin CS, 250g/l + chlorpyriphos ethyl EW, 100g/l) was determined against grain weevil *Sitophilus granarius,* lesser grain borer *Rhyzoperta dominica* and rust red flour beetle *Tribolium castaneum* at doses of 0.02 ml/m^2 on concrete and as 0.2 ml/m^2 on plywood surfaces. Knockdown effect was determined as 100% for all species, both on plywood and concrete surfaces. On plywood, residual effect for *S. granarius, R. dominica* and *T. castaneum* with an efficiency of ≥80% has been continued until 91, 91 and 28 days, and on concrete until 120, 120 and 28 days,respectively. An efficiency of ≥80% against *T. castaneum* was supplied with a dose of 0.06 ml/m^2 until 120 days on concrete. Knockdown and residual efficacy of Ladex 350 ZW was more on concrete than plywood even at 10 times low doses. Also, higher doses according to the other pests are needed to control *T. castaneum* for a long period.

Keywords: *Stored product pests, Coleoptera, knockdown and residual efficacy, ZW formulation*

POPULATION FLUCTUATION AND SOME CRITERIA FOR CONTROLLING OF PISTACHIO TWIG BORER, *Kermania pistaciella* Amsel (LEPIDOPTERA: OINOPHILIDAE)

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Abstract

The study was conducted in two pistachio orchards in Center-Demircik and Birecik-Aşağıincirli villages in Şanlıurfa province (Turkey) during 2012 and 2013. In this study, we intended to determine some important criteria for the management of the important pest *Kermania pistaciella* Amsel (Lepidoptera: Oinophilidae) in Şanlıurfa, such as adult emergence time, adult population abundance, adult population peaks, adult activity duration in the nature, sum of maximum daily temperature and their relationship with the pistachio phenology. The population development of pest adult was determined by sexual pheromone traps. These traps were hung on pistachio orchards when pistachio buds started to wake up at late March - beginning of April. Results showed that adult of *K. pistaciella* began flight in mid-April and it was detected that they had four - five weeks of flight period. The sum of the maximum temperature when the first adults were caught in trap determined 1345.9 day-degree. When the first adult of *K. pistaciella* was captured in traps, fruit buds of the pistachio trees were waken up.

Keywords: *Kermania pistaciella, population fluctuation, day-degree, pistachio.*

PRESENCE OF *ESCHERICHIA COLI*IN MEDITERRANEAN MUSSEL (*MYTILUS GALLOPROVINCIALIS*) AND SEA SNAIL (*RAPANA VENOSA*) FROM BLACK SEA, TURKEY

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Abstract

Coastal and shallow estuarine areas are generally used to collect or produce shellfish, but these regions are exposed to terrestrial pollution especially microbiological pollution. Because mussels are filter-feeding organisms in the water, they are capable of accumulating the pollutants such as microorganisms in water. *Escherichia coli* or fecal coliforms are used to monitor the bacteriological quality of shellfish-collecting waters and bivalve molluscs. This study was conducted to determine the seasonal presence of *Escherichia coli* isolates in both *Mytilusgalloprovincialis* and *Rapana venosa* from twelve stations on the coastline of Artvin, Rize, Trabzon, and Giresun in the Black Sea Region, Turkey. For this purpose, a total of 25 g samples of both mussel and sea snail in each station were homogenized with sterile saline water (0.85 %) and inoculated to Luria Bertani Broth. Further biochemical analysis were conducted and, pure and identified *E. coli* isolates were stored in a broth culture supplemented with 15%glycerol at -70 °C. A total of 54 *E.coli* (35 from mussel and 19 from sea snail) were isolated from the all stations. The highest isolation were found in summer followed by spring, autumn and winter. A total of 19 *E. coli* were isolated from three stations of Giresun followed by Trabzon (18), Rize (13) and, Artvin (4). These results indicated that mussel and sea snail could play an important role and may be a vehicle of infections with *E. coli*.

Keywords: *Escherichia coli, Mediterranean mussel, Sea snail, Black Sea.*

MYCELIAL COMPATIBLE GROUPS OF THE *SCLEROTIUM ROLFSII* ISOLATES AND COMPARISON OF VIRULENCE

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Abstract

Sclerotium rolfsii Sacc. (Telemorf: *Athelia rolfsii* (Curzi) Tu & Kimbrough) is one the most destructive polifag soil-borne fungal pathogen. The research aims to collect isolates of *S. rolfsii* in the bean growing areas in Çanakkale and find out the mycelial compatible groups (MCG), the differences in pathogenicity and morphological characters. Mycelial growth as well as the number and diameter of sclerotia produced were also assessed. All isolates were first paired with itself then with all other isolates in potato dextrose agar (PDA) amended with red food colour to determine mycelial compatible groups (MCG). Pairings were scored as mycelial compatible if sclerotia formed in the interaction zone, however pairings were scored as mycelial incompatible if a red line and a barrier occurred in the interaction zone. As a result of pairing experiments, three MCG were determined: MCG1 consists of 15, MCG2 consists of 11 and MCG1 has only one isolate. We found that all isolates were compatible with themselves. There were statistical differences in means of mycelial growth, the number and diameter of sclerotia produced. The correlation analysis exhibited that there was a negative correlation between sclerotium number - mycelial growth and sclerotium number and sclerotium diameter; however there have been positive correlation between mycelaial growth and sclerotium diameters. All isolates were found to be highly virulent on bean seedlings. This research shows that there is great variation among isolates of *S. rolfsii* isolated from green beans in the area.

Keywords: *Beans, mycelial compatible groups, sclerotium, Sclerotium rolfsii*

DETERMINATION OF THE EFFECT OF TEBUCONAZOLE ON *IN VITRO*MYCELIAL GROWTH AND CONIDIUM GERMINATION OF *FUSARIUM CULMORUM* CONDITION

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Abstract

In this study, 10 different isolates of *Fusarium culmorum* (WG Smith) Sacc. isolated from diseased wheat plants in the Canakkale Province were examined and the effect of tebuconazole, a fungicide, against the fungus was investigated *in vitro* conditions. For this purpose, tebuconazole was amended into PDA culture medium in 10 different concentrations (0.01, 0.05, 0.1, 0.5, 1, 5, 10, 50, 100, 500 ppm) and the mycelial growth, the percentage of conidium germination, germ tube elongation and germ tubes changes were assessed. In addition to laboratory research, two isolates of F. culmorum were selected randomly in order to examine whether tebuconazole have any effect on wheat seed germination and disease severity. Captan, another fungicide effective as seed protectant, was also employed in pot experiment. The in vitro experiments exhibited that the tebuconazole doses above 1 ppm reduced mycelial growth dramatically, and doses above 10 ppm inhibited completely the mycelia growth. Tebuconazole seems to have no effect on conidium germination no matter which concentration was used, however, abnormal branching along with deformation and disorganisation of hyphae were observed under microscope. Germ tube elongation was also measured at four different time intervals (6, 12, 18 and 24 hours after inoculation). Although the growth of germ tubes was associated with the time, the thickness and distortions of hyphae were observed. Pot experiments showed that F. culmorum has serious effects on germination of wheat seeds and crown rot. Covering seeds with tebucanazole resulted in high seed germination and a significant reduction of disease severity compared with positive control plants and the Captan fungicide.

Keywords: *Fusarium culmorum*, Germ Tube, Codinia Germination, Wheat, Tebuconozole

INVESTIGATION ON VIRUSES ON *PHYSALIS PERUVIANA* IN HATAY PROVINCE, TURKEY

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Abstract

Physalis peruviana L., a solanaceous plant was very popular and widely growing crop in Turkey in recent years. Surveys were conducted in Hatay province of Turkey in 2010, in order to identify the virus infections in *P. peruviana*.. The symptoms related to virus infections such as sever mottling, mosaics, chlorosis, reduction in leaf and fruit sizes and deformations of fruits were observed on *P. peruviana* plants. A total of 72 leaf and shoot samples were collected from symptomatic *P. peruviana* plants in the fields in Hassa and Antakya districts of Hatay main growing areas. Samples were tested to investigate of *Cucumber mosaic virus* (CMV), *Bean yellow mosaic virus* (BYMV), *Potato virus X* (PVX), *Potato virus* Y (PVY), *Tobacco mosaic virus* (TMV), *Tobacco rattle virus* (TRV) and*Tomato spoted wilt virus* (TSWV) by Double antibody sandwich-enzyme linked immunosorbent assay (DAS-ELISA). PVY was determined as the most common virus in *P. peruviana* samples taken from main growing areas in Hatay province (27.7%). Symptomatic *P. peruviana* samples were also found to be infected with BYMV (6.9%) and TRV (4.1%).To our knowledge, this is the first report of natural occurrence of PVY, BYMV and TRV on *P. peruviana* in Turkey. It is suggested that other viruses and pathogens such as phytoplasmas and bacteria also cause infections on *P. peruviana* in Hatay.

Keywords: *Cape gooseberry, ELISA, Hatay, Physalis peruviana, PVY, BYMV, TRV, virus*

IMPORTANT FUNGAL DISEASE PROBLEMS OF CEREAL PRODUCTION AREAS IN TURKISH REPUBLIC OF NORTHERN CYPRUS AND SOLUTION OFFERS

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Abstract

Of 329,890 ha in the Northern Cyprus, 187.068 ha area is agricultural land. Having semi-arid climate, in the region, dry farming is usually done and cereals are grown in 84.163 ha area. Cereal production are composed of barley (92.7 %), wheat (6.4%), oat and triticale (0.9%). Various diseases of cereals cause losses in terms of both quality and quantity. As a result of the surveys conducted in the cereal fields of the Northern Cyprus between 2012 and 2014, nearly 40-fungal-agents were determined in the barley, wheat and triticale fields. The most prevalent and virulent diseases were spot blotch and common root rot (*Bipolaris sorokiniana* (Sacc.) Shoemaker), powdery mildew (*Blumeria graminis* (DC.) Speer), sharp eyespot (*Ceratobasidium cereale* D.I. Murray & Burpee), crown rust (*Puccinia coronata* Corda), stripe rust (*Puccinia striiformis* Westend.), barley stripe disease (*Pyrenophora graminea* S. Ito & Kurib.), root rot (*Fusarium* sp.), net and spot blotch (*Pyrenophora teres* Drechsler), scald (*Rhynchosporium secalis* (Oudem.) Davis, semiloose smut (*Ustilago avenae* (Pers.) Rostr.), covered smut (*Ustilago hordei* (Pers.) Lagerh.), loose smut (*Ustilago nuda* (C.N. Jensen) Rostr). and *Ustilago tritici* (Pers.) Rostr. Most of these diseases cause damages being single or together at the same or different times in the same field. Regarding the farmers, being of poor economic level and not having the sufficient knowledge about the cereal diseases, the management was difficult. Therefore, recognizing the diseases and knowing management practices by the farmers are primarily necessity. The farmers must be informed about these by official institutions. In addition, when growing susceptible varieties to the diseases, seed treatment and foliar spraying must be applied. In this regard, it is crucial to develop resistant varieties suitable for the Northern Cyprus conditions for solving these problems.

Keywords: *Northern Cyprus, cereal, fungal diseases, solution offers*

INCIDENCE OF SOME FUNGAL DISEASES OF WHEAT PRODUCTION AREAS IN THE AEGEAN COSTAL REGION

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Abstract

This study was conducted to determine fungal disease of wheat production areas in the provinces (Aydin, Balikesir, Canakkale, Denizli, İzmir, Manisa ve Mugla) located in the Aegean Costal Region of Turkey, in 2014 and 2015. Survey studies were carried out between early milk and hard dough stages (Zadoks 61-79) in April, May and June throughout the both year. In the study, in total, 316 farmer fields, 189 in 2014, and 127 in 2015, were examined. The diseases and disease incidence found using Icarda's survey form in the fields surveyed, were as flows: speckled leaf blotch (*Zymoseptoria tritici* (Desm.) Quaedvl. & Crous) 37,03%, stripe rust (*Puccinia striiformis* Westend.) 27,85%, leaf rust (*Puccinia recondita* Dietel & Holw.) 26,27%, powdery mildew (*Blumeria graminis* (DC.) Speer) 17,41%, take-all (*Gaeumannomyces graminis* (Sacc.) Arx& D.L. Olivier) 7,59%, stem rust (*Puccinia graminis* Pers.) 5,06%, Cephalosporium stripe disease (*Hymenula cerealis* Ellis & Everh.) 2,85% and smut disease (*Ustilago tritici* (Pers.) Rostr.) 0,95%. However, any bunt disease (Tilletia spp.) was not found. These fungi can be found in farmer fields at the different rates. The following diseases such as speckled leaf blotch (*Zymoseptoria tritici* (Desm.) Quaedvl. & Crous), stripe rust (*Puccinia striiformis* Westend.), leaf rust (*Puccinia recondita* Dietel & Holw.) and powdery mildew (*Blumeria graminis* (DC.) Speer) were determined with the higher percentage compared with the others. In this regard, resistant wheat varieties should be developed in breeding programs and management methods must be used against these diseases.

Keywords: *Aegean Costal Region, wheat, fungal diseases, prevalence, Turkey*

INCIDENCE OF SOME FUNGAL DISEASES OF BARLEY PRODUCTION AREAS IN THE AEGEAN COSTAL REGION

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Abstract

This study was conducted to determine fungal disease of barley production areas in the provinces (Aydin, Balikesir, Canakkale, Denizli, İzmir, Manisa and Mugla) located in the Aegean Costal Region of Turkey, in 2014 and 2015. Survey studies were carried out between early milk and hard dough stages (Zadoks 61-79) in April, May and June throughout the both year. In the study, in total, 100 farmer fields, 67 in 2014, and 33 in 2015, were examined. The diseases and disease incidence, found in the barley fields surveyed, were as flows:scald (*Rhynchosporium commune* Zaffarano, B.A. McDonald & A. Linde,) 35%, net and spot blotch (*Pyrenophora teres* Drechsler) 34%, powdery mildew (*Blumeria graminis* (DC.) Speer) 34%, leaf rust (*Puccinia hordei* G.H. Otth) 24%, covered smut + loose smut + semiloose smut (*Ustilago hordei* (Pers.) Lagerh., *Ustilago nuda* (C.N. Jensen) Rostr., *Ustilago avenae* (Pers.) Rostr.) 15%, take all (*Gaeumannomyces graminis* (Sacc.) Arx &D.L. Olivier 1952) 3%, stripe rust (*Puccinia striiformis* Westend) 2%, barley stripe (*Pyrenophora graminea* S. Ito & Kurib.) 2% andsharp eyespot (*Ceratobasidium cereale* D.I. Murray & Burpee) 1%. However, neither stem rust (*Puccinia graminis* Pers.) nor Cephalosporium stripe (*Hymenula cerealis* Ellis & Everh.) was found in the examined fields. The following diseases such as scald, net and spot blotch, powdery mildew, leaf rust and smuts, were determined with the higher percentage compared with the others. In this regard, resistant wheat varieties should be developed in breeding programs and management methods must be used against these diseases.

Keywords: *Turkey, Aegean Costal Region, barley, fungal diseases, prevalence*

OCCURRENCE AND DISTRIBUTION OF WHEAT SEED GALL NEMATODE, [*Anguina tritici* (Steinbuch) Filipjev] IN WHEAT (*TRITICUMAESTIVUM* L.) GROWING AREAS IN THRACE REGION OF TURKEY

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Abstract

Wheat is an important crop for human nutrition in the world with growing areas of the 218.4 million hectares, among cereals. Wheat is also one of the major and strategic crops in Turkey in terms of economy, nutrition and employment. Wheat growing area is 7.8 million hectares and total production is 22 million metric tons. Wheat seed gall nematode, *Anguina tritici*, is considered an economically important pest of wheat in substandard agricultural conditions of some part of Thrace region of Turkey, found in limited fields. In this study, seed samples were collected from farmers' storages in 2015 for determining the wheat gall nematode occurrence and distribution across wheat fields in Thrace Region provinces which is the European part of Turkey. Evaluation was done with samples from Edirne, Kırklareli and Tekirdağ provinces which together have a share of 5.6% in wheat production areas and 7.2% in total production amount. Total of 507 seed samples from Edirne province were examined and 10 samples were found to be contaminated with wheat gall nematode; 156 samples from Kırklareli province were examined and 3 samples were found to be contaminated; 21 seed samples from Tekirdağ province were examined and wheat gall nematode was not found. In total, 685 wheat seed samples were examined for seed gall nematode and 13 samples have been found to be contaminated. Wheat gall nematodes were present at the farmers who do not utilize certified seed and modern seed cleaning techniques.

Keywords: *Anguina tritici, seed gall nematode, wheat (Triticum sp.), distribution*

EFFECT OF DEEP FREEZING AND AIR DRYING STORAGE ON CONTENT OF FATTY ACIDS OF ROSE HIP SEEDS

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Abstract

The aim of this study was to determine the effect of storage media and time intervals on fatty acid content of seeds of some promising genotypes belonging to different rose species. Study was carried out in research and treatment area of Horticultural Department of Agricultural Faculty of Gaziosmanpaşa University (Tokat/Turkey). Seeds of *Rosa dumalis* (MR-15*), R. canina* (MR-26) and *R. villosa* (MR-84*)* rose hip genotypes that selected as promising for cultivar were used in the experiment. Mature fruits of rose hip genotypes were harvested then part of them dried and stored in dark room (20°C) and the other part of them stored in deep freezing (-20°C) conditions as fresh fruit. Total content of fatty acids of the seeds of species were analyzed three-month intervals during the full year.

As results; changes in rate of fatty acids during the storage period varied depending on species (genotype) and fatty acid type. Oleic, linoleic and linolenic acid contents of seeds were remarkable fatty acids in every species or genotypestudied.

Keywords: *Rosa, fatty acid profile, dumalis, canina, villosa.*

SHELF LIFE OF 'NANTES' CARROT TREATED WITH AQUEOUS 1-METHYLCYCLOPROPENE

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Abstract

Carrot, due to its high vitamin and fiber content, is one of the most consumed vegetable all over the world. Carrot wastage is an important problem to overcome owing to poor harvesting, transportation and storage conditions. 1-methylcyclopropene (1-MCP), an ethylene action inhibitor, has become an important tool in postharvest technology to extend shelf life and suppress the quality loss in various fruits and vegetables. For this purpose, 'Nantes' carrot roots were treated by aqueous 10, 100 and 1000 $\mu l.l^{-1}$ 1-methylcyclopropene (1-MCP) and stored at the room temperature (22 ± 1 °C) for 10 days. Carrot roots, after the treatment were dried out and placed in modified atmosphere packages. During the storage time, weight loss, firmness, skin and flesh color, decayed fruit ratio, oxygen and carbon dioxide ratio, and carotene amount were recorded. Most of the parameters were not or slightly affected by 1-MCP application. 1-MCP application at 1000 $\mu l.l^{-1}$ caused a higher carbon dioxide ratio in the packages. 1-MCP application moreover resulted in higher decay ratio as well. 1-MCPeffect on carotene content was found to be diminutive. Results indicate that aqueous 1-MCP application do not provide an advantage for shelf life of carrot roots in modified atmosphere packages stored at the room temperature.

Keywords: *Carrot, 1-MCP, postharvest, carotene, MAP*

PHYSICOCHEMICAL RESPONSES OF APPLE CULTIVARS AGAINST *PENICILLIUMEXPANSUM*, THE CAUSE OF BLUE MOLD DISEASE

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Abstract

Penicilliumexpansum, a causal agent of blue mold disease, is one of the most important postharvest pathogens of apple fruit worldwide. The fungal agent causes decay that can lead to significant economic losses during storage and also is able to produce carcinogenic mycotoxin patulin. The pathogenicity of *P. expansum* was assessed through physicochemical responses in postharvest fruits of five apple cultivars (Fuji, Golden Delicious, Granny Smith, Amasya and Starking) with different ripening habits. Artificially wound-inoculated apple cultivars with the fungus were incubated for 7 days at room temperature. The fruit traits such as forced to break epidermis, cortex firmness, total soluble solids (TSS) and titratable acidity (TA) were correlated with decay severity as measured with lesion diameter. The cultivars Golden Delicious and Starking had higher lesion diameters (3- and 2.1 cm, respectively) than those of Granny Smith, Fuji and Amasya (1-, 0.9 and 0.9 cm, respectively). Weak correlations existed between lesion diameter and TSS & TA in all cultivars. Cortex firmness played more significant roles than those of physiological parameters in determining the resistance of apple cultivars to blue mold. Therefore, we suggest that the response of cultivars could be useful for the implementation of control strategies in shelf or storage conditions to reduce the impact of disease agent. That is because the susceptible cultivars might have potential to pose a threat to human health due to high risk of contamination with mycotoxins.

Keywords: *Postharvest studies, Penicillium expansum, Apple cultivars, Enzyme filtrate, Disease resistance.*

SCREENING OF SOME CUCURBITS CULTIVARS FOR TOLERANCE TO BACTERIAL FRUIT BLOTCH PATHOGEN *ACIDOVORAX CITRULLI* IN TURKEY

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Abstract

Bacterial fruit blotch of cucurbits, caused by *Acidovorax citrulli* is a devastating disease threatening the watermelon and melon industries all over the world. In this study the susceptibility of various commercial cultivars of cucurbits (Suha and Eyfel for squash, Aswan and Crimson Tide for watermelon, Golden West for melon, and Divan and Beith Alfa for cucumber) commonly grown in Turkey was evaluated using seedling-inoculation assays.Emerging pot growing seedlings were grown in climatic room (25-28 ^{o} C, 60-70% RH and 16 hours daylight. Artificial inoculation was performed by spraying of two weeks old seedlings with bacterial suspension of twodifferent melon strains of *A.citrulli* adjusted to 10^{6} CFU/L^{-1}. Ten plants per cultivar were inoculated with the same strain. Control plants from each cultivar were sprayed with sterile water. Following inoculation, plants were covered by plastic chambers in order to keep 90-100% humidity for the first 48 hours. Then the chambers were removed and plants were incubated at the 25-28°C and 70-80 % humidity for subsequent 12 days after inoculation. At the end of incubation, the severity of the disease for the strains was scored using 0-5 scale. Statistical analyses were performed according to Tukey –HSD test. All of tested cultivars were found to be susceptible to the disease. However, some differences in the severity of the disease symptoms were observed. The melon cultivar (Golden West) and squash cultivars (Suha and Eyfel) were significantly (P=0,05) more affected than watermelon (Crimson Tide and Aswan) and cucumber (Beith Alfa and Divan) cultivars.

Keywords: *Cucurbits, fruit blotch bacterium, cultivar susceptibility*

CHECKLIST OF THE APHIDOPHAOGUS GENUS *PARAGUS* LATREILLE, 1804 (DIPTERA: SYRPHIDAE) WITH A NEW RECORD FOR TURKEY

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Abstract

The larvae of *Paragus* Latreille being one of small genera of the family Syrphidae belonging to the order Diptera are aphidophagous and play an important role in the natural balance of the agro-ecosystems. The adults of this genus can be found in open areas where they dwell in open herbaceous plants and visit flowers. Most of the species prefer xerothermic conditions. After revising of West Palaearctic species by Goeldlin de Tiefenau (1976), a lot of species have been described from Europe and Turkey, and totally 32 species in the database of European Syrphidae by Speight (2015) have been recently listed. Until now, five species belonging to the subgenus *Pandasyopthalmus* Stuckenberg, 1954 (*P. abrogans*, *P. coadunatus*, *P. constrictus*, *P. haemorrhous* and *P. tibialis*), and fourteen species belonging to the subgenus *Paragus* Latreille, 1804 (*P. absidatus*, *P. albifrons*, *P. altimontanus*,*P. azureus*, *P. bicolor*, *P. bradescui*, *P. cinctus*, *P. compeditus*, *P. faesi*, *P. kopdagensis*, *P. oltenicus*, *P. pecciolii*, *P. quadrifasciatus* and *P. romanicus*) have been recorded in the present literature from Turkey. In this study, *P. testaceus* Meigen, 1822 was recorded first time in Turkey, and added some new distributional data for the known species. With this study the number of Turkish *Paragus* was increased to 20 species. Additionally, the prey of the species presented in the literature are also reviewed.

Keywords: *Paragus, Checklist, New record, Turkey.*

Acknowledgement

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DETERMINATION OF POTATO Y POTYVIRUS STRAINS IN GREENHOUSE TOMATOES IN AEGEAN REGION OF TURKEY

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Abstract

Potato Y potyvirus (PVY) is an important viral agents causing economic damage in various crop plants of Solanaceae family. The present study was conducted to determine of PVY strains in greenhouse tomatoes in Aegean Region of Turkey including Aydın, Denizli, Muğla and Uşak provinces, where greenhouse tomato cultivation was intensive, between the years of 2010 and 2013. During the surveys 434 tomato leaves samples were collected from 94 greenhouses. The result of DAS-ELISA demonstrated that 35,48 % (154 samples) of samples displaying the symptoms like leaf mottling, mosaic, dark brown necrotic spots, deformation, vein necrosis and stunting collected from Muğla and Denizli provinces were to be infected by PVY. It was seen that the samples from Aydın and Uşak were free from PVY. To find out the present PVY strains (PVY^c, PVY^o and PVY^n), 154 tomato leaf samples were tested by Compound direct ELISA, TAS-ELISA and DAS-ELISA methods. As a result of these assays, the infection rate of PVY^c was 25,32 % (39 samples), PVY^o 46,75 % (72 samples), mixed infection of PVY^{o+c} 1,31% (2 samples) and PVY^{o+n} 26,62 % (41 samples). Consequently, PVY^c was detected only in Denizli province while PVY^c, PVY^o and PVY^n were found in Muğla province. In our present knowledge, this finding is to be considered as the first report of PVY^c and PVY^o on greenhouse tomatoes in Turkey.

Keywords: *Greenhouse tomato, PVY strain, ELISA, Turkey*

BIOLOGICAL AND COT PROTEIN ANALYSİS OF *Arabis mosaic virus* (ArMV) IN IRAN

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Abstract

Arabis mosaic virus (ArMV), from the genus Nepovirus, family Secoviridae, is one of several nepoviruses responsible for infectious degeneration disease of grapevines worldwide. In a limited survey of commercial vineyards in North West Iran in fall 2012, a total of 361 vines were tested for ArMV using a DAS-ELISA. ArMV was detected in 50 (13.8%) samples. İn this study, to confirm the identification of the virus, total RNAs were extracted and the coat protein amplified by RT-PCR using specific primers. The complete CP nucleotide sequences of two Iranian ArMV isolates (Ab11 and Hash2) were 1518 nt long with an open reading frame (ORF) of 515 amino acids. Phylogenetic tree using CP gene sequences showed three groups, which were strongly supported by bootstrap analyses. Most of the isolates from Europe clustered in two main groups I and II (GI and GII), but the two Iranian with a German isolates (NW accession No. AY017339) clustered in GIII group. The pairwise nucleotide distances within ArMV isolates were 0.0-20.4 % with the lowest diversity among GI, followed by GII and GIII which may indicate the GIII was more genetically diverse. The study of the distribution of synonymous and nonsynonymous changes along CP revealed that most amino acid sites are under the effect of negative purifying selection. Prior to this study, no Iranian ArMV isolates have been sequenced. Furthermore in this study the phylogenetic structure, genetic differentiation and the gene flow level between populations were evaluated which indicate populations variability.

Keywords: *Arabis mosaic virus, Iran, Phylogeny, diversity.*

PRESENCE OF EMERGING ISOLATE OF *WATERMELON MOSAIC VIRUS* (WMV)FROM ANKARA PROVINCE IN TURKEY

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Abstract

Watermelon mosaic virus (WMV, formerly WMV2) is a species of the genus *Potyvirus*that presents a worldwide distribution. The virus can cause economically important losses in the quality and quantity or cucurbit crops. WMVis one of the most important viruses in cucurbit plantings in Turkey. In this research, samples fromsymptomatic cucurbit plants were collected from fields in Ankara province.Samples were tested with double antibody sandwich enzyme-linked immunosorbent assay (DAS-ELISA) against WMV antiserum.Total RNAs were isolated from infected plants and subjected to RT-PCR amplifications for WMV coat protein (CP) region. After nucleotide sequence analysis, the CP nucleotide sequences of Ankara isolates of WMV were compared with those of other WMV isolates in Genbank and phylogenetic analyses were performed. According to results most isolates belong to molecular group "classic" (CL), present for many years in the Mediterranean Basin, but 3 isolates from different districts belong to a different molecular group (EM), now emerging in Europe. So far, EMgroup was reported only in Adana provincefrom Turkey. In this study, the presence of EM isolates of WMV was also detected in Ankara provinces.

Keywords: *WMV, Ankara, emerging strains*

DETERMINATION OF SUITABILITY AND NUTRITIONAL PROPERTIES OF LAKERDA MADE FROM THE CULTURED RUSSIAN STURGEON (Acipenser gueldenstaedtii, Brandt and Ratzenburg, 1833)

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Abstract

Lakerda, a traditional salted fish product, has been consumed for many years in all over the world. Lakerda has basically been made from large bonito (*Sarda sarda*), but Atlantic mackerel, salmon and trout have been commercially used in the production of lakerda in the recent years. Moreover, the suitability of lakerda made from different types of large fish specieshas been investigated. For this purpose, this study aimed to determine the suitability and nutritional properties of lakerda made from the cultured Russian Sturgeon (*Acipenser gueldenstaedtii*, Brandt and Ratzenburg, 1833). Fresh fish handled with dry salting method were ripened for 15 days at 4 ± 1°C. The ratio of fish to salt was 5/1 (w/w). After ripening period, the fish were vacuum packed and stored at 4 ± 1°C. For determination of biochemical composition, dry matter, crude protein, crude lipid, crude ash analysis were carriedout and eight trained panelists conducted the sensory analysis for suitability of lakerda. Chemical compositions of raw Russian Sturgeon and lakerda were found as 26.12 and 39.06 for % dry matter, 1.01 and 12.64 for % crude ash, 6.96 and 9.64 for % crude lipid and, 18.97 and 20.73 for % crude protein, respectively. It can be said that lakerda has beneficial nutritional valuefor consumption. According to sensory analysis, panelists evaluated and highly appreciatedlakerda made from Russian Sturgeon. At the end of this study, Russian Sturgeoncould be suitable for lakerda production and produced economically.

Keywords: *Lakerda, Russian Sturgeon, Biochemical composition, Sensory analysis.*

FIELD EVALUATION OF PHEROMONE-WATER TRAPS AGAINST TOMATO LEAFMINER (*Tuta absoluta)* IN TURKEY

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Abstract

Turkey is the fourth most important tomato (*Lycopersicon esculentum* Mill.) producer of the world, followed by China, America and India with the amount of 11.8 million tones of annual fresh tomato. Tomato leafminer (*Tuta absoluta*Meyrick 1917) (Lepidoptera:Gelechiidae) which damaging the tomato plant was at the first time observed in Turkey in 2009 and the pest became the key pest in tomato grown areas, both in protected and open field areas. Chemical control has been used to control the pest since its dispersal in the 2009. Aim of this study was to evaluate efficacy of mass trapping by using pheromone-water traps in conventional tomato fieldsagainst *T. absoluta.* Field trials (pheromone-water trap and insecticide-treated control) were conducted in İzmir (Menemen) in Turkey in two consecutive years, 2011 and 2012. Trials were set up with 6 pheromone-water trap/da. The traps were maintained during whole vegetation period in fields. Adult moths were counted in traps and damage rate was evaluated on fruits and whole plant, weekly. Insecticide applications were recorded in every two fields. It was found that population of the pest was very high on plant and damage was observed on fruits in bothtrap placed fields and insecticide-treated control fields. Pheromone-water traps were not effective in reducing damage of the pest at high population in conventional tomato fields.

Keywords: *Tuta absoluta, Pheromone-water traps, Mass trapping, Tomato open field*

ASSESMENT OF RESISTANCE TO SOME INSECTICIDES AND CHANGES IN ENZYME ACTIVITY OF *Bemisia tabaci* (GENN.) Q BIOTYPE

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Abstract

Cotton whitefly *Bemisia tabaci* (Genn.) is a polyfagous pest that is widely distributed in tropical and subtropical regions. In this study, we determined resistance developing potential to insecticides and enzyme activities of the biotype Q of *B.tabaci*. In Both selection and LC_{50} value bioassays, cypermethrine and imidacloprid were applied to adult stage, spiromesifen to first nymph stage, and pyriproxyfen to eggs of whitefly at different concentrations using leaf dip bioassays. After five, seven and eight times selections with cypermethrine, pyriproxyfen and spiromesifen active ingredients, there was increase in resistance by 213, 15.3 and 2.0 folds respectively.After selection with imidacloprid, the resistance development in biotype Q has not been noticed. At the end of the selection bioassays change in the activities of enzymes were determined. Esterase (EST) activities, with cypermethrin, spiromesifen and pyriproxyfen selections were increased by 128, 2.15 and 22 fold respectively. Acetylcholinesterase activities, with cypermethrin, spiromesifen and pyriproxyfen selections were increased by 1.69, 2.26 and1.92 fold respectively. Cytochrome P450 Monooxygenase activities, with cypermethrin, spiromesifen and pyriproxyfen selections were increased by 1.91, 1.77 and 1.72 fold respectively. The changes in all enzyme activities were statistically significant in Q biotype .The changes in Glutathione S-Transferase activities resulted in a decrease in all selections. In conclusion, Biotype Q has ability to develop more resistance to cypermethrine and pyriproxyfen within a short period. After selections with cypermethrine, pyriproxyfen and spiromesifen, the results showed that there was higher increase in EST activities. According to our results, the resistance capability of biotype Q was as a result of its high Esterase activity.

Keywords: *Bemisa tabaci, Q biotype, insecticide resistance, esterase*

COMPARATION OF RESISTANCE AND BIOCHEMICAL MECHANISM OF WHITEFLY *Bemisia tabaci* (GENN) (HEMIPTERA: ALEYRODIDAE)BIOTYPES WITH PYRIPROXYFEN SELECTION

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Abstract

Cotton whitefly *Bemisa tabaci*(Genn.) is a polyphoagus pest worldwide and it is called species complex. The most devastating biotypes are B and Q. The study was conducted to determine the resistance selection potential of juvenile hormone analog pyriproxyfen on the cotton whitefly, *B. tabaci* biotypes B and Q. Leaf-dip bioassays were conducted to test the dose response lines of pyriproxyfen against *B.tabaci* eggs in two biotypes to calculate lethal concentration (LC_{50}) values. Biotypes were selected in the laboratory. Selections were carried out as method described above for seven generations with each biotype for the assays in different dosages. Biochemical bioassays of pyriproxyfen resistance were also studied. After selections with pyriproxyfen ,the LC_{50} values of the biotype B and Q for egg hatching resulted in an increase from 0.16 to 0.65 mg (AI)/liter, and 0.03 to 0.46 mg (AI)/liter respectively. Biochemical bioassays show that esterase (EST), acetylcholinesterase (AChE) and P450 Monooxygenase (P450) enzyme activities were increased by 1.60, 1.83 and 1.33 folds respectively in B biotype and22, 1.92 and 1.72 folds respectively in Q biotype. Changes in EST activity were statistically significant in Q biotype but not in B biotype. In both B and Q biotypes changes in AChE and P450 activities were statistically significant. Biotypes B and Q of *B.tabaci* develops resistance to pyriproxyfen. EST, AChE and P450 appear to be responsible for the resistance mechanism to pyriproxyfen. An increased in the Q biotype enzyme activity showed that EST is more significant in the resistance. In conclusion, *B.tabaci* Q biotype has more ability to develop resistance to pyriproxyfen than B biotype. For effective resistance management and control of *B. tabaci* biotypes continuous use of pyriproxyfen should be avoided.

Keywords: *Bemisia tabaci, pyriproxyfen, insecticide resistance, biochemical mechanism*

PHYTOCHEMICAL STUDY AND BOINSECTICIDAL EFFECT OF THE CRUDE ETHONOLIC EXTRACT OF THE ALGERIAN PLANT *ARTEMISIA JUDAICAL.* (ASTERACEAE) AGAINSTTHE BLACK BEAN APHID,*APHIS FABAE SCOP.*

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Abstract

Plants are the nature's biochemical factories. They bio-synthesize a diverse array of different natural products, such as alkaloids, terpenes and terpenoids, phenolic compounds, flavonoids and coumarins through their structural mechanisms to reduce insect attacks, both constitutive and inducible, while insects have evolved strategies to overcome these plant defenses. There is a widespread effort to find new pesticides, and currently it is focused on natural compounds such as flavonoids, coumarins, terpenoids, and phenolics from diverse botanical families from arid and semi-arid lands. Algeria by the diversity of its habitatshas a very diverse flora. Some of these plants have very interesting insecticidal properties. The aim of this study is to evaluate the insecticidal effect of the plant *Artemisia judaica*L. (Asteraceae).The crude ethanol extract of the plant *A. judaica* was tested on the black bean aphid *Aphis fabae*Scop. Four doses (12.5, 6.25, 3.12 and 1.56 mg mL^{-1}) were tested on contact wingless adults. The results have showed that the tested extract has been very powerful to aphids.At the highest dose 12.5 $mgmL^{-1}$, the 100% of mortality were recorded 2 hours after treatment, and for the lowest dose (1.56 $mgmL^{-1}$) it was after 96 hours. The LD50 calculated 2 hours after treatment from the regression lines Probit = *ƒ* (doses) shows that it is 2.75 $mgmL^{-1}$. This powerful insecticidal activity of the tested crude extract could be due to the richness of the plant on phenolics compounds known for their bio-insecticide action.

Keywords: *Artemisia judaica, Crude extract, Aphis fabae, Insecticidal activity, Phytochemical study*

ENTOMOFAUNA OF PEARS IN EAST SARAJEVO AREA(BOSNIA AND HERZEGOVINA)

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Abstract

Entomofauna of pears in region of East Sarajevo (entity of Republic of Srpska, Bosnia and Herzegovina) was examined in 2011 and 2012 in intensive orchards in the locations Vojkovići and Kula, in semi-intensive orchards in locations Tilava and Petrovići, and in extensive orchard in the location Kasindo. Using entomological methods, collecting before adult and adult stadium phytophagous and entomophagous-predators species, taking a sample of infested plants organs, cultivation before adult eclosion and determination of collected and newly hatched insects was carried out. Total number of determined insect's species is 44, of which 35 are phytophagous, 8 entomophagous - predators and one with mixed feeding regiment. The largest number of phytophagous insect species trophic related to pear was in semi-intensive orchards, 29 species in the Tilava and 23 species in the Petrovići. In intensive orchards, 13 species was found in Kula, 9 in Vojkovići, while in extensive orchard in the Kasindo, there was 17 species. The most numerous of entomophagous insects - predators was found in intensive orchards in the Vojkovići (8 species) and lowest in extensive orchard in the Kasindo (2 species).

Keywords: *Entomofauna, Pear, East Sarajevo region*

PHYSICAL AND CHEMICAL CHARACTERISTICS OF FLORAL, MEADOW AND FOREST HONEY IN THE AREA OF GORAZDE MUNICIPALITY (BOSNIA AND HERZEGOVINA)

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Abstract

The goal of this paper is to conduct a comparative analysis of physical and chemical characteristics of honey in the area of Gorazde municipality, Bosnia and Herzegovina. Sampling of honey was carried out by random selection of three producers of honey from Gorazde. Physical and chemical analyses were conducted on three types of honey: floral, meadow and forest honey. Physical and chemical analyses have included following parameters: level of water by drying method, level of ashes, conductometric level of reduced sugar according to Luft-Schoorl, level of sucrose according to Luft-Schoorl and level of free acids in terms of volumetry. All parameters were given in percentages and they are compared with the existing Rulebook. The obtained results show that all three analyzed samples of honey have the necessary quality. The conclusion is that, in the period of analysis, the controlled samples have shown the necessary safety and they are in accordance with the regulations of existing Rulebook on honey and other bee products (Official Gazette of Bosnia and Herzegovina, No 37/09).

Keywords: *Honey, physical and chemical analyses, quality.*

Tymus vulgaris – ANTIMICROBIAL DRUG FROM NATURE

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Abstract

It is known that the essential oils of herbs possess antimicrobial activity against a broad spectrum of microorganisms.The subject of this study was to exam antimicrobial activity of essential oils of thyme and antimicrobial drugs against bacteria:*Escherichia coli WDCM 00013,Pseudomonas aeruginosa WDCM00024*, *Staphylococcus aureus WDCM 00032, Salmonella Typhimurium WDCM 00031, Salmonella enterica* WDCM 00030 coagulase positive staphylococcus*Providencia stuarti*, ß haemolytic*Escherichia coli*, Streptococcus group D, *Staphulococcus aureus* and *Pseudomonas spp*.The essential oil of thyme had expressed an inhibitory effect on all tested pathogens. Zones of inhibition ranged in diameter from 5.00 mm in the case of *Pseudomonas aeruginosa* WDCMA 00024, up to 40.00 mm in the case of *Staphylococcus aureus* WDCMA 00034 and *Staphylococcus aureus*which is isolated from clinical materials (swabs of the nose).Because of these findings, the essential oil of thyme could find the extensive application in the food and pharmaceutical industries.

Key words: *Tymus vulgaris, antimicrobial drugs, inhibition*

CONTROL OF HIGHLY BLENDED WEEDING AT MAIZE (ZEA MAYS L.)

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Abstract

The experimentalworkwascarried outduring 2013-2015inthe training and experimentalbasefor implementationof theAgriculturalUniversityof Plovdiv.In the trail the maize (*Zea mays L.*) hybrid "Florence"(FAO group480) was used. The plant density was 6500 plantsda^{-1}. In the experiment three herbicide tank mixtures during the vegetation were applied. In eachof theherbicidecombinations, the productNishin4 OD (40 g/lnicosulfuron) at dose of 130 mlda^{-1} was used. Against the broad leaf weeds,the herbicides Flurostar 200 EC (200 g/l fluroxypyr) at dose of 70 mlda^{-1}, Mustang 306.25 SC (florasulam + 2.4 D) at dose of 60mlda^{-1}andKalisto 480 SC (480 g/l мezotrione)at dose of 20 mlda^{-1}were applied. All products werestudiedtogether with one and two mechanized intercrop soil tillages.Onone thirdof the treated experimentalplotsthesoil tillages were not applied.The threeherbicidemixtureswerehighlyeffectiveagainstthe weedsandselectivefor maize.Theyeffectivelyprotect thecropfree ofweedsfor morethan60 days. The highestefficacyagainstweedsandmaximumyieldwasobtainedafter the combined usage of the herbicides Flurostar 200 EC + Nishin 4 OD. In the conditions ofhighly blended weeding, the mechanizedsoil tillagecomplementedthe herbicideefficacyinthe weed managementvery well.

Keywords: *Maize, herbicides, soil tillages, weeds*

WEED CONTROL IN SUNFLOWERS WITH *CLEARFIELD PLUS* TECHNOLOGY

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Abstract

Field trial experiments were set up in a region close to the town of Pazardzhik (Bulgaria) in the period 2013 - 2015. The object of the experimental work was *Clearfield Plus* technology, which included soil herbicides. The sunflower hybrid that was used during three years of the experiment was *EC Candimis CL Plus*. The main aim of the experiment was to determine the selectivity of imazamox-based herbicides to the sunflower and herbicidal efficacy of the combinations of pre and post emergence herbicides against economically important weeds in the sunflower. Reported herbicide tolerance to crop in three years, which is characterized by slightly lightening the leaves on some of the tretments.The phytotoxicity disappeared within 14 – 21 days after the application of postemergence herbicides. The trial results over the last three years showed that the most significant differences were in the efficacy of *Pulsar 40* against perennial weeds. Solely application of herbicide *Pulsar 40* without *Dash*, significantly reduced its effectiveness against *Sorghum helepense* L., *Cirsium arvense* L. and *Chenopodium album* L. However, against annual broadleaf species – *Amaranthus* spp, *Sinapis arvensis* L, *Raphanus raphanistrum* L, *Solanum nigrum* L. and others – its efficiency was 100%. The pre-emergence herbicides- used immediately after sowing showed great at controlling over some economically important annual weeds in early stages of crop development.

Keywords: *Selectivity, efficacy, herbicides, sunflower*

PHYSIOLOGICAL SPECIALIZATION OF WHEAT LEAF RUST (*PUCCINIA TRITICINA* ERIKS.) IN BULGARIA DURING 2010 - 2012

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Abstract

Brown rust on wheat caused by *Pucciniatriticina*Erikss is a disease widespread in all parts of the world where wheat is a main cereal crop. The investigation was carried out at Dobroudja Agricultural Institute – General Toshevo, Bulgaria. The race, pathotype and genetic variability of the pathogen's population in Bulgaria were investigated during 2010 - 2012. The investigation was carried out under controlled climatic conditions suitable for the development of the crop and the pathogen. The virulence of the pathogen population was studied on Thatcher near isogenic lines with genes *Lr1, Lr 2a, Lr 2b, Lr 2c, Lr 3, Lr 9, Lr 11, Lr 15, Lr 17, Lr 19, Lr 21, Lr 23, Lr 24, Lr 26* and *Lr 28.*The race variability was determined applying nomenclature suggested at COST 817. The identification of pathotypes was based a specifying the response of the isogenic lines. The standart races were identified according to the International register. A total of 221 isolates were analyzed. Seventy-one phenotypically different pathotypes were identified. Pathotypes 63562, 63573 and 63762 had the highest frequency of occurrence. For the first time in this population 25 entirely new pathotypes were identified. The genetic variability was represented by 86 genetic formulae for virulence. The most common combination was 1,9,15,19,24,28 / 2a,2в,2c,3,11,17,21,23,26 (37.9 %). The genes for resistance demonstrated variable efficiency. Absolutely efficient during this period were genes *Lr 22a, Lr22b*and*Lr43.* Genes *Lr 1, Lr 3ka , Lr 9, Lr 19, Lr 25, Lr 28, Lr 40, Lr 41, Lr 42, Lr 45, Lr 47* and*Lr 50* demonstrated very good to high efficiency. During the investigated period, pathotypes were found which were overcoming the resistance of the two strong genes *Lr 9* and*Lr 19.*

Keywords: *P. triticina, pathotypes, virulence, effectiveness, Lr genes*

DYNAMICS OF *BLUMERIA GRAMINIS TRITICI* DISTRIBUTION IN WHEAT IN NORTH-EAST BULGARIA DURING 2013 – 2015

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Abstract

Powdery mildew caused by *Blumeriagraminis*f.sp. *tritici*is an annual disease on wheat in all regions where the crop is grown. This investigation studied the dynamics of development and propagation of the cause agent of powdery mildew in wheat in the region of North-East Bulgaria during 2013 – 2015. Monogenic lines and lines with two or three genes for resistance to the pathogen were used in the investigation. The attacking rate was read on the 10^{th} day as 0-100 %, and the type of infection – from 0 to 4. The relative attacking rate was calculated on the basis of the obtained results according to the highly susceptible line Mich. AmberxCc 8 (*Pm*6) used as a standard in this case. The development and propagation of powdery mildew is strongly limited under temperatures exceeding 25°C, rainfalls above 4 mm, and also by the efficiency of the genes for resistance to the pathogen. During the investigated period, variable virulence was formed in the powdery mildew population; it varied by its quantity and distribution over the individual years. The highest attacking rate was observed in the populations with virulence V- 1, V- 2, V- 2+, V- 4b, V- 5, V- 6, V- 7, V- 8, V- 17, V- 2+8, V- Mli . The populations with virulence V- 3a, V- 3c, V- 2+4b+6, V-Mld had low rate of propagation. The populations with virulence V- 3b, V- 4a, V- 1+2+9, V- 2+6, V- 5+6 occupied intermediate position by their attacking rate.

Keywords: *Blumeria graminis tritici, powdery mildew, wheat, virulence*

HOW PLANT SILICA AFFECT ON MAIZE RESISTANCE TO THE EUROPEAN CORN BORER, *OSTRINIA NUBILALIS* (HÜBNER)

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Abstract

Silicon (Si) is not considered as an essential element but it is beneficial. It has been found to help improving tolerance against insects increasing stem strength, plays a very important role in drought tolerance, enhance nutrient deficiency. Tissue levels of Si vary within plant species or cultivars.The aim of this study was to determine silicon concentration in maize leaf under different levels of irrigation, nitrogen fertilization and various genotypes and relationship with ECB larvae damage. Field experiments were conducted during three years (2012-2014) at the Agricultural Institute in Osijek (Croatia) with natural infestation of European corn borer (ECB). At the end of each growing season ear weight (g), tunnel length (cm), ear shank damage (cm), the number of larvae in maize stalk, number of larvae in the ear shank, and total number of larvae in plant were determined.In silking stage, ten leaves (below the ear), from 10 maize plants were sampled on each variant (total 1,080 plants) and silicon concentration was determined (%). There was no statistically significant difference between irrigation levels in silicon concentration while the variant with the highest level of nitrogen fertilization had the lowest concentration of silicon and the greatest damage from ECB larvae ($P<0.05$). Hybrid resistance didn't entirely depend on silicon concentration, even though damage was reduced with higher concentration of silicon at some hybrids. Silicon availability to plants is low in the soil and it is necessary to apply silicon fertilization to enhance plant resistance.

Keywords: *European corn borer, silicon, irrigation, nitrogen fertilization, hybrid*

ANTIFUNGAL ACTIVITIES OF PLANT EXTRACTS AGAINST COLLETOTRICHUM GLEOSPORIOIDES, THE CAUSATIVE AGENT OF ANTHRACNOSE DISEASE OF MANGO FRUIT

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Abstract

This study was done to evaluate *in vitro* the antifungal activity of water and ethanol extracts of five wild medicinal plants collected from the Sinai Peninsula, Egypt. These extracts were tested against *Colletotrichum gleosporioides*, the causative agent of anthracnose disease of mango fruits. The wild medicinal plants used in this study were *Capparis sinaica* Vill., *Crotalaria aegyptiaca* Benth., *Galium sinaica*(Delile ex Decne.) Boiss., *Plantago sinaica*(Barnéoud) Decne and *Stachys aegyptiaca* Pers.. Ethanol extractsshowed higher effective on the pathogen than water extracts at all concentrations used (2.5, 5, 10 and 20%).Water and ethanol extracts of all plants tested reduced mycelial growth and inhibitedspore germination of the pathogen. Both extractsof *P. sinaica*exhibited the more effective on the pathogen than other plant extracts. Characterization of *P. sinaica* extract revealed the presence of bioactive compounds in amounts more than those of other plants. Electron microscopy revealed a negative alteration of pathogen hyphae treated with the *P. sinaica* extract at 20% and also reflected dramatic changes in the cyto-morphology of pathogen hyphae. The overall results suggested that the use of these Egyptian wild medicinal plant extracts are promising, effective and environment-friendly management measure against *C. gleosporioides*.

Keywords: *Antifungal activity, anthracnose, Colletotrichum gleosporioides, mango, medicinal plants.*

POTATO MINITUBER PRODUCTION UNDER HYDROPONIC SAND CULTURE

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Abstract

Isolation and use of sterile growing media are two important factors in hydroponic production of healthy potato mini-tubers. Sand can be disinfected by solarization, while organic growing media may harbor some pathogenic agents. Under hydroponic condition, number and size of potato tubers are usually controlled by nutritional factors such as nitrogen, phosphorus and pH. The main objective of present study was to find an appropriate combination of N, P and pH (with respect to tuber number) under hydroponic sand culture and to evaluate some physiological traits affected by nutrients and pH.A factorial experiment based on completely randomized design with 4 replications was conducted. The experimental factors included N, P and pH. Some morphological and physiological traits including tuber number, rate of net photosynthesis, concentration of hormones ABA and IAA were studied. Results showed that higher phosphorus concentration for 10 days increased tuber number per plant, but tuberization was not influenced by nitrogen interruption and intermittent reduction of pH. None of N, P and pH affected total nitrogen concentration of potato leaf, stem and tuber. Higher phosphorus concentration increased the level of endogenous ABA and IAA, induced tuberization and thereby increased net photosynthesis rate of potato plants.

Keywords: *Potato, Hydroponic, Sand, Nutrition, Tuberization.*

INTEGRATING THE FLAME TREATMENT IN THE GROWING CYCLE OF ASPARAGUS FOR A SUSTAINABLE CULTIVATION

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Abstract

Manual, mechanical and chemical techniques are used to control weeds in asparagus fields. Chemical weed control is permitted by protocols, except for organic production, but prohibited during spear harvest, because shoots continuously emerge. In the harvest phase, the bed must be kept free from weeds to facilitate picking. Inadequate weed control increases infestations over the years. In this context, liquefied petroleum gas (LPG) flaming is effectively used in three phases of the annual cycle: harvest period, fern production period, end of growing cycle. A specific range of flaming machinery has been designed and adjusted for accomplishing treatments in each phase. During the harvest period, a broadcast flaming machine performs the treatment multiple times. Field tests identified suitable operative parameters to control weeds effectively, safeguarding the emerging spears (5km h^{-1} treatment speed, 0.8 bar gas pressure). During the fern production phase, intra-row flaming is applied to eliminate weeds and prevent seed dispersal. A special flaming machine is used to move through the narrow aisles, treating both sides at the same time (4÷5 km h^{-1} speed, 1.2 bar gas pressure). A laminar air flow provides a barrier to protect the fronds from rising heat. At the end of the growing cycle, the fern fronds are shredded mechanically and the residues are burned, eliminating disease inoculum and weed seeds. The flaming machine promotes the ignition of fern residues, improving combustion. A recent innovation is represented by a combined machine for shredding and flaming the residues simultaneously, reducing work time (3÷4 km h^{-1} speed, 1.6 bar gas pressure).

Keywords: *Asparagus officinalis, flaming, weeds, organic production, mechanization*

SPATIAL AND TEMPORAL VARIABILITY OF NECROPHAGOUS DIPTERA IN AL-BALQA REGION IN JORDAN

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Abstract

Necrophagous fly assemblages were surveyed in a three habitats from Al-Balqa governorate from residential to country- side regions using bottle traps technique from January 2008 to January 2009. From 81 sampling locations and 46048 collected insects from four dipteran families 9 species were identified as follows: family Calliphoridae: *Calliphora vicina* ROBINEAU-DESVOIDY, 1830, *C. vomitoria* (LINNAEUS, 1758), *Chrysomya rufifacies*(WIEDEMANN, 1819), *Lucilia cuprina* (WIEDEMANN, 1830), and *L. sericata* (MEIGEN, 1826); family Muscidae: *Musca domestica* LINNAEUS 1758 and *Muscinastabulans* (FALLEN, 1817); family Fanniidae: *Fannia scalaris* (FABRICIUS, 1791); familySarcophagidae: *Sarcophage carnaria* RHDENDORF, 1937. Rrelative abundance values of *Calliphora viciina*, *C. vomitoria*, *Chrysomya rufifacies*, *L. sericata*, *Musca domestica*, *Muscinastabulans*, *Fannia scalaris* and *Sarcophage carnaria* were 28.7, 0.4, 2.6, 1.9, 35.0, 24.3, 2.7, 1.5, and 2.9%, respectively for species. No significant difference among these species in spatial distribution was detected, except for *Fannia scalaris* and *Lucilia sericata*. Both species showed a significant difference between Al Salt location habitat and Wadi Shabi location habitat.

Keyword: *Forensic entomology, Variability, Habitat association, Necrophagous Diptera, Jordan*

BIOLOGICAL STUDIES ON THE AFRICAN FIG FLY, *ZAPRIONUS INDIANUS* GUPTA (DIPTERA: DROSOPHILIDAE)

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Abstract

The African fig fly, *Zaprionus indianus*Gupta, is a widely distributed polyphagous drosophilid fly of tropical origin. Its occurrence in Jordan was first reported on date palms from the Central Jordan Valley in June 2012. Studies on biological aspects of a fly population collected from Northern Jordan Valley were carried out under laboratory conditions at 25±1˚C, 75±10% RH, and 14 h photoperiod. Mashed banana fruits with dry active yeast of *Saccharomycescerevisiae* were used for the first time as a diet for larval and adult stages. The data obtained showed that the average mating period was 2.5 days, the pre-oviposition period 2.7 days, the oviposition period 42. 7 days, incubation period 24.5 h, hatching of eggs was 91.7%, duration of larval stage 7.4 days, pupal stage 6.8 days, adult male life span 42.2 days, adult female life span was 37.7 days. The larval stage had the highest mortality followed by the pupal stage and then the egg stage. The life cycle lasted 13.9 to 23.2 days with an average of 17.9 days. Emerged adult flies showed a sex ratio of 1.0. The obtained results provided basic data that may help in the management of this pest in Jordan.

Keywords: *Zaprionus indianus, biology, life cycle, laboratory rearing.*

CURRENT SITUATION WITH INVASIVE *ERIGERON ANNUUS* (L.) PERS. (DAISY FLEABANE) IN REPUBLIC OF MACEDONIA

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Abstract

Detail surveys of population of *Erigeron annuus* (L.) Pers., invasive plant species native to eastern North America, were made in three border locations in north-western, northern and eastern parts of Republic of Macedonia. The surveys revealed an intensive growth and different dense population of *E. annuus*. The population's density was not quantified, but several stands of different sizes were found. A rapid ecological risk assessment, mainly based on knowledge about invasion histories in South-Eastern and Central European countries, showed that this species is a serious threat to Macedonian biodiversity, particularly in the North-western part, where dense standsof*E. annuus* monoculture were recorded. Biological invasions of*E. annuus*affect biodiversity worldwide through its fast-growing ability and high seed production, phenotypical plasticity in the native range with regard to the availability of soil nutrients and, releasing compounds to the soil over the period of plant growth. Consequently, the invaded ecosystems suffer from significant losses in economic and cultural values.

Keywords: *Erigeron annuus, distribution, ecological impacts, Republic of Macedonia*

SUSTAINABLE FOOD SECURITY IN MOROCCO: CHALLENGES & OPPORTUNITIES

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Abstract

Food security is a major issue and constant challenge in the developing world. Morocco has reached the target of the first MDG and, since 1990-1992, has maintained the prevalence of undernourishment level of 5%, but it remains vulnerable to climate change in case of recurrence of drought and external shocks. Researches on food security in Morocco and its relationship with sustainable development are not been sufficiently developed in the direction of proposing models of sustainable food security strategies. Then, this study aims to clarify the relationship between food security and sustainable food chain and to propose a roadmap for food security in Morocco, learnt from the visit study to Singapore as a leading country in food security. According to GFSI (Global Food Security Index) of the Economist Intelligence unit, Singapore is ranked second in the world after United States in 2015. Results outline the issues and challenges of food security at both global and national levels and highlight the strengths and weaknesses of food security in Morocco via the analysis of the Moroccan's food security balance through the GFSI (Global Food Security Index) of the Economist Intelligence Unit. Finally, this study proposes a roadmap to ensure sustainable food security in Morocco focused on two strategic pillars:governance and organizational pillar and technical and financial support pillar. The first pillar concerns the establishment of a national authority in charge of coordination and implementation of food security strategies. The second pillar includes a set of recommendations related to technical and financial support aspects as optimizing storage foods, increasing agricultural productivity via agro-ecological intensification and sensitizing farmers in adoption of sustainable agriculture principles.

Keywords: *Food security, sustainable food value chain, sustainable development*

ANTITERMITIC ACTIVITIES OF *PINUS ROXBURGHII* WOOD EXTRACTIVES AGAINST*HETEROTERMES INDICOLA* (WASMANN) (ISOPTERA: RHINOTERMITIDAE)

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Abstract

Pinus roxburghii Sargheart wood extractives were examined for antitermitic activities against *Heterotermes indicola* (WASMANN). Heart wood extractives were removed from wood shavings by Soxhlet extraction by using ethanol:toluene (2:1) as the solvent system.Filter paper bioassay was conducted too bserve concentration dependent feeding response and mortality of termites.Results indicated that the highest termite mortality was occurred at 10 mg/ml with an LC_{50} at 6.48 mg/ml. *P. roxburghii* extractives showed maximum repellent activity after 12 hours of exposure of termites at the highest concentration (10 mg/ml). In choice and no-choice feeding bioassays with extracted and un-extracted *P. roxburghii* wood blocks, increased wood loss due to termite feeding was observed on extracted blocks compared to un-extracted blocks. More number of termites were found dead after feeding on un-extracted blocks compared to extracted blocks. Results also disclosed that extractives from *P. roxburghii* imparted resistance to vacuum-pressure treated Southern pine (SYP, *Pinus taeda* L.) and Cottonwood (CW, *Populusdeltoides*W. Bartram ex Marshall) against *H. indicola*.The results of this study indicate thatextractivesfrom *P. roxburghii* may be potentially useful in the development of environment-friendly termiticides.

Keywords: *Pinus roxburghii***,** *extractives, antitermitic, Heterotermes indicola, repellant*

EVALUATION OF BT COTTON (*GOSSYPIUM HIRSUTUM*) GERMPLASM AGAINST BACTERIAL LEAF BLIGHT OF COTTON

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Abstract

Cotton is considered as a white gold in the economy of Pakistan. Cotton is important fibre crop which support local textile industry of the country and engage millions of peoples to earn their livelihood. There are many factors (biotic and abiotic) which are affecting the yield and fibre quality of cotton crop. Bacterial Leaf Blight (BLB) is known as serious threat to cotton crop under favourable environmental conditions which affect the cotton growth and development hence reducing net gain in the form of fibre *yield*. The causal organism of BLB is *Xanthomonas citri* pv. *malvacearum* (*Xcm*) which is enlisted in the top ten most notorious Plant Pathogenic bacteria due to their wide host range. There is no single variety available which shows highly resistant response against BLB due to presence of number of *Xcm* races in the world. Therefore,in the present study twelve different commercially grown BT cotton varieties were cultivated in glasshouse to find out the genetic response of these BT cotton varieties against bacterial leaf blight of cotton. The bacterium produced yellow round colonies on nutrient agar media and biochemical analysis showed that the bacterium was gram negative and *Xanthomonas*. Screening results revealed that VH-148, FH-113 and VH-282 was tolerant and FH-87, FH-169 and S-3 were susceptible while one AA-703 appeared as highly susceptible. Screening results also showed that there was no single variety found as immune or resistant against BLB. Chlorophyll and yield data revealed that the *Xcm* has highly affected the chlorophyll content and yield of the inoculated plants in glasshouse.

Keywords: *Gossypium hirsutum*, Bacterial Leaf Blight, *Xanthomonas citri*pv. *malvacearum* (*Xcm*).

EVALUATION OF NEW APRICOT CULTIVARS INTRODUCED IN NIKITA BOTANICAL GARDEN

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Abstract

During 2013-2015 we studied 19 new cultivars of apricot, introduced in Nikita Botanical Garden. The cultivarKryimskij Amur was used as a control. In 2013-2014 the susceptibility of cultivarsKryimskij Amur, Kioto, Lanyhou Jim Mama, Lednicka and others to *Monilinialaxa*(Aderh. &Ruhland) Honey did not exceed 0.5-1 points. In epiphytotic year (2015) susceptibility of the same cultivars was rated with 3-5 points. Two genotypes were selected due to their *Monilinialaxa* resistance - Novyij 6357 and I-05-6.*Stigminacarpophila*(Lev.) M. B. Ellis damages did not exceed 3 points during the years of studies. Four cultivars demonstrated high resistance to the disease: Aurel, Lanyhou Jim Mama, Novyij 6357 and Sundrop. Increased resistance to both diseases was detected in three genotypes - Morava, Novyij 6357, Holovousy and one form I-05-6. Morava and I-05-6 were selected since the plants bloom one week later than the control. There are 10 cultivars with early fruit ripening (24.06 - 5.07): Kioto, Lanyhou Jim Mama, Holovousy, Sundrop and others. Cultivars Kryimskij Amur and Weslay-25 are of medium-late ripening July 23-24. The fruit quality of genotypes Aurel, Morava and others is not inferior to the control. In complex of signs (later flowering, increased resistance to fungal diseases, good fruit quality) cultivars Morava and Novij 6357 were dominant.Kioto cultivar is promising for breeding. Its plants have an average resistance to *Monilinialaxa* and *Stigminacarpophila*. Also, it is characterized by early fruit ripening and precocity, abundant yield and good fruit quality.

Keywords: *Apricot, late flowering, disease resistance, fruit quality.*

Acknowledgements

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EVALUATION OF WATER CONTAMINATION USING PHYTOINDICATORS

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Abstract

Agriculture is a significant user of water resourcesthrough irrigation but it also hasconsiderable effect to the quality of water, especially in view of the effects caused by pesticides and fertilizers that end up dissolved in rivers and ground waters. In addition to agricultural production, major pollutants of aquatic ecosystems are: industry, municipal wastewater, waterway traffic, accidents, etc. The analyzed water was taken from two locations of the River Lesa in Portugal. By using biological assay in the laboratory, quality and impact of water were tested regarding the following test plants: barley (*Hordeum vulgare*) and radish (*Raphanus sativus*). Physiological and morphological parameters of the test plants were used for evaluation of water quality by the filter-paper method ISTA (2013) and according to the Regulations on the seed quality for agricultural plants in Serbia. Results for physiological parameters are expressed in percentages. The values of morphological parameters are shown as average values and are processed using the ANOVA and Duncan's multiple comparison tests, with confidence interval of 95%. Physico-chemical analysis of water indicates that nitrates, nitrites and ammonium were detected in values exceeding maximum allowable concentration, according to Portuguese regulations of water quality. Also, in the analyzed water samples cadmium (Cd) and iron (Fe) were found in quantities that exceed the MAC values,as well as some pesticidal substances (MCPA, fonofos). In the tested samples, long list of pharmaceuticals were detected. The obtained results indicate differences in tolerance of test plants towards water quality. The expressed variability of parameters reveal their potential as possible bioindicators.

Keywords: *Lesa, water pollutants, phytoindicators, barley, radish.*

DIAPORTHE ERES AS A PATHOGEN OF QUINCE FRUIT (*CIDONIA OBLONGA*) IN SERBIA

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Abstract

Species in the genus *Diaporthe* and their *Phomopsis* asexual states are responsible for diseases on a wide range of plant hosts, some of which are economically important worldwide, causing root and fruits rots, stem cankers and leaf spots. In December 2015, quince fruit (cv. Asenica) with symptoms of brown rot were collected from storage in the area of Šabac. The isolates formed white mycelium, with dark pigmentation developing in the centre of the colony grown on a potato dextrose agar (PDA). Alpha conidia were abundant, aseptate, hyaline, ovate to ellipsoidal. Based on the morphological characteristics of the colony, shape of conidia and conidiomata as well as sequences of internal transcribed spacer regions (ITS), the fungus was identified as *Diaporthe eres*. Total DNAs were extracted directly from the fungal mycelium with a DNeasy Plant Mini Kit (Qiagen, Hilden, Germany) and PCR amplification was performed with primers ITS1/ITS4. The sequence analysis of ITS region revealed that representative isolate 7-16 (GenBank Accession No. KX274026) shared 100% identity (100% query coverage) with sequences of 13 *D. eres* isolates deposited in the GenBank. A pathogenicity test was conducted and Koch's postulates were fulfilled by re-isolation of the fungus from the diseased tissues. To our knowledge, this is the first report of *D. eres* causing fruit rot on quince in Serbia.

Keywords: *Quince, Diaporthe eres, ITS region*

USE OF PASSIVE SAMPLING TECHNIQUES FOR MONITORING OF PESTICIDES IN SURFACE WATER

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Abstract

The Water Framework Directive (2000/60/EC) (WFD) adopted in 2000, with its daughter directives, provides a common framework for water management and protection in Europe. The goal of the WFD was to achieve good qualitative and quantitative status of all aquatic systems by 2015. However, this has been prolonged to 2021. Among other things, this refers, also, to the control of pesticide residues presence in surface waters. Directive 2013/39/EU defines the list of 45 priority substances for surface waters, which must stay below the specified levels that are safe for water bodies and human health, including 15 pesticides. According to NORMAN list, number of pesticides labeled as emerging substances is significantly higher. In order to achieve this, it is necessary to carry out continuous monitoring program. Representative monitoring of organic micropollutants such as pesticides in aquatic systems is a challenging issue. Most studies that report the occurrence of these contaminants in water were conducted using traditional sampling methods, with a spot or composite samples. Recently, passive sampling, a new innovative method for sampling of a wide range of pesticides and other POPs, is applied. These new techniques (SPMD, POCIS, LDPE, silicon rubber, etc.) have many advantages compared to spot sampling. Some of them are enabling the preconcentration of contaminants, increasing the capability for detecting trace concentrations that otherwise requires large volumes of water and enabling the determination of time-weighted average (TWA) concentration over extended sampling periods. However, the use of passive samplers needs sampling rate (R_s) of the targeted compounds, which is usually determined via laboratory calibration experiment. In this study, a review on use of passive sampling technology for monitoring of pesticides in surface water is given, with the special emphasis on laboratory calibration experiments with the aim of R_s determination.

Keywords: *Passive sampling, Monitoring, Pesticide residues.*

APPLICATION OF MEASURING TECHNIQUES IN TESTING MACHINES FOR THE PROTECTION OF PLANTS IN THE REPUBLIC OF SERBIA

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Abstract

The main task of modern agriculture is the production of safe food. Testing of plant protection machines began in the late nineties in the European Union (EU). Using correct and adjusted machines for the application of pesticides, in favorable weather conditions, increases the effect of protection, and reduce losses of pesticides and toxic contamination of environment. The adoption of relevant legislation in this field is expected in the future because of the desired entry of Serbia into the EU. Current situation in Serbia is such that the percentage of sprayers in operation over ten years is 82%. Crop protection machines are not tested, and also testing of new machines in operation are mostly not implemented. Mostly operate machinery manufacturers that did not have some sort of the training. Plant Protection Department of the Ministry of Agriculture and Environment of the Republic of Serbia, in accordance with European Parliament Directive 2009/128 / EC and 2006/42 / EC, establishes a framework for the control of sprayers and mistblowers. These directives are becoming significant in Serbia, with joining Serbia to the EU. The introduction of Hazard Analysis Critical Control Points (HACCP) and Global Good Agricultural Practices(Global G.A.P.) standards in agricultural production guarantees the health safety of products, as well as the absence of pesticide residues. This is important especially for fresh fruits and vegetables. This allows farmers to export their health safe products on the EU market, which should fulfill all the conditions set by the "Global G.A.P." standards.

Key words: *Measurement techniques, sprayers,mistblowers, plant protection.*

EFFECT OF HERBICIDES ON MAIZE (*ZEA MAYS* L.) LINES

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Abstract

Herbicide application is one of the most important meashures of weed control in maize production. In case of maize inbred lines herbicide use is even more present than in hybrid maize. On the other hand, many factors limits herbicide application, due to lines, herbicides or meteorological impacts. Five herbicides were applied to test their selectivity to 14 maize lines. Herbicides **isoxaflutol + thiencarbazone-methyl** (Adengo), terbuthylazine + dimethenamid-p (Akris), mesotrione + terbuthylazine (Callaris Pro), thiencarbazone-methyl + foramsulfuron (Monsoon active) and tembotrione (Laudis) were applied in recommended dose for use in maize hybrid. First two herbicides were applied in maize stage 11-12 (BBCH), while other three were applied in stage 15-16 (BBCH). Experiment was set up on Zemun Polje, Belgrade, Serbia in 2013 and 2014. With two opposite years in meteorological conditions (first one was with drought, second with high amount of precipitations) herbicides induced slight damages in the first visual evaluation, with no visible symptoms in the second evaluation. Also, maize grain yield was not affected by herbicides.

Keywords: *Herbicides, maize lines, phytotoxicity evaluation, grain yield*

DISSIPATION RATE AND RESIDUES OF ACETAMIPRID AND IPRODIONE IN SWEET CHERRY FRUITS

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Abstract

A neonicotinoid insecticide acetamiprid and dicarboximide fungicide iprodione, are used in sweet cherry for control of the major pest (*Rhagoletis cerasi* L.) and pathogen (*Monilia laxa)*. For the purpose of the safe consumption of agricultural products after pesticide application, studies on their dissipation kinetics are essential to work out their half-lives (DT_{50}) and pre-harvest intervals (PHI). However, there is a lack of information on the persistence of acetamiprid and iprodione in sweet cherry fruits in different climatic conditions of production. Therefore, the objectives of this study were to investigate the dissipation and residues of acetamiprid and iprodione in sweet cherry fruits, as well as to evaluate the validity of prescribed PHI for these pesticides. Field experiments were conducted in a sweet cherry orchard, near Novi Sad, where acetamiprid and iprodione were applied at a recommended concentration. At various time intervals, from treatment to harvest, having in mind PHI (14 days for acetamiprid and 7 days for iprodione) representative samples of sweet cherry fruits were collected. Extraction of pesticides was carried out by QuEChERS method, followed by HPLC-DAD analysis. The method was validated in accordance with the SANCO/12571/2013 document and was used the determination of pesticides in real sweet cherry samples. During the study period, the concentration of acetamiprid and iprodione decreased from 0.52 mg/kg to 0.11 mg/kg and from 0.29 mg/kg to 0.07 mg/kg, respectively. The dissipation of acetamiprid and iprodione residues over the time fitted to the equation $C_t=0.52^{-0.22t}$ and $C_t=0.29^{-0.20t}$, with DT_{50} of 3.15 and 3.47 days, respectively. Finally, the content of acetamiprid and iprodione in sweet cherry samples, at the end of PHI, were below the maximum allowed level specified by the Serbian (1.5 mg/kg and 3 mg/kg) and EU MRLs (1.5 mg/kg and 10 mg/kg).

Keywords: *Sweet cherry, Acetamiprid, Iprodione, Dissipation rate.*

CONTROL OF *CYDIA POMONELLA*L. IN APPLE ORCHARDS WITH ACETAMIPRID

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Abstract

In Serbia, the codling moth (*C. pomonella* L.) occurs regularly in all apple orchards. It is one of the most important pests of apple. Damaged fruits mature and decline prematurely. Their market value is reduced, and during storage they are prone to decay. The pest also attacks pear, quince, peach, apricot, cherry and crab-apple fruits. Thus, exposure of the codling moth, as a target or non-target organism to insecticide effects increases selection pressure on the *C. pomonella*, which results in a decrease of its susceptibility, and finally the occurrence of resistance to the applied insecticides. During 2015, the trials were carried out according to the standard EPPO methods with the aim to establish the level of apple protection against the codling moth, by use of two products based upon acetamiprid (200 g a.i./L product)of SG formulations. In apple orchards at localities Sremski Karlovci, Kovilj and Tavankut, on varieties Idared and Granny Smith, the products based on acetamiprid were foliar applied at a concentration of 0.025%, by backpack sprayer. The experiment was set up in four replications in randomised block design. The efficiency of the insecticides was performed according to Abbott, and significance of differences (ANOVA) for the confidence interval of 95%. Nine days after application of the product based on acetamiprid, the efficacy at locality Sremski Karlovci was 88.9-91.6% and 27 days after the application, the product showed the efficacy 87.2-89.7%. Seven days after insecticideswere applied at locality Kovilj, efficacy was 80.5-91.6%, while after 21 days was 93.1-94.8%. At locality Tavankut, 14 days after the treatment, theefficacy of the insecticide based on acetamiprid was 84.4%, and 24 days after the application 81.2%.The applied insecticides showed high efficacy in protection of apple fruits from *C. pomonella* in agricultural production conditions of Vojvodina province.

Keywords: *Apple, C. pomonella, Acetamiprid, Efficacy.*

ANTAGONISTIC EFFECT OF *TRICHODERMA HARZIANUM* AND *BACILLUS* SP. AGAINST THE LETTUCE PATHOGEN *SCLEROTINIA SCLEROTIORUM*

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Abstract

Sclerotinia sclerotiorum is a major pathogen of many economically important vegetable crops worldwide. Plants can be infected at any stage of their development. The pathogen survives in crops as sclerotia in soil or as mycelium in infected plant debris. This study was conducted in order to: a.) reveal trends of the disease occurrence on lettuce in Serbia, and etiological aspects of the causal agent *Sclerotinia* spp., and b.) evaluate the antagonistic effect of *T. harzianum* and *Bacillus* sp. against *Sclerotinia* spp. Lettuce with symptoms of basal rot were collected between 2012 and 2014 in the area of Lazarevac. All *Sclerotinia* isolates obtained from the diseased lettuce were identified as *Sclerotinia sclerotiorum*,based on morphological and cultural characteristics.*Trichoderma harzianum* (DSM 63059) and three bacterial biocontrol agents: *Bacillus* sp. strains SS 12.6, SS 13.1, and SS 51.1, were evaluated *in vitro* for their antagonistic potential against *S. sclerotiorum*, isolated from the lettuce plant. *T. harzianum* and the cell-free culture filtrate of*Bacillus*strains SS 12.6 and SS 13.1 showed the greatest potential for controlling *S. sclerotiorum* and these agents will be further tested in field trials.

Keywords: *Sclerotinia sclerotiorum, morphology, antagonistic effect,Trichoderma harzianum, Bacillus* sp.

MORPHOLOGICAL AND MOLECULAR IDENTIFICATION OF A NEW ALFALFA PARASITE - *COLLETOTRICHUM LINICOLA* IN SERBIA

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Abstract

Alfalfa (*Medicago sativa* L.) is economically the most important forage crop in Serbia. During the period of 2005-2010, intense occurrence of alfalfa anthracnose was observed in Serbia (Srpska Crnja, South Banat District). Alfalfa plants showed characteristic symptoms of anthracnose disease ("shepherd's crook") including wilting and dying of the upper parts of the stems.Collected isolates formed light green to dark olive-green colonies on potato dextrose agar (PDA) and developed black acervuli around the center of the colony. In cultures on PDA medium acervuli were formed. Conidia were hyaline, aseptate, straight with one end pointed and the other slightly rounded, with dimensions 12.5 to 25.0 × 2.5 to 7.5 μm (mean 19.83 × 4.42 μm). In cultures on PDA medium after 5 days,numerous setae were formed. The setae were slightly darker at the bottom and lighter at the top, septate with 3 septa. Setae dimensions were with dimensions 100 to 185.5 × 2.5 to 5 μm (average 160.9 × 3.12 μm). PCR amplification using ITS1-ITS4, GSF1-GSR1, GDF1-GDR1 and T1-Bt2b primer pairs yielded fragments of approximately 495 base-pairs (bp), 900 bp, 200 bp and 750 bp, respectively.Based on the morphological characteristics and molecular characterization,the analyzed isolate Coll-44 from alfalfa was determined as *Colletotrichum linicola*Pethybr. & Laff..According information we have on disposalthis is the first report of *C. linicola* causing alfalfa anthracnose in Serbia.

Keywords: *Anthracnose; Alfalfa; Colletotrichum linicola; PCR analysis*

BREAD PRODUCTION LEFTOVERS AS POTENTIALLY VALUABLE RAW MATERIALS IN BIOTECHNOLOGY

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Abstract

The total production of bakery products in Serbia is around 800,000 tons per year, whereby the most frequently consumed product is wheat bread. The average consumption of bread per capita is about 106 kilograms. According to the statistics of this product consumption, regardless to the growth of prices, the total production has been increased in recent years. Increase of food production for humans and animals could be achieved through the application of new technologies in the food sector, i.e. in the bio-industry. Nowadays, there are many different ways for thermal processing of cereals: extrusion, hydrothermal processing, micronization, microwave treatment, while in Serbia, the most frequently used processes are extrusion and hydrothermal processing. Baking industry is highly developed in Serbia. Thus, bread consumption per capita in Serbia is far above average consumption in the EU. According to the surveyconducted in January-February 2016 by The Institute of Food Technologies in Novi Sad, there is a significant amount of bread leftovers in Serbia. Bread leftovers represent an environmental problem.On the other hand, they are potentially valuable raw material for human food and animal feed.Therefore, bread leftovers could be considered as a potentially valuable raw material in the food industry.Corn grits (13%) and bread crumbs(12.87%) were used as the main ingredients of extrusion mixes. The result shows a significantincrease of the total energy of mixes in comparison to the basic ingredients. Extruded mixes did not contain any of determinate pathogenic bacteria with an exception of an excessive number of microorganisms.

Keywords: *Bakery products, food waste, raw materials, bread leftovers.*

THE EFFECT OF SELENIUM ON MERCURY TRANSPORT ALONG THE FOOD CHAIN

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Abstract

More than 500 years of mercury (Hg) production in Idrija (Slovenia) resulted in a considerable pollution of Idrija region with Hg. Although the mine is closed for more than 20 years, the total soil concentration of Hg may still reach up to several hundred mg kg^{-1} dry weight in local gardens and more that thousand in other urban regions. Hg in soil undergoes different chemical transformations and in some forms it may enter plants and higher trophic levels in food chains, also with biomagnification pattern. The local population is, besides air and dust, thus exposed to mercury also via consumption of locally produced food. Several studies showed that the increased level of selenium in soil may reduce the uptake of mercury in plants but very few include other trophic levels in a food chain as well. In our pilot study we followed an impact of Se on Hg transport from soil to plants (*Lactuca sativa*) and further to soil dwelling animals (*Porcellio scaber*). Lettuce was planted in a contaminated soil from Idrija and in soil with added $HgCl_2$. The leaves of half of the plants were sprayed with Se solution (5µg L^{-1}) three and five weeks after planting. After six weeks plants were analyzed for Hg and Se and offered as food to terrestrial isopods for two weeks. Our preliminary results revealed that foliar treatment of plants with Se may affect Hg accumulation in plants and therefore further transport of Hg across the food chain.

Keywords: *Mercury, Selenium, Isopods, Lactuca sativa, Food chain*

RESPONSE OF THE PARLATORIA CITRUS SCALE INSECTS (HEMIPTERA, COCCOIDEA) TO COLOURED STICKY TRAPS

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Abstract

The black scale *Parlatoria ziziphi*(Lucas) and the chaff scale *Parlatoria pergandei*Comstock (Hemiptera, Diaspididae) are some of injurious scale insects to citrus crops. A better understanding of stimuli to which male adults respond is essential to develop more effective monitoring techniques and establish pest flight phenology to use in control programs. We sought to study relative attractiveness of coloured sticky traps to males of both citrus scale insects in citrus orchards, and to find a suitable coloured trap to estimate theirpopulations in the field. Consequently, field tests on the colour and position response of *P. pergandei* and *P. ziziphi* males were conducted in two citrus orchards located in Eastern Sicily (Catania), using square coloured sticky traps (30 x 30 cm) placed in and outside the canopy of trees. Significantly high numbers of males of both species *P. pergandei* and *P. ziziphi* were caught with yellow traps. Adults were also attracted by white and green traps but less by red and blue ones. Few significant differences in the captured males were observed when the two trap positions were compared. In conclusion, the yellow traps represent a good tool for monitoring parlatoria citrus scale populations in the field and, correlating those data with the population density on fruits and leaves samples on the trees, their management in citrus orchards is possible.

Keywords: *Parlatoria citrus scale insects, coloured sticky traps, males, captures, monitoring*.

THE CITRUS SANITATION PROGRAM IN TUNISIA

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Abstract

The total citrus growing area in Tunisia is about 24,000 ha mainly located in Cap Bon (Northwest region) with an average yield ranging from 15 to 18 tons/ha. This yield decrease is mainly attributed to biotic constraints. From these, viral diseases are known to seriously reduce the potential of the most cultivars. In fact, almost all of citrus trees in Tunisia are infected with one or more virus and virus-like diseases which induce high economic losses. The establishment of Citrus Sanitation Program was needed to solve this problem.

A National Virus Free Citrus Program was initiated in 1992. Selected trees of the commercially important varieties of sweet orange, clementine and lemon were indexed for several viruses, stubborn and viroids and subjected to shoot tip grafting and re-indexed. These virus free mother plants served as a starting foundation block that was enriched in 1996 by other varieties imported from the French Citrus Variety Improvement Program (National Institute of Agricultural Research of Corsica) in order to extend the list of marketed varieties. Actually, there are around 45 varieties in the foundation block. The pre-basic materiel increased from the mother plants was used for the multiplication of the basic materiel in 29 Citrus nurseries.

Keywords: *Citrus, Sanitation program, virus, Tunisia*.

BIOLOGICAL CONTROL AGAINST SOILBORNE FUNGI OF CUCURBITS

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Abstract

In Tunisia, the incidence of cucurbits soil-borne diseases caused by *Fusarium* sp., *Monosporascuscannonballus* and *Macrophominaphaseolinae*isayield limiting factor of these crops. Two bacteria species*Bacillus subtilis* (B27) and *Bacillus amyloliquefasciens* (B29) were tested against six isolates of *Fusarium*sp., two isolates of *Macrophominaphaseolinae* and one isolate of *Monosporscuscannonballus*. According to confrontation tests between these two bacteria and pathogens, a significant reduction of colony diameter of all species was observedwith the lowest values by B29 (2.46 cm). To confirm the *in vitro* antagonism activities, both preventive and curative treatments were performed on melon and watermelon plants.The damage caused by different plant pathogens was testedbased on rating scales symptoms of infestation. These results revealed that these treatments using bacteria strains B27 and B29 reduced the incidence of plants disease of melon and watermelon inoculated with all pathogens. For watermelon plants inoculated with *Fusariumsolanicucurbitae*and *Monosporascuscannonballus*, both *Bacillus subtilis* and *Bacillus amyloliquefasciens* were more effective than the synthesis active ingredients (Mefenoxan and Azoxystrobin) and Hymexazol. The treatment with B27 seemed to be more effective than the active ingredients(Mefenoxan and azoxystrobin), reducing the incidence of disease caused by *Macrophominaphaseolina*with disease severity index of 1.76 and 2.23 compared to the synthetic product (2.43 and 2.46) according to preventive and curative treatments, respectively.

Keywords: *Antifungal activity, Bacillus subtilis,Bacillus amyloliquefasciens, soilborne fungi.*

WHEN SHOULD THE FRUIT BE CONSUMED IN TERMS OF NUTRITION?

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Abstract

Today, the idea of eating healthy food for a healthy life is becoming worldwide popular. The consumption of fruit rich in bioactive compounds is very important for health as it is known for their characteristics such as anticancer, antimutagenic and antioxidant. Fruit is consumed by people at the fully ripen stage. In some studies, it can be seen that fruit has a few times less bioactive compounds at the fully ripen stage when compared to the previous stages. For example: according to analysis results of the samples of cornelian cherry (*Cornus mas* L.) taken at four different stages (light yellow, blush, light-red and dark red) it is found that at light-red stage, the fruit has about 1.7 times more phenolic, 3.48 times more antioxidant and 2.32 times more tannin when compared with the fully ripen stage (dark red). Similar result was taken for *Ziziphus jujuba* Mill., *Vaccinium macrocarpon* Ait., and *Phoenix dactylifera* L.. In terms of anthocyanin, the values are similar. For this reason, the most important time of consuming fruit in terms of nutrition is not fully ripen stage but the stages before it.

Keywords: Fruit, time of consuming, nourishment, phytochemicals.

OZONE FUMIGATION FOR QUARANTINE ANDPRE-SHIPMENT TREATMENTS AS ALTERNATIVES TO METHYL BROMIDE

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Abstract

Dried fruits and nuts production are important agricultural activity in Turkey.From a phytosanitary point of view,storage pests infesting dried fruits and nuts, especially during drying and storage period, may cause significant problems in dried fruits and nuts sector.Objective of this study is to test gaseous ozone for rapid disinfestations of dried fig and hazelnut as an alternativeto methyl bromide by evaluating its toxicity against major insect pests of stored dried fruits and nuts. Gaseous ozone at low concentrations (1-2, 5-6 and 10-11 ppm) for short exposure periods (1, 2 and 4 hour) resulted in very low mortalities of against all life stages of *Ephestia cautella* (Walker) and *Plodia intepunctella* (Hubner). Ozone flush treatment at 30 minute intervals for 6 hours resulted in almost complete mortality of adults and pupae of *E. cautella* and *P. interpunctella* placed in top position of 1.3 kg of dried fig and hazelnut whereas eggs and larvae of *E. cautella* and *P. interpunctella* placed in top position of 1.3 kg of dried figand hazelnut were hard to kill. The results indicated that gaseous ozone cannot be alternative to methyl bromide for rapid disinfestations of dried fruits and nuts (quarantine treatment) since it did not provide the complete mortality of all life stages of *E. cautella* and *P. interpunctella* on dried fig, and hazelnut even at its high concentrations.

Keywords: *Gaseous ozone, Methyl bromide, Alternative, Quarantine, Ephestia cautella, Plodia interpunctella*

FUMIGANT TOXICITY OF GARLIC ESSENTIAL OIL AND THEIR ACTIVE COMPONENTS AGAINST LIFE STAGES OF CONFUSED FLOUR BEETLE, *TRIBOLIUM CONFUSUM* Jacquelin du Val.

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Abstract

This study was carried out to determine fumigant toxicity of garlic essential oil, its active compounds (diallyl sulphide and diallyl disulphide) and mixture (diallyl sulphide+diallyl disulphide) against life stages of *Tribolium confusum* du Val. Garlic essential oil, its active components and mixtures showed different fumigant toxicity against life stages of *T. confusum*. On the basis of LC_{90} values, toxicity of vapour of treatments to *T. confusum* eggs and adults in descending order was: diallyl sulphide >diallyl disulphide > garlic essential oil and diallyl sulphide+diallyl disulphide > diallyl disulphide > garlic essential oil ≥ diallyl sulphide, respectively. Garlic essential oil, their active compounds and mixture required less than µl$l^{-1}$to kill 90% of the eggs. Garlic essential oil, diallyl disulphideand mixture diallyl sulphide+diallyl disulphiderequired less than 6 µll^{-1} to kill 90% of the pupae. Garlic essential oil,diallyl disulphide and mixture diallyl sulphide+diallyl disulphide required less than 20 µll^{-1} to kill 90% of the adults. On the other hand, garlic essential oil, its active compounds and mixture required the doses ranging from 6.44 to 23.31 µll^{-1} to kill 90% of the larvae. Bioassay tests indicated that the adults and larvae were the most tolerant stages while the eggs and pupae were the most susceptible stages to treatments of garlic essential oil, its active compounds and mixtures.Toxicity tests indicate that garlic essential oil and their active components can be used as possible alternative bio-fumigants in controlling stored grain insects.

Keywords: *Garlic, Essential oil, Diallyl sulfide, Diallyl disulfide, Fumigant toxicity, Tribolium confusum*

HAZELNUT KERNEL DEFECTS AND ASSOCIATED FUNGI IN THREE PROVINCES IN TURKEY

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Abstract

Hazelnut (*Corylus avellana*L.) is one of the most important tree nut crops in Turkey. As having the 80% of world production area, it has the leading position in production and export of hazelnuts. Although there are 16 licensed provinces for growing hazelnut in Turkey, the majority of production is carried out in six provinces including Ordu, Giresun and Trabzon. This study was conducted in 2008 in hazelnut growing areas in provinces Ordu, Giresun and Trabzon in Black Sea Region in order to determine hazelnut kernel defects and associated fungi. Survey was carried out on 221hazelnut orchards in July-August, near harvest time.Total of 5886 nuts derived from 1750 fruit clusters were dried and stored at room temperature in open air andthen examined for kernel defects. The main observed defects were blank, blank and moldy, decayed or moldy kernel, brown spot in internal cavity and spotted kernel. Fungi from these defected kernels were isolated, counted and their incidence was calculated as a percent of total isolated fungi. Total of 65 fungal isolates belonging to 9 genera were isolated from defected kernels. The incidence of *Cladosporium* spp. (24.62%) had the highest rate, and was followed by *Penicillium* spp. (20.00%) and *Trichothecium roseum* (18.46%). The incidence of *Aspergillus* spp. was relatively low with 7.69%.

Keywords: *Hazelnut, Kernel defects, fungi, Black Sea Region*

EVALUTION OF PRECISION FARMING RESEARCH AND APPLICATIONS IN TURKEY

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Abstract

Precision farming as farm management system is very important for Turkey because Turkey has 24 million ha of arable land and Turkish farmers used 10.6 million tonnes of fertilisers and 39222 tonnes of pesticides for agricultural production in 2014. Optimal use of agricultural inputs is vital for environment, health and production cost. Objective of this paper is to summarize precision farming applications and research studies. Farmers' interest in precision farming has been getting increasing. Big private and state farms started to use steering assistance systems in tractors and Turkish Government bought 300 yield monitors for combine owners. In addition, General Directory of Agricultural Research has been started to support to Regional Research Institutes for carrying out National research projects and to join international projects related to precision farming. The universities has been developing control systems for variable rate applications and field scouting robots in order to collect data and measure spatial variability in the fields. There are a few representative companies of precision farming technologies in Turkey. They generally sell Global Position System (GPS) and steering assistance systems for tractors. Farmers are suspicious about profitability of precision farming. Companies look for market to sell precision agriculture systems. After adoption projects and decreasing cost of the system give encourage the farmers to apply precision agriculture. In addition, Turkish government should develop policies to support farmers for sustainable agriculture.

Keywords: *Precision farming, variable rate application, yield mapping, Turkey*

OBSERVATIONS ON THE DISTRIBUTION, MORPHOLOGY AND SOME BIOECOLOGICAL ASPECTS OF *CICADA MORDOGANENSIS*BOULARD (HEMIPTERA: CICADIDAE) IN IZMIR, TURKEY

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Abstract

This study was conducted to determine the distribution, some morphological and bioecological aspects of *Cicada mordoganensis*Boulard(Hemiptera: Cicadidae)that damage fruit trees in Izmir province of Turkey in the period from 2005 to 2008. To determine the distribution of *C. mordoganensis*,investigations were carried out in 17 districts of Izmir and a total of 98 orchards were controlled. *C. mordoganensis* was found in 58,16 % of all orchards. For biology investigation, visual inspections were done in orchards in Kemalpaşa (Yukarıkızılca), Izmir, Turkey. In addition to the visual counting of adults in the shed skins of the nymphs, they were counted at the bottom of the trunk and under the canopy of 10 trees in that orchard. In addition, 10 wooden crates were put under 10 trees in this orchard and checked periodically to monitor the adult emergence.According to the results of these studies, the first adults of *C. mordoganensis*started to appear in the second week of June. The flying period finished at the mid of October. Flight duration of this species is about 110-115 days. The maximum adult emergence occurred between the end of June and mid of July. Population density changed from year to year. Most of the adults were observed in 2007 and least in 2006. Adults were observed on different fruit trees such as olive, cherry, peach, walnut, poplar, plane tree, fig, and pistachio. Females lay their eggs more on the bark of trunk of old trees and a dry stick of young plants. Some morphological characteristics of adult, last nymph instars and shed skins of last nymph of *C. mordoganensis*were also revealed.

Keywords: *Cherry, Cicada mordoganensis, Cicadidae, bioecology, morphology, Turkey*

IMPORTANCE OF INSECT IMMUNITY FOR BIOCONTROL: INFECTIONS IN FIELD-TRAPPED INSECTS FROM OSMANİYE (TURKEY)

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Abstract

Insect immunology is an active research arena. However, the vast majority of research in the area is conducted on model species taken from laboratory cultures. In this study, the hypothesis tested is that insects are usually exposed to infections or invasions in nature and this paper reports on results of a field study designed to assess the extent of natural infections in insects collected in the fields around Osmaniye, Turkey. Specimens were dissected to assess numbers of nodules. Nodulation is one of the insect cellular to microbial infection, In about 600 tested insect specimens, at least some nodules were found in 99%. Number of nodules in each insect was from 1 to 105. From these data, we can speculate that insects are mostly challenged by microbial diseases from which they rescued themselves. Importance of our data is that insect immune systems may limit the host range and effectiveness of agents deployed in biological control programs. Knowledge of insect immune systems may contribute to increase use of biopesticides globally.

Keywords: *Insect immunology; Naturally occurring infections; Biological control.*

THE COMBINE EFFECTS OF EICOSANOID BIOSYNTHESIS INHIBITORS AND TWO NATIVE ISOLATES OF BEAUVERIA BASSIANA ON MORTALITY OF SPODOPTERA LITTORALIS LARVAE

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Abstract

In this study, the effect of *B. bassiana*isolate (6646) was expressed in a time dependent manner on mortality of the larvae although the effect of *B. bassiana* (3288) isolate on mortality was lower. When *B. bassiana* (6646) isolate was co-injected with the eicosanoid biosynthesis inhibitors (phenidone dexamethasone, naproxen, indomethacin, esculetin, ibuprofen)with different modes of action it caused an increased and faster mortality of the larvae. Similarly, increasing phenidone (eicosanoid biosynthesis inhibitor) dosages were associated with increasing mortality of thelarvae co-injected with *B. bassiana*(6646) isolate. These findings support that virulent effects of entomopathogen, *B. bassiana* (6646) can be increased when *S. littoralis* immune systems were suppressed and that increased effects of microbial control of pest insects.

Keywords: *Nodulation; eicosanoid; Beauveria bassiana; Spodoptera littoralis.*

EFFECT OF RAINFALL AND HUMIDITY DURING SHOOTING AND GRAIN FILLING PERIOD ON YIELD AND QUALITY IN BREAD WHEAT (*Triticum aestivum* L.) CULTIVARS

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Abstract

Rainfall and humidity is one of the abiotic environmental factors may influence bread wheat quality during grain filling period in Trakya region (Turkey). It was investigated effect of the rainfall and humidity, in April May and June, to quality of the bread wheat cultivars. Rainfall and humidity from shooting up to grain filling period were taken in experimental area. This research was established with 25 genotypes in RCBD with 4 replications in Edirne, between 2005 and 2015 growing seasons. Aldane, Selimiye, Pehlivan and Gelibolu were selected from this experiment. Grain yield, TKW, TW, protein ratio, gluten, hardness and sedimentation and relationship amongst these traits were investigated.

There were various relations among investigated parameters. The rainfall in shooting stage positively affected and increased protein ratio, gluten, hardness, sedimentation, and grain yield. Rainfall during heading and grain filling period significantly affected and increased TKW, test weight, while negatively affected and decreased protein ratio, gluten value and sedimentation (r= -0.670). The rainfall in late stage of grain filling negatively affected test weight and grain hardness. Grain yield and sedimentation was positively correlated. Mean humidity from shooting up to grain filling positively and significantly affected and increased gluten index. Also, there was highly significant correlation between protein with gluten (r= 0.976**), hardness (r= 0.589), and sedimentation (r= 0.780). There was negative relation between TKW with protein ratio, gluten, index, hardness and sedimentation, while positive relation between yields. The rainfall in April and June positively affected yield potential of the cultivar. During heading and grain filling period high amount of rainfall and humidity decreased grain quality except TKW and test weight.

Keywords: *Bread wheat, cultivar, rainfall and humidity, yield, quality characters*

OROBANCHE (OROBANCHE SPP.)AND PHELIPANCHE (PHELIPANCHE SPP.) IN LENTIL (LENS CULINARIS MEDIC.); IMPACTS ON YIELD, QUALITY AND MARKETING PRICES

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Abstract

This study aimed to assess the impacts of severe parasitic plants (*O.crenata, P.ramosa, P. aegyptiaca*) on to grain yield, some quality characteristics and marketing price of red lentil in the South-east Anatolia. Farmer field trials were carried out in the Adıyaman and Viransehir locations in 2010-11 and 2011-12 crop growing seasons respectively. Randomly distributed twin plots throughout the field relaying on required number of broomrape infestation in Adıyaman field trial in 2010-11 (1+ 1 m^2 each) as experimental units were nominated as follow; A_0B_0: control, A_1B_1: 30-39 broomrape flowering in twin plots; A_2B_2: 40-49 broomrape flowering twin plots; A_3B_3: 50-59 broomrape flowering plots and A_4B_4: over 60 broomrape flowering plots. (4 treatments) Twin plots (2 replications) in Viranşehir in 2011-12 (1+ 1 m^2 each) as experimental units were nominated as follow; A_0B_0: control, A_1B_1: 2-3 broomrape flowering in twin plots; A_2B_2: 4-5; A_3B_3: 6-7 and A_4B_4: 8-9 broomrape flowering plots. Grain yield, hectoliter weights and 1000 kernel weights were scored. All grain samples were presented to randomly chosen grain purchasers in local commodity market and marketing price offers were scored respectively. Results revealed that broomrape infestation under both low and high levels of epidemic reduced the grain yield ranging from 51.5% to 97.7% significantly. Some visual purchasing criteria such as hectoliter and 1000 kernel weights were not affected seriously. Purchasers offered very similar marketing prices for pulse grains with all severity levels. Economic losses were huge varying from \$396.77 to 678.50 ha^{-1} It was concluded that regression equations derived from grain yield vs. infestation densities were found to be reliable with high coefficients of determinations and can be perfectly used for yield estimates under various levels of broomrape infestations

Keywords: *Red lentil, Orobanche, Phelipanche, grain yield, quality, marketing prices*

IMPROVING THE VIRULENCE OF A NATIVE *BEAUVERIA BASSIANA* ISOLATE AGAINST *RHYZOPERTHA DOMINICA* ADULTS

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Abstract

One of the important stored-grain pests is *Rhyzopertha dominica* causing considerable grain loss once high level of population is established. A promising alternative to currently used chemicals is the use of entomopathogenic fungi for suppressing its populations. Several previous studies established the pathogenicity of *Beauveria bassiana* against *R. dominica*. After screening a series of native wild fungal isolates, one *B. bassiana* isolate (151138) was found promising (data not presented). This study was conducted to increase the virulence of the isolate against *R.dominica* in order to reduce the amount of fungal conidia to be used in microbial control practices. The fungus was re-isolated from dead *R. dominica* adults and five single spore colonies were established. They were used in a bioassay using 500ppm conidia and 60-76% mortalities within 14 days were found. Considering variation amongst repetitions, one was selected for a further re-isolation study and other five single spore colonies were obtained. The bioassay was repeated with latter isolates and 98.75-100% mortalities within 14 days were achieved. Similar increases in mortality levels on 7^{th} day of incubation were also noticed. All the bioassays were conducted in centrifuge tubes with 40gr of wheat grains and 20 adults at 25^{o}C and 65% relative humidity in darkness. As initial mortality rate was 50-65% in the same conditions with 500ppm concentration, almost two fold increase in the efficacy of the fungus was resulted. Although wild entomopathogenic fungal strains are good source for finding promising microbial control agents, selecting virulent once from wild strains is valuable for further investigations.

Keywords: *Microbial control, stored-product pest, lesser grain borer.*

EFFECT OF SHORT TIME EXPOSURE OF *RHYZOPERTHA DOMINICA* ADULTS TO *BEAUVERIA BASSIANA* CONIDIA MIXED IN WHEAT GRAINS

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Abstract

Due to various problems of chemical insecticide use against pest insects of stored-grains, alternative control techniques have been investigated. One approach is utilization of entomopathogenic fungi for biological control of these pests and has commonly been considered promising. Previous experiments measured mortalities of insects kept in fungus treated cereals for 1-3 weeks or longer. This study was conducted to reveal the effect of shorter exposure time on *Rhyzoperthadominica* adults challenged with *Beauveriabassiana*. Adult insects (20 for each treatment) were left in wheat grains with fungal conidia(600ppm) for 15 mins, 1 h, 2hs, 6hs, 1 day and 2 days. Thereafter, they were transferred into clean wheat grains and incubated until mortality evaluations on the 7^{th} and 14^{th} days. One additional treatment (full time exposure) was to keep insects in wheat with fungal conidia throughout the experiment. Insects in control treatment were kept in untreated grains. The experiment had five repetitions and conducted at 25^{o}C and 65% relative humidity in darkness. An expected general trend of increasing mortality with increasing exposure time was observed. However, statistical differences amongst mortalities after full time exposure (46%), 1 day (32%) and 2 days (58%) exposure treatments were insignificant in 7 days of incubation. Full time exposure treatment (83%) was also not statistically different from 2 days exposure treatment (64%) in 14 days of incubation. These findings are particularly important for protecting cereal bulks from new insect infestations, and in the cases of uneven distribution of fungal spores in cereal bulks in management of stored-grain pests.

Keywords: *Microbial control, stored-product pest, lesser grain borer.*

EFFECTS OF MODIFIED ATMOSPHERE CONDITIONS ON BETA CAROTENE AND ANTHOCYANIN CONTENTS OF *ARBUTUS UNEDO* L. FRUITS

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Abstract

The fruits of strawberry tree (*Arbutus unedo* L.) species contain a higher amount of nutrients and bioactive compounds and a good source of antioxidants compared to many other cultivated species. *Arbutus* fruits are also good sources of beta carotenes and anthocyanines. However, consumption of those fruits is currently not widespread. This research was aimed to determine cold storage conditions for *A. unedo* berries and to prolong its shelf-life in the market and also to increase its use in the pharmaceutical industry. For this purpose, *Arbutus* fruits were collected from Şevketiye village of Lapseki sub-province of Çanakkale province (40°23' N, 26°52' E) at 92 m above sea level, which is located in the Northwestern part of Turkey in December 2010. The fruits were stored for 14 days at 0 °C and 90% relative humidity at modified atmosphere packaging (MAP) and normal atmosphere (NA) conditions. The *β*-carotene and anthocyanine contents of the fruits were determined in 7 days interval. The fruits were kept at 20 °C plus 2 days for shelf life at the end of the storage experiments. In this study, we presented the *β*-carotene content at initial day, 7th day, 14th day and plus 2 days at 20 °C modified atmosphere (MA) (85.00, 83.00, 78.00, 67.00 mg/100 g, respectively), and control fruits, (85.00, 80.10, 67.03, 55.78 mg/100 g, respectively). Anthocyanine contents were as follows; under MA conditions (37.00, 39.08, 29.76, 54.89 mg/100 g, respectively), and control fruits (37.00, 48.71, 44.84, 43.20 mg/100 g, respectively). Storage conditions are very important for fresh *A. unedo* fruits. MA packaging material preserved the physicochemical characteristics and sensory quality of the fruits during the storage period especially at 0 °C. However, unpackaged (control) *Arbutus* fruits were stored for only 7 days under NA conditions, and 14 days under MA conditions due to significant changes in their physical and sensory properties. Keeping fruits further at plus 2 days at 20°C conditions did not yield any positive results, especially with the MA conditions. MAP should only be implemented under cold storage to best keep of the *A- unedo* fruits.

Keywords: *Strawberry tree, Arbutus unedo, anthocyanins, β*-carotene, *MAP- Cold Storage Conditions*

EFFECTS OF POST-HARVEST DIPPINGS OF CALCIUM OXIDE ON AROMA VOLATILE COMPOUND OF PINK LADY APPLE CULTIVAR

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Abstract

The aim of this work was to assess the profile of volatile compounds changes during the cold storage in 'Pink Lady' apples. Six-year-old Cripps Pink (Pink Lady) apple trees grafted onto M9 rootstock were used as a plant material for this study. The trees were in a commercial orchard in Çanakkale-Turkey. Fruits were carefully picked up by hand at the commercial harvesting time. The fruits were dipped into calcium oxide solutions (concentrations of 2 and 4%) during three minutes. Control fruits were exposed to distilled water. Fruits were stored at 0 $^{\circ}$C and 90% relative humidity for 6 months. The aroma volatile content of apples determined by GC/MS (GasChromatography/Mass Spectrometry) analysis followed by liquid-liquid extraction. Stored fruits were analyzed immediately for their volatile contents at the 2nd, 4th and 6th months. Fresh fruits at the initial stage contained 15 aroma volatile content in total. However, higher levels of aroma volatile compounds were detected after 6 months of cold storage. According to the chromatography results, control fruits had 24 volatiles, 2% CaO treated fruits had 25 volatiles and 4% CaO treated fruits had 27 volatiles at the end of 6 months of cold storage. Apples at the initial stage produced an abundance of hexyl acetate (4.56%), butyl acetate (3.83%), and hexanoic acid hexyl ester (1.68%), which confer typical apple aroma characteristics. Mostly, ester production exhibited a fairly broad peak, declining as fruit aged. Propanoic acid 2-methyl-2-propenyl acetate (initial 0.548%) was lower at the beginning of the storage compare to the end of storage (control fruits 0.064%, 2%CaO 0.127%, 4% CaO 0.203%). CaO applications especially 4% concentration had deformation effect on epidermal layer cells on fruit surface. As a result, CaO applications had a significant effect on aroma enhancement in Pink Lady apples.

Keywords: *Pink Lady, Apple, Calcium oxide (CaO), Aroma volatile, GC/MS*

THE EFFICACY OF SOME ESSENTIAL OIL COMPONENTS AGAINSTCONFUSUED FLOUR BEETLE, *TRIBOLIUM CONFUSUM* DUVAL. (COLEOPTERA: TENEBRIONIDAE) AT DIFFERENT TEMPERATURES

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Abstract

Fumigant toxicity of essential oil components: α-pinene, *p*-cymene, eugenol, cuminaldehyde, linalyl acetate, linalool, α-terpinene, gamma terpinene, limonene, β-pinene, allyl isothiocyanate and diallyl disulphide against all life stages of Confusued Flour Beetle, *Tribolium confusum* DuVal. at three different temperatures (20, 25, 30 °C) and 65±5 % R.H was determined. In preliminary biological tests all life stages of *Tribolium confusum* were exposed to 100 µl/l concentration of compounds during 24 h. Results of preliminary tests were Cuminaldehyde, allyl isothiocyanate and diallyl disulphide showed highly toxicity to *T. confusum* eggs. Allyl isothiocyanate and diallyl disulphide had high fumigant toxicity to other life stages of *T. confusum*. The results obtained from effective components indicated that values of lethal concentration for effective compounds were decreased. However, toxicity increased with increasing temperature.According to results it can be concluded that Allyl isothiocyanate would be a potential compound in controlling stored-product insects, since it had high toxicity to all biological stages of *Tribolium confusum*.

Keywords: *Essential oil components, fumigant toxicity, Tribolium confusum, temperature*

MICROBIAL CONTAMINANTS AT VAROUS STAGES OF BREWING PROCESS

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Abstract

Beer may contain microbial contaminants which originate from different sources such as the raw materials, manufacture equipment, and those introduced during bottling. The raw materials including malt, water and hops contain their own microflora. The brewing yeast should be stored and propagated with maximal hygienic condition in order to avoid contamination. At the bottling process, the contamination can occur in the filling sector as well as in the sealing sector. The airborne microorganisms are a significant problem in all the breweries. The spoilage microorganisms which are mostly encountered in the whole brewing process are molds, wild yeasts and lactic acid and acetic acid bacteria. Species of *Alternaria*, *Cladosporium* and *Fusarium* are field fungi, while *Aspergillus* and *Penicillium* are grown during barley storage. The non-*Saccharomyces* wild yeasts include *Brettanomyces, Hanseniaspora, Pichia, Torulaspora, Zygosaccharomyces* etc. The contamination of brewing yeast from bacterial strains may be a serious problem to the fermentation process. The most isolated bacterial contaminants are lactic acid and acetic acid bacteria. The paper presented here is an introduction of a study related to the determination of environmental contaminant strains and other spoilage microorganisms of beer in Albania. A number of critical points were identified in the technological process taking into consideration the most probable polluted areas of production. The cultivation methods were performed. Isolated and identified strains detected during the microbiological control belonged mainly to the genera of *Penicillium*, *Aspergillus* and *Rhodotorula*. Spontaneous strains were very few in number and were not considered problematic for the indigenous microbial population.

Keywords: *Contaminants, beer, microorganisms, fermentation*

HERBICIDE CONTROLOF WILD HEMP (CANNABISSATIVA L.) AT SUNFLOWER GROWN BY ”EXPRESSSUN” TECHNOLOGY

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Abstract

The Wild hemp (Cannabissativa L.)is relatively rare weed in Bulgaria. Its presence in high density in the sunflower fields makes the production difficult and sharplydecreases yields.To solve this problem a field trail in sunflower (*Helianthus annuus L.*) field infested with the weed Wild hemp in high density was conducted. The experiment was carried out during the vegetation periods of the sunflower from 2010to 2014. The trail was stated on the agricultural land of village Krumovo, near Plovdiv, Bulgaria. The sunflower plants were grown by ”ExpressSun” technology. The primly used herbicide isExpress 50 SG(containing 500 g/kg tribenuron-methyl). For better Wild hemp control as partner products in our study, the adjuvant Trend 90 and the herbicide Pledge 50 WP (containing 500 g/kg flumioxazine) in dose of 7 g/da were used. The trail was conducted in four replications and the size of the plots was 28 m².The evaluated herbicides were applied in three different dates and in different doses. The obtained data for the efficacy of the herbicides were compared with the untreated dredged and not dredged controls. The efficacy of the herbicides against the weeds by the quantitative method (number of weeds per1 m²) and the percentage of efficacy (%) by the visual scale of EWRS(European Weed Research Society) were reported three times annually. The influences of the examined factors on the sunflower seed yields were also studied. The results from the study showed that the wild hempcontrol is extremely difficult and for the best way to control this weed, a system of herbicide application in the correct time is required.

Keywords: *Wildhemp, sunflower, herbicides, efficacy, yields*

THE VALIDATION OF (ALTAIR AGRAR) MODEL AS A DECISIONS TOOL OF IPM PROGRAMES IN COTTON FIELDS

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Abstract

Aphysiologically based model has been developed for use in addressing crop and pest management decisions in processing cotton (ALTAIR AGRAR).Field studies were conducted during 2014-2015 cotton growing seasons in Fayum Governorate (Egypt), to detect the adult population of the pink bollworm (*Pectinophora gossypiella),* cotton leaf worm (*Spodoptera littoralis),* cotton aphis *(Aphis gossypii),* white fly *(Bemisia Tabaci)* and red mite *(Tetranychus Urticae).* Field generation numbers, life table parameters for field, thermal requirements and heat unit's accumulation were used. Cotton plant phonology was recorded as well as weather factors. The relationships in cotton complex were detected.The interaction of pest (5 pests), plant (phenology) and weather (four Factors) were tested by (ALTAIR AGRAR) Model, on cotton varieties (Giza 90).A comparison was made between the expected and observed data. Most of the validations produced results that were in reasonable agreement with the observed data. The forecasts were more accurate, when the phenology of the population peaks was compared than when actual population densities were compared. In general, no computer model can make perfect forecasts; however, we can use (ALTAIR AGRAR) Model successfully to help to take the decisions in cotton fields.

Keywords: *ALTAIR AGRAR, Model, Plant phenology,cotton, Egypt.*

INVESTIGATION ON TOMATO SPOTTED WILT VIRUS INFECTING PEPPER PLANTS IN HUNGARY

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Abstract

In Hungary resurgence of *Tomato spotted wilt virus* (TSWV) frequently causes heavy crop losses in pepper production since the mid nineties. Management of TSWV control was first directed against the thrips (using different insecticides or plastic traps), and against weeds as host plants of the virus and the thrips. Later on *Tsw* resistance gene was introduced from *Capsicum chinense* PI 152225andPI 159236 into different types of pepper. In 2010 and 2011 sporadically, but in 2012 more frequently a resistance breaking (RB) strain of TSWV on resistant pepper cultivars was observed in the Szentes region (South-East Hungary). The presence of a new resistance breaking strain was demonstrated by virological (test-plant, serological and RT-PCR) methods. Previously, the non-structural protein (NSs) encoded by small RNA (S RNA) of TSWV was verified as the avirulence factor for *Tsw* resistance, therefore we analyzed the S RNA of the Hungarian RB and wild type (WT) isolates and compared to previously analyzed TSWV strains with RB properties from different geographical origins. Phylogenetic analysis demonstrated that the different RB strains had the closest relationship with the local WT isolates and there was no conserved mutation present in all the NSs genes of RB isolates from different geographical origins. According to these results, it is concluded that the RB isolates evolved separately in geographic point of view and according to the RB mechanism.In order to find new genetic sources of resistance in *Capsicum* species 89 lines from*Capsicum annuum, C. chinense, C. frutescens, C. chacoense, C. baccatum var. baccatum, C. baccatum var. pendulum* and *C. praetermissum* were tested with the Hungarian TSWV-RB isolate.

Keywords: *Tomato spotted wilt virus, wild type and resistance breaking strains, NSs protein, resistance*

EFFICIENCY OF BIOLOGICAL AGENTSIN CONTROLLING OF SEEDS AND ROOTSDISEASES OF EGGPLANT

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Abstract

The effectiveness of alcoholic extract of Oak gall and Neem seeds on the integrity of eggplant seeds was examined. Five different seed samples were collected from the northern provinces of Iraq and used in this study. The result of our examination showed presence of various fungi including *Aspergillus, Aurobasedium, Botrytis, Cladosporium, Fusarium, Phoma* and *Rhizoctonia* in the examined seeds and roots samples. Isolation rate of fungi ranged from 1% to 17%. Fungi that were isolated from studied roots included *Alternaria, Botrytis, Chaetomium, Cladosporiu, Drechslera, Fusarium, Geotrichum, Macrophomina, Phytophthora, Pythium, Rhizoctonia, Sclerotium*and *Stemphyllium*. Alcoholic extract of Oak gall showed inhibitory effect of 8% and 10% against*F. oxysporum* and *F. semitectum* respectively.Whereas, Alcoholic extract of Neem seeds showed inhibitory effect of 64% and 61.77% against*R. solani* and *F. oxysporum* respectively. The soil-borne fungus *Trichoderma harzianum* showed an antagonistic activity, and it had antifungal effect against several pathogenic fungi, especially *F. solani*, with antibiosis level of 1.66. *Bacillus subtilis*also showed high inhibitory activity of 100% against*F. semitectum* and 92.66% against*F. solani*.

Keywords: *Eggplant, Biological Control, Fungi, Neem, Oak gall.*

TOXICITY OF SPINOSY INSECTICIDE, SPINOSAD AGAINST COWPEA WEEVIL, (*CALLOSOBRUCHUS MACULATUS* (F.) (COLEOPTERA: BRUCHIDAE)

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Abstract

In present study, residual toxicity of Spinosyn group insecticide, Spinosad solution was evaluated on chickpeas against adult of *Callosobruchus maculatus* (F.) under laboratory condition. In laboratory bioassay, *C. maculatus* adults on chickpeas were exposed to Spinosad at 6, 12, 24, 48, 72 and 108 ppm (mg active substance/l water/ 0.5 kg product) concentrations for 7 days. The concentration of spinosad suspension and the exposure period had a significant effect on paralysis and mortality rate of *C. maculatus* adults on chickpeas. %100 paralyze and mortality rate of *C. maculatus* adults were recorded on surface treated chickpeas at 48 ppm concentration of spinosad for 7 day of exposure. At 72 and 108 ppm of spinosad concentrations no progeny production was observed while at 48 ppm concentration progeny production was only 1 adult. These results indicated that spinosad treatment at 48 ppm and above concentrations achieved complete mortality and completely suppressed the progeny production of *C. maculatus*. In conclusion, surface treatment of spinosad would be potential of controlling major stored legume pest, *C. maculatus* and be an alternative to conventional synthetic insecticides.

Keywords: *Spinosad, Callosobruchus maculatus, chickpeas, residual toxicity*

DESIGNING OF A VARIABLE VOLUME COLD STORE

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Abstract

Cold stores do not work for all time as full loaded during storage period. There is always empty space when cold store is not fully loaded. Unnecessary energy is consumed because this empty volume must be cooled even there isn't any stored agricultural product. In this study a system was developed to adjust cold store volume according to the amount of stored agricultural product. Therefore, effective volume of the cold store where agricultural product stored will only be cooled and energy saving will be established. In addition, better cold air distribution will be established in the cold store and the quality of product will also be better preserved. Developed system is a moving wall-door system located inside of the cold store. It can be moved automatically. Sliding-wall door system can be moved by an electrical engine on a rail located at side walls. Leakage of cold air is prevented by a silicone seal balloon. The silicone seal balloon is located all-around of the sliding wall-door. The sliding wall change volume of cold store due to amount of stored product. Sliding wall-door system is a new approach for manufacturing of cold storage. This system will not be used only for new cold stores, but also can be used for old cold stores. Energy saving is expected by using developed system in cold stores. Submission of Petit patent for this developed system was approved by Turkish Patent Institute.

Keywords: *Cold store, energy saving, variable volume, sliding wall-door*

A NEW BACTERIAL ENDOSYMBIONT OF SUNN PEST, *EURYGASTER INTEGRICEPS*

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Abstract

Most insect species harbor endosymbiotic bacteria that play key roles in their hosts' fitness by providing essential nutrients and manipulating their reproduction, also protecting them from natural enemies. *Spiroplasmas*, most commonly *associated with arthropods*, exhibit great diversity with respect to both their modes of transmission and effects on their hosts. Here we evaluated the prevalence of *Spiroplasma* infections in the field populations of *Eurygaster integriceps*, one of the most serious pests of wheat and barley. Whole genomic DNA was extracted from surface sterilized of individual sunn pest samples from 16 different geographic localities in Turkey. PCR-based screening of DNA was undertaken by using the 16S rDNA locus in terms of *Spiroplasma* infection. To our knowledge, this study represents the first report of sunn pest naturally *harboringSpiroplasma* infection in Turkey. We detected widespread *Spiroplasma* infections whereas infection frequencies varied among different populations. The results obtained in this study showed that *Spiroplasma* infections in *E. integriceps* in Turkey had a higher frequency, indicating that symbionts appear to be an important tool in developing alternative control strategies against sunn pest populations.

Keywords: *Sunn pest, endosymbiont, Spiroplasma, 16S rDNA*

FUSARIUM TEMPERATUM - MAIN FACTOR OF EAR ROT OF MAIZE IN POLAND

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Abstract

Fusarium temperatum is considered as one of the most important causing factor of maize ear rot, especially in temperate climate zones of the world. The aim of the studies was analysis of disease severity of maize in field test after plant inoculation with selected, pathogenic fungus strains. In total 120 genotypes of two botanical varieties i.e. *Zea mays* var. *indentata* (dent), *Zea mays* var. *indurata* (flint) supplied by two breeding companies were tested. Infection degree was evaluated using six degree (0–5) rating scale. According to experiment design, each genotype was evaluated in two experimental field localizations. The 60 genotypes were tested at Radzików and Smolice and the next set of 60 genotypes at Radzików and Kobierzyce. The range of trait variation of the analyzed genotypes ranged from 1.30 to 4.35. The significant impact of the environment on the level of cobs infection by *F.temperatum*was noted. The significant strongest level of infected corn cobs was noted in Kobierzyce (2.73) and Smolice (2.83) more than in Radzików (2.30). The flint corn cobs were significantly less infected than dent with infection degree of plants 2.43 and 2.79 respectively. The above mentioned correlation was observed for all three locations of the study, regardless of source of the plant material. The infection degree of *Zea mays* cobs, collected from fields at Radzików was 2.56 and 2.05, for dent and flint respectively. For plant material estimated in Smolice, the infection degree was 3.04 for dent cobs and 2.61 for flint cobs. The range of this trait for corn cobs, collected from experimental fields in Kobierzyce was 2.81 for dent, when the flint forms were less infected 2.66.

Keywords: *Fusarium temperatum, ear rot, maize*

Acknowledgements

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RUTHLESS USE CAN POSE EXTINCTION RISK TO GUNDELIA (*GUNDELIA TOURNEFORTII* L.) IN SOUTHEASTERN ANATOLIA REGION OF TURKEY

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Abstract

Changing climatic conditions and curious nature of human beings lead to the extinction of many plant species annually. However, ever increasing population of globe demands for discovering new species and a considerable number of species are being discovered. Ruthless use of recently identified species for their edible, industrial and medicinal uses lead to extinction risk. *Gundelia tournefortii* is an arable weed in various cropping systems of the world. The weed has gained increased attention of public in South Eastern Anatolia region of Turkey due to its multiple uses in food, gum and coffee industries. Ruthless use of the plant has led to dramatic decrease in its densities in agricultural and abandoned ecosystems. Surveys were conducted in three consecutive years (2010, 2011 and 2012) to record the densities of the plant in wheat based cropping systems and abandoned habitats. The region was divided into five different sub-regions and survey sites were decided. A 100 m^2 area was surveyed to record the prevalence and densities of the plant. Collected data was statistically analyzed using Analysis of Variance (ANOVA) technique and means were separated by Fisher's least significant difference test where ANOVA indicated significance. Significant differences were observed among habitats, sub-regions and survey years. The density was linearly decreased with each passing year indicating gradual and consistent decline in the abundance. Similarly, abandoned habitat had more number of plants compared to wheat crop. Different sub-regions also significantly differed for prevalence and abundance of the weed. The results of three year surveys revealed that ruthless use can pose extinction risk to the plant. It is therefore recommended that serious efforts should be made to save the plant from extinction and inclusion in the prevailing cropping systems of the region.

Keywords: *Gundelia tournefortii, Extinction risk, Potential edible crop,*

EFFECTS OF ECOLOGICAL CONDITION OF SIIRT PROVINCE ON YIELD AND YIELD FACTORS OF SOYBEAN (*Glycine max* (L.) Merr.) VARIETIES/LINES

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Abstract

Thisstudy was conducted to investigate the effects of yield and yield componentsof some soybean varieties and lines in ecological condition of Siirt province in 2014 and 2015 growing seasons. They had a production potential as a main product in Siirt province. This study was designed as randomize blocks of four replication at Kezer Campus of Siirt University. Important components such as yield (kg ha^{-1}), plant height (cm), first pod height (cm), pod number per plant (number/plant), and thousand seed weight (g) were determined. According to the results of combined two-year variance analysis, the lowest seed yield was obtained from the line 834 with 1798.7 kg ha^{-1}, the highest seed yield obtained from the variety of Gapsoy 2016 with 2672.1 kg ha^{-1}. Additional to the variety of Gapsoy 2016, line 1022with 2639.2 kg ha^{-1} came to the forward with of seed yield. Considering first pod height in the line and varieties, line 1022 was seen that reaching the highest value in two years. When compared the first pod height for first year in general appears to be higher than the second year,that is thought to be associated with the first irrigation performed. As a result; the properties examineddepending with line/varieties and years in terms of statistical significance was determined important. The values of the properties examined was observed varied under the influence of different climatic and soil conditionsin both years. The two-year study results shown that soybean can be grown successfully in Siirt province under irrigated conditions and thevariety of Gapsoy 2016 and line 1022 gave the highest yields.

Keywords: *Soybean,Yield, Siirt province, Climate.*

BIOLOGICAL CONTROL AGAINST DATE MOTH ECTOMYELOIS CERATONIAE ZELLER. (LEPIDOPTERA, PYRALIDAE) BY SPINOSAD

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Abstract

Currently, chemical control is the only means used to control populations ofthe date moth (*Ectomyelois ceratoniae*) which is the most important and dangerous pest to palm groves in Algeria, conventional insecticides act faster, but their main drawback is it can't be destroyed or degraded. In this context we conducted our work to explore the insecticidal activity of Spinpsad which is a bio-pesticide on the larval stagesof *Ectomyelois ceratoniae*. The study of the effect of Spinosad on the mortality of different larval stages revealed that the doses used were significantly and positively correlated with mortality adjusted for different durations of exposure of larvae bio-pesticide. Lowest corrected mortality was observed in a short time and lethal in older larvae treated with the lowest concentration. While the higher mortality was observed in a longer duration of exposure in younger instars treated with the highest concentration.

Keywords: *Datepalm, Ectomyelois ceratoniae,Spinosad, Biological control, toxicology.*

EFFECT OF BIO PRODUCTS OF MICROBIAL ORIGIN ON PLANT PARASITIC NEMATODES IN SOYBEAN

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Abstract

Soybean (*Glycine max* L. Merr.) is an important oilseed crop and source of high quality protein. Plant parasitic nematodes pose treat to production of globally demanding high yield soybeans. The most important soybean nematodes are soybean cyst nematodes (*Heterodera* spp.) and root lesion nematodes (*Pratylenchus* spp.). Beneficial soil microorganisms are often antagonistic, and directly or indirectly decrease population of plant parasitic nematodes. A field experiment was conducted with the aim to evaluate the influence of three commercial bio products of microbial origin on population of plant parasitic nematodes in soybean. Treatments were applied as soil amendments and/or foliar. Soil samples were taken twice in the growing season. Nematodes are classified into the trophic groups, whereas plant parasitic nematodes are identified to the genus level. In total, 11 genera of plant parasitic nematodes were identified, whereas the most abundant plant parasitic genus was *Pratylenchus.* Statistical significant differences were observed between the treatments. Interestingly, when leaf treatments were added in plots with soil treatments, population of *Pratylenchus* spp. was significantly decreased compared to plots with only soil treatment. However, population of three plant parasitic genera increased in treatments with beneficial microorganisms. The results indicate that interaction between nematodes and amended microbes exsists. Amendments of beneficial microbes change the population density of plant parasitic nematodes in soybeanand could have suppressive or synergetic effect depending on the genera of nematodes.

Keywords: *Pratylenchus, soil microorganisms, amendments, interaction*

INTEGRATED PEST MANAGEMENT OF THE TOMATO LEAF MINER,*TUTA ABSOLUTA* (MEYRICK*) (*LEPIDOPTERA*:* GELECHIIDAE*)* IN TOMATO FIELDS IN EGYPT

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Abstract

Tomato (*Solanum lycopersicum* L) is universally one of the most important vegetable crops worldwide. In Egypt, the crop is cultivated annually in 2-3 plantations. The tomato leaf miner, *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) is one of the recent devastating pests attacking tomato crop worldwide. It is a new exotic pest in Egypt. A study to evaluate the efficacy of integrated control methods against the pest was carried out at Fayoum Governorate, Egypt in the tomato Nili plantation (September – December) of 2014. Based on the infestation reduction rate, release of the egg parasitoid, *Trichogrammatoidea bactrae* + mass trapping (plot B) showed best results, followed by the application with Biotrine and Fytomax + mass trapping (plot A) and lastly use of insecticides (control) (plot C). Respective seasonal rate of infestation was 9.2, 11.1 and 29.3%. Highest yield production and cost benefits were recorded in plot (B).

Keywords*:* *Tomato, Tuta absoluta, IPM, Cost benefit, Egypt.*

INTROGRESS OF *FOC* 4 QTL LOCUS TO DEVELOP "SUPER ANNIGERI-1" CHICKPEA VARIETY RESISTANT TO FUSARIUM WILT THROUGH MABC

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Abstract

Chickpea is an important food legume cultivated and consumed across the Indian subcontinent. Fusarium wilt is the major constraint in chickpea production. The wilt race confined to Northern-Karnataka region is caused by soil borne fungus *Fusarium oxysporum* f. sp. *ciceris* (*foc* 4). Thus marker assisted backcrossing (MABC) was attempted to introgress the *foc 4* loci from WR-315 (wilt resistant) to elite cultivar Annegeri-1(A-1: wilt susceptible) (A-1 × WR-315). For MABC three markers TA96, TA27-F and TR19-V conferring the *foc 4* loci were used in foreground selection. Background selection was employed using 40 SSR markers that were evenly distributed on to all the 8 LG of chickpea genome. After two backcrosses and two rounds selfing, 67 families were found to be resistant to wilt under wilt sick garden and possessed good background genome recovery (78.85 – 94.83 %). Of the 67 BC_2F_3 families top ten elite families with recurrent parent genome recovery of 91.07 – 94.83 % were selected. The selected lines were homozygous and stable. Stringent phenotypic evaluation of advanced lines of BC_2F_3 families in wilt sick garden could confirm resistance to fusarium wilt Race-4. These elite lines are being evaluated for yield and yield attributing traits in multi-location trails to identify the best possible line as compared to local check for release and general cultivation in Northern-Karnataka region. The present investigation was accomplished with speedy development of elite "Super Annigeri-1" cultivar resistant to fusarium wilt, grain yield advantage that was otherwise susceptible, as early as in two backcrosses and selfing.

Keywords: *Chickpea, Fusarium wilt, MABC, Foc 4 and Super Annigeri-1*

SEASONAL VARIATIONS IN ABUNDANCE AND FLIGHT ACTIVITY OF THE HAIRY ROSE BEETLE, TROPINOTA SQUALIDA (SCOPOLI) IN APPLE AND CHERRY ORCHARDS AND ITS RELATION TO FLOWERING IN SOUTHERN JORDAN

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Abstract

The hairy rose beetle, *Tropinota squalida* (Scopoli) is one of the important insect pests that attacks pome and stone fruits in the southern part of Jordan. This destructive pest attacks the flowers of the crop where it feeds on the reproductive parts of the flowers. The study was initiated to monitor the phenology and flight activity of the hairy rose beetle in an attempt to provide basic information for the development of safe and effective control measures for this economically important insect pest. The study was conducted during 2009-2010 on two apple cultivars, Grany Smith and Royal Gala, and on cherry. Capture of the beetles was performed via locally constructed traps that were improved by incorporation of the floral chemical attractants. Adults of the beetle were captured in apple orchards earlier than cherry orchards. In addition, adults disappeared earlier in the cherry orchard than that in the apple orchards. The flight activity of beetle started in the last week of January to the end of May in the apple orchards, but it was during mid-February to mid of May in cherry orchard. Positive relationships were obtained between the beetle flight activity the flowering pattern of the studied fruit crops.

Key words: *Tropinota squalida, hairy rose beetle, flowering, flight activity*

CONTENT AND ACCUMULATION OF HEAVY METALS IN BLACK SOILS TYPICAL FOR RUSSIAN FOREST-STEPPE

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Abstract

Recently the growing anthropogenic influence deteriorated ecological and agro-chemical state of Russian black soils and, finally, led to decrease of natural soil fertility. The pollution of the soils with heavy metals made it necessary to control the pollution level, the content of general and mobile forms of heavy metals, the mechanism of their fixation in the soil. The research of the typical loamy composition showed that the content of general forms of cadmium increased the terminal concentration by 1,16 times, and approximate concentration by 1,83 times, when ρH> 5,5 and by 3,91 when ρH< 5,5.The content of general forms of cobalt in the soil increases the terminal concentration by 1,33 times. When the soil agro-chemical indices change, the transfer from general forms into mobile forms is possible. These facts may have a negative effect on agricultural produce.The total sum of general forms of heavy metals characterizes agricultural lands as suitable for different crops, on condition that the quality control of the agricultural produce is observed. It is necessary to reduce the level of the influence of soil pollutants and their availability for plants.The research shows high positive correlation dependence between accumulation of general and mobile forms of heavy metals and silt black soil.

Keywords: *Black soil, heavy metals, mobile forms, general forms, granule-metric composition.*

NOZZLES APPLICATION QUALITY IN WHEAT: EFFECT OF SINGLE, DOUBLE AND TRIPLE FLAT FAN NOZZLES

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Abstract

Protection of wheat must be done in an efficient and economical way to protect against diseases and pests. The price of wheat prevents enough space for the calculation in the protection and further subsequent corrective walkthrough. The protection is usually done in two passes, one for weed control and the other for diseases and pests. For several years back, wheat pass through the critical period when flowering. High temperatures and humidity causing invasive attacks of several different diseases and pests. This protection is the most important because it directly affects the grain quality. For efficient protection, besides of respecting norm and dose, it is necessary to use adequate nozzles. Density of wheat and leaf surface is at a maximum. For good protection, it is necessary that the working fluid cover leaf and ear of wheat.During the experiment was used three types of nozzles. The common characteristic is that they have a flat T jet, spray angle of 110^{o} and a flow rate of 1.6 l / min at 3 bar. They differ in the number of jets. Nozzles are used with one, two and three jets. The first nozzles have vertical jet, second have jets at 30 ° from the vertical on both sides and third, one jet is positioned vertically while the other two at an angle of 30 ° on the opposite side. Because they have two or three jets, expected result is to have better pesticide applications. This would achieve effective protection of wheat and thus ensure high yield and quality of grain.

Keywords: *Nozzle, nozzle jet, pesticide application, wheat, sprayer.*

MOLECULAR EVIDENCE ON SYMBIOTIC RELATIONSHIPS BETWEEN BRACOVIRUS AND SPODOPTERA LITTORALIS (LEPIDOPTERA: NOCTUIDAE)

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Abstract

Bracoviruses (BVs) from the Polydnaviridae family are symbionts of parasitic braconid wasps. BVs are used by parasitoid wasps to manipulate their lepidopteran host physiology. The virus is transmitted into the haemocoel of the host during oviposition, together with the parasitoid egg and other maternal protein secretions. Viral products encode proteins that lower host immunity; allowing the development of parasitoid wasp larvae in the host they ensure wasp survival in the lepidopteran larvae. The Egyptian cotton leaf worm, *Spodoptera littoralis* (Boisd.), is an important pest that causes extensive damages in many vegetable, fodder, and fiber crops. Although resistance has been developed to different types of insecticides, chemical-based control methods are still used as a management strategy for *S. littoralis*. In the present study, two transcripts that are members of the C-type lectin family encoding *BV* proteins were annotated from a cDNA library generated from the hemolymph of the fifth instar larvae of *S. littoralis*. Characterizations of the nucleotide and deduced amino acid sequences of these genes approved the bracoviral deriving genes, and also showed sequence similarity to lectin proteins of a parasitoid wasp, *Cotesia* sp. (*Hymenoptera*: Braconidae). . A phylogenetic analysis showed a relationship between the C-type lectins from Lepidoptera and Hymenoptera suggesting that there is *bracovirus-mediated* gene flux *between*two orders. We suggest that the *symbiotic* relationship between *bracovirus* and *S. littoralis* might have an important role in the benefit of wasps, resulting in a suppressed host immune system and also for the evolution process of the interacted genomes.

Keywords: *Bracovirus, Spodoptera littoralis, Lectins.*

SEQUENCE ANALYSIS OF INSECTICIDE RESISTANCE AND DETOXIFICATION RELATED GENES IN *Spodoptera littoralis*(LEPIDOPTERA: NOCTUIDAE)

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Abstract

The Egyptian cotton leaf worm, *Spodoptera littoralis* (Boisd.) is a well-known as one of the most destructive agricultural lepidopterous pests. It is a true generalist species with a promiscuous feeding strategy which enables it to attack numerous economically important crops all year round including vegetables, ornamental plants, and cotton. Recently, chemical control has been commonly used to suppress populations of *S. littoralis*; however, a very large number of *insecticides have led*to the emergence of *resistance.* An extensive use of insecticides also has other side effects, including the elimination of non-targeted organisms, environmental damage and harm to human health. Genome-wide high-throughput technologies help developing resistance management strategies, especially identifying genetic mechanisms of resistance. The aim of the present study was to produce a de novo transcriptome for *S. littoralis* as a resource for current and future studies of this pest species by using next-generation sequencing. This resource was then used as a reference for identifying genes by encoding the target sites of insecticides currently in use for Egyptian cotton leaf worm control. To achieve this, a cDNA library was sequenced using 454 FLX Titanium Sequencing on the Roche platform which revealed good coverage of genes encoding insecticide target sites and detoxification enzymes using a manual annotation. Annotations of assembled sequences were carried out by BLASTx against NCBI non-redundant protein sequence databases using the software Blast2GO. The g*enes*encoding enzymes *involved* in *insecticide* detoxification such as *Acetylcholinesterase, Cytochrome p450, Glutathione S-transferase* were characterized. Furthermore, a phylogenetic analyses based on three protein sequences were generated in order to give evolutionary insights into insecticide resistance gene families of *S. littoralis*.

Keywords: *Spodoptera littoralis, transcriptome, insecticide resistance, detoxification.*

DO BUR CUCUMBER POPULATIONS EXHIBIT DIFFERENCES IN SEED DORMANCY?

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Abstract

Bur cucumber (*Sicyos angulatus* L., SIYAN) is a troublesome invasive vine. Seeds of the plant possess a water-impermeable,hard seed coat exhibiting physical dormancy. Seed dormancy is employed by the invasive plants for persistence in soil seed bank, seedling recruitment and avoiding unfavorable environmental conditions. The seed dormancy differences among populations offer valuable insights for understanding biology and devising effective management practices against invasive plants through experimental studies. Therefore this study was carried out to evaluate the dormancy differences among 3 populations collected from Black Sea region of Turkey. Chemical scarification with H_2SO_4, wet and dry pre-chilling (for 2 weeks) and mechanical scarification (girdling with scalpel) were tested along with an untreated control for comparison. Seeds were dipped in concentrated (98%) H_2SO_4 solution for 1, 2, 3, 4 and 6 minutes for chemical scarification. Whereas, a small portion of the seed coat was removed with the help of scalpel in mechanical scarification. Experiments were incubated at 25 ºC with 12 hours light and dark period for 30 days and repeated. Freshly harvested seeds exhibited higher dormancy with slight differences among populations. Chemical scarification and pre-chilling treatments were ineffective in overcoming the dormancy. Mechanical scarification significantly promoted the final germination percentage with slight differences (82-90%) among populations. The results of the mechanical scarification were consistent in both experimental runs. It is concluded that slight scarification of SIYAN seeds imparts water-permeability in seeds leading to higher germination. The persistence of the seeds in soil seed banks probably leads to the deterioration of seed coat till next growing season resulting in effective seedling recruitment. Mechanical scarification can be successfully employed to break the dormancy in SIYAN for experimental studies.

Keywords: *Sicyos angulatus, Populations, Physical dormancy, Mechanical scarification, Chemical scarification*

INVESTIGATION ON VIRUSES CAUSING YELLOWING DISEASE IN PEPPER IN HATAY PROVINCE, TURKEY

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Abstract

Importantvirusesmainly cause yellows disease in field-grown and greenhouse-grown peppersand their hosts and vectors were investigated in Hatay province of Turkey. Young shoot, leaf and fruit samples taken from suspected pepper plants and weeds were investigated by DAS-ELISA and biological indexing.Virus infections that caused chlorosis or yellowing symptoms virus infections were mostly detected in pepper growing areas of Iskenderun and Samandağ districts in Hatay. PVY (*Potato virus Y*) infection was determined as the most common in pepper growing areas in Hatay (13.6%). PVY was followed by the CMV (*Cucumber mosaic virus*) (5.3%), respectively.Mixed infections caused by double, triple and quadruple viruses including CMV, PLRV (*Potato leaf roll virus*), PVX (*Potato X virus*) PVY and TSWV (Tomato spotted wilt virus) were identified in pepper plants with low rates. *Amaranthus retroflexus, Chenopodium quinoa, Convolvulus arvensis, Malva sylvestris, Physalis angulata, Mercurialis annua, Solanum nigrum, Sonchus oleraceus* and *Xhanthium strumarium* were commonly found in pepper fields. A few pepper plants were found to be infested by dodder (*Cuscutacampestris*) and *Orobanche ramosa*. *Portulaca oleracea, Urtica dioica* and *Plantago major* were observed in peppers grown under greenhouse conditions. *Orobanche ramosa* was also determined in two pepper greenhouses. *A. retroflexus* (28,5%), *M. sylvestris* (40.0%), *S. nigrum* (30.0%) and *S. oleraceus* (33.3%) were found to be infected with AMV; *A. retroflexus* (40.0%), *M. sylvestris* (57.1%), *P. angulata* (16.,6%) and *S. nigrum* (50%) samples were found to be infected with CMV; *M. sylvestris* (20.0%), *M. annua* (41.6%) and *P. angulata* (83.3%) samples were found in PVY; TSWV was detected in *P. major* (25.0%) samples. Other viruses as begomoviruses and phytoplasmas were not tested in this study were thought to be also causal agents of pepper yellowing in Hatay.

Keywords: *ELISA, greenhouse, pepper, yellows, virus, weed*

SEED DORMANCY DIFFERENCES AMONG COMMON RAGWEED POPULATIONS

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Abstract

Common ragweed (*Ambrosia artmesiifolia* L.) is an allergenic invasive weed rapidly expanding its distribution range throughout the Europe. Dormancy is among the important seed adaptation traits of colonizing plants evolved for persistence and seedling recruitment. This study was aimed at determining the presence of seed dormancy in three ragweed populations collected from different regions of Turkey. Nineteen different treatments were tested to infer their potential in breaking seed dormancy. Mechanical scarification with sand paper, chemical scarification with H_2SO_4 (2, 3, 4 and 6 minutes), seed priming with KNO_3 and Gibberellic acid (GA3) at different concentrations (0.1, 0.2 and 0.4% KNO_3, 150 and 300 ppm GA3), wet and dry pre-chilling (15 days), high temperature treatment, hydropriming with tap water (with and without surface drying) and chemical scarification + priming with KNO_3 and GA3 along with untreated seeds were tested in the study. The experiments were incubated at 25 ºC for 30 days with 12 hours alternating day and light period. Significant differences among dormancy breaking treatments and populations were observed for final germination percentage. Presence of higher seed dormancy with varying degree (85-100 % dormancy) was observed in the tested populations. Wet pre-chilling at 4 ºC for 15 days proved most effective in breaking dormancy (80-90% germination in all populations). Mechanical scarification was the second most effective treatment with 60-70% final germination. Chemical scarification, priming with different compounds, scarification + priming combinations and dry pre-chilling did not play any role in breaking dormancy. The population differences are probably due to genetic variation and ecological adaptations. From results it is concluded that under natural conditions only exposure to moist conditions with cool temperature is enough to overcome dormancy and germination. This procedure can be reliably used to break the dormancy for different ecological and experimental studies on ragweed.

Keywords*: Ragweed, Dormancy, Germination, Populations, Wet pre-chilling,*

EFFECT OF *TRACHYSTEMON ORIENTALIS* PLANT EXTRACT ON IMPORTANT PLANT PATHOGENIC FUNGI AND *CUSCUTA CAMPESTRIS*

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Abstract

The antifungal and herbicidal potential of *Trachystemon orientalis* (L.) G. Don plant extracts were evaluated against important plant pathogenic fungi and *Cuscuta campestris.*The leaves, root and flowers extracts of *T. orientalis* were used against *Sclerotinia sclerotiorum*, *Alternaria solani*, *Phytophthora infestans* and *Botrytis cinerea*, and inhibited mycelium growth data were recorded. Water extracts of plant leaves, root and flowers at 1,3,5,7,10 and 20% concentrations were applied. The experiments were conducted under laboratory conditions. Also, in this study, the concentration of 5% of flowers and leaves water extracts of *T. orientalis* were examined regarding herbicidal activity against *C. campestris* Yuncker on *Nicotiana tabacum*L. and *Beta vulgaris* L. under greenhouse conditions. The tested extracts showed significantly inhibited effects on mycelium growth of plant pathogenic fungi. Antifungal activity displayed differences according to increasing extract concentration and plant pathogenic fungi. The results showed that mycelium growth inhibition were found effective on *S. sclerotiorum* [(leaf extract: 0 to 100%; flower extract: 100%; root extract:0 to 25,83%)], *A. solani*[(leaf extract: 32,22 to 100%; flower extract: 46,94 to 100%; root extract:21,12 to 43,69%)], *P. infestans*[(leaf extract: 34,86 to 100%; flower extract: 100%; root extract:25,13 to 55,96%)] and *B. cinerea* [(leaf extract: 5,80 to 100%; flower extract: 13,33 to 100%; root extract:0 to 23,80%)] depending on the extract concentration. The herbicidal activity results showed that the fresh and dry weight of the *C. campestris* was reduced.

Keywords: *Trachystemon orientalis, Antifungal activity, Herbicidal activity, plant extract.*

THE EFFECTS OF GA3 APPLICATION IN DIFFERENT ENVIRONMENTAL CONDITIONS ON THE SURVIVAL ABILITY OF THE SEEDS OF PISTACIA SPECIES AND CULTIVARS

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Abstract

Pistacia species and cultivars have been placed among the important fruit trees of the world for consuming their nuts and using them as rootstocks. Along with the ecological factors, several practices performed during the plant growing causes a positive and sometimes negative effects The purpose of this study is to hasten the growth of seedlings derived from the seeds of several *Pistacia* species and cultivars for a better growth in order to study their developments in different ecological conditions. This study has been conducted between the years of 2010 and 2011 at the greenhouse of Kahramanmaras Sutcu Imam University Greenhouse. In the experiment, the seeds of *P. khinjuck* Stock., *Pistacia atlantica* Desf., *Pistacia terebinthus* L. and of three cultivars of *P. vera* L.. (Ohadi, Siirt, Kırmız) were used. Seed vitality tests were performed using Triphenyl Tetrazolium Chloride (TTC). The vital seeds were kept in GA_3 solutions prepared with three concentrations (0-250-500 ppm) for 24 hrs. Then the seeds were divided into three groups. First group of seeds were sown in pots (8x8 cm in height and diamater) in a heated greenhouse; second group of seeds were sown in pots with the same size which were placed on the steel shelves in outdoor condition; third group seeds were sown into soil outdoor. The decrease in air temperature to -2 degree C in mid-February damaged to to newly germinated seedlings. This damage was exaggerated with the increase in the concentration of GA_3.

Key words: *2,3,5- Triphenyl Tetrazolium chloride, Gibbrellic acid, Scarification, nursery tree.*

THE FOLIAR AND FRUITING- ARCHITECTURAL STUDY OF THE DATE PALM *PHOENIX DACTYLIFERA* L.

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Abstract

Plant architecture is defined like the whole of the structural forms which the plant presents through its existence. In the context of the present study, a statistical checking of relationships between the characteristic parameters in terms of vegetative aerial and reproductive architecture of the date palm was done. This allows the implementation of a new measurement protocol for computing and simulating realistic 3D models.

The palms and mature inflorescences were taken in the palm groves of Gabes in Tunisia, Figuig in Marroco and Biskra in Algeria. Modeling palms and inflorescences requires the observation of many parameters which are architectural, metric and geometrical.It seems evident that the length and width of the pinnae of the different observed varieties is strongly dependent of its position on the nervure, and the width and height of the stalk are strongly dependent of the position on the rachis.

Our study showed that the metric characteristic of the nervure and the pinnae are strongly dependent of their position throughout the nervure and can be considered as regionalized variables. All these geometrical and morphometric characteristics are used as a taxonomical index to differentiate between date palm varieties and allow the date palm tree simulation**.**

Keywords: *Architecture, foliar, fruiting, Phoenix dactylifera L, simulation, 3D models.*

IMPACT OF PLANT PROTECTION PRODUCTS ON THE PARAMETERS OF THE PROCESSION BIOCENOTIC ENTOMOLOGICAL AUXILIARY ASSOCIATED WITH CITRUS IN THE REGION MITIDJA, ALGERIA

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Abstract

The population census was conducted in an effort to understand how diversity is organized on the ground, searching for species of agricultural interest or save our entomological heritage. The collection also aims to identify existing populations, especially local species. It is a living process that illustrates the timeliness of the acclimation process and domestication of useful species. To exploit the variability of species in terms of plant health programs increasingly intensive, we need to know. The priority is to describe and inventory all entomological species. Sampling was carried out in some orchards which are not treated and intended for agricultural research work, while the latter are located respectively at 20, 30, 40 and 50 km of Algiers in full Mitidja which is a region to citrus vocation. We used different sampling means, light traps, pheromone traps and also mowing and knocking. The ecological indexes were used to interpret some variations, the diversity index, Jaccard, and analysis of variance. Total of 98 insect species were inventoried, 12 of useful species belonging to the order Coleoptera, Hymenoptera and Neuroptera. The other species are pests, some very and others less formidable.

Keywords: *Citrus, entomology, inventory, Mitidja, Auxiliary.*

EVALUATION OF THE EFFECTOF THREE BIOPESTICIDES ON SOME BIOPHYSIOLOGICAL PARAMETERS OFTHE MIGRATORY LOCUST

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Abstract

Our work is based on the use of three bio pesticides - an entomopathogenic fungus*Metarhizium anisopliae var acridum*, the Triflumuron (T.F.M.) growth disruptor and the henna extract *Lawsonia inermis* on L5 stage larvae and *Locusta migratoria* males and females. Thereforewe tested their effect on morphology, and the development of L5 stage larvae, like their action on the reproduction of adults. Lastly, we tested the effect of these three bio pesticides on hemolymphatic proteins of L5 stage larvae, in the plan quantitative and qualitative.The results show us that the three bio pesticides caused morphological deformations in the L5 stage larvae, by stopping them from reaching the imago stage. Finally, we can also notice that the three bio pesticides caused a disturbance on the reproductive behavior and also deterioration on the level of the proteinemy of *Locusta migratoria*.

Keywords: *Locusta migratoria, Metarhizium anisopliae var acridum, the Triflumuron, Lawsonia inermis, development, reproduction, hemolymphatic proteins.*

POPULATION OF *TUTA ABSOLUTA* (MEYRICK, 1917), BIO-ECOLOGICAL BEHAVIOR OF DIFFERENT VARIETIES OF TOMATOES IN JIJEL (ALGERIA)

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Abstract

The tomato leafminer, Tuta absoluta Meyrick 1917 (Lepidoptera, Gelechiidae) is an important pest of tomato crops in Algeria, reported for the first time in Spain in 2006 and beyond spreading to most of the Mediterranean countries (Morocco, Algeria, France, Portugal, Italy, Greece, Turkey, Egypt, etc.) allowing to assess the ability of dispersion and nuisance of this pest. The study with the pheromone traps of tomatoes bio destructor in greenhouses (Axium and Tavira varieties) and field (Variety Zahra) in two different regions on the west coast of Jijel Bourchaïd (El-Aouana) and ziama mansouriah, (both stations are spaced approximately 25 Km), will enable us to establish the overall population dynamics of Tuta absoluta, polyvoltine species. Preliminary results for the assessment of fluctuations leafminer population showed that the capture of Tuta absoluta males is higher at the Axium variety in greenhouses for both types of traps used and only two withdrawals. Out of the total number, 804 males have been captured by the water trap with pheromone against 291 individuals captured by the Delta-type trap. These results showed that the number of catching was more important at the tomato glasshouse variety Axium grown Bourchaid than those obtained in the region of ziama mansouriah with only 200 and 117 males respectively captured by the water trap with pheromone trap type Delta at the tomato glasshouse variety Tavira. While the variety of Zahra full field, the number of captures is 130 individuals for 03 samples by the water trap with pheromone.

Keywords: *Tuta absoluta (Meyrick), the pest, tomato, Tavira, Axium, Zahra, water trap with pheromone, Delta-type trap, El-Aouana, Ziama Mansouriah, Jijel.*

SANITARY MICRO PROPAGATION OF POTATO

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Abstract

Each year, seed potatoes certified viruse free reveale the presence of virus after their cultivation. We test plant material consisting of four varieties of seeds of class A considered viruse free, according to regulations with a lower infection rate to 6%.However, according to the results we found that of 57 tubers, 42 are affected at a rate of 27%.Application of enzyme immunoassay Elisa, made for a rapid diagnosis of viruses of potato revealed the following infections:

From PVM virus from the mother tuber varieties and ELVIRA Folv

From PVS virus from the mother tuber varieties and ELVIRA DIAMAND

From PLRV from potato varieties DIAMAND mother, and ELVIRA Folva.

Plants to juvenile state are obtained by the technique of micro propagation Vitro using a medium without growth hormones. A serological test is applied to vitroplants obtained revealed the presence of: Virus PVS in DIAMAND and ELVIRA varieties.

PRLV virus in the ELVIRA variety. We note that the rate of virus explants decreases gradually as one approaches the meristem until it reaches zero. The free-vitro plants viruses are selected. Combined with the TEST ELYSA micro propagation is a sanitary filter. The vitroplants virus-infected are eliminated.

Keywords: *Solanum tuberesum L., ELISA test, Micropropagation*

INHIBITORY EFFECTS OF ESSENTIAL OILS ON *ASPERGILLUS* SPP OF STORED WHEAT

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Abstract

The aim of this study is to evaluate the effectiveness of three essential oils of *Cedrus atlantica* M., *Pistacia lentiscus* L. and *Ammoïdes pusilla* Brot., against *Aspergillus* spp of stored wheat from cooperative of cereals and dried vegetable (Khemis Miliana-Algeria), in the culture middle PDA, CDA and PDAac. The contamination on PDA media is dominated by the genus Aspergillus, with 11.95x102 UF/g; on CDA and PDAac by *A.flavus* with 2.93 x102 UF/g and 1.26 x102 UF/g, respectively. Furthermore, the average extraction yields of essential oils of *C. atlantica* M., *P. lentiscus* L. and *A. pusilla* Brot., are 1.62%, 0.32% and 0.05%, respectively. The susceptibility of wheat molds to essential oils at the dose of 10 µl showed that inhibition zones of *A. niger* and *A. flavus* vary between 17 and 37 mm, respectively; but the mycelial growth of two species, namely *A.fumigatus* and *A.ochraceus* was completely inhibited. However, at the dose of 20µl, we observed the increase of inhibition zones diameter in the other species, and *A. flavus* was totally inhibited. Thus, the MIC showed that *A.ochraceus* was the most sensitive to *A.pusilla* Brot., with 0.1µl/ml. As regards *C.atlantica* M., and *P.lentiscus* L., the antifungal activity was very weak against identified strains. The essential oil of *A.pusilla* Brot., showed a broad spectrum of inhibition and a remarkable antifungal efficacy on *Aspergillus spp*.

Keywords: *Antifungal activity, essential oils, Aspergillus spp, stored wheat, Khemis miliana*.

EFFECTIVENESS OF AQUEOUS EXTRACTS OF THE HARMAL: *PEGANUM HARMALA* AND ESSENTIAL OILS OF PENNYROYAL MINT: *MENTHA PULEGIUM* ON LOCUST BARBARIN *CALLIPTAMUS BARBARUS* (ORTHOPTERA: ACRIDIDAE) AND COCHINEAL OF LEMON: *COCCUS HESPERIDUM* (HOMOPTERA: COCCIDAE)

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Abstract

This work is a study on the insecticidal effect of aqueous extracts of seeds and leaves of Harmal *Peganumharmala* and essential oils of mint *Mentha pulegium* on both of two larvae L2 and L3 of barbarian locust *Calliptamus barbarus* (Orthoptera: Acrididae) and on the Citrusmealybug *Coccus hesperidum* (Homoptera: Coccidae). Treatments on *C. barbarus* have been performed by two ways: contact and ingestion. Regarding the contact, it allowed us to obtain a cumulative mortality rate (after 3 days of treatments) which is 90% for a highest dose (2.4 g/l) with an LD 50 of 0.67 g /l for *P. harmala* EAq seeds and 50% of mortality with 3.01g / l for leaves of the same plant. For the HEs of *M. pulegium,* withthe highest dose (48 µl/ml) we recorded a cumulative mortality of 100%; the LD50 is 12.58 µl/ ml. By ingestion and after 6 days of treatments, the cumulative mortality rate for the dose of 2.4 g/l and the LD 50 of EAq seeds are respectively 90% and 0.45 g /l. For leaves of the same plant, these are 70% and 0.85 g /l. For the HEs of *M. pulegium*,the yield of mortality is 80% with a dose of 48µl/ml for an LD50 of 23.98 µl/ ml. Concerning *C. hesperidum*, treatments were done only by contact. The mortality rate with the dose 2.4g / l for *P. harmala* EAq seeds is 80% with an LD 50 of 1.38 g /l, for the HEs of *M. pulegium*, the mortality caused by the dose 32 µl/ml is 32% for an LD50 of 75.85 µl/ml.

Keywords*: Peganum harmala, Mentha pulegium, Coccus hesperidum, Calliptamus barbarus, DL 50.*

QUANTITATIVE ANALYSIS OF PROTEINS IN SOME SPECIES OF INSECTS OF THE ORDER ORTHOPTERA

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Abstract

This study was carried out in the gardens and the experimental station of the Agronomic National School of El Harrach (36 ° 43 'N.; 3 ° 08' E.).The resort is a collection of ornamental plants divided into three layers, a tree layer, shrub layer, and a herbaceous layer. The resort is located 50 m. above the sea level. It had a 541.1mm rainfall in 2005 and 609.1 mm in 2006. It belongs to the sub-humid bioclimatic stage with mild winter. The sampling technique used to capture Insecta was that of sweep net once a week. Selected biological models belonged to the order Orthoptera and family Acrididae. For each of the species analyzed, the dry matter content was conventionally determined by the weight of these species after drying in an air circulating oven (JARRIGE, 1989).Total nitrogen was determined by the Kjeldahl method. Organic nitrogen of the substrate to be analyzed was digested with concentrated sulfuric in the presence of an acid catalyst. Ammonia nitrogen formed was displaced by sodium hydroxide and assayed by titration (JARRIGE 1989). The crude protein content was determined by the formula (JARRIGE, 1989): MAT% = N (%) x 6.25.The analyzes concerned both adults and larvae.Water contents recorded for all species tested ranged from 74.7% for the larvae *Aiolopus strepens* and 52.3% for the species *Oedipoda coerulescens sulfurescens*. The ash rate for calcined species ranged between 3.5% and 9.7%. Protein levels found in different species varied between 11.0 and35.1%. The results obtained show that the protein content in larvae was more important compared to the adult stage except for Euprepocnemis plorans (35.1%) and males *Aiolopus strepens* (24.9%). Apparently, males seem to be richer in nitrogenous matter than females except for *Aiolopus thalassinus*, but with small differences.

Keywords: *Insecta, Orthoptera, adult; larvae; Kjeldahl, total nitrogen*

ASCOCHYTARABIEI FFECT ON CHICKPEA CALLUS SECONDARY METABOLITS SYNTHESIS

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Abstract

In their environment, plants are subjected to various biotic and abiotic stresses. For their defense, they develop mechanisms-essential secondary metabolites production. Chickpea is an important leguminous throughout the world. Its culture is influenced by various factors and ascochytablight is a major constraint.

This interaction is studied *invitro* on calluses resulting from various chickpea genotypes inoculated with blight causal agent spores. Their methanolic extracts are subjected to a thin layer chromatography separation of TLC to identify the constitutive or *de novo* produced compounds under inoculation effect. Their effect on the growth of *Ascochytarabiei* is evaluated by direct bioautography.

Keywords: *Ascochyta rabiei, Cicer arietinum, callus flavonoids, Thin layer chromatography, bioautography*

MORPHO-MOLECULAR ANALYSIS OF CHILLI (CAPSICUM SP.): AN SREENIG FOR ANTHRACNOSE RESISTANCE

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Abstract

Anthracnose disease is one of the major economic constraints to chilli production in tropical and subtropical regions and significantly affects the yield and fruit quality of chilli. This study aimed to screen sixty germplasms of chilli against anthracnose on the basis of morpho-molecular characters. Significant differences were observed among the genotypes for all the morphological traits. The phenotypic and genotypic coefficient of variations were high for all agronomic traits indicating that the traits had wide genetic variability and would respond better to selection. High heritability and high genetic advances were recorded for fruit yield per plant, number of fruits per plant, fruit length and plant height indicating the role of additive gene action for the inheritance of these traits. The germplasms grouped into six clusters based on their degree of phenotypic divergence. Genetic relationships among sixty chilli germplasms collected from different places of Bangladesh were analyzed using five RAPD and three SSR primers. The RAPD primers produced a total of 54 bands of which 44 were polymorphic with a mean value of 8.800 polymorphic bands per primer, while the SSR primers produced 28 SSR loci with a mean of 9.333 alleles per SSR locus. Polymorphic Information Content (PIC) values of the SSR primers ranged from 0.622 to 0.844 with an average value of 0.749. Both RAPD and SSR markers showed genetic variability in the studied chilli germplasms. Morphological and molecular study with SSR primers confirmed the pathogencausing chilli anthracnose in Bangladesh to be *Colletotrichum capsici*. To identify anthracnose resistant germplasms, mature fruits were inoculated with the pathogen and Comilla morich having no infection was found to be resistant. The information of genetic diversity among the germplasm and gerplasm with remarkable higher yield and anthracnose resistance (BD2035, Comilla, BD2006, BD2064) have the potential use in future breeding programs for the improvement of chilli and to produce anthracnose resistant hybrids in Bangladesh.

Keywords: *Anthracnose resistance*, *Bangladesh*, *Capsicum* sp, *Chilli*, *Colletotrichum capsici*.

HERBICIDE EFFICIENCY TESTING IN SOYBEAN DURING 2014 AND 2015 - COOPERATIVE DANUBE – SOYA PROGRAM

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Abstract

As a participant of a cooperative Danube-Soya Program, Public institution „Agriculture Institute of the Republic of Srpska (PI AIRS) - Banja Luka“ takes an active role in the implementation and the intensification of research Programme in the production of genetically nonmodified soybean with the application of European Union (EU) standards and legal regulations. Speaking of the limiting factors of production, special emphasis, apart fromothers, is placed on effective weed menagment programs, science weed species as direct competitors have an extremely negative impact on the achievement of high and quality yield. Considering the mentioned,the main objective was to test the efficacy of a total 11 herbicide combinations on weed populations in soybean in the Banja Luka region. Efficiency test of 11 herbicide combinations was carried out during 2014 and 2015 on the experimental fields of PI AIRS - Banja Luka.In 2014, due to heavy rainfall, which caused constant emergence of weed species throughout the vegetation period of soybean, using similar, almost identical pre. em. combination achieved satisfactory efficiency. Compared with the previous year, in 2015, pre. em. combination with corrective treatments showed high efficiency, wich indicates on importance of testing in different ecological conditions of production.

Key words: *Danube-Soya Program, herbicide efficiency, soybean*

SEASONAL DYNAMICS OF AEROALERGENIC WEED POLLEN IN BANJA LUKA AREA (BOSNIA AND HERZEGOVINA) DURING 2011 – 2015

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Abstract

As in recent year’s phytoallergens,who includes taxa of various botanical families,presents actual social and health problem around the world, as well as in our area, determination the types and monitoring of the pollen counts in the aero plankton of cities is of relevant medical importance.Considering the mentioned issues, as well as the results of monitoring carried out in previous years, the main objective of the study was to analyze the seasonal dynamics of aero allergenic weed pollen in Banja Luka area during the five-year period 2011-2015. Sampling of aero allergenic weed pollen during the pollination period 2011-2015 is conducted in urban, industrial part of Banja Luka in the Public Institution“Agricultural Institute of the Republic of Srpska - Banja Luka”(PI AIRS – Banja Luka) (N 44º47`41.0``, E 017º12`22.6``) with Hirst's pollenometar type (Hirst, 1952) using the method defined by the International Association for Aerobiology (IAA). Comparative analysis showed that among weed pollen the most dominant was ambrosia pollen on an annual level during the five year monitoring of weed pollen in Banja Luka.

Keywords: *Seasonal dynamics, pollen aeroallergens, weed, Banja Luka*

IDENTIFICATION OF LEAF RUST RESISTANCE GENESIN DOMESTIC BREEDING LINES AND CULTIVARS OF WINTER WHEAT

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Abstract

Wheat leaf rust, caused by *Puccinia recondite* Dietel*et*Holw. is the most common rust disease of wheat (*Triticumaestivum* L.) and occurs world-wide. The fungus is an obligate parasite andcan cause rust epidemics on a continentalscale.Some cultivars and breeding lines from collection of PI Agricultural Institute of Republic of Srpska, Banja Luka (Bosnia and Herzegovina) showed very good to excellent resistance to *P. recondite* even during years that were favorable for disease development. These cultivars and breeding lines were sampled during tillering stage and analyzed in order to identify wheat leaf rust resistance genes by molecular markers. Extracted plant DNA was amplified by Polymerase Chain Reaction (PCR) and molecular markers were used to identify ten Lr resistance genes against the fungal pathogen of wheat *Pucciniarecondita* (Lr13, Lr19, Lr24, Lr26, Lr34, Lr35, Lr36, Lr37, Lr39 and Lr46) in Institute's 23 wheat breeding lines and cultivars. Results showed that the most common genes in tested breeding lines and cultivars areLr39 and Lr46 that are identified in 21 samples. Lr34 and Lr35 genes were identified in 20 samples and 14 samples had Lr37 gen. Lr13, Lr19, Lr24, Lr26 and Lr36 genes weren't identified in tested samples. The objective of this study was to identify resistant wheat breeding lines that carry wheat leaf rust resistance genes and these breeding lines will be included in further selection and creation of new domestic wheat cultivars with higher genetic potential. All this should result in higher wheat yield as well as decreasedimport since wheat is very important grain for our country.

Keywords: *Wheat leaf rust, leaf rust resistance genes, molecular markers*

PRESENCE OF AFLATOXIN B1 IN FOOD AND FEED SAMPLES IMPORTED TO THE ENTITY OF REPUBLIC OF SRPSKA (BOSNIA AND HERZEGOVINA) DURING 2013-2015

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Abstract

Extremely dry and warm weather conditions recorded during 2012 were favorable for intensive development of mold. As a result of these very stressful conditions unusually high contamination of corn with Aflatoxin B1 was established and caused huge economic losses in milk production in Republic of Srpska (RS) and in surrounding countries. The production of corn and other cereals in RS is not satisfactory and it is characterized by low average yields. In order to satisfy all needs, in terms of human and animal nutrition, we are forced to import food and feed from other countries. Considering the situation occurred in 2012, starting from 2013 a continuous control of imported food and feed has been carried out. During the three-year research 434 samples of imported food and feed were analyzed for the presence of Aflatoxin B1. Samples were analyzed by competitive enzyme immunoassay (ELISA) with microplate based kit produced by EuroProxima, the Netherlands. Results of the analysis showed that 46 analyzed samples (10.6%) was contaminated with Aflatoxin B1 according to Regulations of maximum level for certain contaminants in food.

Keywords: *Aflatoxin B1*, *food*, *feed*, *Republic of Srpska*

TESTING FOR THE PRESENCE OF GENETICALLY MODIFIED LIVING PLANTS, PLANT PARTS AND PLANT PRODUCTS IN THE ENTITY OF REPUBLIC OF SRPSKA (BOSNIA AND HERZEGOVINA) IN 2015

Vojislav TRKULJA*, Jelena MIHIĆ SALAPURA, Dragana KOVAČIĆ JOŠIĆ, Bojana ĆURKOVIĆ, Bojana VUKOVIĆ, Jelena VASIĆ, Gordana BABIĆ

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Abstract

Genetically Modified Organisms (GMO's) are organisms which undergo modification on their DNA structure that involves inserting external genes from one species in order to alter the property of another species which would otherwise not be achieved by conventional reproductive means. With the general public aware of the existence of genetically modified foods, consumers are concerned regarding the contents of the GMO in food products. This served as pretext for caring out the research whether the food or feed that is used for human or domestic animals' consumption are genetically modified or not. A total of 96 samples of food and feed are tested for the presence of genetic modifications. Samples were taken by the Republic Phytosanitary Inspection Agency (RPIA) and Republic Food Inspection Agency. Also, samples were taken in the field by the RPIA and several samples were submitted by farmers and food exporters. DNA was extracted according to CTAB method and Real Time analysis was performed using a Stratagene Mx3005P QPCR with MxProdata analysis system. Real time PCR system enables easy and reliable detection and amplification of specific DNA sequences in GM products. Samples are analyzed for detection of specific elements present in GM events: promotor 35S, terminator NOS, cp4EPSPS gene and CTP2-cp4EPSPS construct. Results showed that 19 samples were positive: 4 samples of soybean meal and 6 samples of feed mixtures imported from abroad, as well as 6 samples of soybean that are taken from fields in the entity of Republic of Srpska. The other 77 samples were negative for all tested elements.

Keywords: *GMO, GM plants, samples, analysis of GMO*

THE MOST COMMON DISEASES OF ORNAMENTAL PLANTS IN THE ENTITY OF REPUBLIC OF SRPSKA (BOSNIA AND HERZEGOVINA)

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Abstract

During the period of five years (2011-2015) on territory of Republic of Srpska the continuous monitoring was carried out on different ornamental flowers for the presence of plant diseases. For laboratory analysis were taken following species: *Alyssum* sp., *Aster* sp., *Bacopa* sp., *Begonia* sp., *Bellis perennis*, *Calceolaria* sp., *Chrysanthemum* sp., *Cyclamen* sp., *Dahlia* sp., *Dianthus* sp., *Fuchsia* sp., *Gazania* sp., *Gloxinia* sp., *Lobelia* sp., *Myosotis* sp., *Pelargonium* sp., *Petunia* sp., *Petuniaxhybrida, Phlox* sp., *Plectranthus* sp., *Portulaca grandiflora, Ranunculus* sp., *Rusmarinus officinalis, Salvia* sp., *Sansevaria* sp., *Tagetes* sp., *Impatiens* sp., *Verbena* sp. and *Viola* sp. Determination of causal pathogens was carried out on the basis of studing their morphological, pathogenic, biochemical and physiological, serological and molecular characteristic. The most common causal pathogens were *Alternaria* sp., *Botrytis* sp., *Golvonomyces* sp., *Pestalotia* sp., *Phomopsis* sp., *Phytophtora* sp., *Puccinia* sp. and *Septoria* sp. Also, in much less extent was determined bacterial and viruses diseases. The most common causes of bacterial diseases appear to be *Pseudomonas* sp. and *Erwinia* sp., while the most frequent phytopatogenic viruses were *Tomato spotted wilt virus* (TSWV) and *Impatiens necrotic spot virus* (INSV).

Keywords: *Ornamental plants, common diseases, Republic of Srpska*

MOLECULAR CHARACTERIZATION OF STOLBUR ISOLATES FROM BULGARIA IN PEPPER AND TOMATO

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Abstract

Tomato and pepper are the main vegetable crops, which were cultivated in open field in Bulgaria.During the period 1993-2015 we investigated the spread of stolbur disease on tomato and pepper in several vegetable growing areas in Southern Bulgaria.One of the tasks was to define the percent of spread of stolbur on different cultivars of tomato and pepper.The objective of the present study was to verify association of phytoplasmas with the observed disease symptoms in tomato and in pepper, to identify the phytoplasmas detected and to study some genomic behaviours trough RFLP analyses of conserved genes and of other uncharacterised phytoplasma chromosomal regions.

Keywords: *Stolbur, phytoplasma, tomato, pepper, RFLP*

THE EFFECT OF BIOCHAR APPLICATIONS ON PRATYLENCHUS PENETRANS AND MELOIDOGYNE CHITWOODI POPULATIONS

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Abstract

Organic amendments induce tremendous changes in the abundance and community structure of non-pathogenic, free-living nematodes. Little has been mentioned about biochar's effect on soil fauna. This study was designed to examine the effect of: (i) biochar on Meloidogyne chitwoodi in vegetable production (carrot and common bean), (ii) extracts from compost blended with biochar (CBB) in vitro on the behaviour of M. chitwoodi and Pratylenchus penetrans to locate its host, (iii) extracts from CBB on the behaviour of M. chitwoodi to penetrate its host, (iv) extracts from CBB on the efficiency of hatching of M. chitwoodi. The influence of biochar applications on M. chitwoodi was evaluated on two crops (carrot and common bean) in pot experiments. Biochar applications significantly improved the root weight of carrot in low Pi of M. chitwoodi. Similarly, biochar applications increased M. chitwoodi populations in carrots at high Pi of M. chitwoodi. The CBB gave a higher Pf compared to the soil without amendment. No differences in Pf between treatments were observed at low Pi for carrot. Damage on the taproot was higher in soil + CBB in high Pi of M. chitwoodi. Likewise, biochar applications significantly improved the root weight of common bean in the absence of M. chitwoodi. A greater number of pods were observed in high Pi of M. chitwoodi. Common bean had a lower Pf with high Pi in treatments with biochar and CBB compared to soil. In the exposure experiment, no mortality was observed for the different nematodes when they were exposed to different concentrations of CBB extract at different time periods. In pluronic gel bioassay test, attraction to the roots of tomato (Lycopersicum esculentum cv. Marmande) was high for P. penetrans and M. chitwoodi at 72 h. The host penetration test revealed greater infectivity of nematodes in distilled water control treatment and 50% CBB extract concentration. The results of the hatching responses of M. chitwoodi to different CBB extract concentrations revealed significant differences in the extract concentrations. 100% CBB extract concentration had thelowest final percentage hatch (88.53%) and 50% CBB extract concentration had the highest final percentage hatch (98.25%). This study was carried out to investigate the effect and mode of action of biochar on the populations and the behaviour of M. chitwoodi and P. penetrans in vegetable production.

Keywords: *Carrot, common bean, biochar, compost, amendment, exposure, behaviour, pluronic gel, host location, host penetration, hatching.*

FOOD SECURITY POLICY IN INDIA: CHALLENGES AND OPPORTUNITY

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Abstract

Food is the prime requirement for sustainability of life, but unfortunately, many people are still deprived of adequate meals in the 21st century. India suffers from this colossal problem. Hence, food security is a prime challenge for the developing countries especially in India, where nearly one third of its total population is unable to survive on own afford. In this situation there is an only way to bring food security in a reality and ensuring right to food for every people. Availabilities, approach, allocation, and absorption are the conceptual base of the food security. The paper discusses various challenges and situation of food security in India. Effort of government of India is to ensure adequate food with nutrition for every people through several Government schemes and laws for food security such as Public Distribution System (PDS), (Mahatma Gandhi National Rural Employment guarantee Act (MGNREGA), and National Food Security Act, 2013. This paper analyses food security and malnutrition in India, Situation of food availability for every people, and examines the actual challenges of food security, and tries to scrutinise related government policies and their efforts. The present research has been organized into three sections; the first section elaborates the concept of Food Security and its dimensions, the second section examines the issues and Indian Government's policies related to Food Security; and the third and final section is the denouement of this paper.

Keywords: *Food Security, Malnutrition, Public Distribution System, MGNREGA, National Food Security Act.*

MANAGEMENT OF SUCKING PESTS IN VEGETABLE CROPS USING THE INSECTICIDAL PRINCIPLES ISOLATED FROM CASSAVA

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Abstract

Sucking pests are the most economically damaging group of insects, both as pests and often as vectors of plant pathogenic viruses. Over 2650 plants, including edible crops, possess cyanogenic compound, mainly as glycoside, and this compound gives a relative protection to the plant from herbivores. We have isolated the insecticidal molecules from cassava (*Manihot esculenta* Crantz), a cyanogenic plant, and developed two bioformulations against sucking pests *viz*. mealybugs (*Rhizoecus amorphophalli* Betrem) on the stored tubers of yams and aroids, and cowpea aphid (*Aphis craccivora* Koch). The white waxy substance over the mealybug protects it from insecticidal application. In the current investigation, the mealy substance was subjected to SEM and chemical analysis, and realising its structure and chemistry, solvents varying from polar to non polar, and organic in origin were screened for its removal. Subsequently, a bio formulation was made with a combination of insecticidal principles extracted from cassava along with neem oil and surfactant. Laboratory and field study revealed the mortality of mealybugs due to the treatment of this bioformulation @ 5-10 ml $L^{-1.}$ A second bioformulation was also made with a different combination of the same bioactive molecules against cowpea aphids. Efficacy of the bioformulations was compared with chemical insecticides, and the LD_{50} value and residue analysis were worked out. A Pilot Plant to scale up the production of bioactive principles from cassava was designed and the machine was fabricated. A cassava fumigation chamber was also fabricated for the large scale treatment of tubers infested by mealybugs and scale insects.

Keywords: *Cassava, Biopesticide, Cyanogenic, Mealybug, Aphids.*

VALIDATION OF LLS AND RUST RESISTANCE LINKED MARKERS USING NILs DERIVED FROM HIFs IN PEANUT (*ARACHIS HYPOGAEA* L.)

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Abstract

Peanut is severely affected by foliar diseases like late leaf spot (LLS) and rust. Molecular markers linked to LLS and rust resistance will be of immense use in complimentingconventional breeding for diseases resistance in peanut. Validation of such markers is pre-requisite for their use in Marker Assisted Breeding to develop resistant cultivars. Near isogenic lines (NILs) are the most preferred genetic stocks to validate the markers. The present investigation was aimed to develop NILs from heterogeneous inbred families (HIFs) to validate markers linked to LLS and rust resistance. NILs were developed from HIFs of TAG 24 × GPBD 4 and TG 26 × GPBD 4. The sets of plants belonging to the same HIF, but differing significantly in LLS and/or rust resistance, but not for other morphological and productivity traits, were regarded as NILs. A total of 30 rust resistant, 34 rust susceptible, 21 LLS resistant and 25 LLS susceptible lines were isolated from TAG 24 × GPBD 4 and TG 26 × GPBD 4. Largely, rust/LLS resistant NILs had GPBD 4-type allele, and susceptible NILs carried either TAG 24 or TG 26-type allele at the three SSR loci (IPAHM103, GM1536 and GM2301) linked to a common genomic region governing LLS and rust resistance. Comparison of the remaining genomic regions between the NILs originating from each of the HIFs using a large number of background markers indicated a considerably high genome similarity. These NILs are useful in fine mapping to identify candidate genes governing LLS and/or rust resistance.

Keywords: *Heterogeneous Inbred Families, Near Isogenic Lines, LLS, rust and Peanut*

THE INSECTICIDAL EFFECT OF ESSENTIAL OIL OF *PIMPINELLA ANISUM* L. ON THE LIFE STAGES OF *CALLOSOBRUCHUS MACULATUS* F. UNDER LABORATORY CONDITIONS

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Abstract

Essential oils, natural ingredients, complex and volatile that have a strong odour and high evaporation power and aromatic plants are produced as secondary metabolites. For finding new pesticides renewable, environmentally, friendly and easy to prepare the cytotoxic and insecticidal effect of essential oil of *Pimpinella anisum* L. on the life stages of *Callosobruchus maculatus* F. under laboratory conditions were investigated. This research is based on a factorial completely randomized design with six treatments for the desired effect of essential oil on pest-temperature 2 ± 28 ° Celsius and relative humidity 5 ± 60%. It was performed in three periods of 24, 48 and 72 hours. Oil using steam distillation was prepared by Clevenger apparatus. Treatments consisted of 5 different concentrations of essential oil along with control, each concentration in 3 replicates and each replicate of 20 larvae and the adult from 1 to 3 days. Losses after 24, 48 and 72 h containers and controls the numbers of dead insects were counted and mortality was calculated according to Abbott's formula. The LC_{50} values and 95% confidence limits of *Pimpinella anisum* L. on larval and adults of *Callosobruchus maculatus* F. were 2918.5(2640.37-3199.62) and 3282.96(3282.96-3583.40) respectively. According to study results, essential oil of *Pimpinella anisum* L. is recommended for control of stored product pests.

Keywords: *Pimpinella anisum* L., *Callosobruchus maculatus* F., Essential oils.

INSECTICIDAL EFFICENCY ESSENTIAL OIL OF PUNICA GRANATUM FLOWER AGAINST CALLOSOBRUCHUS CHINENSIS(L.) AND RHYZOPERTHA DOMINICA (F.)

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Abstract

Callosobruchus chinensis (L) and *Rhyzopertha dominica* (F) are two of the most important stored product pests. In this research the essential oil of dried *Punica granatum* fruit peels were evaluated on the above mentioned pests at (27±1°C, 65 ± 5 %R) under dark condition at five different concentrations (50, 70/46, 99/54, 140/60, 200) *Rhyzopertha dominica* (F) µlair oil and *Callosobruchus chinensis* contain (30, 46/88, 73/28, 114/55, 180) µlairoil, at intervals of 24, 48 and 72 h, were tested for their insecticidal effect. In evaluation of fumigant toxicity of *Punicagranatum* floewr**,** *R.dominica* with (LC_{50}=78/823 μlL^{-1} air)was the most susceptible in comparison with *R.dominica* (LC_{50}=102/885 μlL^{-1} air) in 24 h time.The experiments showed that a direct positive relationship between exposure time and susceptibility of adults was observed. With increase in concentrations the rate of mortality increased. Based on the results of this research, essential oils of *P. granatum* petals merit to be considered as potential control against *C.chinensis*, and *R. dominica*, in the control programs of the pests in question.

Keywords: *Essential oil, Punica granatum, Insecticidal, Callosobruchus chinensis (L), Rhyzopertha dominica (F)*

INSECTICIDAL POTENTIAL OF PULVERIZED *CITRUS AURANTIUM* AND *CITRUS SINENSIS* LEAVES AGAINST STORED GRAIN PEST *RHYZOPERTA DOMINICA* (COLEOPTERA: BOSTRYCHIDAE)

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Abstract

The effect of Pulverized *Citrus aurantium*and *Citrus sinensis* Leaves on the adult Stored Grain Pest *Rhyzoperta dominica* (Coleoptera: Bostrychidae) mixed thoroughly with wheat grains contains 10.0 g (about 200 seeds), was treated with five different concentration of each plant leaf powders ranging (0.5, 1.00, 1.50, 2.00, 2.50) and a control at intervals of 15, 20 and 25 day, under controlled laboratory at 27±2°C, 65 ± 5 %R. H conditions, were tested for the Insecticidal effect. The experiments were repeated thrice. A direct positive relationship between exposure time and susceptibility of adults was observed, with increase in concentrations the rate of mortality increased and was significant with respect to controls ($p<0.01$), while the time required for high mortality was at interval Twenty five day in high concentration.These natural products may be alternative to chemical insecticidal and provide an easy method to protect wheat and other agricultural commodities from *Rhyzopertha dominica*in storage.

Keywords: *Concentration, Insecticidal, mortality.*

POLLINATOR-VECTOR APPROACH FOR THE MANAGEMENT OF *TROPINOTA SQUALIDA* SCOPOLI IN CHERRY ORCHARDS

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Abstract

The efficiency of honey bees, *Apis mellifera* in vectoring a dry inoculum of the entomopathogenic fungus, *Metarhizium anisopliae* against the hairy rose beetle, *Tropinota squalida* was investigated in cherry orchards during two growing seasons. In the first growing season, dispensers containing $1X10^9$ Colony Forming Units CFU/g inoculum of the fungus were fastened at the entrances of the bee hive before foraging the crop. The bees successfully disseminated the inoculum as 54.7% of the sampled cherry flowers contained the fungus with a mean of 5690.0 CFU/ flower. The fungus was successfully transferred to *T. squalida* as 41.7% of the collected beetles contained the fungus with a mean of 831.0 CFU/ beetle. The bee disseminated *M. anisopliae* caused 30.0% mortality for adults of *T. squalida* compared to 4.2% in the untreated control. In the second growing season, the inoculum was increased to $5X10^9$CFU/g. Again, 47.3% of the flowers and 44.0% of the beetles contained the fungus with a mean of 8814.7 and 1206.0, respectively. The beetle mortality in the second growing season reached 51.7% compared to 6.7% in the control. These results indicate that using the pollinator vector technology for the dissemination of *M. anisopliae* against *T. squalida* is a novel way to maximize the combined benefit of biological control and pollination for better crop protection and production.

Keywords: *Metarhizium, Tropinota, cherry, pollinator-vector technology.*

TRACE ELEMENTS ACCUMULATION IN DIFFERENT ORGANS OF ORIENTAL TOBACCO PLANTS PRODUCED IN THE REPUBLIC OF MACEDONIA

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Abstract

Absorption of trace elements by plants and their accumulation in vegetative and reproductive organs is strictly specific, both in terms of plant species, and in terms of the specific element. The study was conducted on 150 locations from different agricultural areas in the Republic of Macedonia. Total and DTPA (diethylenetriaminepentaacetic acid) extractable content of following elements: Ag, Al, Ba, Cd, Cr, Cu, Li, Fe, Mn, Na, Ni, Pb, V, Sr, and Zn were determined by atomic emission spectrometry with inductively coupled plasma (ICP-AES). Samples were: tobacco leaves (three harvesting zones), root, stems, blossoms, seeds and corresponding soil. It was found that the elements distribution is quite heterogeneous in different parts of tobacco plants. The results of multielement analyses generally show the highest content in leaves (Al-1472 mg/kg, Ba-45 mg/kg, Cd-0.41 mg/kg, Cr-2.7 mg/kg, Cu-12 mg/kg, Li-13.9 mg/kg, Fe-871 mg/kg, Mn-68 mg/kg, Na-64 mg/kg, Ni-2.5 mg/kg, Pb-1,0 mg/kg, V-2.6 mg/kg, Sr-48 mg/kg and Zn-22mg/kg). Only Cu (15 mg/kg) and Zn (78 mg/kg) had higher content in the tobacco seeds. Availability of studied elements calculated by DTPA extraction and total content of each element in corresponding soil samples is in the following order: Cu>Cd>Mn>Pb>Ni>Zn>Sr>Ba>Fe>Na>Al. The highest Biological Accumulation Factor (BAF) is obtained for Cu, Cd and Zn, showing that oriental tobacco accumulates greater amount of these elements. Analyses of the Biological Transfer Factor (BTF) show that the biggest transfer in the aerial organs of oriental tobacco have Cd, Li and Zn. Furthermore in the sequence follows: Mn>Cr>Ba>Cu>Fe>Al>V>Pb>Ni>Sr>Na.

Keywords: *Trace elements; oriental tobacco; accumulation; organs*

EFFECT OF SOME BIO-PRODUCTS ON THE INFESTATION RATE OF GUAVA FRUITS CAUSED BY THE PEACH FRUIT FLY *BACTROCERA ZONATA* (SAUNDERS)

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Abstract

The peach fruit fly *Bactrocera zonata* (Saunders)is consideredasone of the most dangerous pests infesting fruits in Assiut governorate, Egypt. The fly infest peach, guava, mango, citrus and apricot. It causes great loss in fruit production and the reduction in yield may be up to 30% or even more. The aim of paper is to evaluate effect of the bio-products such as "Vertimic and Evisect", the anti-fedant Chess and the Juvenile hormone mimics Admiral and Match on the infestation rate of Guava fruits caused by the peach fruit fly. Data revealed that the bio-product Vertimic was the most toxic tested compound against the peach fruit fly, since it exhibited infestation redaction of 92.12%. On the other hand, the least effective tested compound was the bio-product Evisect which exhibited infestation redaction of 33.79%. Obtained data also indicated that the Juvenile hormone mimics Match and Admiral and the anti-fedant Chess had moderate effective against the peach fruit fly and they exhibited infestation redaction of 64.80, 62.04, and 57.66 %, respectively.

Keywords: *Bio-products, infestination rate, Guava fruits, Bactrocerazonata(saunders)*

EFFECT OF NEEM BOTANICAL-PESTICIDE ON SCRUTINIZING AND CONTROL OF SUCKING PESTS AND GROWTH OF COTTON (*GOSSYPIUM HIRSUTUM* L.) AS COMPARED TO SYNTHETIC INSECTICIDES

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Abstract

Cotton (*Gossypium hirsutum* L.) is an important fiber crop of the world and also in Pakistan. However, in Pakistan its yield is considerably low as compare to other cotton producing countries. In present study the effect of neem botanical-pesticide on sucking pests of cotton and plant growth as compare to chemical pesticides. This research was conducted in field of Haroonabad district Bahawalnagar. Different treatments were applied, such as T1; Control, T2; Neem botanical-pesticide, T3; chemical pesticides, with three replications in randomized complete block design. The statistical analysis of data showed that the application of neem botanical-pesticide (individually) significantly increased growth, yield and productivity of cotton. However, the use of neem botanical-pesticide resulted in maximum increase in number of bolls per plant (28%), boll weight (22%) and seed cotton (more than 20%). Furthermore, sucking pests such as whitefly and thrips population is reduced more than 15% as compare to chemical pesticides and more than 50% to control. Hence, it was concluded that application of neem botanical-pesticide was significantly more effective in enhancing cotton plant growth. And it has low residual effect on plant, animal and environment. Thus, it is recommend for domestic as well as industrial use and application to minimize the adverse effects of synthetic pesticides and pay repellent quality for major sucking pests in cotton.

Key words: *Cotton, Neem botanical-pesticide, Synthetic pesticides, Thrips, Whitefly*

ECO-FRIENDLY MANAGEMENT OF JASSID, AMRASCA DEVASTANS (DIST.) AND WHITEFLY, BEMISIA TABACI (GENN.) ON OKRA

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Abstract

The field studies on the eco-friendly management of *Amrasca devastans* and *Bemisia tabaci* on okra were carried out at the Experimental Area of Entomology Section, Agriculture Research Institute Tando Jam. Seeds of okra variety (Subz pari) were planted on 5th March 2015 in a complete randomized block design with 4 replications. Treatments applied were T_1 (Neem Powder), T_2 (Hing), T_3 (Tobacco Extract), T_4 (Detergent) and T_5 (Control). Crop was sprayed twice. The pre-treatment observations were recorded 24 hours before spray, whereas, post-treatment observations were taken after 24, 48, 72 hours and at one week intervals. The results revealed that all bio-pesticides reduced the population of *B. tabaci* and *A. devastans* up to one week interval. Maximum reduction in population of the insects was recorded during both sprays. The means showed that Tobacco extract reduced population of *B. tabaci* up to 0.29 per leaf, (92.62 %) followed by Neem powder 0.33 (91.50 %), Hing 1.83 (50.93 %) and detergent 1.85 (53.16%) and *A. devastans* up to 0.03 (99.57%), 0.14 (98.18 %), 3.17 (59.89 %) and 3.18 (59.64 %),respectively. Similarly, in the 2nd spray the population of *B. tabaci* was reduced up to 1.87 (89.39 %), 2.74 (84.04 %), 5.88 (65.89 %) and 6.44 (63.49 %) percent by Neem powder, Tobacco extract, Hing and Detergent, respectively. The population of *A. devastans* was reduced by these bio-pesticides up to 0.33 (96.09 %), 0.39 (95.41 %), 3.37 (9.08 %) and 3.40 (62.34 %), respectively. Analysis of variance showed significant difference in effectiveness of the bio-pesticides. However, LSD showed non-significant difference between 72 hours in Neem powder and Tobacco extract, Hing and Detergent at $P< 0.05$.

Keywords*:* *Bio-pesticide, Jassi, whitefly, okra*

REPORTING RALSTONIA SOLANACEARUM CRK1 CAUSING WILTS IN CHILIES AS THE MOST VIRULENT STRAIN FROM PUNJAB PAKISTAN

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Abstract

Ralstonia solanacearum (Rs), being one of the most destructive pathogens of *solanaceous* crops was detected in a recent survey of Punjab Province in districts of Okara, Chiniot and Faisalabad with 58 %, 43 % and 20 % disease incidence. Pathogen was identified on media plates containing casamino acid-peptone-glucose-agar (CPG) medium supplemented with 2,3,5-triphenyltetrazolium chloride (TZC), appearing as centrally pink irregular mucoid white colonies. Total of 72% of the isolates showed positive hypersensitive reaction (HR) with variable response. Among these, only 40% could be confirmed as *R. solanacearum* through simple staining, streaming, KOH solubility, biochemical, pathogenicity and Plate Trapped Antigen-Enzyme Linked Immunosorbent Assay (PTA-ELISA). The isolate CRK1 from Chiniot region had the highest wilt index. This isolatewas confirmed as *R. solanacearum* on molecular basis using phylogenetic analysis of PCR amplified BLAST identified genomic DNA using Rs-specific primers and partial 16S rRNA gene sequence.

Keywords: *Ralstoniasolanacearum*, wilts, 16S rRNA gene.

BIOLOGICAL CONTROL OF ROOT-KNOT NEMATODES BY *TRICHODERMA HARZIANUM*IN FIELD TOMATOES

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Abstract

Root-knot nematodes are economically important endoparasites having a wide host range. In the current study, efficacy of four indigenous isolates of *Trichderma harzianum* viz, Th-1, Th-2, Th-9 and Th-15 was studied against root-knot nematodes in tomatoes under field conditions in Dargai and Swat, Pakistan. Wheat grains, infested with*T. harzianum* isolates, were applied to the root zone of tomato plants. Results revealed that *T. harzianum* isolates significantlyreduced the nematode infection thereby enhancing the growth and yield of tomato. Significant reduction in galls plant^{-1} and egg masses per root system were observed in the treated plants. Isolate Th-1 was found to enhance shoot and root lengths to the maximum levels of 78.76 cm and 19.59 cm, respectively. Tomato shoot weight was significantly increased (65.36g) in Th-1-treated plots as compared to 49.66 g in control. Maximum (156) number of flowers plant^{-1} and highest (48.18%) fruit set plant^{-1} was observed in Th-1 treated plots. Maximum fruit weight (70.97 g) plant^{-1} and highest (17.99 t ha^{-1}) marketable yield were recorded, where Th-1 was applied. It was concluded that *T. harzianum* isolates reduced the root-knot nematode populations and enhanced yield of tomato.

Keywords: *Biological Control, Trichoderma harzianum, Root-knot nematode, Meloidogyne sp.*

ASSESSMENT OF MILK QUALITY IN VEHARI: EVALUATION OF PUBLIC HEALTH CONCERNS

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Abstract

Milk is an important and fundamental nutrient of human diet. In Pakistan, the milk used by the consumer is of low quality and is often contaminated due to the lack of quality controls. Mycotoxins produced from molds contaminate the agriculture commodities of animal feed. Mycotoxins are poisons which affect the animals when they consume contaminated feeds. Aflatoxin AFM_1 is naturally occurring form of mycotoxins in milk which is carcinogenic. To assess public awareness regarding milk, Aflatoxin contamination a population-based survey using a questionnaire was carried out from general public and from farmers of both rural and urban areas. Data revealed that people of rural area were more satisfied about quality of available milk but the awareness level about milk contamination was found lower in both areas. Total 297 samples of milk were collected from rural (n=156) and urban (n=141) areas of district Vehari during June-July 2015. Milk samples were collected from three different point sources; farmer, milkman and milk shop. These point sources had three types of dairy milk including cow milk, buffalo milk and mixed milk. After performing ELISA test, 18 samples with positive ELISA results were maintained per source for further analysis for aflatoxin M_1 (AFM_1) by High Performance Liquid Chromatography (HPLC). Higher percentages of samples exceeded the permissible limit for urban area. In rural area about 15% samples and from urban area about 35% samples exceeded the permissible limit of AFM_1 with 0.05µg/kg set by European Union. From urban areas about 55% of buffalos, 33% of cows and 17% of mixed milk samples exceeded the permissible AFM_1 level as compared with 17%, 11% and 17% for milk samples from rural areas respectively. Samples from urban areas 33%, 44% and 28% exceeded the permissible AFM_1 level for farmer, milkman and of milk shop respectively as compared with 28% and 17% of farmer and milkmans samples from rural areas respectively. The presence of AFM_1 in milk samples demands the implementation of strict regulations and also urges the need for continuous monitoring of milk and milk products in order to minimize the health hazards. Regulations regarding aflatoxins contamination and adulteration should be strictly imposed to prevent health problems related to milk quality. Permissible limits for aflatoxin should be enforced strongly in Pakistan so that economic loss due to aflatoxin contamination can be reduced.

Keywords: *Milk, Aflatoxins AFM_1, ELISA, Vehari, HPLC.*

MULCHING STRATEGIES FOR WEEDS CONTROL AND WATER CONSERVATION IN COTTON IN BAHAWALNAGAR DISTRICT

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Abstract

Cotton is main cash crop in Pakistan and plays an important role in economy. In Pakistan, potential yield is very low due to many problems. Weeds also minimize the yield due to competition. In Pakistan, availability of water is main problems. The field experiment to study the effect of different mulching techniques and irrigation intervals on weeds control and water conservation in cotton (*Gossypium hirsutum* L.) was conducted at Haroon Abad district Bahawalnagar. The experiment was comprised of three mulch treatments (control, plastic mulch and straw mulch) and three irrigation intervals (five days, ten days and fifteen days interval). Randomized complete block design with split plot arrangement and three replications was applied and as well as measuring of a net plot size of 5 m × 5 m. Crop was sown with hand dibbling method keeping 75 cm row to row and 22.5 cm plant to plant distance. The data on growth, weeds, water relation and yield parameters was recorded by using standard procedures. The data obtained was analyzed statistically by using Fisher's analysis of variance technique and differences among treatments means were compared by using least significant difference test (LSD) at 5% probability level.

Keywords: *Conservation, Cotton, Mulching, Water, Weeds*

FOOD SAFETY: PERCEPTIONS VS REALITY

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Abstract

This study aims to investigate the differences in people's preferences about food safety and the ground realities. For this purpose, primary data were collected from 210 residents of peri-urban areas of North (Rawalpindi) and South (Multan) Punjab. Perception regarding various aspects of water and food safety was recorded using a well developed questionnaire. Samples of water and vegetables from the study areas were collected. Vegetables were purchased from vegetable shops of both studied areas. Simple percentages were calculated to explain perceptions. Chemical analysis was carried out to trace heavy metal and pesticide residues. The majority of the households perceived that they consume safe drinking water (68%) and food (83%). But, at the same time, they contradicted with their perception while reporting about the incidence of waterborne diseases. Percentage of 73% of the households reported the incidence of water borne diseases during last month (from interview). Chemical tests of water and vegetables confirmed that drinking water and vegetables available in both studied areas were not suitable for human consumption. It is recommended that the awareness level of households must be improved. This can be done through a comprehensive campaign through print and electronic media. In this regard, help may be sought from the UNICEF's cartoon series of 'MEENA'.

Keywords: *Food safety, water borne diseases, heavy metals, pesticide residues, food analysis.*

A FRUIT FLY SPECIES FROM THE GENUS *EUPHRANTA* LOEW (DIPTERA: TEPHRITIDAE: TRYPETINAE) FROM PAKISTAN

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Abstract

Fruit flies as quarantine pests cause huge economic losses due to their heavy damages to fruits, vegetables, and medicinal, oil-seed and ornamental plants in Pakistan. Their incidence reduces both, yield and quality of produce. The females puncture the fruits and vegetables with their syringe-like ovipositor and lay eggs just under their peel. The larvae or maggots after hatching, make tunnel and penetrate into the fruits and vegetables for feeding on the pulp and thus render them unfit for human consumption. In certain fruits and vegetables, rotting starts at the puncture points of hosts. As a result, through broad trapping collections of fruit flies fauna in Pakistan, adults or larvae of these pests were collected from different localities. After sampling, to characterize fruit fly fauna involved, the collected samples were brought to laboratory for rearing of maggots and then proceed for identification. On the basis of extensive literature records, the presence of fruit fly, *Euhphranta cassiae* (Munro) (Diptera: Tephritidae: Trypetinae) belonging to the genus *Eupharanta* Loew was identified in Pakistan. This species is described and illustrated on the basis of morphological characteristics, supported by data on its ecology and geographical distribution. Information is also given on its host plants, location, distinguish remarks and morphological diagnosis. This information on fruit fly identification is important for estimating of its damage potential and control option.

Keywords: *Tepritidae, Trypetinae, Morphological characteristics, Identification, Fly pest*

FUNGISTATIC ACTIVITY OF *CARUM CARVI* L. ESSENTIAL OILS, *CITRUS LIMON* L. ESSENTIAL OILS, *CITRUS MANDARIN* ESSENTIAL OILS, ESSENTIAL OIL OF TEA TREE IN RELATION TO PATHOGENS FROM INFECTED PELARGONIUM (PELARGONIUM SPP.) CUTTINGS

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Abstract

For many years, chemical method has been one of the most common ways to protect ornamental plants in Poland. Despite the many drawbacks it is considered to be the most effective. For several years, more and more chemical pesticides have been replaced with preparations of natural origin. The preparations of natural origin make it possible to eliminate or reduce the amount of chemicals, protecting the environment by causes the weaker of these measures and easier biodegradation in the environment. In addition, a disturbing trend is presence of more common pathogens resistant to chemical preparations and the possibility of contamination of water resources. The aim of the study was to isolate microorganisms that inhabit the cuttings of pelargonium, identification of fungal isolates as well as to evaluate the influence of some essential oils: *Carum carvi* L., *Citrus limon* L., *Citrus mandarin* and essential oil of tea tree in *in vitro* circumstances on the linear growth of the mycelium:*Phytophthora cryptogea*, *Phytophthora nicotianae* var. *nicotianae*. Previcur Energy 840 SL was used as a standard chemical protection. The highest efficiency in relation to *Ph. cryptogea* and *Ph.nicotianae var. nicotianae* is characterized by *Carum carvi* L. essential oil (concentration 1%).

Keywords: *Essential oils, pelargonium, Phytophthora spp.*

THE EFFECT OF WATER EXTRACTS FROM *ARTEMISIA DRACUNCULUS* L. ON COLORADO POTATO BEETLE LARVAEFEEDING

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Abstract

Effective protection of plants against pests has become very difficult in recent years. The chemicals do not provide adequate level of plants protection because pests are more often able to immunize to these substances. Moreover, pesticides often have a negative effect on all elements of the environment. One of biological plant protection methods is the use of plant extracts that may reduce pests feeding effectively. The aim of this study was to determine the effect of water extracts prepared from dry and fresh matter of *Artemisia dracunculus* L. on feeding of Colorado potato beetle L2, L3, L4 stage larvae. Dried extracts were prepared at concentrations of 2%, 5% and 10%, while the fresh plant at concentrations of 10%, 20% and 30%. Larvae feeding intensity assessment was conducted by dipping leaves of potato in respective solutions of the extracts, and determining the mass of food consumed by larvae, and changes of larvae body weight once daily. In addition, absolute deterrence index and palatability index were calculated. The results of the experiment showed that L2 stage larvae are the most vulnerable to the effects of extracts. Extracts prepared from both dry and fresh matter at two highest concentrations contributed to the greatest reduction of these larvae feeding and decreased their body weight. Extract from dry matter at concentration of 10% reduced the feeding of L3 and L4 stage larvae. With increasing concentrations of extracts their deterrent effect on the tested larvae was usually increasing while the value of palatability index was decreasing.

Keywords: *Biological control, water extracts, Artemisia dracunculus L., Colorado potato beetle.*

SOIL QUALITY IN URBAN GARDENS IN NOVA GORICA, SLOVENIA

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Abstract

In the urban environment, pollution due to traffic, industry and emissions from households is a bigger problem than in rural areas. Despite this, many people decide to cultivate their gardens in cities, trusting that homemade produce are safer than store-bought. In order to ascertain if the soil in urban gardens in the town of Nova Gorica (Slovenia) is of lower quality than soil in gardens in the countryside and if any maximum permissible limits are exceeded, we sampled soil in six urban gardens. The sampling sites were chosen near roads, railway tracks and also in more secluded areas. One site was in a rural environment. We measured the microbial respiration rate, pH and soluble salts, soil texture, dry weight, organic content and nitrate and phosphate content. The most common heavy metals were measured by flame atomic absorption spectrometry after acid digestion and persistent organic pollutants (POPs) such as organochloride pesticide, PCBs and dioxins, were extracted using accelerated solvent extraction and measured on GC-MS. In order to see how the sampled soils are suitable for decomposers that accelerate soil fertility, we performed an avoidance test with earthworms, giving them a choice of all soils and observing which they prefer. The results show that growing vegetables in urban gardens can be an option for people who have the means, but some precautions should be taken, such as analyzing the soil to see that it is not polluted.

Keywords: *Urban gardens, Soil quality, Heavy metals, POPs.*

THE EFFICACY OF SOME HERBICIDES AGAINST BROOMRAPE AND MAJOR WEEDS IN THE FOOD LEGUMESFIELDS AND THEIR SENSITIVITY

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Abstract

The study was conducted in 2011/12 cropping season in food legumes fields (lentil, chickpea, and broad bean).The applied herbicides were selected based on the results of an earlier experiment (screening herbicides on legume crops during 2010/11 growing season) which selected four promising herbicides: Imazethapyr, Pendimethalin, Imazapic, and Aclonefin. The main objective was to determine the efficacy of the mixture (Imazethapyr & Pendimethalin), which was applied as pre-emergence treatment, followed by imazethapyr applied as a post-emergence treatment when the crop is at 10-12 cm height. Results revealed the efficiency of some herbicides against broomrapes in the three crops, where Imazethapyr treatment was clearly superior as compared to the standard treatment used at ICARDA (two post emergence applications of Imazapic). Results also showed differences in the sensitivity of the crops to the herbicides used: Faba bean was the most tolerant, while lentil was the most affected. Yield results indicated the superiority of hand weeding treatment as compared with other treatments used in lentil and chickpea. In addition, chemicals treatments were better than the untreated control. The situation was different in faba bean and reflected different results, the high dose of mixture (Imazethapyr & Pendimethalin) treatments which was followed by application of imazethapyr or application of Aclonifen, gave relatively better yield than hand weeding treatment, and these results reflect a kind of positive stimulant that might have led to increase in yield. Furthermore, results of herbicides' efficacy demonstrated the positive effect of pendimethalin in reducing weeds' density.

Keywords: *Broomrape, food legumes, herbicides, sensitivity, tolerance.*

CYTOTOXICITY, ANTIOXIDANT AND ANTIMICROBIAL ACTIVITY OF *CAPSICUM ANNUUM* L.

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Abstract

The objective of this study was to evaluate cytotoxicity, antimicrobial and antioxidant activities of pepperextracts grown in Serbia. The content of phenolic and hydroxycinnamic acids of investigated extracts was determined using HPLC. These vegetable extracts to all three cell lines proved to be a potent inhibitor of cell growth (**FemX and LS 174**). The IC_{50} against FemX and LS174 cell lines was 29.02 ± 0.05 and 38.02 ± 0.05 μg/ml. The highest antioxidant capacity in the *C. annuum* L.(Palanacko čudo) (98.01 ± 0.72 μg AA/g). The investigated pepper extracts showed strong to moderate strong antimicrobial activity (19.53- 312.50μg/ml). Pepperextracts can serve as new dietary and food supplements.

Keywords: *Capsicum annuum* L.;*Cytotoxicity; Antimicrobialactivity; Antioxidant capacity.*

PHENOLIC COMPONENTS AND ANTIMICROBIAL ACTIVITY OF THE VARIOUS CAPS ANTIOXIDANTS TYPES OF CARROT

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Abstract

The objective of this study was to evaluate antifungal and antioxidant activities of vegetable extracts (*Dancus carota* L.) grown in Serbia. Different experimental models have included the determination content of total phenolics, total flavonoids, antioxidant capacity and minimum inhibitory concentration of extracts. The phenolic composition of different extracts was determined by the HPLC method. The highest amounts of phenols and highest antioxidant capacity were found in the *D. carota* extract Bolero F_1. The highest fenolic content has shown Bolero F_1extract. All of the extracts showed strong to moderate strong antimicrobial activity. On the basis of the results obtained, it is found that extract serve as a potential source of natural antioxidants and antimicrobial due to their marked activity. The obtained results may be useful in the evaluation of new dietary and food products.

Keywords: *Dancus carota L, HPLC, phenolic components, antimicrobialactivity, antioxidant activity.*

CONTRIBUTION TO THE ASILIDAE (DIPTERA) FAUNA OF SOUTHEASTERN ANATOLIA, TURKEY

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Abstract

The robber flies (Diptera, Asilidae) are a predators which have an important place at preservation of the natural balance and sustain. This study was carried out to determine the belonging to species of Asilidae family in cereal fields of Adıyaman, Diyarbakır, Şanlıurfa and Mardin provinces of Southeastern Turkey from 2006 to 2009. In surveys, Asilidae species were collected with sweep net and preserved withintubes being 70% alcohol. . As a result of study, *Habropogondecipiens* Theodor 1980, ve *Machimus* sp. in Adıyaman, *Stenopogon sabaudus* (Fabricius 1794), *Triclis olivaceus* (Loew,1851) in Diyarbakır, *T. olivaceus, Neomochtherus mundus* Loew, (1849), *H. decipiens, Dioctria* sp., *Machimus* sp. and *Holopogon* sp. in Şanlıurfa, *T. olivaceus* in Mardin were determined. These species were recorded for the first time in these provinces.

Keywords*:* *Asilidae species, cereal fields, Souteasthern Anatolia, Turkey*

DETERMINATION OF DAMAGE STATUS AND MAIN STRUGGLE FOR BIOLOGICAL CRITERIA OF *HAPLOTHRIPS TRITICI* KURDJ. (THYSANOPTERA: PHLAEOTHRIPIDAE) ON WHEAT IN SOUTHEAST ANATOLIA, TURKEY

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Abstract

This study was conducted in order to determine damage status and main struggle for biological criteria of *Haplothrips tritici* Kurdj. (Thysanoptera: Phlaeothripidae) which is a considerable pest for wheat fields of Sanliurfa and Mardin provinces in Southeast Anatolia Region of Turkey during the years 2011-2012. The present studies have been conducted and evaluated at three stages of the wheat. In the light of the current findings, the peak intensity of larvae was observed at dough stage of the wheat, but the intensity decreased as the wheat grain became though. At milk and dough stages, the weight losses of wheat caused by *H. tritici* with 23.8 larvae/spike and 14.3 larvae/spike per spike in Alakus and Ortakoy locations was 0.06 g and 0.02 g, respectively. At the dough and/or the ripening stage, it was determined that the values of the spotted grain rate, gluten index rate (%), sedimentation resulted from *H. tritici* with the average of 20.6 larvae/spike in Alakus location were found as 71.0%, 92.5% and 68.6 ml, respectively, but corresponding values in Ortakoy location with the average of 11.8 larvae/spike were recorded as 56.5%, 93.6% and 67.0, respectively. At the end of the present study, it was understood well that *Haplothrips tritici* did not adversely influence the flour quality of the wheat, but spots on the wheat grain reduced its virtuousness feature. At the beginning of the bloom, damage of thrips was more important, and economic losses were determined when the intensity of thrips in spike was 12 adult+larvae/spike.

Keywords: *Wheat, Haplothrips tritici, Biological criteria,damage, Southeast Anatolia, Turkey*

INVESTIGATION OF DENSITY OF GUNDELIA (*GUNDELIA TOURNEFORTII* L.) IN THE FIELD ECOSYSTEM AND ITS DIFFERENT USES AS TRADITIONAL FOOD BY THE PEOPLE IN SOUTHEASTERN ANATOLIA REGION OF TURKEY

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Abstract

Weeds are one of the most important plant protection problems adversely affecting agricultural production. They cause yield losses by competing with crops for light, water and nutrients which are required for a good yield. Despite of these adverse effects, however, there has recently been an inclination to the use of weeds as food due to increased interest on ecological agriculture. For that reason, determination of density and way of use of the weeds that have a beneficial potential as a food has gained importance. *Gundelia tournefortii* is a weed which naturally grows in most of the places worldwide. This weed, which grows abundantly in the spring, has been a seasonal source of livelihood for the regional people. It is known as "kenger" by people and has not been cultivated yet. Studies on this plant are limited regarding nutrient content and were carried out by the researchers of medicinal and aromatic plants. Although it has been utilized as vegetable, used in gum, coffee and pharmaceutical, it has not yet received sufficient attention. This study was conducted in 2010-2012 to determine the density of *G. tournefortii* in the field crops ecosystem along with its way of uses as food by the local people in eastern Anatolia region of Turkey. Study was carried out by interviewing people, who collect this plant from nature and market in local bazaars or use it as food, in the provinces, districts and villages in eastern Anatolia. Study results revealed local name, definition, environmental requirements, chemical content, collection time and the way of uses of this plant.

Keywords: *Gundelia tournefortii, weed, food, Southeastern Anatolia Region, Turkey*

WEED CONTROL IN MAIZE FIELDS USING BANDED HERBICIDE APPLICATION

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Abstract

The yield loss caused by weeds may exceed the economic thresholds especially in frequently irrigated crops like maize. The troublesome weeds in maize, such as *Cynodon dactylon* (L.) Pers, *Cirsium arvense* L., *Convolvulus arvensis* L. and *Bromus tectorum L.*, cannot be easily controlled by selective herbicide in conventional crop production system (CCPS) because the traditional field sprayer used for selective herbicides couldn't allow using total herbicides controlled many annual and perennial weeds. The objective of this study was to control serious weeds in non-glufosinate-resistant maize using a hooded sprayer. Recommended rate of glufosinate ammonium was applied in rows while rimsulfuron was treated in inter-rows. All the weeds in rows were effectively controlled by glufosinate ammonium at 600 g a.i. ha^{-1}. Rimsulfuron controlled some annual weeds in inter-rows at 12.5 g a.i. ha^{-1}, but efficacious control of perennial weeds couldn't be done. Using hooded sprayer not only can help to control perennial weeds couldn't controlled in CCPS but also give a new opportunities to control the weed species became resistant to other herbicide groups. The basic limitation of using hooded sprayer in CCPS is the seeds should drill on the proper strip.

Keywords: *Banded herbicide application, maize, glufosinate ammonium, rimsulfuron*

IMPORTANCE OF COLD CHAIN FOR FOOD SAFETY

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Abstract

Food safety is necessary and also very critical issue for consumers. The target of food safety is to preserve the safety and quality of refrigerated food. Cold chain is temperature-controlled supply chainused to describe the series of interdependent operations for chilled and frozen food.The cold chain extends from the raw material supplier to the consumers' refrigerator or freezer. Safety and quality of chilled and frozen food is related to cold chain conditions during production, distribution, storage and retailing. A poorly controlled step can result in the loss of a product or a product that becomes toxic. The safety and quality measures are taken by the Hazard Analysis and Critical Control Point (HACCP) plan, which is an important element in the control of safety and quality in food production. The HACCP system can be used at all stages of a food chain, including food production and preparation processes including packaging, distribution, etc.Additionally, legislation and good manufacturing practices (GMP) within the cold chain are designed to ensure effective control of safety and quality. The objective of this study is to present information about cold chain and its importance for food safety.

Keywords: *Food safety, cold chain, HACCP, GMP.*

PHYLOGENETIC ANALYSIS OF TOMATO YELLOW LEAF CURL VIRUS ISOLATES FROM ANTALYA, TURKEY

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Abstract

Turkey contributes immensely to the production of tomatoes worldwide, by cultivating as high as 30% of tomatoes consumed worldwide. According to the statistical data collected in 2011, 60% of these tomatoes were produced in glasshouses whilst the rest were produced in plastic houses. However, Tomato yellow leaf curl virus (TYLCV) belonging to the genus *Begomovirus*, family *Geminiviridae* is the most destructive virus disease in greenhouse tomatoes of Antalya. With its single-stranded DNA (ssDNA), it is transmitted by the whitefly *Bemisia tabaci*. In this study, DNA from infected tomato plants was isolated by I-genomic plant DNA extraction mini kit (Intron Biotechnology). The qPCR method was used to detect TYLCV infected tomato plants. The partial nucleotide sequence of the coat protein coding region of that virus was sequenced for six isolates from the Antalya region of Turkey namely; Serik, Merkez, Finike, Demre, Kas and Kumluca. Phylogenetic tree was constructed using MEGA 6.0 in the Neighbor-Joining algorithm. Genetic analysis of the sequence showed very low genetic variability among the tested isolates. The distances between the locations were directly reflected in the nucleotide differences between the isolates; such that the isolate from Merkez was 100% identical to that of Serik. The nucleotide sequences have been deposited in the GenBank database under the accession numbers KC489095, KC489096, KC489097, KC489098, KC489099 and KC489100 respectively.

Keywords: *Tomato, Tomato yellow leaf curl virus, Phylogenetic analysis, Antalya, Turkey*

OUTBREAK OF BACTERIAL CANKER OF TOMATO CAUSED BY *CLAVIBACTER MICHIGANENSIS* SUBSP. *MICHIGANENSIS* IN THE AEGEAN REGION OF TURKEY

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Abstract

Bacterial canker, caused by *Clavibacter michiganensis* subsp. *michiganensis* (Cmm), is one of the most destructive diseases of tomato (*Solanum lycopersicum* L.) producing areas worldwide. Severe outbreaks of bacterial canker of tomato were observed in many greenhouses in the province of Muğla (Fethiye) in the Aegean Region of Turkey in the spring of 2013. Cultivars Jadelo F1 and Daylos F1 were affected severely and serious crop losses ocurred. The disease incidence was greater in greenhouses with plants derived from grafted seedlings. Many growers uprooted the plants and gave up from tomato production in related growing season. Symptoms were curling, yellowing and wilting of leaves which finally turned brown and collapsed. On some plants, the wilting was on one side of plants or leaves. Typical stem canker symptoms on stems were seen. When symptomatic stems divided into two pieces lengthwise vascular discoloration was observed. The ‘’bird's eye’’ symptoms existed of on the fruits.The pathogen isolated from infected samples was identified as *Clavibacter michiganensis* subsp. *michiganensis* by using biochemical and immunofluorescence (IF) test methods. In the pathogenicity tests,bacterial suspension (10^6 cfu/ml) was injected into 4 weeks old tomato seedlings.Control plants were inoculated with sterile water. The inoculated plants were maintained at 26±1C^o for 10 days in climatic room. After 7 days bacteria-inoculated plants developed wilting symptoms, whereas water inoculated plants remained symptompless. The pathogen was re-isolated from the symptoms and it had the same characteristics as the original bacteria. It was concluded that negligence of sanitation measures during the grafting and transplant of houses led to the increase in the disease incidence in the greenhouses in Fethiye.

Keywords: *Bacterial canker, tomato, greenhouses, outhbreack.*

EFFECT OF HOT-WATER TREATMENT ON BLACK-FOOT DİSEASE OF GRAPEVİNE

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Abstract

Black foot disease of grapevines is a decline and dieback disease caused by a soil borne pathogen complex including *Ilyonectria liriodendri*, *Campylocarpon fasciculare.* Black foot primarily affects young grapevines (up to 8 years old), and symptoms of the disease are characterized by short shoot internodes and small chlorotic leaves, which lead to eventual death of the vines either during the growing season or during the following winter. The viability of two species of black foot disease to grapevine was studied after a hot water treatment (HWT) in order to evaluate the feasibility of this technique as a potential tool to control these species during the grapevine propagation process. In a first trial (*in vitro*), mycelial plugs contained in Eppendorf tubes with sterile distilled water were subjected to different combinations of temperature (49–51° C serial) and exposure time (15, 30 and 45 min) in a hot water Heating/Cooling Dry Block Thermostat (Biosan CH 3-150, Combitherm-2). Growth rates of treated mycelia were compared to untreated controls. Significant differences in survival and growth for all factors (species, temperature and time) and their 2-way interactions were observed. Fungal survival generally decreased with increasing temperatures and exposure times. In a second trial (*in vivo*), the fungi were inoculated into grapevine canes (1103 Paulsen rootstocks). Inoculated canes were incubated at 25°C for 3 weeks to allow the fungi to colonize the wood and then subjected to HWT in the range of 49–50°C for 30 min, and survival of fungi after HWT was assessed. Survival of all species was sharply reduced after HWT of 30 min at 50°C. Results obtained in this study demonstrate the feasibility of controlling these pathogens by HWT in the nursery grapevine propagation process.

Keywords: *Black foot, hot water, grapevine rootstocks.*

A TRANSCRIPT ENCODING RYANODINE RECEPTOR-LIKE PROTEIN IN *SPODOPTERA LITTORALIS*

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Abstract

Diamide insecticides are one of the most promising new compound classes in insecticide chemistry. This chemistry has been confirmed the mode of action to be ryanodine receptor (RyR) activation which leads to uncontrolled release of calcium within insect muscle cells. This newest class of insecticides is rapidly replacing major uses of the earlier insecticides. Diamides have notably high activity against Lepidoptera and they are used in a gradually increasing number of agricultural settings. However, cases of resistance development to diamides have been reported for some lepidopteran species especially due to extensive use of flubendiamide and chlorantraniliprole in some countries. In this study we presented a transcript encoding ryanodine receptor-like protein (SpliRyRl) in*Spodoptera littoralis* using Next-generation sequencing (NGS). The analyzed protein exhibits sequence similarity to previously identified *Danaus plexippus* RyRl protein. A phylogenetic analysis was performed using ClustalW and the MEGA 6.0 program based on the ORF amino acid sequence of RyRs and RyRls from Lepidopteran species with high bootstrapping support in 1000 replications. The phylogenetic tree shows that there isagenetic divergence between RyRs and RyRls which needs further comprehensive functional characterization of SpliRyRl protein. The sequence data will still provide insights to the promising new pesticide targets and insecticide resistance mechanism against Egyptian cotton leaf worm as well.

Keywords: *Egyptian cotton leaf worm, insecticide resistance, pest control, ryanodine receptors.*

FLOWER MONITORING OF *Erwiniaamylovora* BY REAL-TIME PCR IN THE AEGEAN REGION OF TURKEY

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Abstract

Fireblight caused by *Erwiniaamylovora* is a devastating disease affecting particularly quinces, pears and apples in Turkey. Monitoring of pathogen populations in/on flower is a key factor for accurate disease prediction and establishing of suitable disease management strategy. Sensitive molecular methods for detection of the pathogen on asymptomatic tissue were developed. In the study convenience of real time PCR for flower monitoring of the pathogen was evaluated on naturally infected and artificially inoculated flowers. In the spring of 2014,samples were taken periodically from experimental pear tree orchard with fireblight history (Izmir, Aegean Region) from the beginning of bloom. Also flowers from non-infected tree were artificially inoculated with 10-fold serial dilutions of previously identified *E.amylovora*strain to determine detecting level of the test. The bacterial concentrations on the inoculated flowers ranged from 10^{7} to 10^{1}cfu. Naturally and artificially infected flower samples were macerated for direct DNA extraction. DNA extracts (200 µl) were placed on Sucrose Nutrient Agar medium and plates were incubated for 18 h at 26 ^{o} C for enrichment. Washings of bacteria recovered from each plate were diluted, bacterial cells were pelleted by centrifugation and pellets were re-suspended to be used in real-time PCR tests. Previously developed TaqMan real-time PCR targeting amplification of chromosomal DNA of the pathogen (amsC gene and ITS Region) was found to detect the bacterium in infected pear flower before showing any symptoms successfully (Ct values <30 values). The detecting sensitivity of the test on artificially inoculated pear flower was estimated as 10^{1}cfu. Consequently the method can be used for pre-symptomatic screening of flowers providing forecasting of actual infections and correct definition of chemical or biological control timing.

Keywords: *Fireblight, pear, flower, monitoring, real-time PCR*

TOMATO MUTANTS CONTROL RESISTANCE TO BACTERIAL CANKER AND WILTING DISEASE

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Abstract

Tomato is under attack by many bacteria, fungi and viruses. Tomato bacterial canker and wilting disease caused by bacterial *Clavibacter michiganensis* subsp. *michiganensis* (*Cmm*) pathogen is a serious infectious disease resulting in devastating losses. Control of bacterial canker is difficult and relies on cultural practices and defense mechanisms. No effective resistant tomato cultivars are registered against the bacterial disease. This study aims to identify genetically resistant tomato cultivars using a chemical mutagen on susceptible tomato seeds and characterize resistance against the bacterial canker. M3-9 and M3-15 tomato mutants were obtained in pathogenicity tests against virulent *Cmm2* isolate. The M3-9 and M3-15 have elevated chlorogenic acid and rutin hydrate levels compared to susceptible original plants. When the two mutants were crossed with a susceptible tomato variety, they produced F_1 and F_2 plants where 3 susceptibleand 1 resistant plants were identified to the *Cmm2* indicating the resistance inherited by recessive single gene. The resistant mutants were also crossed with each other, their F_1 plants were also susceptible to the *Cmm2* pathogen revealing M3-9 plant's resistance is different from M3-15 mutant's resistance. The M3-9 and M3-15 resistant plants were further analyzed in real time PCR whether they produce *pathogenesis related* gene 1 (*PR1*) to *Cmm2*. *PR1* gene transcript accumulated 4-6 times higher in M3-9 and M3-15 mutant plants than susceptible original parent in response to the virulent *Cmm2* at 24 hours post inoculation. The *PR1* transcript accumulation was rapidly and strongly increased from 0 to 72 hpi in response to *Cmm2* in resistant mutant plants. These results are consistent with *PR1* gene playing a role in plant disease resistance responses under resistant loci against the bacterial canker.

Keywords: *Tomato, Bacterial canker, Resistance, Time course.*

EFFECT OF PLANT GROWTH PROMOTING RHIZOBACTERIA (PGPR) ON SEED GERMINATION AND SEEDLING GROWTH OF BANYARD GRASS (*Echinochloa cruss galli* L.) AND REDROOT PIGWEED (*Amaranthus retroflexus* L.)

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Abstract

Recent concerns about possible detrimental effects of herbicides on the environment lead to the development of alternative weed control methods including biological control using microbial agents. A laboratory investigation was carried out for testing effects of seven different bacteria isolated from different soil types including volcanic (H_1, H_3 and H_5) salty (H_2 and H_7) and sandy (H_4 and H_6) soils on seed germination and seedling growth of two main weeds of barnyard grass (*Echinochloa cruss galli* L.) and redroot pigweed (*Amaranthus retroflexus* L.). Twenty seeds inoculated with different bacterial species were placed in each petri dish. In negative and positive control, distilled water and trifluralin herbicide were used respectively. The results show that seed germination varied depending on treatments in both of examined weeds. One (H_3) of the seven strains assayed significantly inhibited seed germination of barnyard grass and the seed germination of redroot pigweed was inhibited by H_3 and H_5. In addition, the growth of seedling of barnyard grass was significantly reduced by bacterial treatments H_1, H_3 and H_7. According to the results of this study we can suppose that under soil and rhizospher conditions, these bacteria could have a major impact on germination and seedling growth of barnyard grass and redroot pigweed.

Keywords: *Biological control, PGPR, Barnyard grass, Redroot pigweed*

DEMOGRAPHY OF *PANONYCHUS ULMI* (KOCH) ON TWO APPE VARIETIES

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Abstract

Development, survival, reproduction, and population growth parameters of European red mite,*Panonychus ulmi* (Koch) (Acari: Tetranychidae) were evaluated on two different apple varieties (Golden delicious and starking delicious) which are very common in Turkey.Experiments were carried out on leaf discs (40 mm in diameter) placed in petri dishes (100x150 mm) at 25±1°C, 65±10 % RH, and a photoperiod of 16:8 (L:D) h in climate room.Population parameters were obtained by analyzing life history raw data using the age-stage, two-sex life table that takes the variable developmental rate among individuals and male population into consideration. Results indicated that Golden cultivar is less favorable host for European red mite because of the longer preadult developmental time, higher preadult mortality rate, and lower total fecundity on this cultivar. Population pamaters; the intrinsic rate of increase (r), the net reproduction rate (R_0) and the finite rate of increase (λ) values were lower on Golden.

Keywords: *Panonycus ulmi, Golden delicious, Starking delicious, life table*

USE OF HOT WATER TREATMENT TO CONTROL CROWN ROT DISEASE OF BANANA

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Abstract

Heat treatments are currently used as an alternative to chemical treatments to control postharvest disease and pests in various horticultural products. Banana crown rot is the main disease affecting the quality of banana fruits during transport and marketing. The objective of this study is to examine the effects of hot water treatments on mycelium growth and conidia germination of *Colletotrichummusa*e, *Chalara paradoxa* and *Fusarium* sp., and to evaluate dipping of banana fruits in hot water as potential control procedure against crown rot. Fruit in clusters were subjected to 45, 50 and 55°C for up to 40 min followed by dipping in running cold water for 10 min. The result showed that exposure of fruit to water at 55°C for 20 min and longer caused peel blacking and a failure to soften. Hot water treatment for 20 min at 50°C inhibited conidia germination by 11.3%, 5.7% and 11.3% for *Colletotrichummusa*e, *Chalara paradoxa* and *Fusarium* sp, respectively**.** There is no significant difference ($p \leq 0.05$) for this treatment comparing to treatment at 50°C for 30 min and 40 min and also with 55°C for 20 min and longer which did not inhibited conidia germination, but caused severe skin scald and a failure to soften. So, 50°C for 20 min provide an excellent way of controlling the growth of these three pathogens on banana crown and had no skin scald.

Keywords: *Hot water treatments, crown rot, banana, Colletotrichum musae, Chalara paradoxa, Fusarium sp*

SEASONAL DYNAMICS OF AEROALERGENIC WEED POLLEN IN BANJA LUKA AREA (BOSNIA AND HERZEGOVINA) DURING 2011 – 2015

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Abstract

As in recent year’s phytoallergens,who includes taxa of various botanical families,presents actual social and health problem around the world, as well as in our area, determination the types and monitoring of the pollen counts in the aero plankton of cities is of relevant medical importance.Considering the mentioned issues, as well as the results of monitoring carried out in previous years, the main objective of the study was to analyze the seasonal dynamics of aero allergenic weed pollen in Banja Luka area during the five-year period 2011-2015. Sampling of aero allergenic weed pollen during the pollination period 2011-2015 is conducted in urban, industrial part of Banja Luka in the Public Institution“Agricultural Institute of the Republic of Srpska - Banja Luka”(PI AIRS – Banja Luka) (N 44º47`41.0``, E 017º12`22.6``) with Hirst's pollenometar type (Hirst, 1952) using the method defined by the International Association for Aerobiology (IAA). Comparative analysis showed that among weed pollen the most dominant was ambrosia pollen on an annual level during the five year monitoring of weed pollen in Banja Luka.

Keywords: *Seasonal dynamics, pollen aeroallergens, weed, Banja Luka*

BIOCONTROL POTENTIAL OF ENDOPHYTIC AGENTS AGAINST *PYTHIACEAE* CAUSING DIEBACK OF APPLE TREES

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Abstract

Dieback disease of apple trees caused by *Pythiaceae*((*Pythium*sp.,*Phytophthora*sp.; oomycetes) is an important soil-borne disease reducing apple (*Malus communis*) production in Tunisia. It causes severe damages and trees losses in numerous apple orchards. This disease causes cankers, necrosis and rot in the collars and roots. The present study aimed at investigating of the biocontrol potential of antagonistic microorganisms of diverse endophytic fungal (e.g., *Trichoderma* spp, *Aspergillus* spp, *Penicillium* spp)or bacterial isolates(*Bacillus* spp) against *Pythium* and *Phytophthora* sp strains. The antagonistic effects of selected biocontrol agents (BCAs) were evaluated by different screening methods *in vitro*. Using the dual culture technique on PDA medium as well asusing culture filtrates we concentrated our study on those isolates for which we were able to detect secreted antifungal activity inhibiting*in vitro* growth of tested*Pythiaceae* byover 50%. The results achieved in this study showed*in vitro*efficacy of two isolates of *Trichoderma* spp., one isolate of *Aspergillus* spp. and two strains of *Bacillus* sppagainst *Pythium* and *Phytophthora* spp. The culture filtrates of *Aspegillus spp* inhibited the mycelial growth of *Pythium undulatum*, *Phytophthora unidata* and *Pythium rostrating* withthe highest percentage (up to 100 %).The ability of these BCAs to manage dieback disease on apple trees was tested *in vivo*; both preventive and curative treatments were performed on apple rootstocks. The damage caused on root by *Pythium undulatum* and *Phytophthora unidata*was tested based on rating scales symptoms of infestation. The results revealed that (BCAs) significantly reduced the disease severity and incidence on roots, but also stimulated plant growth. The results achieved in this study incite us to proceed with feasibility studies for using these BCAs to manage root rot disease as alternative to synthetic chemicals and their potential stimulate growth promotion in plants.

Keywords: *Malus communis*, Antifungal activity,*Trichoderma* spp, *Aspergillus* spp, *Penicillium*spp ,*Bacillus* spp.,*Pythiaceae* ,BCAs.

CONSUMERS` SURVEY OF INDUSTRIAL FISH SOUP PRODUCED FROM THREE DIFFERENT FISH SPECIES

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Abstract

Soup is a very popular food all over the world and it is prepared from different food groups. Fish soup is healthier than other food types in terms of nutrition values and functional properties. Usage of fish waste has increased in importance in recent years. In this study, industrial fish soup was prepared using by-product of cultured seabream (*Sparus aurata*), seabass (*Dicentrarchus labrax*) and trout (*Oncorhynchus mykiss*) (head, mince, waste of bone) and natural additives. A survey was conducted to estimate consumer response to fish soup prepared with above mentioned species. Criteria of sensory analysis were chosen as taste, flavor and appearance. Approximately 400 people participated in the survey study. The survey showed that seabass soup was the most appreciated soup in terms of taste and flavor followed by seabream and trout soup. About 66% of the respondents claimed that they intended to buy fish soup prepared from any of these species. The most responses were related for trout and seabass soup. About 35.5% of respodents who intended to buy fish soup have claimed that they never consumed fish soup before. Therefore, this study shows that commercial fish soup prepared from fish filleting waste from trout, seabass and seabream has a marketing potential. Further studies may need to identify market profile of this product.

Keywords: *Fish soup, Consumer survey, By-product, Trout, Seabass, Seabream*

Acknowledgement

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3. ORGANIC AGRICULTURE

AGRO ECOLOGICAL PRACTICES TRIGGERED BY FARMER TO FARMER IMPROVING VEGETABLE PRODUCTION VIDEOS IN BENIN

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Abstract

Vegetables production in Benin plays an important role in food security and poverty reduction. But their production is undermined by pests and farmers rely on pesticides to control them. Drawing lessons from traditional extension approaches and mass distribution of training videos, DVDs of "Improving vegetable production" video were sold through the network of entertainment DVD sellers, agro-input dealers, vegetable sellers, and taxi-moto drivers from August to December 2015, to strengthen farmers' learning in agro ecological practices. In March of 2016, a snowball sampling procedure was used to select 98 buyers/viewers in four different areas where DVDs were sold. Using checklists, we interviewed respondent followed by a field visit to see some of the practices and change people had mentioned in the interviews.

Results show that farmers were motivated to buy DVD and find their own way to watch videos, usually several times, with their families, friends and farm hands etc. Farmers who watched the video enhanced their creativity and adapted the learning to their environment. Farmers start seriously to grow healthy seedlings; destroy all sources of pest/disease in and near their field; rotate with crops that are resistant to pests; avoid introducing diseases from other fields, protect seedlings by putting an insect net over them. About 86% of respondents said they spent now less money in the pesticides to manage pests/diseases. Videos improve farmers' knowledge and trigger agro ecological practices. This study can be used as a starting point to make farmers aware of the benefits of ecological farming.

Keywords: *Farmer-to-farmer videos, Motivation to pay for information, Ecological Agriculture.*

WINTER WEEDS AND ITS CONTROL IN MEDICINAL PLANTS IN EGYPT: SURVEY STUDY

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Abstract

There are about 50 species of medicinal plants cultivated regularly in Egypt, which have a high value and cultivated mainly for export. Weed control is the main obstacle in the production of medicinal plants, especially in the organic farming where the growers cannot use the synthetic herbicides. The weed flora of more than 20 cultivated medicinal plants and the common weed control practices have been evaluated in eight regions with variation in the climatic conditions. All tested farms have been applied the organic farming systems and their products are mainly for export. The most common medicinal plants farms were Chamomile Anise, Coriander, Fennel, Basil, Peppermint, Marjoram, Calendula, Artichoke, Caraway, Fennel, Dill and Lemongrass.The most problematic weed in the medicinal plants crops is*Seneciodesfontainei*because it is related to Pyrrolizidine Alkaloidplants.The dominant weeds associate withthe medicinal plants were*Malvaparviflora*(16.8%), *Chenopodium album* (12.4%),*Medicagointertexta* (8.8%), *Anagallisarvensis*(8.8%), *Sonchusoleraceus* (6.2%), *Beta vulgaris* (5.3%) *Brassica Kaber*(5.3%),*Cichoriumpumilum*(3.5%),*Melilotusindica*(3.5%),*Euphorbia geniculata* (3.5%), *Seneciodesfontainei* (1.8%), *Emexspinosus (0.9),Solaniumnigrum*(0.9%) and*Conyzalinifolia*(0.9%).The narrowleaf weeds are*Loliummultiflorum*(7.1%),*Avenafatua*(6.2%),*Phalaris minor* (2.7%) and*Polypogonmonspeliensis*(1.0%). The perennial broad and narrow leaf weedswere *Convolvulus arvensis*(3.5%)and*Cyperusrotundus*(0.9%).The common practice for weed control in the medicinal plants is hand-weeding, mulch and mechanical weeding (in limited area).Hand weeding is unacceptable due to itshigh cost and unavailable skill in farmers at the adjust time especially in the new reclaimed area. Acetic acid as a natural herbicide which can be used between trees or before germination of medicinal plants as well as after sowing irrigation. Biodegradable mulch, especially the straw of crops can be effective control the weeds in the medicinal plants. The efforts must be taken regarding search for safe, new and non-traditional weed control methods to apply in the medicinal plant fields.

Keywords: *Medicinal plants, weeds, mulch, organic farming,*

THE INTERACTIVE EFFECT OF ORGANIC MANURE, PHOSPHATE FERTILIZATION, AND IRRIGATION WATER QUALITY ON GROWTH AND YIELD OF WHEAT

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Abstract

A pot experiment was conducted to determine the effect of organic fertilization, irrigation water quality and level of phosphate (P) fertilization on some growth parameters and yield of wheat. The experiment included three factors: the first was level of organic fertilizer (0, 2 %) the second was irrigation water quality (sweat water 0.24 dS. m^{-1} and saline water 5 dS. m^{-1}), and the third was level of P fertilizer (0, 60 and 120 kg. ha^{-1}). The design was randomized complete block design (RCBD) in three replicates. Pots were cropped to wheat (Triticum aestivum var. Sham6). Plant height no. of tillering. Pot-1, no. of spikes. Pot^{-1}, were measured. Dry weight of spikes, straw, seeds, 100 seeds per pot were measured. Roots were extracted from soil, dried and the dry weight was measured. Results showed the superiority of organic fertilizer treatment (2%) in all studied parameters. The increase in P fertilizer caused a significant increase in all of the studied parameters except weight of 100 seeds. Sweat water was significantly superior in all of the studied parameters except seed weight and weight of 100 seeds which was higher in saline water with values reached 25.79 g .pot^{-1} and 3.45 g .pot^{-1}, respectively. The best triple interaction treatment was for the benefit of organic fertilizer, irrigation with sweat water, and fertilizing with the highest level of P (120 kg P.ha^{-1}) which achieved the following values : 31, 30, 61.5 g, 38.59 g, 55.12 g. and 65.01 g, respectively for no. of tillerings, spikes no., root dry weight, seed weight, straw weight, and spikes weight.

Keywords: *Organic fertilization, irrigation water quality, phosphate fertilization, wheat.*

HOMEOPATHIC EXTRACTS INFLUENCE ON FRUIT QUALITY OF TOMATOES (*SOLANUM LYCOPERSICUM* MILL.)

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Abstract

Investigation was carried out at the Institute of Horticulture, Lithuanian Research Centre for Agriculture and Forestry in 2012-2013. The object of investigation was tomato cultivars – Slapukai BS, Balčiai, Viltis. Plants were sprayed with homeopathic extracts – Silicea (two times in early plant growing stage) and Carbo vegetabilis (two times at the middle of plant vegetation) of different solution concentrations (dilution rate: *SI6 + CV6; Si30 + CV30; Si200 + CV200)*. The solutions were sprayed every 10 days. The obtained results showed that the preparations influenced the yield and biochemical composition of tomato fruit. It was determined that plants sprayed with the homeopathic extracts *Si30+CV30*formed the highest yield (10.2-11.8 kg m^{-2}). The average amout of soluble solids in the tomatoes fruit reached 4.3-4.5%. The highest amount of ascorbic acid (19.33 mg $100g^{-1}$) was detected in the fruit of cultivar Balčiai, which was sprayed with homeopathic extracts *Si30+CV30* and *Si200+CV200*.Our results showed that the highest amount of lycopene (7.34 mg $100g^{-1}$) and (1.034 mg $100g^{-1}$) β-carotene was detected in fruits of cultivar Viltis. The highest amount of total sugar (5.01%) and less acidity (0.63%) were detected in cultivar Slapukai BS.

Keywords: *Biochemical composition, extracts, yield, fruit, quality.*

AGRICULTURAL EVALUATION OF POULTRY MANURE COMPOST QUALITY USING A RADISH CROP

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Abstract

Spread of poultry manure pathogens is of considerable concern due to use of poultry manure for land application; consequently there is concern about the efficacy of composting with regard to reducing or eliminating fecal bacterial pathogens. Thermophilic composting of manure is recognized for its ability to transform contaminated waste to a sanitized product due to high temperature that can be achieved during this process. In this context, this study was devoted to composting of poultry manure (PM) with municipal organic waste (MOW) and with (compost mixture C2 and C3) or without (compost mixture C1) sugar beet lime sludge (LS).The physicochemical and microbiological parameters of the mixtures were investigated during composting until the final productswhich were the subject of a phytotoxicity test and of an agricultural assay. The results showed that the final products were phytotoxic free and have C/N ratio (10.6-10.9) and pH (7.3-7.8) values within the standards. In addition, the monitoring of the microbial population during the composting process showed that the produced composts are mature and hygienic.The agricultural assay of these composts was done on a culture of radish. Three doses 6 t/ ha (300 g/parcel), 12 t/ ha (600 g/ parcel) and 24 t/ha (1200 g/ parcel)were studied to determine the optimum application rate for the crop. Moreover, soil samples were taken before planting the radish seeds and after the harvest of radish plantsin order to highlight the influence of the final composts on the soil composition and structure.

Keywords: *Poultry manure; radish crop; composting process; phytotoxicity test; agronomic test.*

REGRESSION ANALYSIS OF ROTATIONAL INTENSITY, CROP DIVERSITY INDEX, LAND UTILIZATION INDEX AND YIELD EFFICIENCY IN BIO-INTENSIVE AND CONVENTIONAL FARMING SYSTEMS IN NEPAL

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Abstract

This study was conducted in Udayapur district, Nepal. A questionnaire-based survey with 100 household heads along with field visit and personal interaction with the concerned farmers were conducted to gather required information. Data were analyzed to compute rotational intensity (RI), crop diversity index (CDI), land utilisation index (LUI), and yield efficiency (YE). Regression analyses were done to reveal relationships among these traits. Bio-intensive farming system (BIFS) farmers were found to practice scientific crop rotation substantially more than conventional farming system (CFS) farmers both in rice-based and maize-based cropping systems. In this study, higher RI, CDI, LUI and YE were found in sustainable bio-intensive farming system (BIFS) as compared to conventional farming system (CFS). The study has revealed strong positive relationship of RI with CDI and LUI in BIFS, CFS and in general. Cropping system both in BIFS and CFS with scientific crop rotation that ensures higher CDI and LUI is recommended for increasing yield efficiency. Direct positive relationship among RI, CDI and LUI has been revealed by this study as a rule; and has suggested to be used in validating yield efficiency of optional farming system as compared to the mainstream conventional farming system.

Keywords: *Relationships among Rotational Intensity, Crop Diversity Index, Land Utilization Index and Yield Efficiency in Bio-intensive and Conventional Farming Systems*

INCLUSION OF SUSTAINABLE WHEAT VARIETIES TO ORGANIC PRODUCTION FOCUSING HARD CONTINENTAL CLIMATE

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Abstract

Different of sustainable meaning economical and safe the organic production was limited in use of pesticides. By residua content most critical were underground formed vegetables also applicable after wheat. Wheat had been important in crop rotation as weed most reductive. Generally for organic production, use of local naturally adapted genotypes by durable resistance to wide spectrum of pathogenswassuggested. Level of such wheat varieties resistance to obligate parasites was correlated to growth parameters also. Different by last parameters in controlled and field conditions grain yield as respond to prevalent diseases were estimated in field trials 2011-2016th as well as technological quality parameters partially. Adequate by growth type main in production were of higher grain yield potential at least for 5% of above ones. Even accounted was application of fungicides before variety replacement because of unpredictable yield losses up to 30% by *Pucciniatriticina* resistance overcome appeared more economical respecting continual of five years period. Novel race of stripe rust relative former more aggressive caused suggestion that complete resistant ones surround adequate variety type 1:5 in mercantile production. Expected benefit was also across accelerated nearby spreading of most effective insignificant yield influential rusts antagonist and practically increased technological quality by amylase presence. Seed productions of however minor varieties require protection of high seed categories while for mercantile ones untreated could be adequate for stable organic production. Beside parasite overdevelopment temporary risk, it could be also valuated trough stable gliadin share decrease and higher protein content.

Keywords: *Wheat varieties, organic production*

QUALITY OF ORGANIC VS. CONVENTIONAL LETTUCE (*LACTUCA SATIVA* L.)

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Abstract

For more than two decades there has been a continuous development of the organic agriculture sector in Tunisia and consumers have become more aware of the interested in organic agricultural products. However, much ambiguity exists as to the quality of the products obtained by organic farming and their comparison with those from conventional one. Within this framework, this study aims to determine whether or not organic lettuce has a better nutritional quality when compared with conventional ones. Experimentation was conducted in Chott Meriem (Tunisian central east region) to reveal differences in lettuce (variety 'Audran') obtained using organic and conventional farming systems. Several fruit traits were investigated: agronomic parameters, physicochemical properties, organoleptic parameters and nutrient contents. The measurement of various parameters was made on three harvests made in April and separated by one week.

The results didn't show any effect of the farming system (organic or conventional) on agronomic parameters of lettuce (weight and diameter). However, we noticed that with organic farming these parameters didn't vary along the harvest dates compared to the conventional system.

From the measured physico-chemical parameters, it is primarily the acidity and the soluble sugar content of lettuce juice that marked the difference between the two farming systems and they were in favor of the organic one. The pH juice didn't vary along the dates harvest neither between the two farming systems.

Finally, the nutritional quality was studied, and superiority of organic lettuce was observed with chlorophyll content and total phenols content. However,for flavonoids and dry matter conventional system has yielded the most significantly elevated values.

Keywords: *Organic, conventional, lettuce, quality*

THE CHALLENGE OF DATES-PALM BRANCHES WASTES USE FOR PEAT SUBSTITUTION IN NURSERY PRODUCTION

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Abstract

Peat-based substrates constitute the standard media used in conventional and organic seedling production. However, in recent years, the concern about the environmental impact associated with peat extraction (destruction of ecosystems highly fragile, potential source of C emissions) has increased together with the demand of this non-renewable substrates. The re-use of organic wastes as substrate seems to be good solution to substitute commercial peat. This study evaluates date-palm peat (wastes and residual of date palm branches) as an alternativenursery substrate. The research was conducted in a completely block randomized design with a linear substitution (0%, 25%, 50%, 75% and 100%) of peat with date-palm waste peat for transplant production of lettuce (*Lactuca sativa L.*). Different physicochemical parameters (porosity, bulk density, pH, and CEC) of cultivation substrates were measured. The growth parameters (leaves number, leaves area, length, chlorophyll values, fresh and dry weight of seedlings) were evaluated at the end of growth period (when the seedling reached the commercial transplanting size). The results showed that date-palm waste peat is an appropriate media for nursery production, showing similar properties with peat and best plant response with 25% and 50% substitution. With considering to low cost, availability and abundance of date palm cultivation in Tunisia and over the world, it seems that peat can be replaced with substrate of date-palm wastes in horticulture sector.

Keywords: *Nursery production, date-palm brunch wastes, peat, substitution.*

COMPOST EFFECT ON THE YIELD AND COMPOSITION OF ESSENTIAL OILS OF *OCIMUMBASILICUM* "FIN VERT"

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Abstract

Three crops of (*Ocimumbasilicum*var Grand Vert) were conducted in the experimental field of the Technical Centre for Organic Agriculture of ChottMariem (Tunisia). Plants fertilized with sheep manure served as a control and other plants were fertilized with two composts C_1 and C_2 with the respective compositions (30% cattle manure, 30% sheep manure, 30% poultry manure 5% straw and5% olive mill) and (70% cattle manure, 25% poultry manure and 5% straw) and irrigated with the respective juices of both composts prepared with 1volume of compost and 5volumes of water. The extraction of essential oils from leaves was carried out by GC-MS. The results showed that the yields of essential oils have been improved by the tested composts (0.36% with compost C_1, 0.38% with compost C_2 against 0.28% in the control). The composition of essential oils has been modified by the composts. Indeed, rates of the major components of essential oils in the plants fertilized with compost increased: compost C_2 gave the highest levels of the following components Methyl cinnamate, Linalool, 1,8-Cineole 8- and ß-elemene. However, 15-Octadecenoic Acid present in the essential oils of the control plants was not detected in plants treated with composts.

Keywords: *Essential oils, Ocimumbasilicum, Chemical composition*

COMPARATIVE EVALUATION OF SUPPRESSIVE EFFECTS OF ESSENTIAL OILS ON FUNGAL PATHOGENS

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Abstract

Four organic aromatic species: *Artemisia absinthum, Pelargonium graveolens, Cymbopogoncitratus* and *Santolina chamaecyparissus,* cultivated in the experimental field of the Technical Center of Organic Agriculture, were harvested. The essential oils of these four species were extracted by hydro-distillationandanalyzed by GC/MS and GC-FID/IK methods. The suppressive effects of the essential oils were tested on four fungal pathogens *Fusarium solani*, *Fusarium oxysporum, Aspergillus niger* and *Penicilliumdigitatum*. The confrontation sessential oils /fungi were performed by the disk method. The results show that *Artemisia absinthum*gave the highest rate of essential oil (0.21%) while *Pelargonium graveolens*gave the lowest rate (0.07%). However, the suppressive effects of essential oils are not proportional to the performance; in fact we recorded after 7 days of confrontation in Petri dishes, a total inhibition (100%) of the four fungi by the essential oils of *Pelargonium graveolens* and *Cymbopogoncitratus* species. *Santolina chamaecyparissus* had a total suppressive effect (100%) on *Fusarium solani* and on *Fusarium oxysporum,* a partial inhibition on *Aspergillus niger*(21%) and none on *Penicilliumdigitatum*. Essential oil of *Artemisia absinthum* had a partial suppressive effect on the four fungal strains tested (inhibition ratesregistered were 21% on *Penicilliumdigitatum*, 24% on *Fusarium oxysporum*and *Fusarium solani*, and 33% on *Aspergillus niger*). Therefore, we may conclude that essential oils can constitute an effective organic antifungal agent that could substitute chemical fungicides.

Keywords: *Antifungal effects, essential oils, aromatic species.*

ANTIMICROBIAL ACTIVITY OF *ORIGANUM ONITES* L.ESSENTIAL OIL AND EXTRACT

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Abstract

This study was carried out to determine antibacterial activity of *Origanumonites*, essential oil and extract against *Pseudomonas syringae*pv. *tomato* (*Pst*) and *Clavibacter michiganensis* subsp. *michiganensis* (*Cmm*). Plant material was collected in Tokat province (Turkey). This study was carried *in vitro*using King B medium. 10%, 20%, 30%, 40% and 50% of the essential oil of *O. onites* was applied with filter paper impregnationmethod. The extract of *O. onites* was mixed with autoclaved King B medium to obtain final concentrations 1%, 2%, 3%, 4% and 8%. 10^6cell/ml of *Pst* and *Cmm*suspansion was plated on the medium containing the essential oil and extract. The media without essential oil and extract were used as the negative controls. Three replicates were used for each treatment. King B plates were then incubated at 28 ºC. Colony density of the bacterium was measured at the end of two days incubation periods for *Pst* and at the end of three days for *Cmm*. Based on the results of the study, increase in the essential oil and extract concentration resulted in increase of the efficacy on pathogens. The 50% dose of essential oil of *O. onites* inhibited the growth of *Ps*t and *Cmm* at a rate of 67% and 89%, respectively, while the 8% dose of extract of *O. onites* inhibited the growth of *Ps*t and *Cmm* at a rate of 97% and 99,5%, respectively. In conclusion, *O. onites* extract has higher antibacterial activity than essential oil.

Key words: *Origanum onites L., Pseudomonas, Clavibacter, antibacterial.*

DETERMINATION OF ANTI-BACTERIAL ACTIVITIES OF PROPOLIS EXTRACTS

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Abstract

This study was carried out to determine the antibacterial activity of ethanol extract of propolis on *Clavibacter michiganensis* subsp. *michiganensis* (*Cmm*), *Pseudomonas syringae* pv. *tomato (Pst*), *Xanthomonas axonopodis* pv. *vesicatoria* (*Xav*), *Xanthomonas axonopodis* pv. *phaseoli* (*Xap*). Propolis was collected from Tokat and Sivas provinces in Turkey. Ethanol extracts of propolis were mixed with King B media to obtain the final concentrations of 0.5, 1, 3, 5%. The bacterial suspension (10^6 cells/ml) was plated on the King B medium with propolis extract. The media without extract were used as the negative controls. Three replicates were used for each treatment. King B plates were then incubated at 28 ºC. Colony density of the bacterium was measured after 2 days incubation period. Based on the results of the study, increase in extract concentration resulted in increase of the extract efficacy.Tokat and Sivas propolis ethanol extract at 5% and 3% concentration inhibited the growths ofall pathogens at the rates of 100% and mean %96, respectively. While propolis extract at 0.5% and 1% concentration inhibited the growths of *Cmm* and *Pst* at the rates of 99%, propolis extract partially inhibited the growth of other pathogens. In conclusion, propolis ethanol extract has antibacterial activity and have potential as biopesticide.

Keywords: *Propolis, Pseudomonas, Clavibacter, Xanthomonas, antibacterial.*

EVALUATION OF ANTI-FUNGAL EFFECTS OF PROPOLIS EXTRACTS

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Abstract

This study was carried out to determine the antifungal activity of ethanol extract of propolis on *Macrophomina phaseolina, Cylindrocarpon destructans, Rhizoctonia solani* and *Fusarium oxysporum.*Propolis was collected from Tokat, Sivas and Corum provinces of Turkey. Ethanol extracts of propolis were mixed with Potato Dextrose Agar (PDA) media to obtain the final concentrations of 0.5, 1 and 3%. Discs (5-mm diameter) of the mycelial plugs from the actively growing edge of the fungal colonies were transferred on the PDA plates. The media without extract were used as the negative controls. Three replicates were used for each treatment. PDA plates were then incubated in the dark at 25 ºC. Mycelial diameter of the fungus was measured after 7 days incubation periods. Based on the results of the study, increase in extract concentration resulted in increase of the extract efficacy. Tokat, Sivas and Corum propolis ethanol extract at 3% concentration inhibited the growths ofall pathogens at the rates of 100%. Tokat, Sivas and Corum propolis ethanol extract at 1% concentration inhibited the growths of the pathogens between 58 and 100%. While Tokat and Corum propolis extract at 0.5% concentration inhibited the growths of all pathogens at high proportion, Sivas propolis extract was low on *F. oxysporum* ve *C. destructans.* In conclusion, propolis ethanol extract has antifungal activity on pathogens.

Keywords: *Propolis, Macrophomina, Cylindrocarpon, Rhizoctonia, antifungal.*

THE INFLUENCE OF DIFFERENT ORGANIC FERTILIZERS ON YIELD OF CAULIFLOWER

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Abstract

It is known that yield of vegetables was variation to depend on agricultural operations Also agricultural operations were enhanced soil quality, soil health and yield of plants. Fertilization was one of the most important of agricultural practices. However yield in agricultural production was affected with climate, cultivar and soil structure. Organic fertilizers were input which increase yield and quality of vegetables. This study was carried out in order to compare different forms of organic fertilizer applications on yield in growing cauliflower under the field conditions during the period 2012-2014. Treatment included O1 (50 kg/ha Biofarm), O2 (37.5 kg/ha Biofarm+15 kg/ha NOF), O3 (25 kg/ha Biofarm+30 kg/ha NOF), O4 (12.5 kg/ha Biofarm + 45 kg/ha NOF), O5 (60 kg/ha NOF),(control). The experiment was conducted in research plots at the Directorate of the Middle Black Sea Transition Zone Agricultural Research Institute. Cauliflower cultivars used in study were white (Barcelona F1) and purple color cultivars (Grafiti F1). The experiment was set up as a randomized complete block design with three replicates. Result indicated that the effect of different organic fertilizers applied on yield of cauliflower was found significant. The highest cauliflower yields were taken (306.43 kg ha^{-1}- 305 kg ha^{-1}) from O4 application toGrafiti F1 and Barcelona F1 varieties. Cauliflower variety “Grafiti F1” had higher yield in comparison with variety “Barcelona F1”.

Keywords: *Yield, organic fertilizer, cauliflower, crop rotation*

EFFECT OF ORGANIC AND CONVENTIONAL PRODUCTION ON SELECTED CHARACTERISTICS OF DRY BEAN *(Phaseolus vulgaris* L.*)*

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Abstract

Bean is known as profitable crop and good preceding crop. Being a short season legume and possible second crop or intercrop, it is suitable in intensive agricultural systems under irrigation but also in sustainableecological agricultural systems. The aim of this study was to compare the effect of bacterial inoculations on morphological and yield parameters of bean (*Phaseolus vulgaris*). Organic production was conducted on the field in the village Pivnice, while conventional production was conducted in the village Curug (Serbia) during 2014 on the chernosem type soil. Cultivars of beans Belko, Dvadesetica, Maksa, Slavonac, Sremac, Zlatko were used. Before sowing, the bean seeds were inoculated by biofertilizers NS-Nitragin. NS-Nitragin contains a mixture of selected strains of symbiotic bacteria *Rhizobium leguminosarum* bv. *phaseoli*. Laboratory analyses were performed in the Institute of Field and Vegetable Crops, Novi Sad. Determined parameters were: height of plant, height of first pod (height from the ground to the first pod), plant weight, number of pods per plant, number of seeds per plant, seed weight. The results showed that there were differences on morphological and yield parameters of bean (*Phaseolus vulgaris*). In organic system cultivar Slavonac had biggest mass of the plant (48.20), number of pods per plant (20.53), highest numbers of seed per plant (68.83), and the largest seed mass (27.29), while the cultivar Sremac in conventional system had the biggest mass of the plant (44.20), number of pods per plant (20.46), and the largest seed mass (21.87).

Keywords: *Dry bean, Morphology, Inoculation, Rhizobium.*

LOSSES CAUSED BY DISEASES ATTACK QUINOA IN EGYPT

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Abstract

Quinoa is a very recent crop was introduced to Egypt. Quinoa is considered as important crop due to it can grow and gives considerable yield in new reclaimed salty soil with salty water (1800 ppm) where wheat or many other cropscannot grow. This work was designed to illustrate different losses may occurred due to different diseases attack quinoa under Egyptian conditions. Obtained data show that soil borne pathogens*Fusariumsolani, Rhizoctoniasolani*and *M. phaseolina* were the most destructive pathogens for quinoa crop and caused more than80% losses of yield. Foliage diseases came in the second rank causing about65% in Egyptian variety.This work also included biological and chemical methods to control soil borne or foliage disease. Obtained data show that these losses can be reduced and yield increase six times in case of control soil borne pathogens. Foliage diseases were reduced to be 14 %using approved pesticides according to organic agriculture laws. Two different biocides were used to control soil borne pathogens. Obtained data indicated that product Clean root (a.i group of *Bacillus subtilis* isolates) was the most effective one compare with the other product Trichoderma (a.i isolates of *Trichodermaharzianum*). When downy mildew assessed use of Copiralmax(Copper fungicide)show highest effects compare with the biocide Blight stop(contain *B. subtilis* and *T. harzianum*).

Keywords: *Quinoa- Diseases- Biological control- Losses*

BIOMASS PRODUCTION OF MORINGA (*Moringa oleifera* L.) AT VARIOUS SOWING DEPTHS IN A COARSE TEXTURED SOIL

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Abstract

Different parts of Moringa (*Moringa oleifera* L.) plant, especially leaves, pods and flowers, are usually processed for human and animal consumption as these parts have been reported to be rich in nutrient elements that are essential for human and animal health. Consequently, a 19-month field experiment was conducted to determine effect of seed sowing depth on biomass production by moringa plant at the Teaching and Research Farm of the University of Ibadan, Nigeria. Moringa seeds were sown at five sowing depths of 1.5, 3.0, 5.0, 7.0 and 9.0 cm. The results showed that sowing depth significantly ($P \leq 0.05$) affected emergence of seeds 14 days after sowing in the following order: 1.5 > 3.0 > 5.0 > 7.0 > 9.0 cm sowing depths. Also, number of branches, height, canopy cover and dry biomass of the resulting seedlings were significantly influenced by seed sowing depths. Number of branches, heights and dry biomass of seedlings from seeds sown at 1.5 and 3.0 cm depths were at par but were significantly superior to those seedlings from seeds sown at 5.0, 7.0 and 9.0 cm depths. However, canopy cover was not in a definite order. Data obtained in this study seemed to indicate that sowing moringa seeds beyond 3.0 cm depth in the field may not be beneficial to moringa plant for organic biomass production.

Keywords: *Moringa*, *Sowing depth*, Seed e*mergence*, *Organic biomass*

THE ORGANIC MILK PRODUCTION IN POLAND – ECONOMIC ASPECTS AND PROSPECTS FOR DEVELOPMENT

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Abstract

The production of organic milkshows a continuous growthinEurope but the market supplystilldoes not meet thedemand for organic milk and its products. InPoland, the organic milk productionis conductedon a small scale, mainly due to an underdeveloped market of organic products. However, among the consumers the interest in such products is increasing, as well as for the farmers the organic milk production may be considered as a one of profitable agricultural production. The purpose of this article is to reflect the economic situation of organic milk production in Poland and the attempt to define prospects for further development.Accounting data for 'dairy cows' activity were collected since 2006 and processed according to the rules of the Agricultural Products Data Collection System (AGROKOSZTY). Surveyed farmswere selectedfroma sample ofPolishFarm Accountancy Data Network. Under the AGROKOSZTY system, the methodology of the gross margin was used (in accordance with the EU rules) which may give a full insight on actual direct costs and helps to determinethe competitiveness of organic milk production. The income from 'dairy cows' activity account is based on the Polish FADN accounting data collected from the same farms. The survey indicate that the production results of organic dairy farms were significantly lower than an average results of dairy farms in Poland. In that case, the income of organic milk production strongly depends on the low level of production costs and the support of subsidies.

Keywords: *Dairy cows, organic milk production, profitability.*

SIGNIFICANCE OF THE COMMON AGRICULTURAL POLICY FOR ORGANIC FARMS ECONOMICS IN POLAND

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Abstract

Accession of Poland to the European Union (EU) has been connected with a number of benefits, but at the same time, the obligations have been imposed on the agricultural producers. Farmers are active economic units, that operate on the common european market, as well as they are beneficiaries of governmental support. Governmental programmes allowed to take part in measures directed to agricultural farms development. Farmers have been obliged to comply with European law and implementation of the desired production standards.Both regulations and governmental programs have determined the direction of agricultural holdings development. Especially in the last decade, organic farms make demanded and fast-growing form of environmental friendly agriculture. Organic methods use of agricultural production in accordance with soil, plants and animals requirements, taking care of the other environmental components. Organic farms fit in with the concept of sustainable development. According to this, organic production should at least not affect the ecosystems` sustainability and meet the economic purposes.The purpose of the article is evaluation of organic farms economics in Poland, taking into consideration influence of the Common Agricultural Policy (CAP). There were analysed production and economic condition of organic farms in comparison to all Farm Accountancy Data Network (FADN) farms. The research were conducted on the basis of indicator analysis, considering calculation reflected cost, production, economics and subsidies connected with the Common Agricultural Policy directed to farms. The analysis was based on FADN 2004 and 2013.

Keywords: *Organic farms, farms` economics, sustainability, CAP, FADN, Poland*

WAYS TO PRESERVE SOIL FERTILITY BASED ON AGROLANDSCAPE

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Abstract

As it is known, fertility is the most important property of soils to meet the needs of plants in nutrient elements, moisture or air and to provide conditions for their normal life. It is clear that yield of crops depends on soil quality. That is why the preservation of fertility is an important task in the implementation of agricultural production. Agrolandscape systems based on environmental based should be introduced in agriculture to solve the problem of preventing the degradation of soils, reducing water and wind erosion. Principles and methodology of landscape planning can be successfully adopted in farming systems that combine high environmental and economic indicators. During the years with unfavorable conditions such as drought or excessive moisture in farms with adaptive farming the yield is 30 % higher than in agricultural enterprises with the traditional farming system. The article discussed that the minimum value of the environment-stabilizing farm land agrolandscapes should not exceed 40% of the total land. The conducted experiments proved that the humus content in the households under consideration was increased by 0.24%. Average crop yields in the years with unfavorable weather conditions in the test farm (Kantemirovsky District, Voronezh region) are the following: grains 29 dt/ ha, sunflower 24 dt/ha, and for Kantemirovsky District, on average, 19.4 dt/ha and 17 dt/ha respectively. Stability of agrolandscapes depends on correlation between sustainable and destruct lands. Percentage ratio of agricultural lands for the sustainable agrolandscapes is determined.

Key words: *Agrolandscape, adaptive landscape system, soil fertility, Chernozem region.*

USING MOISTURE CONTROLLING SUPERABSORBENTS FOR IMPROVEMENT OF BARLEY YIELD CAPACITY

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Abstract

The article deals with an important issue of yield capacity improvement through using water retention agents. As a result of a laboratory experiment a special superabsorbent was developed as a moisture retention ingredient and successfully tested in the field conditions. The experimental part of the study focused on the development of cross-linked polymers including biodegradable nitrogen synthesized by free radical copolymerization, on polymers swelling kinetic and dependency of swelling rate versus cross-linking agent. The research describes the method sand stages of obtaining superabsorbent containing microelements or humic acid. The superabsorbent was then tested in the laboratory and in an experimental micro plot in the territory of the Botanical Garden of the Voronezh State Agricultural University to verify its water retention characteristics and ecological efficiency. The sprouts and further development of the tested barley plants demonstrated a positive influence of the used superabsorbent. The obtained results clearly show the vivid advantages of the superabsorbent which can both contribute to sustaining the environment and enhance an increase in microorganisms promoting soil humification and mineralization. The research statistics show that using such type of absorbent definitely leads to growth in barley yield capacity without producing and undesirable impact on the local environment.

Keywords: *Superabsorbent, humidity sorption, microbiological activity of the soil, barley yield.*

EFFECT OF ORGANIC GROWING SYSTEM ON MICROBIAL POPULATION IN RHIZOSPHERE OF MEDICINAL AND AROMATIC PLANT SPECIES

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Abstract

The aim of this study was to compare abundance of microorganisms in the rhizosphere of four different medicinal and aromatic plant species (basil, mint, dill and marigold) grown under both conventional and organic management. The trials were set up on chernozem soil at experimental field of Bački Petrovac, Institute of Field and Vegetable Crops, Novi Sad (northern Serbia). Rhizosphere soil samples were collected in two sampling terms during 2015 (June 2 and July 28, 2015) and analysed by the indirect dilution method followed by plating of soil suspension on selective nutritive media. The obtained results showed significant differences in microbial abundance between plant species, growing systems and sampling terms. The highest number of azotobacters and cellulolytic microorganisms were obtained in rhizosphere of marigold, while total microbial number and fungi were the most abundant in rhizosphere of basil. The most common population of ammonifiers, free N-fixing microorganisms and actinomycetes were recorded in rhizosphere of dill. Significantly higher number of microorganisms was found in organic growing system compared to conventional,while the number of most tested microbial groups was higher at the first sampling period.

Keywords: *Basil, dill, marigold, mint, organic production*

SUSTAINABLE WHEAT VARIETIES FOR ORGANIC PRODUCTION FOCUSING HARD CONTINENTAL CLIMATE

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Abstract

Different of sustainable meaning economical and safe the organic production was limited by no use of pesticides. By residua content most critical were underground mostly formed vegetables also applicable after wheat. However, wheat had been important in crop rotation as weed most reductive. Generally for organic production, use of local naturally adapted genotypes by durable resistance to wide spectrum of pathogens was suggested. Level of such wheat varieties resistance to obligate parasites was correlated to growth parameters also. Different by last parameters in controlled and field conditions grain yield as respond to prevalent diseases were estimated in field trials 2011-2016th as well as technological quality parameters partially. Adequate by growth type main in production were of higher grain yield potential at least for 5% of above ones. Even accounted was application of fungicides before variety replacement because of unpredictable yield losses up to 30% by *Puccinia triticina* resistance overcome appeared more economical respecting continual of five years period. Novel race of stripe rust relative former more aggressive caused suggestion that complete resistant ones surround adequate variety type 1:5 in mercantile production. Expected benefit was also across accelerated nearby spreading of most effective insignificant yield influential rusts antagonist and practically increased technological quality by amylase presence. Seed productions of however minor varieties require protection of high seed categories while for mercantile ones untreated could be adequate single for stable organic production. Beside parasite overdevelopment temporary risk, some of could be also valuated trough stable gliadin share decrease and higher protein content.

Keywords: *Wheat varieties, organic production*

EFFECT OF SOME BIOLOGICAL PRODUCTS IN CONTROLLING YOUNG OLIVE TREES DIEBACK

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Abstract

During the recent years, symptoms of yellowing and wilting of young olive plants are observed in many orchards in the central part of Tunisia. Basing on surveys done during the two crop seasons (2013 and 2014) in the governorate of Kairouan, SidiBouzid and Kasserine, disease incidence exceed in certain orchards 20% and especially in plants of 4-5 year old and obtained from herbaceous twigs.Isolation made from roots and collar of dieback plants revealed the presence of *Fusarium solani*, *F. oxysporum*, *Pythium sp*, *Rhizoctoniasolani*and *verticillium dahlia* which pathogenicity was confirmed in control conditions. These pathogens were the subject of control tests by using 4 bio-fungicides which are Dalgin active composed of *Ascophyllumnodosum*, Biobacwhich the active ingredient is *Bacillus subtilis*, Plandak formulated from polysaccarides and plant extracts and SpVégétaux composed of mineral salts.In vitro tests demonstrated that the 4 bio-fungicides have entailed mecylial growth of the 5 used pathogens where the mecylial growth inhibition has exceeded in the most cases 75%. In vivo application of these bio-fungicides using three techniques (inoculation 7 days before treatment, simultaneous treatment and inoculation and treatment 7 days before inoculation) revealed that the lowest values are obtained when the product was applied earlier. Indeed, the disease severity, its incidence and the percentage of altered leaves are almost zero whatever the bio-fungicide has been used compared to the control whose values are respectively 4, 100% and 82%.These results demonstrated that early treatment at the nursery before transplantation can significantly reduce the disease incidence in the field.

Keywords: *Bio-fungicides, in vitro, in vivo, disease incidence*

MYCOFLORA ANALYSIS AND INTERACTION STUDY OF PATHOGENS-ANTAGONISTS FUNGI ON WATERMELON DEVELOPMENT IN TUNISIA

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Abstract

Soil mycoflora analysis from watermelon rhizosphere showed remarkable diversity. The screening revealed the presence of antagonist and pathogenic fungi belonging to 16 species. The highest isolation frequency was for *Aspergillus terreus*(13.82%), then *A. niger* (12.59%), *A. pseudoelegans* (10.81%) and *A. flavus* (9.88%). According to this work, both mesophilic and thermophilic pathogens are *Cladosporium cladosporioides*(6.92%) and *Colletotrichum gleosporioides* (2.59%). For thermophilic fungi, *Gliocladium viridian* (21.44%), *Scytalidium thermophilum* (18.42%) and *Arthrinum* Kunze (17.13%) are the most frequent. *In vivo*, *Trichoderma* species have demonstrated their effectiveness on the degree of symptoms caused by soil-borne pathogens.Indeed, in the case of plants inoculated with *R.solani*,*M. phaseolina*, *F.oxysporum*, *F. solani* treated preventively with both antagonists *T.viride* and *T. harzianum*, the disease severity index did not exceed 0.83. Treatment by *A. niger* (0.17) seemed the most effective against *M.phaseolina* and *F. solani*. Preventive treatment was the most effective for plants inoculated with *F. oxysporum*, treated by *Penicillium italicum* (0.33), and plants inoculated by *M.cannonballus*, treated with *T. harzianum* and *A. niger*.

Keywords: *Antagonists, biological control, mycoflora, preventive and simultaneous treatment*

COMPARATIVE EVALUATION OF SUPPRESSIVE EFFECTS OF ESSENTIAL OILS ON FUNGAL PATHOGENS

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Abstract

Four organic aromatic species: *Artemisia absinthum*(Aa), *Pelargonium graveolens*(Pg), *Cymbopogoncitratus*(Cc) and *Santolinachamaecyparissus*(Sc), cultivated in the experimental field of the Technical Center of Organic Agriculture, were harvested. The essential oils of these four species were extracted by hydro-distillationandanalyzed by GC/MS and GC-FID/IK methods. The suppressive effects of the essential oils were tested on four fungal pathogens *Fusarium solani*(Fs),*Fusarium oxysporum*(Fo), *Aspergillus niger*(An) and *Penicilliumdigitatum*(Pd). The confrontationsessential oils /fungi were performed by the disk method. The results show that *Artemisia absinthum*gave the highest rate of essential oil (0.21%) while *Pelargonium graveolens*gave the lowest rate (0.07%). However, the suppressive effects of essential oils are not proportional to the performance; in fact we recorded after 7 days of confrontation in Petri dishes, a total inhibition (100%) of the four fungi by the essential oils of *Pelargonium graveolens* and *Cymbopogoncitratus* species. *Santolinachamaecyparissus* had a total suppressive effect (100%) on *Fusarium solani* and on *Fusarium oxysporum*, a partial inhibition on *Aspergillus niger*(21%) and none on *Penicilliumdigitatum*. Essential oil of *Artemisia absinthum* had a partial suppressive effect on the four fungal strains tested (inhibition ratesregistered were 21% on *Penicilliumdigitatum*, 24% on *Fusarium oxysporum*and *Fusarium solani*, and 33% on *Aspergillus niger*). Therefore, we may conclude that essential oils can constitute an effective organic antifungal agent that could substitute chemical fungicides.

Keywords: *Antifungal effects, essential oils, aromatic species.*

ORGANIC AGRICULTURE IN PROVINCE OF USAK IN TURKEY

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Abstract

Organic agriculture consists of environmental and human friendly production systems in order to reestablish the natural balance which is lost as a result of inaccurate and excessive farming practices. In others words, instead of using synthetic chemical pesticides and fertilizers, organic agriculture promotes organic and green fertilization, crop rotation, soil conservation, increasing plant resistance as well as benefitting from parasites and predators. In addition, organic farming refers to improving not the amount of production but the quality of it. Due to the spread of diseases caused by pesticide and hormone residue on the products, people show great interest in organic agriculture so as to lead a healthier life. Total organic agricultural production in the world is 4.516.810 tons, while in Turkey it is 353.173 tons. As for Turkey's organic agriculture, Uşak province has little share in it despite its favourable climate and location. In this study, as a methodology, we analyzed the existing data on organic agriculture in Uşak province and in Turkey as well as in the total production in all over the world. And then, we compared those statistics with each other, finding that Uşak province, however great potential it has, hasn't been able to reach the desired level in terms of organic agriculture. We focus on determining the potential of Uşak province for organic agriculture. Furthermore, we aim to define the problems of organic agriculture and to find solutions to them in order to make organic agriculture more widespread and more practicable.

Keywords: *Organic agriculture, Uşak province, potential*

EFFECT OF ORGANIC PRIMING ON SEEDLING EMERGENCE OF WATERMELON UNDER LOW TEMPERATURE STRESS

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Abstract

Seed priming is a pre-sowing treatment in which seeds are exposed to an external water potential that is low enough to restrict germination by various agents (i.e. polyethylene glycol, potassium nitrate, vermiculite) but permits pre-germinative physiological and biochemical activities. Seeds of watermelon (*Citrulluslanatus*(Thunb.) Matsum. &Nakai.) cv. Crimson sweet were primed with leonardite (30 g moistened with 25 ml distilled water, 25 °C, 24h); waste tea (12 g waste tea moistened with 40 ml distiled water, 25 °C, 24h), potassium nitrate (KNO_3, 3%), polyethylene glycol, (PEG-6000, -1.25 MPa), and patula herbal tea (2 and 10 g dried petal/ L) along with hydropriming and unsoaked control to study the effect of seed priming. The seed priming significantly increased the rate of as well as percentage of seed germination. Further, survival of primed seedlings was better than those of control seeds subjected to low temperature (15 ^{o}C) and greenhouse optimal condition (25^{o}C). Although priming agents weren't positive effect in germination stage, they showed higher performance in greenhouse condition. Especially, emergence percentage of watermelon seeding subjected to waste tea, leonardite, and patula were higher than control and others agents in greenhouse condition. In addition, the low temperature emergence performance of leonardite primed seeds was better than control. Organic seed priming with leonardite, waste tea and patula was a cost-effective and eco-friendly approach to develop low temperature emergence in watermelon cv. Crimson sweet.

Keywords: *Abiotic stress, germination, priming agents, seed treatment*

INFLUENCE OF SPECIAL HERBAL PREPARATION ON GROWTH AND DEVELOPMENT OF CUCUMBER, PEPPER AND TOMATO

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Abstract

The trial tests of special herbal preparation (SHP) in the capacity of PGR were executed on cucumber, pepper and tomato at a large glasshouse in Orenburg Region of Russian Federation. Special preparation was based on wild growing herbs: comfrey(*Symphitum officinale*),dandelion (*Taraxacum officinale*), horsetail (*Equisetum arvense*), lemon balm (*Melissa officinalis*), nettle (*Urtica dioica*), valerian (*Valerianaofficinalis*) and yarrow(*Achillea millefolium*). In order to extract the active matter without application of chemical means, an unique production process has been developed. The foundation of this process is based on a special combination of water extraction and biofermentation with continual oxygen enrichment. The experiment was executed as per following treatments: 1. Control, 2. Basic fertilization + SHP, 3. Basic fertilization, 4.Basic fertilization + additional fertilization + SHP, 5. Basic fertilization + additional fertilization. Treatments were repeated twice with random allocation on 100 m^2 sample plots for cucumber and tomato and 50 m^2 for pepper. The examinations have shown that SHP had a positive impact on growth and development of vegetable crops planted in the glasshouse.

Keywords: *Special herbal preparation, PGR, cucumber, pepper, tomato*

GROWTH OF ORGANIC FOOD INDUSTRY IN INDIA

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Abstract

The organic food industry in India is in the early stages of growth. Higher disposable income and greater health awareness have resulted in an increased domestic demand for organic food. There is huge premium in selling organic products, not only to export markets but also to affluent, health conscious domestic consumers. India is endowed with an abundance of labour and has diverse agro-climatic region that is well suited to year round agriculture. It still has strong traditional agricultural practices. Can India make use of this comparative advantage to introduce sustainable agriculture practices and at the same time improve incomes of small and marginal farmers?On the supply side, small and marginal farmers realize that there is an opportunity to get higher net incomes even if yields are low in organic agriculture. This is because the price of pesticides and chemicals has increased significantly over the last few decades resulting in a significant increase in the cost of production. Organic farming cost could be 50% to 60% less when compared to inorganic farming practices.In addition to domestic demand side, globalized markets provide significant opportunities for Indian agriculture to capture a larger share of the global demand for organic food. This paper analyzes the growth of the organic food industry in relation to domestic and export demand. We also look at the supply side to determine if organic farming and sustainable agricultural practices could help improve farmers' income. Finally, this paper analyses existing policy framework towards organic agriculture and how small and marginal farmers could possibly benefit in this niche market.

Keywords: *Food supply, Organics, Sustainable agriculture, India*

EFFECT OF BIOPULS APPLICATION ON GROWTH AND YELD OF TOMATO, CUCUMBER AND STRAWBERRY

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Abstract

There is no way to completely eliminate chemical protection and fertilization. Effective and economically viable alternative is to use limited NPK combined with application of microbial products that stimulate growth and yield of crops. The possibilities offered by the biological soil, BioPuls Microlife, is a line of products based on the special composition of yeast *Yarrowia lipolytica* and their metabolites which contain a high content and quality of protein-rich composition of bioactive substances and health-promoting nutrients for plants and soil. Use of beneficial microorganisms and bioproducts that are enriched microbiologically presents several opportunities such as development of sustainable methods of horticultural production, improvement of quality in produced yields and protect environment and human health. The aim of the study was comprehensive assessment of impact of BioPuls on growth and yielding of three species of cultivated plants. Experiment was conducted in Research Institute of Horticulture in Skierniewice (Poland) in 2013-2014. Experiment compared the growth and yelding of tomato (*Lycopersicon esculentum* Mill.), cucumber (*Cucumis sativus* L.) and strawberry (*Fragaria ×ananassa* Duchesne) var. 'Elkat'. BioPuls has a positive effect on the vegetative growth, develop and yield of tomato, cucumberand strawberry in greenhouse cultivation.

Keywords: *Yarrowia lipolytica, yeast, plant biostimulator, microorganisms, bioproducts*

USING MOISTURE CONTROLLING SUPERABSORBENTS FOR IMPROVEMENT OF BARLEY YIELD CAPACITY

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Abstract

The article deals with an important issue of yield capacity improvement through using water retention agents. As a result of a laboratory experiment a special superabsorbent was developed as a moisture retention ingredient and successfully tested in the field conditions. The experimental part of the study focused on the development of cross-linked polymers including biodegradable nitrogen synthesized by free radical copolymerization, on polymers swelling kinetic and dependency of swelling rate versus cross-linking agent. The research describes the methodsand stages of obtaining superabsorbent containing microelements or humic acid. The superabsorbent was then tested in the laboratory and in an experimental micro plot in the territory of the Botanical Garden of the Voronezh State Agricultural University to verify its water retention characteristics and ecological efficiency. The sprouts and further development of the tested barley plants demonstrated a positive influence of the used superabsorbent. The obtained results clearly show the vivid advantages of the superabsorbent which can both contribute to sustaining the environment and enhance an increase in microorganisms promoting soil humification and mineralization. The research statistics show that using such type of absorbent definitely leads to growth in barley yield capacity without producing and undesirable impact on the local environment.

Keywords: *Superabsorbent, humidity sorption, humic acids, microelements, barley, humification, mineralization, microbiological activity of the soil, barley yield.*

IMPACT OF SALYCILIC ACID, CYANOCOBALAMIN AND GLUTAMIC ACID ON FRUITING OF BARHY DATE PALMS GROWN UNDER UPPER EGYPT CONDITIONS

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Abstract

During 2014 and 2015 seasons, Barhy date Palms were treated three times with salycilic acid, cyanocobalamin (vitamin B_{12}) or glutamic acid each at 100 ppm. The target was elucidating the effects of these materials on flowering, fruit setting, yield and fruit quality.

Treating Barhy date palms three times with salycilic acid, cyanocobalamin or glutamic acid each at 100 ppm caused a material promotion on the flowering, fruit setting, yield and fruit quality relative to the check treatment. The best results were obtained due to using glutamic acid, cyanocobalamin and salycilic acid, in ascending order. Using all materials together gave the best findings. The best results with regard to yield and fruit quality of Barhy date Palms grown under Upper Egypt conditions were obtained due to supplying the Palms three times with a mixture of salycilic acid, cyanocobalamin and glutamic acid each at 100 ppm.

Keywords: *Barhy date palms, salycilic acid, cyanocobalamin, glutamic acid, yield, fruit quality.*

ORGANIC FARMING AS GREAT CHALLENGE FOR GEORGIAN FARMERS

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Abstract

Organic farming in Georgia is comprised of an integrated suite of practices that provide these benefits in addition to producing safe food for consumption. Studies provided by Association for Farmers Rights Defense (AFRD) conducted over the past decade have called for the agricultural industry to be responsive to changing climate and environmental conditions directly affecting organic farming development in Georgia. Converting a farm to organic is a multi-year process and very complicated. To gain organic certification, farmers must prove that no prohibited substances have been used on the farm for at least three years, reducing the chance that the farm has residual contamination of crops, soil or water. Organic farmers in Georgia are required to maintain buffer zones between organic farmland and adjacent potential sources of water, chemical or genetic drift to prevent their crops from being contaminated by actions taken on nearby farms. It is well known that plant health requires vital mineral inputs to ensure growth. We provide a variety of plant nutrients for improved yield and consistent crop quality. Organic growers trust us as approved providers and Bio advisors for plant nutrition resulting in less waste and higher performance. The benefits of organic farming for producing eco fruit in Georgia are widespread and important to multiple sectors of society. Organic and eco fruit can help protect what is most valuable to people –their health. Eating a healthy diet rich in antioxidants, vitamins and minerals is a solid investment in preventative care. Preventing disease is much more cost efficient than treating disease. Organic foods can play an important role in keeping people healthy. In addition to the health benefits, the organic industry is important in many other ways. For investors the organic agricultural sector is one of the few sectors with consistent growth over the last decade. During the current economic downturn, the growth of the organic industry has outpaced the food industry as a whole. Organic products are increasingly important to consumers who are committed to reducing their carbon footprints and their impacts on the environment. More and more people are making their purchasing decisions based, at least partially, on environmental considerations.

Keywords: *Georgia, mulching, foliar feeding, biocontro, organic farming.*

EFFECTS OF PREPARATION 501 ON VERDICCHIO GRAPEVINE

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Abstract

Biodynamic agriculture is based on the concept of the farm as an organism in balance. In order to preserve soil fertility and plant health,specific “preparations” are utilized in biodynamic farming. The 501 or "horn-silica" preparation is believed to act on the aerial part of plants stimulating the light interception by leaves and to adjust a series of internal mechanisms to the plant, including the defense against pathogens, the response to biotic stress, the vegetative growth and the maturation of the fruits.

To evaluate the effects of 501 on grapevine, four treatments with the preparation 501 during the growing season 2015 were applied in two Verdicchio vineyards of different ages. The levels of chlorophyll and carotenoids in leaves of plants treated with 501 were higher than in leaves of control plants. Significant responses of the plant to the biodynamic 501 treatment were observed, mainly in relation to the accumulation of chlorophylls and carotenoids in the leaves, and to the maturation of the grape cluster as for the concentration of soluble solids and the thickness of the skins.

Keywords: *Grapevine, Biodynamic agriculture, Preparation 501, Pigments.*

REMOVAL EFFICIENCY BY SUNFLOWERS IRRIGATED WITH DILUTED LANDFILL LEACHATE

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Abstract

The use of energy crops for the decontamination of wastewater is gaining interest worldwide, due to the lack of water availability in many countries and the concomitantopportunity to obtain renewable sources of energy. Landfill leachate must be treated for contaminants removal prior to discharge it. Phytoremediation can be taken into account as an alternative cost-effective and environmentally-friendly option for contaminant abatement. Sunflower plants were grown in soil-filled tanks irrigated with diluted landfill leachate by horizontal or vertical flow. The plants supplied with diluted landfill leachate showed improvedplantgrowth, compared to untreated plants, without any toxicity symptoms. Analyses at the outlet of the tanks evidenced good COD and total nitrogen removal efficiencies ($\eta > 50\%$), which were reduced after plant flowering, while phosphorousremoval was always above 60%. The bestperformances in terms of contaminants removal were observed in the tanks irrigated through horizontal flow, although vertical flow tanks appeared to be moresuitable for sunflower plants growth.

Keywords: *Sunflowers, landfill leachate, phytoremediation, vertical flow, horizontal flow*

ORGANIC CERTIFICATION: A CASE STUDY OF ORGANIC VALLEY, NEPAL

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Abstract

Organic agriculture is a holistic production management system, which promotes and enhances agro-ecological health,biodiversity, soil biological activities and biotic cycle. There is an increasing interest in organic or biological production all over the globe. With certification, there adds the confidence in marketplace. Nepal government has authorized an organization called Organic Certification Nepal (OCN), which offers internationally accredited inspection and certification services to local operators. There are many international organizations like NAASA (Australia), ECOCERT (France), OneCertAsia (USA), IMO (Switzerland), Control Union (Netherlands), CertAll which are also active in Nepal.

Organic Valleycomprises of five VDCs out of which two VDCs are in Kabrepalanchok district and three VDCs are in Lalitpur district. The survey was carried out to assess the status of organic agriculture and certification in the valley with different stakeholders. This paper aims at finding the potentials and development of organic agriculture and certification in Nepal with reference to exploring the constraints of organic certification.

Through interaction with farmers, it was found that 81.61% people are aware about organic farming while 68.96% are not aware about the organic certification. The major organic crop exported from the valley is coffee. Internal Control System (ICS) has been found suitable for the certification of coffee. Since there is more scope of diverse organic production from the valley Participatory Guaranteed System (PGS) alsoshould be used.

Keywords: *Organic certification, organic valley*

EFFECTIVE CONTROL OF WHITE GRUB OF EUROPEAN COCKCHAFER (MELOLONTHA MELOLONTHA) IN ORGANIC STRAWBERRY PRODUCTION

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Abstract

An increasing threat from the white grub of European cockchafer (*Melolontha melolontha*L.) and forest cockchafer (*Melolontha hippocastani*L.) has been registered in different crops, particularly organic strawberry plantations. We have developed a holistic strategy aiming at the control of these soil-borne pests which includes the use of biocontrol entomopathogenic fungi (*Beauveria bassiana*, *Beauveria brongniartii*, *Metarizum anisopliae*) and entomopathogenic nematodes (*Heterorhabditis bacteriophora*) together with agronomical methods based on mass capture of adults, soil tillage, physical exclusion and phytosanitary crops. The efficacy of the single treatments and of different combinations of methods was assessed by checking the plant mortality as well as the persistence of the biocontrol agents in the soil. Entomopathogenic organisms allowed to reduce significantly the pest population and the damage to the plants, either when applied singly or in consortia. Capture of adults and their physical exclusion by covering the soil with tissue mulch was also quite effective. Growth of plants producing allelopathic substances before planting strawberries strongly reduced the pest damage. The association of different methods generally increased the overall control of white grubs. A new method for the evaluation of persistence of fungal BCA was also developed and will be presented. In conclusion, the designed integrated strategy resulted in a high efficacy in controlling the grubs and could be applied to different crops.

Key words: *Effective control , white grub, Melolontha melolontha, strawberry*

ALLELOPATHIC INFLUENCE OF *ASCLEPIAS SYRIACA* L. ROOT EXTRACT ON GERMINATION OF *AMBROSIA ARTEMISIIFOLIA* L.

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Abstract

With the aim to determinate common milkweed allelopathic properties, the effect of aqueous extract of this weed species root was studied on germination and initial growth of common ragweed. Common milkweed aqueous extract, prepared at concentrations of 12.5; 25.0; 50.0; 75.0 and 100.0 g of dry matter/1l of distilled water, was applied to common ragweed seeds, and their germination was monitored in 9 days period, in controlled conditions. Monitoring of the number of germinated seeds, as well as the effect of allelochemicals on the tested plants epicotyl and hypocotyl growth was conducted every day during the assay. Results of variant analysis showed that aqueous extract of Asclepias syriaca root had statistically significant effect to common ragweed seed, as well as to the growth of above ground and underground parts of seedlings. The last day of the testing, common ragweed seedlings germination at the concentration of 75.0 g/l and 50.0 g/l was 82% lower than control, while the highest concentration totally inhibited seed germination. Seeds treated by the concentration of 25.0 g/l germinated only 39% in comparison to the control. Until the end of the assay, use of the lowest concentration of the extract resulted in inhibition of hypocotyl length for about 34%, while higher concentration (25.0 g/l and 50.0 g/l) caused epicotyl inhibition of almost 18% and 29% in regard to control. It is evident that aqueous extract of common milkweed had inhibitory effect to different seedlings parts of common ragweed.

Keywords: *Asclepias syriaca, Ambrosia artemisiifolia, allelopathy, germination*

ANTIMICROBIAL ACTIVITY of *Origanum onites* L. ESSENTIAL OIL AND EXTRACT

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Abstract

This study was carried out to determine antibacterial activity of *Origanum onites*, essential oil and extract against *Pseudomonas syringae*pv. *tomato* (*Pst*) and *Clavibacter michiganensis* subsp. *michiganensis* (*Cmm*). Plant material was collected in Tokat province (Turkey). This study was carried *in vitro* using King B medium. 10%, 20%, 30%, 40% and 50% of the essential oil of *O. onites* was applied with filter paper impregnation method. The extract of *O. onites* was mixed with autoclaved King B medium to obtain final concentrations 1%, 2%, 3%, 4% and 8%. 10^6cell/ml of *Pst* and *Cmm* suspansion was plated on the medium containing the essential oil and extract. The media without essential oil and extract were used as the negative controls. Three replicates were used for each treatment. King B plates were then incubated at 28 ºC. Colony density of the bacterium was measured at the end of two days incubation periods for *Pst* and at the end of three days for *Cmm*. Based on the results of the study, increase in the essential oil and extract concentration resulted in increase of the efficacy on pathogens. The 50% dose of essential oil of *O. onites* inhibited the growth of *Ps*t and *Cmm* at a rate of 67% and 89%, respectively, while the 8% dose of extract of *O. onites* inhibited the growth of *Ps*t and *Cmm* at a rate of 97% and 99,5%, respectively. In conclusion, *O. onites* extract has higher antibacterial activity than essential oil.

Key words: *Origanum onites* L., *Pseudomonas, Clavibacter, antibacterial.*

ANTIMİCROBİAL ACTİVİTY OF *Origanum onites* L. ESSENTİAL OİL AND EXTRACT

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Abstract

This study was carried out to determine antibacterial activity of *Origanum onites*, essential oil and extract against *Pseudomonas syringae*pv. *tomato* (*Pst*) and *Clavibacter michiganensis* subsp. *michiganensis* (*Cmm*). Plant material was collected in Tokat province. This study was carried *in vitro* and used King B medium. 10%, 20%, 30%, 40% and 50% of the essential oil of *O. onites* was applied with filter paper impregnation method. The extract of *O. onites* was mixed with autoclaved King B medium to obtain final concentrations of 1%, 2%, 3%, 4% and 8%. The amount of 10^6cell/ml of *Pst* and *Cmm* suspansion was plated on the medium containing the essential oil and extract. The media without essential oil and extract were used as the negative controls. Three replicates were used for each treatment. King B plates were then incubated at 28 ºC. Colony density of the bacterium was measured at the end of two days incubation periods for *Pst* and at the end of three days for *Cmm*. Based on the results of the study, increase in the essential oil and extract concentration resulted in increase in the efficacy on pathogens. Dose of 50% of essential oil of *O. onites* inhibited the growth of *P*st and *Cmm* at a rate of 67% and 89%, respectively. Dose of 8% of extract of *O. onites* inhibited the growth of *P*st and *Cmm* at a rate of 97% and 99,5%, respectively. In conclusion, *O. onites* extract has higher antibacterial activity than essential oil.

Key words: *Origanum onites* L., *Pseudomonas, Clavibacter, antibakteriyal.*

THE INJECTION OF AIR INTO DRIP IRRIGATION SYSTEMS TO IMPROVE PRODUCTION IN ORGANIC FARMING REGIMES

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Abstract

AirJection is the process of injecting air into the water with a hydraulically-driven, venturi-type fertilizer injector and delivering the proper air/water mixture to the root zone via subsurface drip irrigation. AirJection has showed to have positive and significant effects on critically important agro-economic variables: overall yield; crop quality and uniformity; early maturation; reductions in fertilizer; reductions in tillage; and improved water-use efficiency. The contribution of AirJection to the three objectives of Climate-smart Agriculture (CSA) are also significant as it is a fossil-free fuel for improved outcomes and requires no transportation costs or electrical power. The three objectives of CSA consists of: *mitigation* of environmental damage caused by traditional agricultural practices; *adaptation* of farming methods and regimes that cope with the uncertainty and variability of climate change; and *food security* or improved agricultural production and profitability for the grower. This paper presents the results of an 8-year study that satisfies the objectives of CSA and can serve as an important tool for cost=effective agricultural improvement in organic landscapes. The case study provides evidence that injecting air into a sub-surface drip irrigation system creates an aerobic oxygen/nitrogen root environment which significantly and positively improves production with no increases in fertilizers, water or fuel. This study evaluates the carbon and nitrogen cycling implications, and cost benefit analysis benefits of the *AirJection* system on cantaloupes, corn, honeydew and bell peppers in central California.

Keywords: *Climate-smart irrigation, Sub-surface drip irrigation, Nitrogen cycling, Fertigation, organic agriculture*

4. ENVIRONMENT PROTECTION AND NATURAL RESOURCES MANAGEMENT

CHEMICAL-LIMNOLOGICAL ASSESSESMENT OF WATER QUALITY OF VIROI LAKE (ALBANIA)

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Abstract

Viroi Lake is one of the most important lakes in Gjirokastra district, south of Albania. This lake has a surface of 17 ha, which is supplied by the limestone source 'Mother of Viroi', a natural monument. This study aims to assess quality of fresh water of this ecosystem, the eutrophication process and the determination of trophic status referring to the Carlson's equations. The water samples for their physico-chemical assessment were collected in 5 sampling sites of Viroi Lake during 2011 - 2014. Immediately after collection water samples were transported to the laboratory in ice boxes in a constant temperature of $4^{o}C$, according to the standard procedures. The methods that were used during the analysing were ISO standard methods. The water of Viroi Lake, according to Water Framework Directive (WFD) 2000/60/EC, for the maximal values of nutrients has been classified as follow: for nitrites $N\text{-}NO_2^-$ from class II to IV and for the concentration of nitrates, ammoniums and orthophosphates in water, class I and II. The values of calculated trophic index (TSI) for Viroi Lake according to the total phosphor, total nitrogen, chlorophyll-α and Secchi disc depth, resulted in the average values showing the *Mesotrophic*status of this water ecosystem.

Keywords: *Water, eutrophication, nutrient, trophic state index, mesotrophic*

COST-EFFECTIVENESS ANALYSIS OF WATER MANAGEMENT MEASURES IN ALGERIA: THE CASE OF ALGERIAN COASTAL BASIN (02A)

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Abstract

The traditional response of the Algerian government to water scarcity problems is focused on increasing supply. However, all analysts agreed on the need for a transition to a demand management, encouraging water conservation and rational use of this resource. They argue that demand management measures are less costly and more efficient. To verify this thesis, researchwasperformed in order to find, through the application of economic analysis, the optimal investment sequence that would cover the future water demand with a lower cost in the Algerian coastal basin, on the horizon of the year 2030. The management measures of supply (increase supply by seeking new conventional resources such as dams and transfers as well as unconventional by desalination of sea water) and of demand (fight against the networks losses, the reuse of the waste water in agriculture and the generalization of drip irrigation) were the subject of a cost-effectiveness analysis for the two scenarios of water demand evolution (pessimistic and optimistic). Overall, the results show that demand management measures have a better reports cost effectiveness than the supply management measures for the scenarios studied. The classification of these reports, from less to more cost effective for each scenario, allows to stagger and prioritize the various investment projects in the water sector, in order to achieve twoobjectives, social (meet water demand) and economic (minimize public expenditure).

Keywords: S*upply management, Demand management, Cost-effectiveness analysis, Algeria.*

SOCIAL FORMS OF IRRIGATED AGRICULTURE IN THE WESTERN MEDITERRANEAN, RISK EXPERIENCES AND "WORLDVIEWS"

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Abstract

Irrigated agriculture in the Mediterranean region is characterized by an increasingly tense ratio between the insurance-vocation to climate hazards and the multiple problems associated with irrigation. Therefore, the irrigation often creates a vulnerability that can be multi-dimensional: technical, economic, social and environmental. This paper aims to analyze the links between farming system and the relations with irrigation's risks and to interpret them in the broader context of farmer's relations tothe societal (autonomy/dependency, individualism/collective action, trust/distrust in public institutions) and natural (environmental sensitivity/insensitivity, adherence or not to intensive agriculture model, faith in progress) world. The results of survey data analysis conducted on a total of 565 farmers in several localities in six countries in the Western Mediterranean (Algeria, Tunisia, Morocco, Spain, Portugal and France), as part of a project FSP/MSH Paris "*Risks and inequalities in the sustainable management of the water resource*" (2005-2009), show that the relations with risks are varying according to the farming system and that vulnerable farms predominate in the south, where the majority of farms may accumulate vulnerabilities on several kinds. However, further analysis revealed that the relations to risks and the relations to the societal and natural worlds are rather varying according to socio-technical configurations of irrigation.

Keywords: *Farming systems, irrigation, vulnerability, worldview, Western Mediterranean.*

DIVERSITY AND STRUCTURE OF BUTTERFLY (LEPIDOPTERA, RHOPALOCERA) IN THE REGION OF M'SILA (ALGERIA)

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Abstract

This work was an inventory of the Lepidoptera fauna in the region of M'sila (34°22' 36°05'north latitude and 3°35' 5°35' east longitude) in Algeria.The study was carried out in five stations (agricultural, steppe, forest, and ruderal areas) for each region. The sampling done by direct hunting with the use of a sweep net during 12 months of surveillance allowed collection of a total of 586 mature butterflies rounded up in seventeen species. These species were belonging to five families from which the most represented were those of Pieridae by six species: Pierisrapae, Euchloebelemia, Euchloecharloniacharlonia, Coliascrocea ,Pierisbrassicae and Pontiadaplidice.At the same time, the Hesperiidae family was represented only by one specie Carcharodusbaeticus.This study revealed that the agricultural plot was the richest biotope in butterflies both in the number of butterflies invidious and species(66.04 %),while the two biotopes steppe and ruderal accommodated a few of the species (4.95 % and 3.42 % respectively). Pierisrapaewas the most abundant species in the regions studied with a High frequency sampling throughout the year. It reaches 29,18 %, particularly during the months of April, May and June.Butterfly species richness was correlated with plant species richness, and butterfly density with percentage ground cover of the vegetation.

Collecting sites, seasonal occurrence and available biological or ecological notes are given for each species. An updated list of the butterflies of M'sila is given based on this study.

Keywords: *Biotopes, Lepidoptera fauna, M'sila, Pieridae, species.*

STATUS, REVITALIZATION AND MAINTENANCE OF SUBSURFACE DRAINAGE SYSTEMS ON AGRICULTURAL LAND IN CROATIA

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Abstract

Protection and management of subsurface drainage systems on agricultural land in the Republic of Croatia is regulated by the basic laws, Water Management Act, Water Management Financing Act and Agricultural Land Act.

Appreciable potentials for the development of agricultural production in the Republic of Croatia are involved in the need and possibility of revitalization of subsurface drainage systems, constructed on a total agricultural area of 167,174.50 hectares.

In the total of 2,326,220.60 hectares of agricultural land in Croatia, the share of agricultural land on which subsurface drainage systems - pipe drainage is 7.18 %, while its share in 833,239.90 hectares of overall state land is 20.06%.

Of the total length of 9,151.99 km of ameliorative open channels of orders III and IV, constructed on drained land, 5,157.08 km or 56.35 % were revitalized by 2012 while 3,994.99 km or 43.65 % are still unrestored.

High degree of subsurface drainage system functionality has been determined on 43,229.71 hectares or 25.85 %, medium on 18,941.68 hectares or 11.33 % and low degree on 105,002.84 hectares or on 62.82 % of total drained land.

According to the order of priority of system revitalization and regular maintenance, the first (I) level includes 72,578.25 hectares or 43.41 %, the second (II) 81,593.18 hectares or 48.82 % and the third (III) level 13,003.07 hectares or 7.77 % of drained areas.

Further revitalization and regular maintenance of subsurface drainage systems on agricultural land in the Republic of Croatia require financial input of about 200,305,545.00 EUR.

Keywords: *Agricultural land, drainage, revitalization, maintenance.*

FERTILIZER VALUE OF COMPOSTED BIODEGRADABLE WASTE

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Abstract

Croatia annually produces about 1,000,000 t of biodegradable waste, 83% of which is deposited in landfills. EU Framework Directive on Waste prescribes the obligation of separate bio waste collection for purposes of composting, anaerobic digestion and energy recovery or use of environmentally safe materials from bio waste. Most local governments choose composting, because it produces valuable fertilizer. This paper describes fertilization value of composted biodegradable waste from two counties in northwest Croatia: Koprivnica-Križevci (cities: Koprivnica, Križevci) and Međimurje (Prelog, Čakovec). Basic fertilization value is calculated based on the concentration of N, P and K, and supplementary based on CN ratio, the relationship of NH_4-N and NO_3-N and the concentration of trace elements (Fe, Mn, Zn, Cu and Mo). The results show that compost from Križevci has the highest basic fertilization value, followed by compost from Prelog. Compost from Koprivnica has median basic fertilizer value, and compost from Čakovec low. The highest supplementary value of fertilization is determined for compost from Križevci, and the lowest for the composts from Koprivnica and Čakovec. Due to very low concentrations of toxic elements (Cd, Cr and Pb) the lowest index of harmfulness is determined for compost from Koprivnica. The compost from Krizevci has similar values. The other two composts have slightlyhigher index of harmfulness. Recognizing the basic and supplemental fertilizer value and the index of harmfulness, compost from Križevci received the best fertilization rating (8.38), followed by composts from Prelog (7.48) and Koprivnica (7.19), while compost from Čakovec received the lowest fertilization rating (6.96).

Keywords: *Biodegradable waste, Compost, Fertilization value, Northwest Croatia*

STUDY ON USE OF COMPOSITE MATERIAL TO REPLACE THE WOODEN COMPONENTS IN ANIMAL DRAWN HILL EQUIPMENT

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Abstract

Yokes and harnesses are the means of attaching the animals to the implements for deriving the power. These days' yokes are developed by using locally available woods in hilly regions of Uttarakhand state (India)like Haldu and Tun etc. It is important to develop and use alternate bio-material to replace wood effectively. Hence, a study on composite material has been undertaken to develop yokes. The resin, cellulose ,glass wool , jute net and silica were used in different ratio to prepare composite material for this study. On the basis of this study, The compressive strength, tensile strength and flexural strength of composite material and wood yoke were found 169 and 111.5 N/mm^2, 26 and 22.1 N/mm^2 and 44 and 13 N/mm^2 respectively.The yoke of composite material having resin 87% w/w, silica 10% w/w, 16 numbers of jute net plies 2.5% w/w and 5 numbers of glass wool plies 1.75% w/w is suitable for sustaining the momentary force of 30% force equivalent to body weight of bullock and sufficient to carry out all the agriculture operations those are being performed by animals. The cost of composite material yoke was Rs.325 which is cheaper than the traditional yoke.

Keywords: *Composite material, resin, silica*

FUEL CELLS: A PRACTICAL ANSWER TO THE WORLD'S PRESSING NEED FOR CLEAN AND EFFICIENT POWER

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Abstract

A fuel cell turns hydrogen the fuel, into electricity using air and other catalysts. The fuel cell harnesses chemical energy trapped in hydrogen gas and converts it into kinetic energy we know as electricity, without fossil fuels, combustion, or polluting emissions. As a remarkably efficient, incredibly clean source of renewable energy fuel cells can take the place of both batteries and engines to power vehicles, laptops and residential power grid. Such a clean power source, guarantees les dependence on the dwindling supplies of fossil fuels, creates less greenhouse gases that contribute to global climate change, and does not explode or malfunction as frequently as engine driven electricity. These sources are pollution free and hence provide clean energy apart from being inexhaustible.Fuel cells offer utilities the opportunity to provide customers with an added value energy service that is not subject to the same competitive or regulatory pressures as exist for conventional electric supply and will be able to do so at overall lower cost. India is the only country in the world to have an exclusive ministry for renewable energy development. Power generation in India has grown in size to around 1 lakh MW. The demand for power is growing rapidly. Under such condition, environment-friendly and pollution-free, non-conventional and renewable energy sources known as 'clean and green energy' have emerged as an important alternative to conventional energy source.The potential available under solar photovoltaic energy is 20MW per sq. km, but the process is rather slow. A lot of work has been done and is being done in the field of wind energy, solar energy, solar thermal energy and biomass, but still its contribution to the nationwide power requirement is less. Now is the time when we need to explore other sources of non-conventional energy. One such source is fuel cell.

Keywords: *Fuel cell, non-conventional sources of energy, hydrogen power.*

DRAINAGE RUNOFF IN CLIMATE CHANGE CONTEXT IN CENTRAL LITHUANIA

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Abstract

The size of drainage runoff depends on meteorological conditions of the year, the most important of which are the precipitation quantity and air temperature. However, the interdependence of precipitation quantity and drainage runoff is quite complex. Drainage systems are especially important in spring, during the snow melting period, because the excess of water is removed quickly from the arable layer of the ground, therefore, the conditions to start spring field works for about two weeks earlier are guaranteed. The article presents the influence of fluctuation of the main climatic factors over time on drainage runoff, the analysis of drainage runoff distribution in the course of a year in Central Lithuania. The seasonal differences of annual temperature amplitude and precipitation quantity decrease. It has a significant impact on the seasonal distribution of drainage runoff. The change of drainage runoff and its distribution over a year as well as the patterns of runoff have been analysed. The article analyses the nature of multi-year change of runoff during the last four decades – periodic fluctuations and change trends. The analysis of runoff observation data revealed that seasonality, typical for run-off change, remains, however, the drainage runoff during winter season has increased significantly over the past four decades. It was also influenced by growth of multi-year temperatures of all seasons, except autumn: the frozen soil is characterized by low water permeability, irrespective of its content. Water, present in thinner capillaries of clay and loam soil, freezes at lower temperature. An increased incidence of thaw of frozen ground demonstrates that water infiltration conditions of cold season must have changed.

Keywords: *Drainage runoff, Climate change, Water recourses.*

AN OVERVIEW OF NATURE CONSERVATION PROGRAMMES IN LITHUANIAN AGRICULTURE

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Abstract

Participation of farmers in different nature conservation programmes started in 1991 when Lithuanian Government established national environmental agriculture programme and the "Tatula" foundation. The main aims of the programme were to promote sustainable farming and farming practice related to protect underground water resources in North-Eastern environmentally sensitive karst region (total area 194 000 hectares). The programme started to enhance transformation of conventional farms to sustainable farming with long term aim to establish organic farms.

Special Accession Programme for Agriculture and Rural Development (SAPARD) operated in 2000 – 2006 period. Due to some political and technical problems, this programme did not include any environmental protection measures. Active farmer participation in different nature conservation programmes started upon adoption of National Rural Development Strategies and Rural Development Plans (2004 – 2006, 2007 – 2013). The plan for 2014 – 2020 included more different biodiversity conservation measures, especially results-orientated measures. The Ministry of Environment developed National Programme on Protection of Biological Diversity, Planning and Management of Protected Areas for 2007 – 2013. Recently, the programme has been renewed and farmers and agricultural organizations as well as protected area administrations are participating in nature conservation measures.

Beside governmental agri-environmental programmes, Lithuanian farmers participated in different voluntary nature conservation projects. Biodiversity friendly projects were supported by some western, especially by the Netherlands, countries in 1991 - 2004. The projects were implemented through nature conservation nongovernmental organizations. New biodiversity-friendly conservation initiatives were included in different LIFE Nature projects. The first ones started in 2006 and some are still ongoing, especially in protected areas.

Keywords: *Biodiversity, nature conservation, agri-environmental programmes, farmers.*

BIOMONITORING OF ATHMOSPHERE AIR POLLUTION IN THE FOREST ECOSYSTEMS AND ECO-TONE ZONE

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Abstract

Within our research, the air quality of 62 forest ecosystems from Republic of Moldova was assessed, taking into consideration the lichens indicator species specific diversity, abundance and toxitolerance. It was established that the Moldavian forest ecosystems do not contain reserves concerning critical loads for SO_2 pollution, the annual average for the vegetation season for dendrological species being 0,02 mg/m^3 air, and for communities of lichens and cyanobacteria, organisms sensitive to pollution, represented only 0,01 mg/m^3. Lichen indication demonstrated that the current level of pollution is between 0,05 and 0,5 mg/m^3 SO_2air, thus long-term harmful effects are manifested in all 62 studied forest ecosystems and the ecosystems from the eco-tone zone. We believe that for the Republic of Moldova lichen, indicator species can provide a scale of 6 levels: 5 levels characterized by species with different toxitolerance degree and the last step being an area in which lichens are completely missing, thus the most polluted area. Within the Republic of Moldova territory, there were reported 3 forest ecosystems in which the air is evaluated as clean air, 11- low polluted air, 31- moderate polluted air, 12- polluted air, 3- high polluted air and those with critical polluted air was missing.

Keywords*: Licheno-indication, air quality, forest ecosystems, eco-tone zone.*

SEWAGE SLUDGE ASH CHARACTERISTICS AND VALORIZATION FOR USE IN CEMENT

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Abstract

Sludge from sewage treatment plants is a serious problem in many countries in recent decades. There has been a sharp increase in quantities from wastewater treatment plant (WWTP). This can cause adverse effects and risks on the environment and on human health.In this work, we propose an innovative and sustainable concept based primarily on the use of sludge outcome of WWTP. This sludge is generated in considerable amounts during wastewater treatment operations by organic methods (trickling filter, activated sludge –etc-). This sludge is commonly managed by conventional ways (next WWTP, spreading, rejection by dump), but which are the source of many environmental impacts. In this context of recovery, the objective is the realization of an innovative material and original cement to use this waste as fuel in cement kiln of his one hand and removing certain amounts of ash sludge produced by is an oven. We studied the behavior of the sludge. Different parameters were investigated: pH, electrical conductivity, organic matter, moisture, lower calorific value, plasticity. The results have put in evidence the physico-chemical composition and mineral slurries, their size distribution

Keywords: *Sewage sludge, calcination, cement, physico-chemical, characterization*

MAPPING AND ASSESSEMENT OF WATER EROSION IN THE IKKOUR WATERSHED (MIDDLE ATLAS, MOROCCO)

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Abstract

Soil erosion is one of the major factors affecting sustainability of agricultural production. In most developing countries, like Morocco, anthropological or accelerated erosion, which is mainly favored by human activities, is the major trigger factor for the loss of soil and water resources. To facilitate the urgent policy intervention that targeted soil degradation, study the amount of soil loss is inevitable. In this paper, a GIS simulating model using a universal soil loss equation (USLE) was applied to analyze the amount of soil loss in Ikkour basin in middle atlas of Morocco.

The modeling of erosion in the Ikkour watershed required the evaluation of various factors of the USLE over the entire drainage area and their expression in the form of thematic maps. This is a multiplicative function of five factors that control water erosion: rainfall erosivity, soil erodibility, slope gradient and length, vegetation cover and erosion control practices.

The multiplication of those factors allowed us to produce a quantitative map with an average rate of erosion. A comparative analysis was conducted to highlight correlations between erosion rates and the various factors of this process.

Keywords: *Universal Soil Loss Equation (USLE), Geographic Information System (GIS), Water Erosion, Watershed, IKKour River, Morocco.*

CONTRIBUTION TO THE STUDY OF THE AGRICULTURAL POLLUTION OF THE SUBTERRANEAN WATERS IN IRRIGATED ZONE (TADLA-MOROCCO)

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Abstract

This studypresents the survey conducted among farmers regarding management of pesticides used against crop pests in order to emphasize practices lead to groundwater table quality degradation inTadla region wherethe use of agricultural pesticides is a reality and where the pesticides get directly in touch with the ground including environment compartments.(In particular underground waters and surface water). The survey comprises of the ground water tableof BNI MOUSSA, and BNI AAMIR. It covers producers of Lucerne, legumes, citrus fruits, truck farming and cereal of both zones of the perimeter using a quantitative and qualitative questionnaire aboutused pesticides and fertilizers, mainly doses and frequencies of treatment. Also, it covers places of purchase, the quantity of pesticide and the cost per hectare per year.The questionnaire takes in consideration hygiene measurements taken by the farmers during the pesticidal treatments and in case of poisoning. The questionnaire concerns also with the mode of irrigation, the volume and costs of used water per hectare. The survey showed that the 1, 3 Dichloropropène, in particular (organophosphate) chlorpyrifos-éthyl, is the most used productswith an overdose which affect the ground water quality.

Keywords: *Quality, pesticides, groundwater, plain, Survey.*

EVALUATION OF HEAVY METALS CONTAMINATION IN AGRICULTURAL SOIL OF THE BÉNI-AMIR REGION (TADLA, MOROCCO).

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Abstract

The perimeter of Beni-Amir (Tadla plain, Morocco) is characterized by large hydric capacities, agriculturaland urban activities. These characteristics make the perimeter sensitive and vulnerable to various types of pollutions (industrial, urban and agricultural), which increasing day to day.

Pollution indices, Index of geo-accumulation (Igeo) and Enrichment Factor (EF) were used in this study to investigate and to assess the degree of pollution in a polluted area under the effect of agricultural practices. Soil samples were analysed to detect concentration of heavy metals. Cr, Cu, Zn, and Fe in soil extracts were analysed by ICP-AES (Inductively Coupled Plasma Atomic Emission Spectrometry).

Results show that the area has been harmfully affected by the heavy metals: Cr, Zn, Cu and Fe, in order: Cr>Zn>Cu>Fe. The calculation of the Enrichment Factor shows that Zn is classified in the third class indicating that the area is highly rich in this metal. In contrast, Cr and Cu are classified in the second class indicating the moderate enrichment of these elements. The Geo-accumulation index indicates that the soils in most of studied stations were slightly polluted (classe.1). The results obtained of the indices of pollution of these heavy metals show that the zone is polluted.

However, these trace metal assessment indices gives an idea about contamination of soils without the concept of toxicity related to each metal. There are more indices can be used as indicator for soils quality such pollution load index (PLI) and Contamination Factor (CF).

Key words: *Heavy Metal, Soil Pollution, ICP-AES, Enrichment factor, Geo accumulation index.*

EVALUATION OF THE SUITABILITY OF SURFACE WATER FROM SROU RIVER (MIDDLE ATLAS, MOROCCO) FOR IRRIGATION PURPOSES

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Abstract

The quality of water is of key importance compared to quantity in any water supply. Water is not only the basic need for human existence but also a vital input for all development activities and especially in irrigation.

The present study aimed was conducted to assess the suitability of surface water from Srou River and its tributaries for irrigation activities. The water quality assessment was conducted usingthe salinity and sodium absorption ratio (SAR) relative to the concentrations of the other major cations (ratio of sodium ions to calcium and magnesium ions) in the water system. These major cations have been monitored on 12 sampling points froma physicochemical survey conducted in Srou basin water. The result showed that the SAR values are generally low than 4 whereas the salinity based on the electrical conductivity show a high values. This suggests that the water from Srou River is suitable for irrigation without the prospect of causing sodium hazard but the high salinity can pose negative effects and can harm soil. The observed high electrical conductivity value can be attributed to diverse effects of geological formations surrounding Srou basin, precipitation, weathering and water-rock interaction. The ratio of sodium ions to calcium and magnesium ions is called the sodium adsorption ratio (SAR).

Key words: *Srou River, surface water, irrigation, SAR, salinity*

RECOGNITION OF THE AQUIFEROUS SYSTEM OF THE NORTH-EAST OF THE PLAIN OF TADLA BY ELECTRIC IMAGERY

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Abstract

A geoelectric investigation was carried out in the north-eastern zone of the plain of Tadla to colour the structure of its aquiferous units. Measurements of electric tomography were treated, analyzed then correlated with the data of certain drillings and existing wells in the zone.

The analysis of the whole of the results indicates that resistivity sections show the superposition of several geological levels with varying thicknesses (15-300 m) and resistivities (2.5-<300 Ω.m). The geological layers dip from the NE to the SW. This structure is affected by a series of faults which are at the origin of the depression of the compartments located at the south.

The limiting plate-basin is also marked by a series of flexures resulting in geoelectric discontinuities on the profiles of resistivity. This system of flexures does not affect lithostratigraphic continuity between the plate and the basin of Tadla, but influences considerably the hydrodynamic properties of the aquiferous system.

Keywords: *Tadla, aquifer, resistivity, section, structure.*

SOIL ANALYZE BY THE COUPLING OF A GIS MODEL AND PHYSICO-CHEMICAL PARAMETERS

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Abstract

Soil is the support of the majority of human activities and most ecosystems. It is at the interface with other environmental compartments such as water, air and the biosphere. As part of the recovery and conservation of soil resources, for sustainable agriculture, This research explores the potential for synergy between the laboratory analysis, GPS, GIS and methods of deterministic interpolations (Spline and Inverse Distance-known IDW) and probabilistic (Ordinary Kriging and Universal Kriging) to map soil types in a semi-arid to arid environment. To achieve our aims, we sampled 97 points in the northeast part of the plain of Tadla distributed almost evenly considering all soil classes covering our study site. In the first stage of this research, the samples were analyzed in the laboratory to determine their size characteristics and their physicochemical properties (pH, organic matter, and total and limestone particle size). In a second step and in the GIS environment, the potential deterministic interpolation methods (Spline and IDW) and probabilistic (Ordinary Kriging and Universal Kriging) was evaluated for the derivation of fractional maps of each of the textural classes and properties of treated soils. The results obtained in this step highlighted the ways in which the interpolator's models process information.

Keywords: *Physicochemical parameters, soil, plains Tadla, interpolation methods (spline, IDW, kriging)*

THE EVALUATION RESULTS OF CLIMATE CHANGES FOR SLCAL BENEFICIARIES' PROJECT

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Abstract

Farmers in the Gaza Strip are affected by the climate changes of temperature, humidity, wind, rain and frost which have caused economic losses of more than 80%of their agricultural production.The researchers conducted 11 workshops in five areas in the southern part of the Gaza strip (Abasan, Khuzaa, Al-Qarara, Al-Shoka and Al-Fokhary) in the period between1-17 December, 2015. It aimed to educate farmers about climate changes and its effects on agriculture sector. A structured interviewed questionnaire was used to collect dataon climate change effects on the targeted farmers in SLCAL project. The total number of farmers who participated in the interviews in all areas was 206 participants. The researchers used the questionnaire as a tool for monitoring and identifying these changes in the Gaza Strip and how the farmers are dealing with these changes. The main indicators which were used to measure the climate change effects are: A) Temperature: Through the analysing the farmer's answers in different areas, where they mentioned that the crops affected by high temperature in all areas with a relative weight of 43.7%. B) Rain: The intensity of the rainfall negative impact was the greatest on agricultural crops in all areas and reached 45.3%. C) Humidity: Considering the effect of moisture on agricultural crops, results showed that the high humidity has the greatest impact rate which reached 59.3%. D) Wind: According to the farmers' opinions, it has been shown that all areas affected by wind in terms of intensity, speed and direction, relative weight were as follows 50% - 33.7% - 16.3%.

Keywords: *Evaluation, agricultural crops, climate changes, beneficiaries.*

POSSIBILITIES OF USING CARBONATE-SILICEOUS ROCKS IN PROTECTION AND FORMATION OF THE ENVIRONMENT

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Abstract

The paper presents the current state of knowledge on the usage of carbonate-siliceous rocks in various aspects of protection and formation of the environment. Relating to environmental protection, the usage of raw materials of natural origin in various technologies is an important issue, as it enables people to pursue their goals without using any chemicals, these materials are produced and utilised without additional pressure on the environment. One of such materials is a carbonate-siliceous rock that can be found in different parts of Poland. There has been carried a research about the usage of this rock, so it can be used among other for: wastewater treatment, reducingof odour emissions from piggeries and cowsheds (removal of hydrogen sulphide and ammonia) and remediation of acid soils. This study includes an assessment of the effectiveness of the usage of carbonate-siliceous rocks for phosphorus removal from domestic sewage. The rock properly prepared by granulation and firing in high-temperatures. It noticed that we can reach ahigh effectiveness in the depending on the grain size and hydraulic loads. Having based on some previous research, it has been found that thecarbonate-siliceous rock, under the trade name "Rockfos", can be used to remove phosphorus from domestic sewage. This is an important issue in the context of the protection of the surface and groundwater. International rules about the protection of the Baltic Sea require paying special attention to the quality of water drained into the basin.

Keywords: *Carbonate-siliceous rock, protection and formation of the environment, wastewater treatment, to reduce odour, remediation of acid soils*

THERMAL REGIONS IN POLAND (1971-2010)

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Abstract

During the final two decades of the 20th century and at the beginning of the 21st century it is observed a clear and well-documented increase in air temperature. The aim of the study was the assessment of the changes in the size and range of thermal regions in Poland between 1981-2010 compared with the 1971-2000 period. The thermal regions were distinguished on the basis of the amount of active temperatures above 10°C in the mentioned periods from 53 meteorological stations evenly distributed in Poland. On the basis of the calculated values of the amounts of active temperatures, three thermal regions were distinguished: cold 1600 – 2000°C, moderately cold 2000 – 2400°C and moderately hot 2400 – 2800°C. Between 1971 and 2000 the cold region covered 1.0% of the area of Poland, and between 1981-2010 it disappeared. The area of the moderately cold region decreased from 37% to 14%. The area of the moderately hot region increased from 62% to 83%. In addition, this study attempts to depict a number of consequences of climate changes by illustrating the possibility of expansion of the surface area of thermophilic plants.

Keywords: *Global warming, Poland, thermal regions*

APPLYING THE GEOSTATISTICAL AND STATISTICAL METHODS TO THE ASSESSMENTOF THE POSSIBILITY OF UTILIZING RAINWATER IN THE MODERATE CLIMATE IN POLAND

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Abstract

The geostatistical methods, originally applied in geological research, now are also used to interpret economic, social and environmental issues. These methods allow to precisely describe the phenomena that occur in the natural environment. What is crucial here is that these methods take into consideration the information on the location of the examined parameters, which traditional statistical analyses do not provide. The statistical methods, especially cluster analysis, for determining areas homogeneous in terms of the examined quality, are commonly applied among others in hydrometeorology as regards discovering the relations between the circulation and development of water reserves.

In recent years, due to water deficits, in many regions worldwide more and more attention has been paid to utilizing water from additional sources, including rainwater. The aim of this work is to present the application of the geostatistical and statistical methods in the assessment of the possibility of utilizing rainwater in the moderate climate in Poland.

To estimate the spatial distribution of precipitation in Poland, data from 51 meteorological stations were used. On the basis of the observation of the monthly amounts of precipitation carried out from 2001 to 2010, for particular stations annual amounts of precipitation were determined as the arithmetic mean. The obtained data underwent geostatistical analyses in order to determine their spatial variability. In the case of the statistical methods cluster analysis was applied with Ward's method to distinguish homogeneous clusters. These analyses allowed to distinguish areas in Poland homogeneous in terms of average amounts of precipitation.

Keywords: *Geostatistical and statistical methods, rainwater,moderate climate, water resources*

EFFECT OF NITROGEN FERTILIZATION TYPES ON THE SOIL MICROBIAL BIOMASS AND GREENHOUSE GASES EMISSION

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Abstract

Global climate models shows patterns of temperature and precipitation changes worldwide. Soil moisture and type of fertilization are key determinants of the microbial processes that determine the fluxes of gases from soil. There are not many research activities including the assessment how land conversion to the grassland can influence the greenhouse effect. The aim of this study was to determine the biomass content of microorganisms in soil and CO_2 and CH_4 emissions in conditions of diversified nitrogen fertilization and soil moisture in the cultivation of pot grass mixtures. The results of the study were treated by two-factor analysis of variance. The linear correlation between analysed gases and between microbial biomass and CO_2 or CH_4 emissions was performed. The volume of soil microbial biomass in the cultivation of grass mixtures was affected by the type of nitrogen fertilization and the level of soil moisture.Approximately 1.5 times bigger microbial biomass was found after fertilization than under control conditions.The same relationship occurred in the comparison between the microbial biomass during wet and dry conditions.Only the volume of CO_2 emission in this pot experiment was affected by the type of nitrogen fertilization. Higher emission of CO_2 was accompanied by increased emission of CH_4. In humid conditions, both mineral and organic fertilization affected positively on soil microbial biomass and the volume of CO_2 emission. From the viewpoint of reducing greenhouse gases emission, inorganic fertilizers used in dry conditions during the land conversion to the grassland, would be the best grassland cultivation method.

Keywords: *Grassland, microbial biomass, carbon dioxide, methane*

IMPORTANCE OF THE BUFFER ZONE OF THE WATER INTAKE FOR THE MAINTENANCE OF AGROSYSTEM PHYTODIVERSITY

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Abstract

A change of the agricultural policy in Poland after 1990 caused significant changes in the structures of the agricultural landscape functioning in the area of West Pomerania (Pomorze Zachodnie). The field fragments, which had been in a form of barren land in the protective zone of Miedwie Lake for 30 years, were chosen for the detailed phytosociological studies. The aim of the current study was the analysis of anthropogenic impacts on flora in the surveyed terrain.

In the studied area, the values of the synanthropization indices of the flora were as follows: synanthropization - 2.58, apophytisation - 2.0, anthropophytisation - 0.56, archaeophytisation - 0.38, kenophytisation - 0.16, and fluctuation changes in the flora - 0.04. It is assumed that the larger the share of nonsynanthropic species, the larger the naturalness of the flora in these biotopes. Large values of indices of apophytisation signal transformations of natural habitats. The large values for the apophytisation index showed degradation in natural habitats A large share of anthropophytes indicates dominance of the processes of a decline in native species in a given biotope, which means that there are disturbances of the ecological balance of a given ecosystem.

The 30 year cessation of agricultural use around the lake resulted in the improvement of the chemical state of waters. A significant role in stopping water runoff played dense sodification of the surveyed area. The state of the flora found in this area was influenced by both natural and anthropogenic factors. This is proved by the dominance of synanthropic over nonsynanthropic, and spontaneophytes over anthropophytes species.

Keywords: *Intake protection buffer, flora, biodiversity, agroecosystem, Poland*

THE POSSIBILITIES OF USING CARBONATE-SILICEOUS ROCK IN PROTECTION AND FORMATION OF ENVIRONMENT

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Abstract

The paper presents the current state of knowledge on the use of carbonate-siliceous rock in various aspects of protection and formation of environment.

The use of raw materials of natural origin in various technologies related to environmental protection is an important issue, as it provides pursuing goals without the use of chemicals, the production and utilization of additional pressure on the environment. One such material is a carbonate-siliceous rock occurring in different parts of Poland.

There are ongoing studies on the use of this rock, among others, wastewater treatment, reduce odour emissions from piggeries and cowsheds (removal of hydrogen sulphide and ammonia) and in the remediation of acid soils.

Our own study includes an assessment of the effectiveness of the use of carbonate-siliceous rock for phosphorus removal from domestic sewage. The rock has been properly prepared by granulation and firing high-temperature. It has been found highly effective regarding removal of phosphorus (56-97%), depending on the grain size and hydraulic loads. Based on previous research, it was found that the carbonate-silica rock, occurring under the trade name "Rockfos", can be used for remove phosphorus from domestic sewage. This is an important issue in the context of protection of surface and groundwater. International rules on the protection of the Baltic Sea require of special attention to the quality of water discharged into the basin.

Keywords: *Carbonate-siliceous rock, protection and formation of environment, wastewater treatment, reduce odour, remediation of acid soils*

PREDICTION OF AVAILABLE SOIL ZINC USING CHEMICAL EXTRACTANTS

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Abstract

Zinc (Zn) is an essential micronutrient for crop growth. Deficiency of zinc has been frequently detected in soils in Serbia. Soil parent material, pedo-chemical transformations and anthropogenic interventions play important roles in the distribution of zinc (Zn) into its various forms in the soil and ultimately, its bio-availability for plant uptake.This study included 10 cultivated agricultural soils field of Serbian (field) and their uncultivated pairs (meadow).A batch extraction scheme was used to estimate water-soluble and exchangeable adsorbed (I), specifically adsorbed and carbonate bound (II), Mn oxide- and Fe-oxide bound (III), organic bound (IV), and silicate structural bound (residual forms) (V) zinc (Zn) in each soil.The distribution of Zn in the soils on the basis of average concentrations was in the order 60.15 mg kg^{-1} residual Zn (71.93 %)>16.07 mg kg-^{1} oxide bound Zn (19.89%)>5.31 mg kg-^{1} organic bound Zn (6.69%)>0.68 mg kg-^{1} specifically adsorbed and carbonate bound Zn (0.89%)>0.2 mg kg-^{1} exchangeable adsorbedZn (0.26%).The correlation analysis showed that exchangeable adsorbed and specifically adsorbed Zn amounts increase by decreasing soil pH, CEC, clay and clay + silt as well as by increasing silt and sand. The residual Zn fraction varied directly with soil pH, clay, CEC, clay+silt.

The fact is that the soils in Serbia are dominated by stable fractions of zinc, while its content in easy available forms is low. The zinc present in water-soluble, exchangeable and adsorbed fractions is readily bio-available, while zinc associated with primary and secondary soil minerals is relatively unavailablefor plants.

Keywords: *Agricultural soils, correlations, soil fractionation, Serbia, zinc content*

CHARACTERISTICS OF SOIL AROUND THE MAIN DUMP IN CITY OF NOVI SAD (SERBIA) AND PROPOSAL FOR ITS RECULTIVATION

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Abstract

One of the biggest potential sources of environmental pollution are dumps. Soil around dumps can be considered as a buffer zone, which retains different types of pollution generated in the process of decomposition of waste. This paper presents the results of analyzes of soil characteristic, located around the main dump in Novi Sad, Serbia. Soil sampling was done at two depths of 0-30 and 30-60 cm, at two sites near the dump. Also, one sample was taken from the sludge in the canal, which drains atmospheric water from the dump. Based on results it can be said that tested soil, around the dump belong to the texture class loamy coarse sand, it is characterized by an alkaline reaction (pH in H_2O of 8.43 to 8.61), it is very carbonate (from 7.87% to 9.11% $CaCO_3$). Also it has very low content of humus, nitrogen, and medium content of and potassium. Content of microelements (Cu, Zn, Co, Mn) and heavy metals (Pb, Cd, Ni, Cr, As, Hg) in all tested samples is significantly lower than the maximum permissible concentrations (MPC) and is at the level of the value of heavy metals in the soils of the wider area of Novi Sad. Based on these results it can be concluded that the land near dump are not contaminated with heavy metals. Considering a highly favorable chemical properties of mud it should be considered the possibility of using the sludge in the future recultivation in terms of increasing soil fertility around dump.

Keywords: *Dumps, soil characteristics, recultivation*

THE INFLUENCE OF LAND USE ON WATER-PHYSICAL PROPERTIES OF SOILS IN VOJVODINA PROVINCE (SERBIA)

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Abstract

Due to the different land use, the man significantly influences and changes soil properties, water-air, thermal, biological and nutritious regime. In order to evaluate the influence of different land use (arable fields, gardens, orchards and vineyards) on water physical properties, the research was conducted in selected representative soil samples which were taken on the territory of Vojvodina autonomous province and it covered six soil types. For research proposes, the undisturbed soil samples were taken from different localities (61 localities) from surface horizon (0-30 cm) by Kopetzky cylinders in 3 repetitions. The rate of water permeability through soil sample is determined by method of constant pressure of water column. The majority of soil samples has a value of K-Darcy coefficient of 10-3 cm / s, which means that they belong to the class of soil that have good water permeability. Ecologically, the most favorable values of density and porosity has land under meadows (1,25 g cm^{-3} and 47.24%), followed by forests (1.35g cm^{-3} and 45.05%) and the soil under arable land that have at least a decent level (1.45g cm^{-3} and 41.09%). From the results of statistical analysis it can be seen that land use has a much greater effect on the tested properties than soil types. On the basis of this research it can be concluded that land use significantly affects the water-physical properties. Arable agricultural land subjected to high anthropogenic influence is more likely exposed to deterioration of these properties.

Keywords: *Soil, water permeability, land use, water-physical properties*

EROSION PROCESSES IN THE DRAINAGE BASIN OF THE PREDEJANE RIVER (SOUTHEASTERN SERBIA) IN THE PERIOD 1953-2012

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Abstract

The first organised torrent control works in Serbia started in Grdelica Gorge in the late 19th century because the area was the locus of the most intensive erosion processes. They required the implementation of various methods and structures for torrent control and soil protection against erosion. The works were carried out in drainage basins (biological and biotechnical works) and in torrent channels (technical works).

The effects of the performed works on the state of erosion in the drainage basin of the Predejane River were studied through a comparative analysis of the situation in 1953 and in 2012, with the aim of upgrading the methods of water erosion and torrential flood control.

The intensity of erosion processes in 1953 was determined on the basis of available erosion maps, whereas in 2012 it was determined by using satellite images and field research. The values of Z erosion coefficient for all reference periods were calculated after Prof Gavrilović's methodology and then used to conduct a comparative analysis of the obtained data.

Key words*: Erosion process intensity, drainage basin, torrent control works, Serbia*

CONSTRUCTED WETLANDS

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Abstract

Given the importance and a great request for water in the world and insufficient water quantities available, search for unconventional water resources is increasing. The most important resource is wastewater reuse, especially for agriculture sector, which due to great water consumption accepts water of a relatively low quality. This does not mean that agriculture can accept any quality of water, but irrigation water should meet the standards accepted by national and world organisations for health, environment and agriculture. In this paper, an experimental method for treatment called Wetlands is discussed, and an appraisal of its design, efficiency and economy was given.The work included seven ponds, three were planted with common reeds, three with Vetiver grass and one was left unplanted (a control pond).In the efficiency analysis, the monitoring parameters included conductivity, PH, COD, BOD_5 and P,N,K, trace elements, etc.The economic analysis shows that constructed wetland are a cheaper solution than most of other treatment methods and that some advantages can be achieved from wastewater reuse.

Keywords: *Constructed wetlands, wastewater reuse, treatment methods, Alkhayer Iyad*.

DETERMINATION SUITABILITY OF SOIL QUALITY PARAMETERS RELATED TO PLANT SPECIES, CASE STUDY: KÖSRELİK POND RECREATION AREA

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Abstract

In this study, some soil quality parameters related to plant species were determined. As the case study area was selected Rural Recreation Area of Kösrelik Pond near Ankara (Turkey),. For this purpose, ten surface soil samples were taken and excuvated four profiles. In this context, soil structure, hydraulic conductivity, available water, field capacity, wilting point, bulk density, CEC, organic carbon, water-resistant aggregates percentage, lime, pH, EC, N, P, K, B, Na, Ca + Mg such as quality parameters were investigated. According to the results, the soil studied is clayey loam textured, poor organic matter, mildly alkaline and salt-free. Furthermore, erosion risk maps have been created by CORINE Methodology. It was found that 62% is of high actual risk of erosion. Results showed that 83% of total area has a low quality soil. According to the land suitability map, 20.4 da of terrain will be available for natural habitat, 41 da for plantation, 10.7 da for picnic, 28 da for rock gardens 100 da for green space and 13.6 da for organic farming. The study area should provide continuity of sage species which are types of natural herbs by preserving them. Apart from that, growing barley, wheat, vegetables and fruits is appreciated. Planting of black pine, quercus, cedar, eleagnus, pistacia, almond, mahaleb cherry, japonica and turpentine trees at the forestation areas have been recommended.

Key words: *Soil quality parameters, land planning, soil erosion, rural recreation*

BIOINDIKATORS AND ENVIROMENTAL POLLUTION

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Abstract

Environmental pollution adversely affects on living things and environment. These things react differently to the deterioration of the ecosystem. The World Health Organization (WHO) estimates that about a quarter of the diseases facing mankind today occur due to prolonged exposure to environmental pollution.While some of species moved from this environment some of resisting species remain. Most of the bioindicators, benthic organism, live at the sea bottom and slowly moves. To determine the contamination of the soil cryptostigmat mites and quality of water may be used as well as fish, benthic organisms algae, bacteria (indicator bacteria) and plankton (planktonic indicator species).For example; *Salmo trutta* (carp fish) is an indicator in low temperature oxygenated fresh water. Organic and inorganic impurities in areas where it can live up to *Chlorophyta* and typically species *Cyanophyta* member is observed. *Posidonia oceanica*, *Cymodoce nodosa* clean area are species which indicated. One of the pollulution indicator species are green algae*Ulva rigida*, *Ulva lactuca*,*EnteromorphalinzaE. intestinalis* and red algae *Gracilaria verrucosa*in our seasIn the same way,it the Oribatid mites humidity temperature can be usedas an indicator because of its response to changes in the content of heavy metals and organic substances. Another study on the impact of very serious sulfur and heavy metal pollution on the density and diversity of oribatid mites werecarried out around the big Norilsk Nickel mining in Middle Siberia In this article information about the use of indicator species and environmental pollution will be provided.

Keywords: *Bioindikator, carp fish, oribatid mites, pollution, environment.*

ALLEVIATION OF BORON STRESS ON WATER CONTENT AND ENZYMATIC/NON-ENZYMATIC ANTIOXIDANT SYSTEM THROUGH EXOGENOUS FERULIC ACID APPLICATION IN WHEAT (*Triticum aestivum* L.) ROOTS

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Abstract

Boron (B) is unique as a micronutrient in that the threshold between deficiency and toxicity is narrow. B stress-induced reactive oxygen species (ROS) are possibly scavengedby ferulic acid (FA). FA is an abundant phenolic phytochemical found in plant cell wall components and exhibits wide variety of biological activities such as antioxidant, metal chelation, modulation of enzyme activity and signal transduction. However, the studies about this effect have focused more on animals.The present study is aimed to study the effects of exogenous FA on growth, water content and the activities of enzymatic [ascorbate peroxidase (APX) and glutathione reductase (GR)] and non-enzymatic antioxidant [ascorbate (AsA), glutathione (GSH), oxidized glutathione (GSSG)] and of lipid peroxidation (TBARS) in roots of boron-stressed wheat (*Triticum aestivum* L.).For this, three-weeks-old wheat seedlings were treated with 4 and 8 mM boric acid (B) with/without FA (25 and 75μM) treatments for 7 days (d). After B treatment, the growth and water content (RWC) was observed to be reduced and this reduction was proportional to the increased B concentration. However, a beneficial effect of FA supplementation on the B-stressed wheatroots was manifested also by an increase in growth and RWC. Also, the increased activities of APX and GR and, the enhancement in AsA and GSH contents were observed in response to increasing levels of Bconcentration. When compared to the plants treated with stress alone, added FA significantly decreased TBARS content. Results suggest that FAapplication may be involved in the alleviation of damage causedby ROSoverproduction through improving the growth, water content and, enhancing antioxidant defense system.

Keywords: *Antioxidant enzymes; Ascorbate; Ferulic acid; Glutathione; Triticum aestivum*L.

DETERMINATION OF HARRAN UNIVERSITY AGRICULTURE FACULTY STUDENTS' AWARENESS OF CLIMATE CHANGE IN ŞANLIURFA, TURKEY

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Abstract

Global climate change occurs as a result of strengthening of natural greenhouse effect with increase in the concentration of greenhouse gases by human impact. As a result of this, earth temperature is rising. Rises in air temperature result in climate changes on the world. Unfortunately, climate change has become a problem on a global scale in recent years. It was wondered whether or not such an important issue was known by university students. The aim of this research was to determine the perception of the climate change term by the students studying at Harran University. For this purpose, a survey was conducted to 60 students studying at Faculty of Agriculture. Case study is carried out at Agriculture Faculty during the academic year 2015-2016. In this research, importance of global warming for the students their precautions for it and their environmental sensitivities were investigated. Significant differences were found between the students major and their climate change perception. 93 % of students believes that global warming is caused by climate changes. Therefore, it is essential to take care of consumptions of water, electricity, paper and cosmetics and recycling.In order to raise awareness of the next generation for environmental issues, each faculty should give courses on this. As a result of university students with environmental groups to increase awareness for environmental issues and the students who were sensitive about the environmental issues to planned environmental education.

Keywords: *Climate Change, Global Warming, Environmental sensitivities, Awareness*

RECYCLING OF AGRICULTURAL WASTES USING COMPOSTING: WINDROW METHOD

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Abstract

Soil physical and chemical characteristics are very important forsustainable agricultureand soil quality. Organic matter is a component of soil affecting extremely positivesoilphysical,chemical and biological properties, and itisalsoan indispensable elementof sustainablefarming practices. Many materials can be used as an organic matter sources, and one of them is compost. Composting is the aerobic decomposition of organic materials under high temperatures. Composting is a process actually ongoing in nature, and it is a nutrient recycling in the ecosystem. Products obtained by composting improve soil physical and chemical characteristics. In this study, wastes produced during agricultural production in farm affiliated with Agricultural Faculty of Ankara University were composted by using windrow method. Cattle, sheep and chicken litters, vegetative residues and a mixture including all of the wastes were used as compost windrows. The length, width and height of windrows were nearly 100m, 3m and 1m, respectively. Windrows were periodically turned by compost turner, and temperature, moisture and C/N ratios were measured during composting period. Composting was terminated at the end of two months considering the temperature, physical appearance, C/N ratios in windrows. Afterwards, organic matter content, total organic C, N, P, K, Ca, Mg, Fe, Mn, Zn, B, Cu, Cr, Cd, Pb, As, Hg, and water soluble P, K, Ca, Mg, Fe, Mn, Zn, B, Cu, and moistures retained at pF0, pF2,54 and pF4,2 were determined in all composts. Also, phytotoxicity tests were done in composts. Then composts were evaluated for agricultural use in term of physical and chemical characteristics.

Keywords: *Environment, soil quality, composting, wastes, agriculture*

DETERMINATION OF SUITABLE WALNUT PRODUCTION AREAS IN LOWER KELKIT BASIN IN TURKEY AND MAPPING BY GEOGRAPHIC INFORMATION SYSTEMS

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Abstract

Lower Kelkit Basin is the region which is located in the border of Tokat (Reşadiye Başçiftlik, Niksar, Erbaa) and Amasya (Taşova) cities of Turkey. Total area of the basin is 433.703 hectares. The altitude of the region is the base of the mountain, which is surrounded by land in between 200-590 meters. The height of the mountains from the west to the east progressed towards increasing until 1400 meters. In the basin, a total of 137.812 hectares of land is carried out agricultural hydraulically and non-hydraulically. 187.327 hectares of forest and bush areas in the basin, there are 42.488 hectares of grassland area. There are no major industries in the basin mainly an agriculture provides the livelihood to the local population Walnut is an important feature of economic items. In particular, the industry has been formed and based on walnuts in Niksar district. Our study aimed to determine the appropriate fields for walnut cultivation in the basin, and mapping the suitable areas. Currently, cultured varieties of local and national varieties suffer from the late spring frost in many areas. Our study determined to be particularly suitable varieties of one of the main problems in growing walnuts is important for our country to bring a solution to the problem. Suitable areas have been identified considered walnut in the economic field, flowering, leafing date, climate and soil requirements, yield and quality will be decisive in many ways, such as economic values. In the study have made a field survey, point data were collected with Global Positioning System (GPS). Determination of these points, land use status, soil structure, their distance from residential areas, industrial areas and away from the mines and evaluated in terms of erosion risk and the scoring system was created. Vector and elevation of land benefiting from digital elevation model (DEM) maps, unsuitable areas were determined in ArcGIS program. The collected point data were analysed by the ArcGis program used Cracking techniques and the maps were established.

Keywords: *Lower Kelkit basin, Tokat, walnut, geographic information system (GIS)*

THE COMPARISON OF SOWING METHODS ON DICHONDRA REPENS IN IGDIR CONDITIONS (TURKEY)

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Abstract

*Dichondra repens*is the most widely used vegetation asground cover plant that has a creeping habit in the landscape. Increasing seeding rates may help decrease weed pressure in *Dichondra repens* with proper sowing methods. The objectives of this paper are to analyse two different sowing methods(1.the agriculturalnonwoven fabric (agril)method and 2. the conventional sowing method) at different seedingrates (10, 20, 30, 40, 50,100, 150, 200, 250 and 300 ha^{-1}) on covering rate of *Dichondra repens* on ecological conditions of Igdır plain. The obtained data were analysed by repeated measures design with two factors, sowing method and time. The results showed that there was a significantdifference between in both sowing methods and timesin terms of covering ratio ($p<0.05$). Weeds were difficult to control in Dichondra on the conventional sowing method compared with the agril nonwoven method in the experimental area. The covering on the surface of the plots with biodegradable nonwoven material (the agriculturalnonwoven fabric method) before seeding had a positive impact on covering ratio of*Dichondra repens*compared with the conventional sowing method. While the plant coveringratio reached up to85 % in the agriculturalnonwoven fabric method,but the covering ratio was 1%in the conventional sowing method at T6, respectively. However, strong linear relationships are obtainedbetween the plant covering ratio and seeding rates in both the agriculturalnonwoven fabric method,R^2 (0.96, 0.89, 0.88, 0.85 and 0.70) and the conventional sowing method, R^2 (0.95, 0.97, 0.98, 0.98 and 0.93) at (T1, T2, T3, T4 and T5), respectively.Consequently, the agriculture nonwoven fabric sowing method to be used in parks, gardens and landscapes will provide a very significant savings, reducing the use ofseed and for weed controlandwill be particularly prominent in terms of health maintenance.

Keywords: *Dichondra repens, Sowing methods, Seed rates and Plant covering rate*

LONG TERM VARIATION OF RAINFALL IN SOUTHEASTERN ANATOLIAN PROJECT (GAP) AREA

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Abstract

In this study, variation in annual and seasonal rainfalls in Southeastern Anatolian Project (GAP) area was analyzed by using the non-parametric and parametric approaches. According to Mann-Kendall (MK) test, there were significance monotonic trend in the five of the considered rainfall stations, whereas unit root test was incompatible with the MK.

Keywords: *GAP, Mann-Kendal, unit root test*

VARIABILITY ANALYSIS ON WATER QUALITY OF STREAMFLOW FROM YESILIRMAK BASIN IN TURKEY

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Abstract

In this paper, variability in monthly water quality records at Durucasu monitoring station on the Yeşilırmak River in Turkey was analyzed by considering the Mann-Kendal (MK) and Theil-Sen Slope estimator (TSE) statistical approaches to detect the direction and magnitude of an available monotonic trend in any given data.For this purpose, the data sets of nine analysis parameters, based on monthly measurementat the monitoring station, were considered in the study. The pH, chlorides, sulfates and SAR data sequences for some months had statistically significance upward trend when there was a decreasing trend in streamflow data of the nine months. The largest percent change in streamflow data was found as 153% in November, whereas July in the pH, June in chlorides and January in sulfates and SAR had the maximum percent change.

Keywords: *Yesilirmak, **w**ater quality, Mann-Kendal, Theil-Sen Slope estimator*

THE DETERMINATION OF EFFECTS OF SOIL CONDITIONERS ON WATER EROSION IN SOILS HAVING DIFFERENT TEXTURES

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Abstract

The water erosion, which can be observed in every region where heavy precipitation and sloping lands are present, is a type of erosion that erodes the soils at most. Polyacrylamide (PAM) and phosphogypsum (PG) are two of substances used for soil conservation. PAM has not been produced in Turkey at the present time, and its price is very expensive. On the other hand, PG is waste product of the fertilizer plants that produce and use phosphoric acid and is produced in Turkey. This study tried to determine amount of soil loss of three different soil samples (Clay loam, Sandy loam and Loam), which were taken from Tuzluca District, Igdir Province of Turkey and eroded, through the precipitation formed in rainfall simulator and having the intensity of 100 (± 3) mm h^{-1}. The soil samples were subject to eighty one 1-hour rainfall processes, involving three different and repeated rainfalls as Control, PAM (7.5 kg ha^{-1}) and PG (7.5 ton ha^{-1}). While PAM applications increased final infiltration values at the rate of 70% and overall infiltration values at the rate of 39-48%, they decreased runoff values at the rate of 19-41%, erosion occurring via runoff at the rate of 200-300% and amount of soil replaced via side splash at the rate of 250-300%. While PG applications increased last infiltration values at the rate of 54-57% and overall infiltration values at the rate of 28-38%, they decreased runoff values at the rate of 20%, erosion occurring via runoff at the rate of 190-260% and amount of soil replaced via side splash at the rate of 200-260%. According to results of analysis of variance, positive effects of PAM and PG on erosion processes were found to be significant at the level of $P<0.05$ and $P<0.01$.

Keywords: *Simulating rainfall, PAM, PG, infiltration, runoff, erosion.*

POSSIBLE EFFECTS OF GLOBAL WARMING ON AGRICULTURAL SOILS

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Abstract

The soils and climate are closely linked and covered with each other. Similarly, these factors are always prone to many external factor(s). One of the most important is potential effects of *Global warming* on agricultural soils. Within this context, these potential effects can be itemized as follows: i) *on soil water* (drought, location, growing and breeding practices, environmental temperature, soil water content reducing, etc.) ii) *on soil temperature* (vegetation, organic matter, moisture, conductivity, etc.) iii) *on soil workability* (management of arable crops, tillage machinery, accessibility of land, the soil water content, etc.) iv) *on soil structure* (combination or arrangement of the particles, organic or inorganic components of the soil, etc.) v) *on soil degradation* (salinity, waterlogging, transporting agents such as water, wind, acidification, erosion etc.) vi) *on soil organic matter* (availability of soil water, decomposition and decaying of the remains, etc.) vii) *on soil nutrient status* (availability of the soil water usage, plant growth, ecological factors, soil profile depth, etc.) viii) *on soil ecology* (soil microbial activity, nutrient cycling, topography, etc.) ix) *on mineral transformation* and *clay surface processes* (weathering, temperature, water percolation, etc.) x) *others* (land management and use, interactions between soil and climate factors, soil carbon deposition and sequestration, etc.). It is important to know possible effects of global warming on agricultural soils either positively or negatively. Otherwise, it will be very late for agricultural sector and its related factors. In this presentation, the possible effects of global warming on agricultural soil will be explained diagrammatically and schematically.

Keywords: *Agricultural Soils, Global Warming, Soil Properties*.

THE SELENIUM CONTENT OF AMANITA SPECIES FROM SAMANLI MOUNTAIN OF MARMARA REGION (TURKEY)

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Abstract

Selenium contents were analysed in some wild *Amanita* taxa (*A. caesarea* (Scop.) Pers., *A. excelsa* (Fr.) Bertill., *A. franchetii* (Boud.) Fayod, *A. gemmata* (Fr.) Bertill., *A. mairei* Foley, *A. muscaria* (L.) Lam., *A. pantherina* (DC.) Krombh., *A. phalloides* (Fr.) Link, *A. rubescens* Pers., *A. vaginata* (Bull.) Lam. and *A. verna* (Bull.) Lam.) from Marmara region of Turkey by ICP-AES equipment. The widespread forest vegetation types in the research area are *Fagus orientalis*, *Carpinus betulus*, *Castanea sativa*, *Abies nordmanniana* susbp. *bornmulleriana*, *Pinus sylvestris*, *Pinus maritima* (cultivated) and *Quercu*s sp. communities. Selenium uptake levels were observed at different amounts in *Amanita* species. Selenium levels were determined as 0.1-1.10 mg.kg^{-1} (*A. citrina*), 0.1-2.20 mg.kg^{-1} (*A. gemmata*), 0.10-3.80 mg.kg^{-1} (*A. muscaria*), 0.30-3.80 mg.kg^{-1} (*A. excelsa*), 0.20-11.50 mg.kg^{-1} (*A. rubescens*), 1.10-2.70 mg.kg^{-1} (*A. caesarea*), 1.60-4.40 mg.kg^{-1} (*A. mairei*), 0.30-0.90 mg.kg^{-1} (*A. phalloides*), 0.70-2.50 mg.kg^{-1} (*A. vaginata*), 0.20 mg.kg^{-1} (*A. pantherina*), 3.70 mg.kg^{-1} (*A. franchetii*) and 3.20 mg.kg^{-1} (*A. verna*). The highest Se concentrations were determined as 11.5 mg.kg^{-1} in *A. rubescens*. In order to demonstrate possible spatial variations in Se composition of *Amanita* species multivariate analysis [cluster (CA)] were done.

Keywords: *Se, Amanita, Mushroom, Turkey*

TILLAGE EFFECT ON SOIL QUALITY INDICATORS IN SECOND CROP MAIZE PRODUCTION

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Abstract

Improving and maintaining the level of soil functions in agriculture are important to sustain food, fibre and quality of environment. The purpose of this study was to assess the impact of tillage practices on the indicators of soil quality in a corn, wheat rotation field. The Soil Management Assessment Framework (SMAF) was employed to obtain the scores of each of quality indicators and overall soil quality index. The three year experiment was carried out in an alluvial field (Turhal, Turkey) with clay texture. The tillage systems used in the experiment were Irrigation+Moldboard plow +Disc harrow (CT1), Moldboard plow+Rotovator (CT2), Rotovator (RT1), Chisel+disc harrow (RT2), and No till (NT). Bulk density (BD), pH, electrical conductivity (EC), total organic carbon (TOC), aggregate stability, plant available P and K concentrations were determined. The lowest BD score was obtained in NT with 0.28 and highest by RT2 with 0.37. Surface TOC score and silage corn yield had significant positive correlation ($P<0.05$). The results revealed that soil tillage systems are needed to enhance organic carbon content of soils to increase the yield and minimize adverse impacts on the soil quality. The highest soil quality score for 0-10 cm depth was recorded in CT1 and RT2 as 0.71, for 10-20 cm depth in CT1 as 0.71 and for 20-30 cm depth in CT1 as 0.70. Although NT has been recognized worldwide as a more suitable system than tillage for enhancing soil quality by many of the researchers, the SQI values in NT system were found as 0.70, 0.68 and 0.67 for the consecutive three soil depths.

Keywords: *Indicator, Tillage Practice, Soil Properties, Soil Quality.*

ECONOMICAL EVALUATION FOR APPLICABILITY OF SUSTAINABLE CULTIVATION METHODS UNDER SILAGE CORN AND SILAGE TRITICALE ROTATION

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Abstract

Field experiment was conducted to determine the efficiency of four different tillage systems on time consumption, gross return and crop yield of silage maize and silage triticale rotations. The experiment with three replicates was carried out in two different soil series (Kizilca and Karadeli) at central Anatolia region of Turkey. The tillage systems were: conventional tillage system (CT), reduced tillage system (RT1), reduced tillage system (RT2) and direct seeding (NT). The lowest time consumptions for silage corn and silage triticale were recorded 0.20 h/ha and 0.28 h/ha in NT and the highest work success was obtained 4.93 ha/h and 3.58 ha/h in NT. The highest time consumption and the lowest work success were obtained 1.15 h/ha and 1.22 h/ha, and 0.87 ha/ha and 0.82 ha/h in CT for silage corn and silage triticale, respectively. The highest silage yields for Kizilca series were recorded as 41.9 ton ha^{-1} and 15.3 ton ha^{-1} in RT2 system and in Karadeli Series RT1 system yielded the highest yields of 34.0 ton ha^{-1}- and 15.01 ton ha^{-1}, respectively. The highest cost for both crops was irrigation due to the arid nature of the experimental site. The highest income-cost ratios for silage corn and triticale were obtained in RT2 (1.84-0.92) for Kizilca soil and in RT1 (1.49-0.75) for Karadeli soil. The RT2 system appeared to provide the highest gross income under silage corn and silage triticale rotation in the region. However, NT might provide higher benefits in time when soil becomes more stabile.

Keywords: *Soil tillage, conservation tillage, time consumption, gross returns, sustainable production.*

CONTRIBUTION OF PHYSICAL QUALITY PARAMETERS TO CO_2 FLUX İN A FLOOD PLAIN UNDER DIFFERENT MANAGAMENT SYSTEMS

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Abstract

Natural and human interferences such as tillage may play significant impacts on porosity and efflux of CO_2 from soil surface. Accurate description of time and space dependent CO_2 flux is fundamental in many ecological studies to explain the processes such as water infiltration and storage. This study demonstrates and compares the effects of soil physical quality indicators on CO_2 diffusion under three different (field crop production, orchard and pasture) management systems. Total of 377 soil samples were collected from 0-15 cm depths of field crop grown fields (326 sample), orchards (12 samples) and pastures (39 samples). Bulk density (BD), total porosity (TP), volumetric water content (θv), air filled porosity (AFP) and water filled pore surfaces (WFPS) of soil samples were determined. The effect of management systems on physical quality indicators except WFPS was found to be significant. The highest bulk density value was recorded under orchard and the lowest was under pasture. The soils compaction as indicated by high BD values strongly affected the TP of soils. However, orchards had the lowest potential as shown by the lowest AFP 9.76% and the highest BD 1.54 g/cm^3 values. Further studies on CO_2 flux measurements for specific plant, various moisture contents and temperatures in the region should be conducted. Farmers in the region usually apply conventional tillage practices which significantly deteriorate soil structural porosity and water permeability of soils. Agricultural practices applied in orchards and field crop areas should be reconsidered and practices to sustain agricultural production should be adopted.

Keywords: *CO_2 fluxes, soil management, spatial, water filled pore space, bulk density, total porosity.*

DETERMINATION OF HEAVY METAL POLLUTION CAUSED BY MOTOR VEHICLES: ŞANLIURFA-VİRANŞEHİR HIGHWAY EXAMPLE, TURKEY

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Abstract

The purpose of this study was to determine the distance dependent changeability of heavy metal accumulation in the soil along highways, which is caused by vehicle traffic. Soil samples were taken along North and South side of the highway at 6 seperate sites with 2 km distance, from points 0, 15, 30 and 60 meter distance from the highway at each site in Şanlıurfa- Viranşehir in 2012. Four samples were taken from 0-15 cm depth at each point, making a total of 96 measurements. Obtained results were evaluated statistically and lead, nickel, cadmium, cupper, chrome and zinc values were found inside permissible limits depending on distance. It was also observed that the heavy metal concentration decreases with increasing distance away from the highway. These results suggest that the pollution in the samples was caused by vehicle traffic.

Keywords: *Heavy metal, Soil pollution,Environmental pollution.*

IMPROVOMENT OF SOIL ENZYME LEVELS THROUGH HALOPHYTES

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Abstract

Salinity is one of the major limiting factors for plant growth and productivity throughout the world. Damage by salinity is observed as loss of crop productivity and quality. In severe cases, plant death is inevitable. Although salinity in soils existed before human activities, industrialization or excess irrigation or irrigation with marginal quality of water resulted in heavy accumulation of salt both in non-agricultural and agricultural areas. In order to increase the crop productivity in these areas, use of salt tolerant plants is not always the option since they have a certain capacity to tolerate salt. Therefore, these areas should be remediated by removing the salt via physical, biochemical or biological approaches for cultivation of salt tolerant, moderately salt tolerant or even for salt sensitive plants. In this study, one of the halophyte species *Salsolasoda* was employed for 14-week plantation in non-saline (EC= 1.38 dS m^{-1}), slightly saline (EC= 3.5 dS m^{-1}) and high saline (EC=9.6 dS m^{-1}) soils to improve the soil health condition. Soil pH became slightly alkaline in all soil conditions (from 8.1 to 8.4 in non-saline; 7.8 to 8.1 in slightly saline; 7.9 to 8.4 in saline soils) while soil EC levels were significantly decreased, $P< 0.05$. Soil enzyme contents such as dehydrogenase, protease and urease significantly increased in non-saline, slightly saline and saline soils after cultivation with *S. soda*, $P<0.05$. We conclude that the use of *S. soda*, a cost-effective approach, could improve the soil health via decreasing soil EC level and increasing soil enzyme level in non-saline and saline-affected areas.

Keywords: *Halophytes, Salsola soda, Phytoremediation, Soil enzymes, Electrical conductivity.*

TREATED SEWAGE SLUDGE APPLICATIONS: HEAVY METAL CONTENTS OF CORN AND SECOND CROP WHEAT SEEDS GROWN IN SANDY CLAY SOIL

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Abstract

In this study, effect of treated sewage sludge (TSS) rates and mineral fertilizer applications on heavy metal content of corn and second crop wheat seeds grown in a sandy clay soil was investigated. The experiment was conducted in the experimental fields of Ege Agricultural Research Institute during 2011-2012 in Menemen-İzmir Turkey. The field study was conducted in 20 plots in a randomized-block design with four replications and five different applications including control, mineral fertilizer, treated sewage sludge 12.5 tha^{-1}; 25.0 tha^{-1}; 37.5 tha^{-1} as dry matter. Corn (*Zea mays* L. var. ZP 737) was the first crop, wheat (*Triticum durum* L. var. Ege 88) was second crop. Increasing TSS applications to soil resulted in significantly increased concentrations of Pb in corn seeds. But it was under threshold values. The heavy metal contents of corn seeds were within the normal limits for Cr, Cu, Ni, Pb and Zn while Cd was not present in corn seeds. Increasing TSS and mineral fertilizer applications to soil resulted in significantly increased concentrations of Cu in second crop wheat seeds according to control.But also it was under threshold values. The heavy metal contents of second crop wheat seeds were within the normal limits for Cd, Cr, Ni and Zn while Pb was not present in wheat seeds. It is recommended that 37.5 tha^{-1} TSS of İzmir city can be used once in a 2-year period for improving properties of sandy clay soil for corn and wheat growth without having any heavy metal problems.

Keywords: *Corn, Heavy metals, Treated sewage sludge, Sandy clay soil, Wheat*

GROWTH OF PEPPER (*CAPSICUM ANNUUM* L.) IRRIGATED WITH WASTE WATER DILUTED AT DIFFERENT LEVELS

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Abstract

The sectoral water consumption in the world accounts for approximately 70% of agricultural irrigation water. As the world population increases, the need for food also increases and irrigation water remains insufficient. Therefore, it is necessary to use treated waste water as an alternative to irrigation water. In this study, the use of treated waste water taken from Van Treatment Facility in pepper (Capsicum annuum) cultivation was investigated. This study was carried out as a pot experiment in growth chamber in 2015. For the irrigation applications treated waste water was diluted at three levels (33% waste water + 67% clean water; 67% waste water + 33% clean water and 100% waste water) and clean water was used as control. The electrical conductivity, pH, Ca, Mg, Na, K, CO_3, HCO_3, Cl, NO_3 and suspended solid amounts in irrigation water; chlorophyll measurement (SPAD), shoot length, number of branches, and number of flowers were determined. The difference between shoot length, number of branches, and number of flowers of the subjects irrigated with treated waste water and control subject irrigated with clean water was found significant.Approximately 10% of increase in number of branches and flowers to 30% in shoot length were obtained at the end of the irrigation with treated waste water.

Keywords: *Waste water, Waste water use, Irrigation, Capsicum annuum L.*

MORPHOLOGICAL DIVERSITY OF WILD MYRTLE (*MYRTUS COMMUNIS* L.) POPULATIONS IN ALBANIA

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Abstract

Myrtus communis L. is a common shrub of the Mediterranean basin, well known for its medicinal properties, content of essential oils and ornamental value. In Albania, myrtle grows wild, mainly in the western part of the country, where it forms a vegetation belt. Morphological and genetic diversity of wild *Myrtus communis L*. populations in Albania have not been evaluated yet. This research explored and morphologically evaluated 16 wild myrtle populations collected from four localities in Albania in order to provide the first characterization and obtain important data for the management and conservation of myrtle genetic resources and also for future domestication and breeding programs. The data showed high variability among myrtle populations for some of the examined traits, such as plant height, branch height, leaf height and width. The Unweighted Pair Group Method with Arithmetic mean (UPGMA)clustering revealed morphological diversity, the mean similarity value among populations was low (0.18); the populations grouping was not clearly related to their geographical distribution. The Principal Coordinate Analysis (PCoA) performed on Nei's unbiased genetic distance matrix showed no grouping of populations based on their geographical origin, supporting the results obtained in UPGMA cluster analysis. The results obtained in this study highlighted a high level of variation of wild myrtle populations in Albania, which represents a valuable resource to be conserved.

Keywords: *Myrtis communis L., morphological traits, diversity, Albania.*

ON-SITE AND OFF-SITE EFECTS OF LAND DEGRADATION IN ALBANIA

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Abstract

Land degradation seriously impairs food security, biodiversity and economic development, especially in lower income countries, such as Albania, where land users are highly dependent on the quality of natural endowments. This paper is devoted to preliminary assess the economic cost of land degradation in Albania resulting from poor land use. The framework for the Economic Assessment of Land Degradation is based on comparing the costs of action against land degradation versus the costs of inaction. The causes of land degradation are divided into proximate and underlying ones, which interact with each other to result in different levels of land degradation. The impact of land degradation on soil uses is valuedin economic terms according to the typology of the economic impact of the land degradation. The different impacts have been classified spatially into on-site and off-site effects, distinguished according to the economic values that are affected. The results show that, the private, on-site costs of soil degradation are significant, but will not be a major concern in the short run. However, on the local scale, impacts will be more substantial for the affected areas. The off-site costs of soil degradation are substantial. In some cases, they may exceed the on-site costs, despite the fact that a large part of the off-site costs could not be quantified. Some of these issues, especially the conservation of water resources and sustainability of water resources management by reducing the sedimentation in rivers and dams from land degradation, call for immediate measures.

Keywords: *Economic Assessment, Cost, Impact, Soil use, Sustainability.*

BATCH PROCESS TESTING FOR ANAEROBIC CO-DIGESTION AS AN ALTERNATIVE FOR RENEWABLE BIOGAS

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Abstract

A bioreactor was filled with different substrates at once and left to degrade anaerobically without any interference until the end of the cycle phase. Experiments were performed in usual 1.5-l digester flasks in the batch process and measurement of biogas was done by standard water displacement method. The biogas production was recorded up to 50 days.Different agricultural and animal wastes have been tested. In most of the cases pretreatment in the form of soaking in water, acid or alkali was found to increase the biogas content on digestion mixed with chicken manures or any other animal waste the yield was higher. Our study has been firstly focused in preparing biomass for the anaerobic digestion for methane profit, using calculated mixtures of different agro-forestry residues such as spent organic substrates, wheat straw, corn straw, corncob and a mixture of leaves and thin sticks etc., premixing them with animal wastes like manures and other organic wastes. Experimental series have been performed with wide ratios C:N in range 23-40.So, we have followed a systematic procedure for the anaerobic biologic digestion process design simulated in a fixed capacity chosen. At the end as a result we have recommended an engineering flow sheet for the specified biochemical process.

Keywords: *Renewable energy, Biogas, Biomass, spent substrate, anaerobic digestion.*

DYNAMICS OF WASTEWATER QUALITY BEFORE AND AFTER TREATMENTTHROUGH PILOT PLANT

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Abstract

Discharge of untreated wastewater into the environment and/or especially in the superficial freshwater like rivers, lakes and the coast is the main cause of pollution. Untreated wastewater consists of liquid wastes discharged by domestic residences, commercial centres, industries, and/or the agriculture sector and can include a wide range of potential pollutants. For this purpose, considerable work was done to assess the quality of contaminated residence's wastewater near the Agricultural University of Tirana, before and after treatment, using a pilot plant. Physical and chemical parameters of wastewater were examined, and the necessary recommendations were suggested in order to improve water quality. Quality assessment of untreated and treated wastewater, analysing physical and chemical parameters, was performed for a period of three years, from 2012 to 2014. Physical and chemical pre-treatment parameters (pH 8.10, TSS 213.4 mg/l, N-NH_4 38 mg/l, 1.03 mg/l for N-NO_3, N-NO_2 0.21 mg/l, N-Total 44.4 mg/l, P-Total 4.26 mg/l, COD-Total 270 mg/l and BOD 176.28 mg/l) and after treatment parameters (pH 7.9, N-NH_4< 0.05 mg/l, N-NO_3 0.1 mg/l, N-NO_2< 0.02 mg/l, P-Total < 0.05 mg/l and COD 40 mg/l) were analysed. Results confirmed that the quality of the treated water through the use of the pilot plant, referred to the content of COD, BOD_5, TSS, N and P, is within the standard norms set by the Albanian and EU standards, for the third level treated water.

Keywords: *Wastewater, pilot plant, physical and chemical parameters, permissible level*

THE EVALUATION OF AIR POLLUTION IN SOUTH-EASTERN REGION OF ALBANIA

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Abstract

Atmospheric pollution causes serious damage for human health and to all natural ecosystems. Nowadays, the biggest provocative of atmospheric pollution is anthropogenic human activities and transport sector, main pollutants being heavy metals (HM).Study and evaluationof air pollution level from heavy metals in south – eastern Albania region was performed with mosses (specie *Hypnum cupressiforme)* as bio-monitor.Active biomonitoring technique for determination of atmospheric deposition level of heavy metals was applied in Albania since 2010. Based on the fact that the mosses are plant *with* un-development root system, consequently they take the nutrients mainly from rain and atmospheric deposition, the amount of heavy metals in those, reflect direct the air quality.The mosses were collected in 7 different stations in south-estern region of Albania. Sampling was performed in accordance with the LRTAP Convention – ICP Vegetation protocol and sampling strategy of the European Program on Bio-monitoring of Heavy Metal Atmospheric Deposition. The ICP/AES analysis of 11 elements (Al, Cr, Cu, Fe, Li, Mg, Mn, Ni, Pb, V and Zn) was performed by the Institute of Chemistry, Faculty of Science, Sts. Cyril and Methodius University, Skopje, Macedonia. Statistical analysis and correlation analysis, was applied to distinguish elements mainly of anthropogenic origin from those predominantly originating from natural sources and to point out the most polluted areas. The study of the contamination factor for the analyzed elements show that the region south - eastern Albania is slightly contaminated by heavy metals.

Keywords: *Moss, ICP/AES, heavy metal, contaminated factor*.

BEHAVIOUR OF SEVERAL APPLE (*MALUS DOMESTICA* BORKH.) CULTIVARS GROWN UNDER AGRO-ECOLOGICAL CONDITIONS OF GJAKOVA, KOSOVO

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Abstract

Study "Behaviour of several apple (*Malus domestica* Borkh.) cultivars grown under agro-ecological conditions of Gjakova, Kosovo", was carried out during the period 2014-2015, in Skivjan, Gjakova, in an apple orchard planted in 2006, using grafted seedlings over M9. Apple trees were planted in distances 3.8 m x 1.8 m (1460trees/ha). Six apple cultivars (variants) (Montear Gala, Royal Gala, Red Falstaff, Saturn, Jonagored, and Golden Delicious), 4 replications, with 5 apple trees for each variant on each replication, were used. There was found that there were significant differences between cultivars for flowering period and duration. Montear Gala bloomed the first (April 26), followed by Royal Gala (April 27), Red Falstaff (April 29), Saturn (May 10), and Jonagored (May 12). Flowering duration varied from 13 days, for the earliest cultivar (Montear Gala) to 9 days, for the latest cultivar (Jonagored). At harvest time, there were measured, evaluated, accounted and compared several quality indicators, such as moisture content (%), total soluble solids content (^{o}Brix), dry matter content (%),total acidity (mg/100 g), and vitamin C (mg/kg). DMC varied from 14.2% (Saturn and Montear Gala) to 16% (Golden Delicious), TSSC varied from 11.46^{o}Brix (Royal Gala) to 12.8^{o}Brix (Saturn), TA varied from 0.25 (Saturn) to 0.395 mg/100 g, and vitamin C varied from 195 mg/kg (Red Falstaff) to 230 mg/kg (Montear Gala). Observed differences between cultivars were significative and statistically confirmed by ANOVA, while, there was found a strong relationship between chemico-technological features of the apple fruits (r>0.9).

Keywords: *Apple cultivar, blooming period, chemico-technological features, duration, orchard.*

EFFECTS OF FRUIT THINNING METHOD ON FRUIT QUALITY INDICATORS OF "ROYAL GALA" APPLE CULTIVAR, UNDER GJAKOVA'S CLIMATE CONDITIONS

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Abstract

The study on effects of fruit thinning method on quality indicators of "Royal Gala" apples, trained on slender spindle and improved pyramidal shapes, was carried out during 2015, in Skivjan, Gjakova, in the South-Western part of Kosovo. Two different fruit thinning methods (hand thinning and chemical thinning using a combination of Carbaryl 1000 ppm + NAA 40 ppm, with 1200 L ha^{-1} spraying solution) and two replications, with 10 apple trees for each variant on each replication for each system shape, were used. Fruit thinning was carried out 15 days after bloom, when fruit diameter was 10-12 mm. At the harvest time, there were measured, evaluated, accounted and compared several quality indicators, such as fruit firmness (kg/cm^2), fruit colour (H^o), pH of juice, total soluble solids content (Brix), dry matter content (%), total acidity and malic acid content (% per 100 ml), and were counted the mean values for each thinning method. Observed results showed that thinning method (hand and chemical) significantly affected the fruit quality indicators of "Royal Gala" apple cultivar, of training systems, slender spindle and improved pyramidal shapes. Hand thinning showed more coloured fruits, higher SSC, higher DMC, and lower TA/MA, compared to chemical thinning (CB + NAA). The observed results were statistically confirmed by Anova ($p \leq 0.05$).

Keywords: *Carbaryl, chemical thinning, fruit quality indicators, "Royal Gala", hand thinning, Naphthalene Acetic Acid (NAA).*

CONSERVATION OF BIODIVERSITY AND GEOGRAPHICAL INDICATIONS IN MOUNTAIN AREA OF ALBANIA

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Abstract

There are two decades or so, that the biodiversity issue was enriched by a new dimension called "Agrobiodiversity". Geographical indications have been developed for primary and processed products of biodiversity.Geographical indication can be a tool to enhance the value of agrobiodiversity products and promote sustainable rural development. Geographical indications establish a connection between products (or services) and their territorial identity, and the quality, characteristics, and reputation of origin-based products are essentially associated with their geographical origins.The natural and cultural heritage of the Albanian Alps is one of the most rich and varied in Europe. The populations in these areas are, extremely poor and exploiting these natural resources, whether through farming or gathering, is one of the main means of earning an income. Official quality signs, especially Geographical Indications and organic farming, make it possible to improve product prices and value added for producers while encouraging the preservation of biodiversity by introducing this subject in product specifications. The aim of this paper is to present a research-action project aiming at crossing environmental injunction of biodiversity *in situ*conservation and traditional knowledge with economic objectives of rural period October 2015-March 2016P objectives were to identify, promote and protect agrobiodiversity in the poorest part of the country, creating quality signs of the local products(including medicinal and aromatic plants). BiodivBalkan project wants though the preservation of agrobiodiversity to: (i) improve the quality, adopt the standard and quality controls along the value chain; (ii) increase competitiveness of marginal producers in the market to bring higher income to farmers.

Keywords: *Agrobiodiversity, geographical indications, BiodivBalkan Project*

AN IMPROVED SIMULATION METHOD OF CRUDE OIL FRACTIONAL SEPARATION TO ACHIVE AHIGHER QUALITY IN NATURAL SOURCE MANAGEMENT

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Abstract

Crude oil refinery units are basic components in process plants of petroleum refinery. Changes in these units have a great impact on product yield and quality, so it is recommended to operate these units at optimal conditions, especially the distillation unit. The process of crude oil distillation impacts the refinery economy greatly. Design of crude oil distillation systems, which consists of distillation columns and heat recovery systems, are of great importance in the overall processes. The main objective of this paper is the evaluation of simulation results, in order to improve and archive optimized process units of crude oil distillation which will lead to a higher quality in natural source management. This way, we can reach better fractioning stages, reduced power and an overall integrated process. We have made the characterization of some natural oilfiled in Albania through distillation and evaluation of their physical characteristics. During the sampling process we also observed their environmental impact and determined the constituent components of crude oil. The aim of the study includes drawing true boiling curves based on our experimental measurements of crude oil sources in Albania and also interpretation of differences between simulation results and experimental results, in order to get an optimal characterization of crude oil.

Keywords: *Crude Oil, Simulation, Distillation unit, Albania.*

EFFECTS OF ENTOMOPATHOGENIC BACTERIA ON HONEYBEES APIS MELLIFERA INTERMISSA. EVALUATION OF PHYSIOLOGICAL CHANGES.

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Abstract

Bees have been part of culture and human heritagefor millenniums. Yet these useful insects seem increasingly affected by diseases and parasites. Repeated use of synthetic chemical compounds leaves harmful residues in wax and honey. In fact, the use of biological control agents (BACs) is encouraged. In this context, the present work studied the effect of two local bacterial strains of the genus *Bacillus* on honeybees *Apis mellifera intermissa*.

Initially we conducted a macroscopic, biochemical, physiological and physicochemical characterization of the two bacterial strains isolated in 2011, from soil in two regions from Algeria (a coastal area and the Sahara Desert).Study of abiotic characteristics of the two bacterial strains showed that growth is better at a temperature between 32 ° C and 45 ° C and pH between 6 and 8. Afterwards, we focused our study on the effect of these bacteria on mortality, feeding activity and production of wax. Hence, the study of the effect on mortality shows a low rate of mortality among bees treated with the two bacterial isolates; whereas the feeding activity demonstrates no effect on the consumption of syrup and pollen. Furthermore, the production of the wax slightly increased in some individuals treated with different concentrations of bacterial strains. Finally, it would be very advantageous for further study on these bacteria about their effects on other biological parameters of the bee.

Keywords: *Honeybees, bacteria, mortality, feeding activity, wax.*

LOTUS spp: BIOTECHNOLOGICAL STRATEGIES TO IMPROVE THE BIOECONOMY OF LOWLANDS IN THE SALADO RIVER BASIN (ARGENTINA)

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Abstract

The Salado River Basin region is the most important livestock breeding area in Argentina, wherethe *Lotus* species has been traditionally cultivated as forages. Nearly 60% of their land surface is dominated by salt-affected soils with severe constraints for crop cultivation. In order to cope with that limitation, farmers have utilized species such as non-native *L. tenuis* (ex- *Lotus glaber*), which shows a very good adaptation. As a result, inter-seeding of *L. tenuis* has been proposed as a strategy of choice for improving forage production in marginal areas. The increase in soil quality by these means is achieved by an increment of the organic matter content, improvement of soil fertility as well as microbial biodiversity. Thus, the introduction of *L. tenuis* and/or other *Lotus* genotypes could have enormous benefits for similar constrained lands around the world. We are developing an integrated analysis of the changes that occur in soils under legume production. We will not only analyze the microbial diversity associated, but also soil physical and chemical characteristics and the impact of different legume-microbes association on mitigation of GHG emissions. In addition, we are identifying the main genetic determinants associated with interesting agronomic traits such as plant tolerance against biotic and abiotic stresses and the content of condensed tannins. Our future and present research will build a solid base for the improvement of agronomically-important species and the development of better strategies for the management of constrained lands such as the lowlands in the Argentinean Pampas.

Keywords: *Lotus spp, Flooding Pampas, Salado River basin, Condensed Tannins, Constrained soils.*

EFFECT OF CLIMATE CHANGE ON AGRO HYDROLOGICAL BALANCE FOR SOME REGIONS IN BOSNIA AND HERZEGOVINA

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Abstract

The main characteristic of agro-hydrological balance (AHB) in Bosnia and Herzegovina (B&H) is the occurrence of surplus water during the cold months and water deficit during the warmer months.In the southern regions, surpluses and deficits of water are significantly more pronounced than in the central and northern regions of B&H.Among other things, within the research of agro-hydrological balance made for the period up to 1991, it was found that B&H agriculture covers most of the water needs throughout precipitation inputs (around 83%).Based on the comparative analysis for the period of 1981-2010, with respect to the reference period of 1961-1990, average yearly air temperature in B&H increased from 0.4 to 0.8ºC, whereas temperature increases during vegetation period were up to 1.0 ºC. Significant variability in precipitation has not been recorded within the same period. The main objective of this paper is to determine the significance of changes in AHB in some regions B&H as a result of climate change, with a special focus on the trend of water surpluses and deficits and their impact on agricultural production.Data from weather stations: Banja Luka, Tuzla, Zenica and Mostar, for the period 1991 - 2015 were used for analysis of AHB components by Thornthwaite-Mather method (TM). Potential evapotranspiration (PET) calculated with Thornthwaite method was used as input for water balance calculation. A significant increase in air temperature (1981 – 2015) resulted in change of PET value, and therefore the value of other AHB components, primarily water surplus and deficit.

Keywords: *Bosnia and Herzegovina, climate change, agro-hydrological balance, water deficit*

HABITAT TYPES OF EUROPEAN IMPORTANCE IN THE AREA OF WETLANDS GROMIZELJ (BOSNIA AND HERZEGOVINA)

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Abstract

The paper presents the types of wetlands habitat Gromizelj which is of European importance. The review is made on the basis of studies of flora and vegetation and the Guide of the types of habitats according to the European Union (EU) Habitats Directive. Swamp Gromizelj is located in the northeast of Republic of Srpska (RS) and Bosnia and Herzegovina (BiH), in the municipality of Bijeljina. During the research the following habitats have been isolated: 3150 Natural eutrophic lakes with Magnopotamnion-or Hydrocharition-vegetationtype, 3270 Muddy river banks with Chenopodion rubri p.p. and Bidention p.p.vegetation, 6430 Hydrophilous tall-herb fringe communities of plains and of the montane to alpine levels, Reedbeds, tall sedges and vegetation of Phragmito-Magnocaricetea, 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinusexcelsior* (Alno-Padion, Alnion incanae, Salicion albae) and 91F0 Riparian mixed forests of *Quercus robur, Ulmus laevis* and *U. minor, Fraxinus excelsior* or *F. angustifolia*, along great rivers (*Ulmenion minoris*).

Keywords: *Habitat, wetlands, Gromizelj.*

ASTERACEAE IN THE FLORA OF THE JAHORINA MOUNTAIN (BOSNIA AND HERZEGOVINA)

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Abstract

The aim of this paper is to present floristic diversity of the family Asteraceae in the flora of theJahorina Mountain in Bosnia and Herzegovina (BIH). TheJahorina Mountain is located in the central part of BiH and entity of Republic of Srpska, southeast of Sarajevo city It belongs tocontinental Dinarides with the direction of the main ridge from northwest to southeast. Jahorina massif is long about 30 km, with the highest peak Ogorjelica (1916meters above sea level). Research was carried out in the period 2010-2011. Taxonomic analysis of the Asteraceae family was found in 203 tax (135 species, 49 subspecies, 13 varieties and 6 forms). The analysis of the areal spectrum shows the dominance of the endemic areal group with 24 species and Euroasian group with 20 species. The biological spectrum of the Asteraceae family indicates the dominance of plants belonging to the hemikryptophytes life forms.

Keywords: *Asteraceae, flora, Jahorina Mountain*

RUDERAL ASSOCIATION *SAMBUCETUM EBULI*FELFÖDY 1942.OF THE MUNICIPALITY OF PALE (BOSNIA AND HERZEGOVINA)

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Abstract

The aim of this paper is to present the floristic composition, syntaxonomic affiliation, ecological and phytogeographical characteristics of the association. The studies were performed using the method of transect (Braun-Blanquet, 1965). Identification of species was based on floristic literature (Beck, 1903 и 1927; Josifovic ed. 1970-1977; Javorka et Csapody, 1979). Floral elements and life forms of plants have been given by Oberdorfer (2001). The floristic composition of this plant association is built out of 91 species. The dominant species *Sambucus ebulus* L. shows the highest level of presence (V) and ground cover (2150). The analysis of the areal spectrum shows the dominance of the Euroasian species(38%).The association has hemicryptophytic character,43 species (47%).

Keywords: *Ruderal association, areal spectrum, biological spectrum, Pale*

THE PROPOSAL OF MEASURES RECULTIVATION OF LANDFILLS, BOSNIA AND HERZEGOVINA

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Abstract

Soil is one of the most important natural resources. It is priceless, irreplaceable, immovable resource for agricultural production which cannot be multiplied and represents the good of humanity, not of one generation, nation, group or individual.The exploitation of coal in the Gacko coal basin is followed by excavation and disposal of large quantities of land (limestone-dolomite black soil, rendzinas, smonitza, brown soil on limestone and dolomite, fluvial land, fluvial meadow land) of different geological composition and characteristics. In the process of thermal power plants creates a huge amount of slag, ash and tailings that are usually deposited in its vicinity. Pedological profiles were opened, at the dump Dražljevo. Laboratory testing of physical and chemical properties of the soil were performed at the laboratory of the Faculties of Agriculture in East Sarajevo. Deposols are characterized by physical properties which are mostly much worse in relation to the properties of autochthonous soils on which the dumps have been formed.Measurement of microbial communities in the soil would provide answers to important questions such as the success of the restoration of the ecosystem and restore its basic functions and biodiversity of. To this end, microbial communities in the soil criteria to as: the number of microorganisms or their quantity, represented distinct species or functional groups and metabolic activity as measured asimilicaja or breathing.Possible contamination of landfills can be objectively explain only after determining the content of heavy metals and other pollutants, soil and plants that require further research.

Keywords: *Dump, recultivation,landfills*

EFFECT OF COMPOST APPLICATION ON CHEMICAL COMPOSITION AND QUALITY OF ORIENTAL TOBACCO KRUMOVGRAD 90

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Abstract

A comparative research on the impact of compost on the chemical composition and quality of Oriental tobacco Krumovgrad 90 has been carried out. The experiment was performed on an agricultural field contaminated by the lead zinc smelter near the town of Kardzali, Bulgaria (Ostovitsa village). The field experiment was a randomized complete block design containing two treatments and four replications (8 plots). The treatments consisted of a control (no organic amendments) and compost amendments (40 t/daa). Heavy metals were measured in roots, stems and leaves of Oriental tobacco Krumovgrad 90.The compost treatments had significant effects on the uptake and allocation of plant nutrients and heavy metals.It can be concluded, that heavy metals were accumulated mainly in the tobacco leaves.Soil contamination with heavy metals did not affect the quality of tobacco leaves.Application of the compost leads to increased content of potassium, calcium and magnesium in the leaves of tobacco and therefore may favorably affect burning properties of tobacco. Incorporation of compost in the soil affect plant height and number of leaves formed, leads to an increase in the size of the leaves and to a lowering of the quality of the tobacco. Application of compost to soil resulting in increased mineral substances (pure ash) and quantity of proteins, and reduces the amount of reducing sugars in tobacco leaves in relation to the control. The application of compost to the soil affects more negatively as regards quality and typicality of oriental tobacco variety of Krumovgrad 90.

Keywords: *Compost, Oriental Tobacco,Quality, Chemical composition*

SPECTROSCOPIC CHARACTERIZATION OF HUMIC SUBSTANCES OF ANTHROPOGENIC SOILS DERIVED FROM TERRA ROSSA

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Abstract

The aim of the study was spectroscopic characterization of humic substances and evaluation of humus quality of anthropogenic soils derived from Terra Rossa. The study was conducted on 15 soil samples collected from top-soil horizon of olive groves in Middle Dalmatia (Croatia). Total organic carbon was determined according to Walkley-Black method (1934) and humic substances isolation following procedure given by Schnitzer (1982). Spectroscopic characterization of isolated humic substances was carried out by measuring absorbance in VIS spectral range 400-700 nm and optical indices ($Q_{4/6}$, $E_{4/6}$) were calculated. SOC content in top-soil samples varied from 1.45% to 4.21% with mean value of 2.98%. The absorption spectrum showed monotonous decrease of absorbance from 400 to 700 nm for all samples. The optical indices $E_{4/6}$ and $Q_{4/6}$ varied from 3.58 to 5.05 and from 3.91 to 5.04, respectively and indicated differences of humus quality. The optical index below 4, which implies a high quality of humus, was determined in six samples. The low humus quality (optical index above 4) was determined in other nine samples. The SOC content has significant positive correlation with optical indices $Q_{4/6}$ and $E_{4/6}$. Soils with higher organic carbon content have lower humus quality.

Keywords*: VIS spectrum, $E_{4/6}$, humus quality, Dalmatia*

CHANGES OF THE SOIL PHYSICAL PROPERTIES IN AREA IMPACT OF ZAGREB-SPLIT HIGHWAY IN CROATIA

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Abstract

The biggest change occurring in the area of the highway Zagreb – Split is the degradation of the natural soil, especially its physical properties. The main objectives of this study were: (1) determine the physical properties of the soil in the area impact the highway (damaged soil) and outside these area (natural soil), and (2) determine the level, type and current processes of soil degradation. The research was conducted in 2006 on the section of the highway Zagreb - Split, from Gospić to Sveti Rok. Each of the 20 representative sites is divided into two sub sites: damaged soil and origin/natural soil to determine the condition and quality of the soil before and after the highway construction. The surface layer (0-10 cm) of damaged soils generally was less porous, smaller soil capacity for water and air, higher bulk density of soil, strong compacted, with more clayand unstable to a little stable macroaggregates. Excavation of topsoil, filling, and subsequently spreading new layers of soil in the lower horizons of the damaged soil contributed to the deterioration of its water and air conditions, poor infiltration, and difficulty in growing the plants. The results of the soil analysis as well as the state determinate in the field, indicating that the degree of soil degradation in the area of highway was extremely high. It is necessary to make repairs a unfavorable soil properties by agro ameliorative measures considering the plant requirements. Also, it is important to plan the full protection of the soil.

Keywords: *Physical properties of soil, soil quality, highway, soil degradation.*

SOLANACEAE DIVERSITY IN VIETNAM: A PRELIMINARY TAXONOMIC INVENTORY FOR CONSERVATION AND UTILIZATION

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Abstract

Solanaceae play an important role in providing food, vegetable, spice, medicine and ornament in Vietnam. However, solanaceous genetic resources are facing serious threats of erosion and eradication. Our objective is to focus on survey on the diversity as well as the evaluation of the role of solanaceous indigenous plants in the local communities to identify the status as well as importance of them for conservation and sustainable utilization in the future. The data comes from a survey and collection in central Vietnam and herbarium specimens from the collections of solanaceae in Vietnam. An analysis of these specimens and result from the survey show that the number of Solanaceae in Vietnam includes 15 genera with 63 species. Besides, there are also 6 species belonging to 5 genera being doubtful. Three genera, *Solanum* (31 species), *Lycianthes* (7 species) and *Physalis* (5 species) represent 68% of the total number of species. There are 29 wild species, 22 cultivated species and 12 species being wild and cultivated, in which 6 species for fruit, 41 species for medicine, 16 species for ornament, 4 species for spice and 22 species for vegetable. The indigenous solanaceous plants include 24 species belonging to three genera: *Lycianthes* (7 species), *Solanum* (13 species) and *Tubocapsicum* (1 species). The indigenous solanaceous species in Vietnam are mostly wild species with three endemic species. Thirteen species belongs to *Solanum* genus to be valuable and rare indigenous species that need to conserve in Vietnam. *Solanum album*, *Solanum melongena* and *Solanum procumbens* are the highest valuable species in indigenous solanaceous plants in Vietnam.

Keywords: *Solanaceae, diversity, genetic resource, species richness, Vietnam*

ALPHA AND BETA PLANT DIVERSITY IN MULTISPECIES AGROECOSYSTEMS OF CENTRAL GREECE

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Abstract

Intercropping encouragesbiodiversity, by providing a habitat for a variety of plants, which benefit the population of insects and soil organisms that would not be present in a single-crop environment. The literature about this issue is scarce. Hence, the study of plant species density, alpha (species richness, Shannon, Simpson and Evenness index) and beta diversity (Jaccard similarity index) were held in the University of Thessaly facilities on May 2014, with the use of sample plot (50 x 50 cm). The experimental plots were constituted of the following types of intercropping: Pea-Oats (P-O), Pea-Barley (P-B), Winter Vetch-Oats (WV-O), Winter Vetch-Barley (WV-B), Grass Pea-Oats (GP-O) and Grass Pea-Barley (GP-B). A total number of eight species of herbaceous plants were recorded in all types of intercropping. The average density of herbaceous plants was found significantly higher in the Pea-Barley (21.80 ± 13.68, $p < 0.05$) than the Pea-Oats (10.00 ± 7.61, $p < 0.05$), Winter Vetch-Oats (10.60 ± 17.79, $p<0.05$), Winter Vetch-Barley (6.80 ± 9.47, $p < 0.05$), Grass Pea-Oats (13.00 ± 12.20, $p < 0.05$) and Grass Pea-Barley (5.00 ± 5.91, $p < 0.05$).The Shannon diversity index was higher in the Pea-Barley (1.33) and lower in Winter Vetch-Oats (0.00), Winter Vetch-Barley (0.00) and Grass Pea-Barley (0.00) ($p < 0.05$). The results also showed that the type of intercropping Pea-Barley (1.00-0.85) favoured the evenness and similarity of plant species in relation to other types of intercropping ($p<0.05$).Conclusively, intercropping systems clearly have the potential to increase the long-term sustainability of food production under low inputs. Specifically, the type of intercropping Pea-Barley favours alpha and beta plant diversity making this type of intercropping important, favouring parameters of biodiversity both in Greek and in the wider Mediterranean areas. We conclude, also, on the need to enhance agricultural research on these multispecies systems, combining both agronomic and ecological concepts and tools.

Keywords: *Sustainability, crops, biodiversity, Mediterranean.*

DEVELOPMENT OF A DECISION SUPPORT TOOL FOR ON-FARM ASSESSMENT OF ENERGY CONSUMPTION AND GREENHOUSE GASEMISSIONS IN OLIVE ORCHARDS

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Abstract

Intensified farming systems have a substantial impact on the depletion of several environmental resources and climate change. The energy and greenhouse gas (GHG) emissions analysis of food production systems is a useful method for the evaluation of environmental performance, within an agroecological context. In thisstudy we focused on the environmental impact in terms of energy inputs and GHG emissions of olive crop, a major Mediterranean production system, in Crete, Greece. The aim was to develop an appropriate tool for the assessment and improvement of sustainability performance with regards to input management, energy use and GHG as well as best management practices for olive orchards. Management practices, inputs and outputs were monitored weekly for two years using questionnaires and on-site observations in twenty four olive orchards. The energy inputs and the correspondent GHG emissions were calculated for each orchard. The primary source of energy inputs was the fossil fuels used for machinery in soil management, harvesting and pruning, followed by the use of synthetic chemical fertilizers and labor man-hours. Carbon emissions followed a similar trend with synthetic fertilizers and use of fossil fuels being the main emitters. A user-friendly Decision Support Tool (DST), named "CO_2MPUTOLIV", was developed in adigital form, calculating energy inputs and carbon emissions in olive orchards and providing best management practices for sustainable olive production.CO_2MPUTOLIV is expected to assist and educate farmers and agronomists on farm-sustainability assessment and input management performance.

Keywords: *Energy analysis, carbon emissions, olive, sustainability performance, agroecology.*

MICROBIAL COMMUNITY PROFILES IN RESPONSE TO DIFFERENT SOIL MANAGEMENTS IN SANDY SOIL

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Abstract

The growing human population has higher and higher food demand, which requires an increase in efficiency of agricultural production. Healthy and fertile soils are essential to satisfy this demand. The microbial community structure is an excellent indicator of the soil fertility and the diversity of bacteria and fungi. In our work we compared the effect of organic and conventional cultivation methods on the microbial community profiles of sandy soils in the Nyírség region, Hungary. These fields have topographical heterogeneity therefore the sampling sites were divided into top of hill and bottom of hill. Sampling was done in autumn 2013, from the 0-30 cm and the 30-60 cm soil depths. The phospholipid fatty acids (PLFA) were used for the monitoring of microbial community. PLFAs break down when the cell dies therefore these molecules show the community structure in a real time. In the 0-30 cm soil layer of organically managed field the PLFA structure was significantly different between top and bottom of hill, but the difference were low. In conventionally managed field, high differences were found between the PLFA groups measured in the top and bottom of hill. The PLFA values were higher in the top of hill in organic field, while in case of bottom of hills sites higher PLFA values were measured in conventional farming system. In the deeper soil layers the tendencies were found similar to the upper soil layer, but the measured values were lower.

Keywords: *Cultivation system, microbial community structure, PLFA, topography, soil depth.*

SHORT- AND LONG-TERM EXPERIMENTS. HOW CAN WE INTERPRET THE RESULTS?

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Abstract

Sewage sludge could be a valuable waste all over the world. Its agricultural utilization has high importance because of: i) the decreasing organic matter content of soils, ii) the environmentally sound recycling of a waste, iii) complex nutrient supply of cultivated plants. The quality of sewage sludge can be improved by composting, which process stabilizes the organic matter content of the sludge, disinfects the sludge, and the applied additives can improve the macro- and microelements content and other properties/components of the compost. However, the sewage sludge compost (SSC) application could have negative effects, especially the accumulation of toxic elements in the soil-plant system. The evaluation of the effects of SSCs bases on experiments with different duration. Therefore, we look for answers for the following questions: Do we want to utilize the SSC once or regularly? Can we deduce the effects of regular SSC utilization from the results of a two-year- experiment? Is it important to maintain long-term experiments?Our answers based on the results from a 13-year long-term experiment where 0, 9, 18 and 27 t/ha^{-1} doses of SSC have applied in every third year in a small-plot experiment since 2003. The SSC contains dewatered sewage sludge (40%), straw (20%), rhyolite (25%) and bentonite (5%), designed for acidic sandy soils. Soil was sampled every autumn. The regular SSC application resulted in continuous changes of soil properties.

Keywords: *Sewage sludge compost, sandy soil, soil enzymes, soil chemical properties.*

EFFECT OF A LONG-TERM COMPOST TREATMENT ON THE WATER MANAGEMENT OF SANDY SOIL

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Abstract

The large part of sandy soils in the Nyírség region has unfavourable water, heat,air management and nutrient supply. The crop safety to ensure on sandy soils requires the improving of their soil structure. Results have shown, that the sewage sludge compost, due to its high organic matter content, is suitable for nutrient supply and improving structure and water management of these soils. Sewage sludge, which is considered as a waste, also can be placed in an environmentally sound way. Our experiment was established in 2003 at the Research Institute of Nyíregyháza of the University of Debrecen in Hungary to study the utilization of sewage sludge compost in agriculture. The characteristic soil type of the experiment is Arenosol (Dystric Lamellic Arenosol). The applied compost contained sewage sludge 40% (m/m %), straw 25% (m/m %), bentonite 5% (m/m %) and rhyolite 30% (m/m %). The compost has already re-treated five times as the farmyard manure every 3rd years in the following amounts: 0, 9, 18 and 27 Mg ha^{-1} of dry matter. Compost was ploughed into the 20-25 cm soil layer. The aim of our study was to determine the effects of the application of sewage sludge compost on physical properties of sandy soil. In this study, the changes of water retention and erodibility of soil were measured for three years. According to the results, the sewage sludge compost seems to be an effective soil improving material of acidic sandy soils, but its beneficial effect lasts only for two years.

Keywords: *Sewage sludge compost, sandy soil, water management, erosion.*

SINGLE MULTIPLICATIVE NEURON BASED ANN RAINFALL-RUNOFF MODEL

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Abstract

Water Management and efficient utilization of the water resources requires the accurate information about the runoff produced from a watershed. Normally, rainfall-runoff models are developed for the prediction of runoff from a watershed. Conceptually, the rainfall-runoff transformation process is a non-linear phenomenon which is highly complex in nature as it involves large number of variables pertaining to mainly rainfall, soil system, morphology and vegetation. A number of approaches have been adopted to represent complexity of rainfall-runoff process. In the recent time, the concepts of Artificial Neural Networks (ANN) have been applied successfully for modelling non-linear relationships in different fields of Engineering and Science. Multilayer perceptron based artificial neural network (MLP-ANN) using back propagation algorithm is widely used for rainfall-runoff modelling. In this technique, to make a decision for appropriate number of neurons in hidden layer is a cumbersome process as it involves trial and error method. In order to overcome this deficiency in MLP-ANN modelling, an attempt has been made to develop a single multiplicative neuron based artificial neural network (SMN-ANN) model which eliminates the selection of neurons as it consists of only one neuron in the hidden layer. The developed (SMN-ANN) model was applied for its validation in a hilly watershed namely Khunt micro-watershed, situated in district Almora (Uttarakhand), India and was found to be providing a reasonably accurate prediction of daily runoff.

Keywords: *Artificial neural networks,hydrological modelling,multiplicative neuron model*

EFFECT OF EXCLOSURE ON RUNOFF, SEDIMENT CONCENTRATION AND SOIL LOSSIN EROSION PLOTS

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Abstract

Nowadays watershed and rangeland management projects play the important role in water resources and soil management worldwide. Although watershed and rangeland management projects have the considerable importance as approaches to rural areas development and natural resources management, more studies have been focused on their effects on sediment and their effects on soil erosion have rarely been considered. The present study was conducted in two treated and control sub-watersheds with exclosure treatment and under grazing respectively, in Khamsan representative watershed with an area of 4337.27 ha in south of Kurdistan Province, Iran. Three plots were installed in each western, northern and eastern slopes for the runoff volume and coefficient, sediment concentration and soil loss measurement. The exclosure treatment was operated for installed plots in treated sub-watershed from 2007. Then, all the data of runoff volume and coefficient, sediment concentration and soil loss from USLE standard plots in both control and treated sub-watersheds for 52 events over the years 2009 to 2014 were compared and evaluated. Therefore, in order to the number of plots and sub-watersheds, 18 USLE standard plot data were finally recorded and analysed for each storm event. The results showed the significant ($p \leq 0.05$) decreasing effect of exclosure treatment on runoff volume, sediment concentration and soil loss at plot scale. Finally, decreasing rates of 15.68, 6.13, 16.67, 24.37 and 21.43% due to exclosure respectively for runoff volume and coefficient, sediment concentration, soil loss and sediment yield were obtained. The variables of runoff volume, soil loss and sediment yield had statistically significant differences ($p \leq 0.05$) in treated and control sub-watersheds. The sediment concentration variable had p value of 0.058 and therefore the effect of exclosure treatment on sediment concentration was also significant ($p \leq 0.06$).

Keywords: *Khamsan Watershed, Soil Conservation, Soil Loss, Vegetation Cover, Watershed Management.*

GENETIC ENGINEERING OF ROSE SCENTED GERANIUM WITH BACTERIAL GENES FOR PHYTOREMEDISTION OF POLYCHLORINATED BIPHENYLD

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Abstract

Polychlorinated biphenyls (PCBs) are major water and soil contaminants worldwide. These harmful compounds to human health are highly stable and resistance to degradation. Biphenyl dioxygenase (BPDO) is a bacterial enzyme from *Burkholderia xenovorans* which has catabolic degradation activity of PCBs. In present study we report simultaneous genetic transformation of three coding components of BPDO enzyme, *bphA*, *bphE*, and *bphG* genes, into rose scented geranium (*Pelargonum graveolens L.*), a fast growing plant with high phytoremediation potential. Toward this end, the *bphA, bphE, and bphG* genes were cloned into pGreen0029 vector. Then, pGreen0029 vector carrying all three genes along with pSoup plasmid were introduced into *Agrobacterium tumefaciens* strain LBA4404 which then were used for transformation of rose scented geranium. Fully green putative transformant plantlets produced in selection medium were successfully rooted in presence of 50 mgl^{-1} kanamycin. The transgenic nature of fully green and rooted rose scented geranium plantlets were confirmed by Polymerase Chain Reaction (PCR) analysis. Specific primers of *bphA* gene (one of the three tandem cloned genes in the vector of this experiment) was used for PCR analysis and produced a 1380 bp fragment which is the exact size of this gene. Transgenic plants were successfully transferred into soil and continued their growth.

Keywords: *Chlorinated biphenyls, rose scented geranium, Agrobacterium LBA4404, pGreen vector.*

IMPROVING MANAGEMENT OF AGRICULTURAL WATER RESOURCES: TECHNICAL OPTIONS AND STRATEGIC OPPORTUNITIES

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Abstract

In arid and semi arid regions water is the main constraint to agriculture sustainability and food security. Available information characterizing the water status in those regions evidently indicate that water scarcity will escalate with increasingly fall down in the available water resources particularly those allocated to the agriculture sector. In the context of overgrowing water resources scarcity to tackle the challenges of more efficient and sustainable agriculture water use, it is needed to have a sustainable water resources management strategy that is identifying and streamlining policies, governance and practice that can sustainably improve agriculture productivity and food security. In addition, on the national level, sustainable scarce water resources management should include a group of actions to put in place instruments for optimal water allocation between sectors and to ensure that water allocated for agriculture is used efficiently and productivity. The priority areas of actions should be evidence-based-to know what are the components of effective intensive structures that drive farmer behavior, reduce water consumption and support food production improvements.

In this paper emphasis will be given to discuss the strategic opportunities to implemented for improving the scarce water resources management in the agriculture sector, as well as the technical options and innovative modalities to tackle the challenges of producing more with less water.

Keywords: *Water scarcity. Water productivity, food security, water use efficiency, opportunities, challenges*.

APPLYING EARTH OBSERVATION TO DETECT NON-AUTHORISED IRRIGATION: THE CASE STUDY OF CONSORZIO SANNIO ALIFANO (ITALY)

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Abstract

In addition to reducing global water availabilityunauthorized irrigation and over-consumption can have social consequences in terms of conflicting water use. In its Water Framework Directive, the European Union (EU) has outlined an agenda for future water policy, emphasizing that,to ensure a sustainable use of water resources, these practices should be strongly opposed. In order to address this problem efficiently, water managers need to map irrigated area, plan the rational use of water resources under limited availability, and prevent unauthorized irrigation. We are currently developing an innovative system to do this based on a series of multi-spectral satellite acquisitions from two sensors having different spatial and temporal resolutions (DEIMOS, Rapid Eye). In this system, the irrigated area is identified based on temporal pattern recognition, exploiting the differing developmental rates between irrigated and not irrigated crops. This method was applied in the district of Consorzio Sannio Alifano, located in Southern Italy, where irrigation is required for most crops including corn, alfalfa, fruit trees and vegetables. An accuracy assessment of the methodology has been performed and has demonstrated positive results of this approach. Future system upgrades will exploit information derived from short-wave infrared data obtained using of the newly developed Sentinel-2 sensor. The approach described herein is the technological basis of a recently-funded EU H2020 project, named ***D****etection and* ***I****ntegrated* ***A****ssessment of* ***N****on-authorised water* ***A****bstractions using Earth Observation*or DIANA.

Keywords: *Detection of non-authorised irrigation, EO & illegal irrigations, agricultural advisory services, satellite monitoring of irrigated areas, management irrigation systems.*

APPLICATION OF MYCORRHIZAL FUNGI IN LANDSCAPE TURFGRASS ESTABLISHMENT UNDER ARID AND SEMIARID ENVIRONMENTS

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Abstract

Turf grasses are considered an integral part of landscape ecological systems worldwide which provide functional, recreational and aesthetic benefits to society and the environment. In arid and semiarid regions (e.g., Mediterranean region), turf grass is usually grown under harsh and unfavorable growing conditions with low rainfall and high rates of evapotranspiration as well as in soils with nutrient deficiencies. Hence, growing turf grass in these regions becomes dependent on application of high levels of fertilizers as well as on excessive use of irrigation water, resulting in an environmental pollution. Therefore, it is important that turf grass plantations are managed in a sustainable way to reduce the impact of turf grass cultivation on ecosystems while maintaining healthy and productive turf through using such practices as mycorrhizal fungi technology. The application of mycorrhizal fungi technology is an option that can benefit both agronomic plant health and ecosystems. Mycorrhizae confer numerous benefits to host plants including improved plant growth, mineral nutrition, water uptake, tolerance to diseases and stresses such as drought and salinity. The aims of this paper were to review how mycorrhizal fungi might play a role in enhancing landscape turf establishment and productivity in arid and semiarid regions and to evaluate the effectiveness of application of commercial mycorrhizal inoculum to enhance plant growth and survival under field conditions.Field experiment was conducted to study the effects of arbuscular mycorrhiza (AM) fungi inoculation on water use efficiency and establishment of a landscape turf. The results showed that turf grass inoculated with AM fungi used water more efficiently, established lawn more quickly and had more biomass than uninoculated turf grass. The conclusions of this paper indicated the potential of mycorrhiza inoculation in improving the fast establishment of turf landscape plants under arid and semiarid environments.

Keywords: *Arbuscular mycorrhizal fungi, sustainability, urban, irrigation, Jordan*.

IMPACT OF INULIN ON CALVES' GROWTH AND POSSIBLE REDUCTION OF GREENHOUSE GAS EMISSION

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Abstract

To reduce greenhouse gas emission (GGE) researchers propose to shorten the period of breeding calves of dairy breeds (Mirzaei-Aghsaghali et al., 2015, Fao, 2010). However, producers try to prolong the time of rising animals in order to get more valuable production. The aim of this research was to determine the impact of different dosages of inulin concentrate (50%) produced in Latvia by using special technologies on calves' health, amount of obtained production and to evaluate possible reduction of GGE. Research has been supported by the National research programme AgroBioRes (2014-2017).Four week old clinically healthy *Holstein Friesian* calves which were kept in barn in individual cages were included in this research. Ten were in control group (CoG) and thirty were fed with additional flour supplement (groups: Pre6 (n=10), Pre12 (n=10), Pre24 (n=10)) until the groups' median weight was above 90kg. We found out that inulin supplement reduced the cases of diarrhoea especially in Pre12 (P=95%) less than in CoG. Also, the overall health condition in Pre12 was the most stable. The best rate of live weight showed calves from Pre12 and Pre24, the desired weight was exceeded on 42nd test day (median increase rate respectively 0.85 kg/day and 0.95 kg/day). Pre6 reached that goal on day 56 (0.76 kg/day), CoG only on 70 (0.55 kg/day). Conclusion: the optimal dose of that supplement for speeding up the growth rate is 12g which can stabilize the health and reduce breeding time. Besides shortening breeding time minimum to 3 weeks (i.e. 17%), GGE can be reduced too.

Keywords: *Calf, inulin, greenhouse gas emission, live weight.*

VISUAL IMPACT OF WIND TURBINES IN LITHUANIAN LANDSCAPE

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Abstract

In the 21st century, wind energy has started to be seen as a national asset. It is estimated that by 2020, wind turbines should produce 12% of all the consumed electric energy. Wind energy benefits include very eco-friendly source; efficiency of the generated electric power is up to 25-30% (solar panel efficiency is up to 20%); independent and safe source of energy which is getting increasingly affordable (Kytra, 2006).Due to their visual – spatial parameters, these sites are becoming dominant verticals, thus, changing the local landscape and its visual quality, which in turn determines the quality of the living environment. In order to preserve the identity of the regional landscape, it is important to estimate the potential impact of both existing and planned wind turbines on the landscape. Visual impact of wind turbines depends on a number of features: the size, colour and shape of the turbine, observation distance, landscape diversity, time of day, and many other factors.Considering visual-spatial parameters of wind turbines in Lithuania, landscape features with their potential, and the impact of anthropogenic environment, the basic methodological principles for the assessment of visual impact of wind turbines have been developed. The main phases are distinguished: determining the zones of visual impact; creating GIS (geographic information system) database; visibility modeling; assessment of nature, significance and contrast of the impact.

Keywords: Wind turbines, *visual impact, zones of visual influence, environmental impact assessment.*

SPRINKLER IRRIGATION MANAGEMENT FOR PASTURE IN LOAM SOIL

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Abstract

The sprinkler irrigation systems are often regarded as a hydraulics problem. The average rate of water application is usually fixed at some level below the basic infiltration rate of the soil to avoid surface water runoff. However, water starts to accumulate on the soil surface when the water application rate exceeds the infiltration rate for a sufficiently long period of time. Surface runoff occurs when sufficient water accumulates on the soil surface to overflow shallow depressions and flow over or past surface. A good pasture management is the production of economically optimum forage yield and quality without compromising the environment. This field experiments (Gorki district, Belarus) aims to determine irrigation time for traveling irrigation device Bauer Rainstar T-61, and the required water supply rate without puddles and runoffs formation to loamy soil. Results show that irrigation rate without soil erosion was: in loose soil - 12.8–15.8 mm; then plant are 5–10 cm high - 28.8 mm or more at the vegetation beginning and 19.2–23.4 mm at the vegetation end; then plant are 10–20 cm high - at the vegetation beginning and at the end - the same - 30.0 mm and more. The watering time until beginning to runoff formation consisted from 64 min to 150 min. The average artificial rain droplet diameter for traveling irrigation device Bauer Rainstar T-61 was established from 0.7 to 1.2 mm. Maximum diameter of 1.2 mm and 0.7 mm drops were formed when the 30 mm and 16 mm diameter spray were used respectively. The resulting value correspond to the allowed limits of quality agronomic characteristics of irrigation, without causing damage to irrigated crops using any removable irrigation spray.

Keywords: *Erosion, Bauer Rainstar T-6, traveling irrigator.*

INFLUENCE OF AGROCHEMICAL REHABILITATION ON THE HEAVY METAL MIGRATION TO THE WATER

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Abstract

Soil plays the main role in the sustaining life of Earth ecosystems – it is the fundamental foundation of agriculture resources, food security, economy and environmental quality. The heavy metal pollution has been increasing in agricultural soils worldwide. For example, Cu is widely used as a pesticide against fungal and bacterial diseases in crops or as a contaminant in organic amendments, or for irrigation as pig manure or sewage sludge. Soil and water pollution have the great impact on food safety and to human health: polluted soils have direct health risks, and secondary risk is connected to contamination of water supplies. The article presents the lysimetric experiment with the chemical composition results. This exploratory study aims to evaluate the influence of agrochemical rehabilitation on the heavy metal migration to the water. The chemical composition of intra soil water has shown that contaminated black soil has a high absorption capacity of heavy metals. The bulk of heavy metal brought about in a form of water-soluble salts was absorbed and converted by soil colloids of podzolized chernozem into relatively stable compositions. Results of the analytical research showed that organic and organic-mineral systems, where phosphates were used in the average volume of 60 kg of P_2O_5 per hectare a year, reduced intake of cadmium in the subsurface water. Mineral systems also impeded migration of zinc and copper to the ground water. On the contrary, high doses of superphosphate in the fertilizer system increased the leaching of Cd, Pb and Cu to the infiltration waters.

Keywords: *Heavy metals, pollution, water, soil, detoxification methods.*

REPRESENTATION OFTHE CONTENT OF INORGANIC NITROGEN IN ELESKA RIVER

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Abstract

The composition of surface water is quite different because of specific physicochemical and biological processes that take place in them. The rivers which man uses are variable in their composition and largely depend on the quality of water flowing into them. The purpose of this paper is to determine the content of inorganic nitrogen expressed through ammonia, nitrites and nitrates,and dissolved oxygen and thus determine the water quality in the Eleska River.The Eleska River is a tributary of the Crna River. Its source is on the eastern slopes of Mount Baba in the Aegean part of Macedonia. It flows into the CrnaRiver between the villages Bukri and Brod.In the experimental part were taken water samples from Eleska River after its entry into R. Macedonia near the village of Egri. Samples were taken in the first week of July and September. To make experimental research the following procedures were used: Ammonia and nitrite in the water were assessed spectrophotometricly with device Spectroqvant UV / VIS Pharo 300. Ammonia according to the method 14752 (Mitrovis, 1954), while the nitrites with method 14776. Determination of nitrates was performed with UV PASTEL - a tool for direct readout of values.The obtained values indicate that there is no greater fecal contamination (according to the content of ammonia), but according to its quality and purpose the water belongs to the third category. This water according to the purpose can be used for irrigation.

Keywords: *Eleshka River, ammonia, nitrates, nitrites, dissolved oxygen*

EFFECTS OF IRRIGATION AND FERTILIZATIONON THE NUMBER OF FORMED FLOWERS AND FRUITS SETS IN PRUNED PEPPER

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Abstract

The main goal of this investigation was to compare effects of different irrigation and fertilization regimes on the number of formed flowers and fruits sets in pruned pepper ("V"system). For this purpose, the field experiment with pepper (*Capsicum annum L.var.* Bela dolga)grown in an experimental plastic house in the Skopje region was conducted during the period of May to September in 2005, 2006 and 2007. Four different irrigation and fertilization regimes were performed during the investigation. Three of the treatments were irrigated with drip irrigation and drip fertigation (DF1, DF2, DF3), while the last one was irrigated with furrow irrigation and conventional application of fertilizer ($Ø_B$). From the results obtained during the threeyears of investigation, we can conclude thatdrip fertigation frequency of every 2 days (DF1) has shown the largest number of formed flowers (69.67) and fruits sets (41.67) in comparison to DF2, DF3 and $Ø_B$. The results are statistically significant at 0.5 level of probability. Also, drip fertigation frequency of every 4 days (DF2) significantly affects the number increase of formed flowers and fruits sets in comparison to DF3 and $Ø_B$.A positive effect of drip fertigation on the number of formed flowers and fruits sets is presented by comparison of the results from the treatments DF3 (drip fertigation scheduled by tensiometers)and $Ø_B$. Namely, the DF3treatment (with similar and sometimes a bit longer irrigation interval compared to$Ø_B$) has shown 8.32% and 19.2% higher number of formed flowers and fruits sets compared to $Ø_B$. The results are statistically significant at 0.5 level of probability

Keywords: *Drip fertigation, furrow irrigation,pruned pepper,fructification*

MACROELEMENTS AND HEAVY METALS CONTENT IN *Panicum virgatum* CULTIVATED ON CONTAMINATED SOIL UNDER DIFFERENT FERTILIZATION

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Abstract

Heavy metal contamination of soils is a major problem worldwide. As a result, arable land polluted with heavy metals is unsuitable for food production. Utility of energy crops which allow the commercial exploitation of these soils by establishing biofuel feedstock production systems can offer a solution. Additionally, plant cultivation offers opportunities for site remediation.Field experiments have been performed on heavy metal contaminated arable soil located in southern Poland, in the vicinity of a former smelting factory. Although heavy metal concentration exceeded standards, the area has been used for agricultural purposes. Experiments involved testing Switchgrass (*Panicum virgatum*) cultivated with standard NPK fertilizers and commercially available microbial inoculum. Biomass water, macronutrients (N, P, K, Mg, Ca) and heavy metal (Cd, Pb, Zn) content in aboveground plant organs were assessed at the end of two growing seasons.Switchgrass biomass water content was higher after the second year for nearly 40%. Additionally, after the first as well as the second year fertilizers increased it. Magnesium content, essential in chlorophyll biosynthesis, was higher in the first year and additionally more evident in fertilized variants after every year. Heavy metals accumulation in aboveground organs was lower after the second year compare with the first year. Similar trend was observed for Ca and N plant accumulation. However P and K accumulations were higher after the second year of experiment.In conclusion, due to acclimatization, switchgrass reduce heavy metal uptake, what could result in increase of two biogenic elements (P, K) essential in plant growth.

Keywords: *Switchgrass, Heavy metals, Macronutrients, Inoculum, Biomass composition.*

THE INFLUENCE OF THE DIFFERENT FORMS OF MELATONIN TO THE PHISYOLOGICAL CONDITIONS OF THE LABORATORY AND FUR ANIMALS

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Abstract

Melatonin is found in animals, plants and bacteria. In animals, it is a hormone that anticipates the daily onset of darkness. In animals, melatonin is the hormone of regulation of the circadian rhythms, seasonal reproduction and many other physiological functions. There are few side effects of melatonin made from brains of cattle such as headaches, dizziness, nausea and drowsiness, and also it may contain prions - short for "proteinaceous infectious particles". Scientific examinations is conducted in the veterinary laboratory of Russian Institute of Hunting and Farming, Kirov region with red fox which belongs to breeding fur farm «Vyatka»., Kirov region. Two groups of the foxes were organized: the control group (7 animals) and the experimental group (7 animals). The experimental onewas injected subcutaneously in the interscapular region by melatonin-retard (melokril) in the dose of 10 mg per 1 animal. In the control group, this drug was not injections.White laboratory mice which belong to the vivarium of Kirov State Medical Academy and rats which belongs to the vivarium of Kirov State Agricultural Academytook dynamicizing form of melatonin (mel-3CH) in the dose of 5 drops per 20 ml of water during 14 days.The investigation has shown that the hair structure, fleece and activity of the rodents taking melatonin (mel) 3CH from the 5th to the 14th days are improved. The animal hair becomes bright, healthy and thick.Compulsory swimming method confirmed that the dynamicizing form of melatonin increased adaptability of the animals. The time of swimming was 2,5 times more in comparison with the control group.Animals which are injected melakril have more the primary the secondary and the triatory follicules than in the animals of the control group.

Keywords: *Mel-3CH, melatonin-retard (melakril), hair, ovaries*

PREPARATION AND PROPERTIES OF CHITOSAN FROM CRAB SHELL CONTAINING RAW MATERIAL BY ELECTROPHYSICAL PROCESSING

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Abstract

Traditional technologies of chitosan producing involve the use of hard alkali-acid treatment of crab shell raw materials, which negatively affects the main quality parameters of chitosan (molecular weight, the degree of deacetylation). We propose an alternative technical approach. It involves the use ofelectrohydraulicshocks,whichuseextra-long bits. The proposed approach has the following advantages:the stages of grinding and deproteinizationof the raw materialsare combined, the additional use ofalkaliis excluded at the stage of deproteinization.For comparative characteristics of the structure of the polymer the IR-spectra of the samplesof chitosanwere removed. Chitosan, obtained using electrohydraulic treatment is not inferior in its physico-chemical parameters of chitosan, obtained by using alkaline reagents. It is possible to organize the process of chitosan production on the base of the enterprises for shrimp processing. Specific requirements for physico-chemical and functional properties of chitosan-containing substances make the actual means and methods of control of the target parameters, the key of which are qualitative identification and comprehensive determination of chitosan in the composition of film-forming compositions and films coatings. As the chromophore to measure the surface potential of the chitosan substances, we used 1-aniline-8-naphthalenesulfonate (ANS). The maximum fluorescence of the dye in chitosan films is shifted to longer wavelengths compared to chitosan gels, because of the increased polarity of the medium of films on the attitude to gel-like chitosan substances. The data obtained by the fluorimetric studies can be used in the development of methods for the detection of chitosan.

Keywords: *Chitin, chitosan, electro-shocks, the degree of deacetylation,shrimp shell*

THE REDUCTION OF NICOTINE CONTENT IN THE COMPOSTING PROCESS OF TOBACCO WASTE MIXING WITH SHEEP AND CHICKEN DROPPINGS

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Abstract

Due to the rise of industrialization and urbanization, the amount of waste is gradually increasing as well, both in developed and developing countries. Tobacco waste generates in all processes it starts in the field and ends up with the production of cigarettes. The total global tobacco waste production in the year 2005 was more than 25.1 million tons. In our experiments we used Virginia tobacco waste (TW) after processing, as well as sheep and chicken drop pings.Two experimental samples were formed according to the following scheme: I 50% TW + 50% sheep drop pings, II 50% TW + 50% chicken drop pings. The comparison is made with the reference sample (100% TW). The experiment was conducted at the experimental farm of the Faculty of Agriculture, under natural conditions, in the open, during a three months period. The nicotine content in the samples was determined by a HPLC method.At the beginning of the experiment, the nicotine content in the tobacco waste was 17 363 mg/kg. By adding sheep and chicken droppings, nicotine content decreased by 66.5%. At theend of the research, nicotine content as droppedbelow 10mg/kg inboth experimentalsamples.The results confirmed that the organic material, sheep and chicken manure, can be successfully used for composting of tobacco waste, primarily in order to reduce the nicotine content. Composting can be done in the open air and on the site where the waste is made, thereby it reduces energy costs, and what's the most important – the costs of the transport.

Keywords: *Composting, tobacco waste, sheep droppings, chicken droppings, nicotine.*

QUALITY ANALYSIS OF THE *MISCANTHUS X GIGANTEUS* BIOMASS CULTIVATED IN AGROECOLOGICAL CONDITIONS OF THE REPUBLIC OF SERBIA

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Abstract

The paper presents the results of the quality of Miscanthus biomass grown in two locations in the Republic of Serbia, on two soil types with different production capabilities (Luvic Chernozem and Calcic Gleysol). Chemical parameters of Miscanthus biomass were obtained by analyzing leaf and stem of Miscanthus at the end of the third year of cultivation on experiment variants with the following structure of the rhizomes planting: 2 and 3 per m^2. By examining the content of total forms of potassium, phosphorus, calcium and magnesium, it was found that the values of those parameters are within the range of values that are confirmed and exercised in a variety of research in Europe. By analyzing the values of the results of chemical analysis of biomass, difference is noticeable in the most of the examined parameters obtained in leaf and stem from different localities. The most significant is the increased content of calcium in leaf of Miscanthus grown on Calcic Gleysol. The values of examined parameters obtained are below the critical values for solid fuels. Preliminary research results show that Miscanthus grown in the Republic of Serbia, both on soils suitable for intensive crop production, such as chernozem, could be also grown on soil with slightly unfavorable production capacity as Calcic Gleysol. Research is needed to expand both trials set up on marginal soils, or in areas where it is necessary to conduct remediation and supplemented by additional physical-chemical analyzes of biomass, in order to give a complete assessment of the possibilities for exploitation of the Miscanthus biomass as a biofuel.

Keywords: *Miscanthus, quality biomass, Luvic Chernozem, Calcic Gleysol*

THE POSSIBILITY OF USING BURLEY TOBACCO STALKS AS A BIOFUEL

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Abstract

The reduction of world`s fossil fuel reserves,as well as concern environmental pollution, encourages the use of renewable energy sources. In the Republic of Serbia, biomass from agriculture represents a significant energy potential. The aim of this paper was to examine the possibility of using tobacco stalks as biofuels, considering that each year, after the harvest of leaves, about 70 000 tons of stalks from all tobacco types remains in the fields. Thematerial used in this study were Burley tobacco stalks, sawdust from beech wood and wheat straw, which were chosen due to the fact that they arealready in use as biofuel. In the first part of the experiment the ash content in all samples was determined, which is used to predict the higher heating value (HHV). The HHV as a function of ash content (ash, wt%) was calculated using the equation by Sheng and Azevedo.The experimental determination of the calorific value of all samples in a calorimetric bomb was conducted in the second part of the study. Based on predicted (18208.18 kJ/kg) and experimentally determined HHV of tobacco stalks(17504.44 kJ/kg), as well as comparisons with other forms of biomass, it was concluded that Burley tobacco stalks can be used as biofuel. Experimental values of tobacco stalks are only 9% lower in relation to HHV of beech sawdust.Tobacco stalks and wheat straw have the approximate values of HHV.

Keywords: *Burley, tobacco stalks, ash, higher heating value (HHV), biofuel*

AGRO-CHEMICAL CHARACTERISTICS OF SOIL IN RASPBERRY-GROWING REGION OF IVANJICA (SERBIA)

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Abstract

Raspberry growing in certain parts of Serbia is rapidly developing owing to cost-effectiveness of production and specific physical-chemical characteristics of the soil, making it unsuitable for other types of fruit-growing. Analysis of soil samples from existing and prospective raspberry plantations reveals its heterogenic composition, depending on sampling site and actual method of land use. Prospective raspberry-growing land areas are characterised by strong substitution acidity (pH/KCl<4.5) in 52.8% samples, with non-carbonic composition present in 88.9% of samples and an approximately equal share of medium and high content of humus and total nitrogen in the humus horizon, compared to a considerable reduction of these parameters in the sub-humus horizon. The content of accessible phosphorus is <6 mg/100 g in 41.7% of humus horizonsamples, compared to 55.6% in sub-humus horizon, whereas accessible K_2O content ranged from low to medium supply required for raspberry cultivation. Soil under raspberry plantations shows presence of acidic soil reaction in the humus horizon, with 97.2% of non-carbon samples and a significant number of samples having a high content of humus and total nitrogen, as well as a high content of accessible phosphorus in the humus horizon in 77.8% of samples, as opposed to only 16.7% in soils of prospective raspberry plantations. The high content of accessible potassium was pronounced, reaching 94.4%. The presented results show that unfavourable agro-physical and agro-chemical composition of soil is compensated by high volumes of mineral and organic fertilizers, with potentially multiple impacts on environmental sustainability and productivity of raspberry plantations.

Key words: *Agro-chemical analysis, Soil reaction, Phosphorus, Potassium, Raspberry.*

THE EFFECT OF LONG-TERM USE OF PHOSPHATE FERTILIZERS ON THE CONTENT OF EXCHANGEABLE BASES IN VERTISOL

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Abstract

A long-term use of mineral fertilizers affects many soil properties, including the content of exchangeable cations. The study has been conducted to determine the effect of a thirty-year use of phosphate fertilizers on major agrochemical properties of Vertisol in leaching (pH, Y1, organic matter content, total N, total P, total K, available P, and available K) and the concentration of exchangeable base cations: K^+, Na^+, Ca^{2+} and Mg^{2+}. During the experiment, two doses of phosphorus were continuously applied, a lower one, with which phosphorus has been applied every year in the amount of 80 kg P ha^{-1} and higher than 160 kg P ha^{-1}. Both doses of phosphorus were combined with a constant amount of nitrogen (120 kg N ha^{-1}) and potassium (80 kg K ha^{-1}) The research has been carried out on a stationary model farm in Kragujevac in central Serbia. The thirty-year use of mineral fertilizers has caused an additional acidification of Vertisol. However, continuous use of phosphate fertilizers has provided a smaller effect on the acidification of the surface layer of Vertisol than nitrogen and potassium fertilizers. At the same time phosphate fertilizers has significantly contributed to the increase in total and available phosphorus, the increase in the concentration of exchangeable K^+, and the reduction in the concentration of exchangeable Na^+, Ca^{2+} and Mg^{2+}.

Keywords: *Long-term fertilization, Vertisol, phosphate fertilizer, content of exchangeable bases*

THE POSSIBILITY OF OBTAINING ORGANIC FERTILIZER FROM TOBACCO WASTE

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Abstract

The aim of this study was to examine the possibilities of composting of tobacco waste (TW) with the addition of various organic waste materials, to obtain fertilizer with a high content of organic matter and low levels of toxic elements.Virginia tobacco leaves, which are classified as waste in the tobacco processing, were used in this experiment. Two experimental samples are formed according to the following scheme: I 50% TW + 50% cabbage; II 50% TW + 20% soil + 20% dry forest leaves + 10% cabbage. The comparison was made with the reference sample (only TW).The experiment was set up in the indoor area at the Faculty of Agriculture, during the winter period, without automatic control of temperature and humidity. Nicotine content in the samples was determined by the HPLC method. Mineral matter content was determined by the atomic-absorption spectrophotometer AAS Perkin Elmer Aanalyst 300th.The results showed it is possible to obtain organic fertilizer from tobacco waste, through the process of composting. At the end of the composting process, the nicotine content had fallen below 10 mg/kg. The content of the basic macronutrients in experimental samples was suitable from the point of agricultural production. The levels of all heavy metals, except cadmium, were all below the allowable limit.Application of obtained products could come into consideration only if they are mixed with fertilizer, which has a low content of cadmium, so that it's content in the mixture does not exceed the allowed 0.7 mg/kg.

Key words: *Composting, tobacco waste (TW), organic fertilizer, nicotine, heavy metals*

THE STABILITY OF STRUCTURAL MICROAGGREGATES AND THE RISK OF THE SOIL CRUSTING IN THE AREA OF THE FLOODED AGRICULTURAL SOILS OF THE REPUBLIC OF SERBIA

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Abstract

In 2014, in the area of the flooded agricultural soils of the Republic of Serbia, it was conducted the study on the effect of extreme climatic conditions, especially rainfall, on the structural micro aggregates stability and the risk of crust formation. The agricultural soil samples were taken in a disturbed state from the surface soil layer (0-30 cm) from fifty locations affected by the floods.The degree of the micro aggregates stability was expressed according to Vageler and determined by the ratio between the total content of clay particles in soil samples prepared with sodium pyrophosphate, and the content of such particles in soil suspension prepared with water. The risk of the soil crust formation was determined according to a Van der Watt & Claassenpattern on the basis of the ratio between the content of organic matter, and total content of the clay and silt particles in soil samples. The obtained results showed that the analyzed soil samples had stable to very stable degree of the structural micro aggregates stability and that extreme climatic conditions have not significantly influenced the tested parameter. In the analysed samples the risk of the soil crusting was in limit values in 58% of the samples, than, in high risk values - in 40%, while in one soil sample (2%, respectively) the risk of soil crusting was low.

Keywords: *Agricultural soil, floods, structural aggregates stability, soil crusting*

THE POSSIBILITY OF USING HOUSEHOLD FOOD WASTE IN REDUCING NICOTINE CONTENT IN TOBACCO WASTE

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Abstract

Tobacco waste is generated during its growth and processing, and represents a significant part of the agro-industrial and municipal waste. Although tobacco waste has a high content of organic matter, its use is limited due to its nicotine content, which is above the limit of 500 mg/kg. Domestic food wastehas also become a significant global issue.The aim of this study was to examine the possibilities of the nicotine reduction through the composting process, by mixing tobacco with the household waste. Through this process we can: solve the problem of generating different types of waste, reduce pollution and get a stable product.In this experiment, we used Virginia tobacco leaves, which are classified as tobacco waste (TW) after processing, as well as the household food waste. Three experimental samples of the same composition percentage (50% TW + 50% household food waste) were formed. The two of them were placed in the chamber, while the third one was held at room temperature. The experiment was carried out in the laboratory of the Faculty of Agriculture, during a period of 44 days. The nicotine content in the samples was determined by High Performance Liquid Chromatography (HPLC) method.Already by mixing tobacco with the household waste, the content of nicotine was reduced by one-third. At the end of the experiment, the nicotine content of the samples that were held in the chamber has fallen below 10 mg/kg. Nicotine content in the batch that has been kept at room temperature was 76.5 mg/kg.

Keywords: *Household food waste, tobacco waste, composting, nicotine*

WATER MANAGEMENT IN TUNISIA

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Abstract

Tunisia is classified among the least water resources endowed countries in the Mediterranean basin with underground water resources. The volume of available water is estimated at 450 m^3/ person/yr. In 2030 this is expected to fall to315 m^3/person/yr. Conventional water resources throughout the country amount to 4,670 MCM/yr, 2,700 MCM of which is surface water and 1,970 MCM is groundwater. The non-conventional resources are limited to treatedhousehold wastewater, which amounts to 250 MCM.As for quality, about 72 percent of the surface water has a salinity of more than 1.5 g/l. Percentage of 71 percent of the groundwater has a salinity level varying from 1.5 to 5 g/l and the remaining 29 percent exceeds a salinity of 5 g/l and becomes brackish water.Thanks to the adoption of rational and modern management of its water resources, Tunisia, despite the scarcity of its water resource, has been able to develop its agricultural and economic sectors linked to the water resource in a sustainable manner. Agriculture, which consumes 80% of natural water resources, has adopted a modern distribution system using water conservation and water reuse. The strategy of water resource mobilization and use constitutes an essential component of the economic and social development of Tunisia.This strategy assures the security of food supplies, improves the quality of urban, rural and Saharian life and assures water supplies in the industrial and tourist sectors. It integrates the management of surface and ground water resources as well as natural and non-conventional resources; and has set in place a mechanism of the optimization of water use through the efficiency of use, water conservation, reduction of loss and waste and the protection of water sources.

Keywords: *water resource mobilization, strategy, management, Tunisia.*

DEVELOPMENT OF IRRIGATION AUTOMATION SYSTEM (IAS) USING BY PROGRAMMABLE LOGIC CONTROLLER(PLC) AND ITS APPLICATION ON IRRIGATION SCHEDULING CREATED USING CLASS A PAN

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Abstract

Aims of this study are to develop irrigation automation system (IAS) using PLC and to measure water level automatically in Class A Pan by IASfor daily evaporation and to refill certain level with pressure transducer, to calculate amount of water to be given irrigation treatments from daily evaporation, to control drip irrigation control unit and to irrigate pear plots when total daily evaporation reached about 35 mm.The two years of the study, scheduled three years, was conducted (*Pirus communis* L.) in the Department of Biosystem Engineering, Faculty of Agriculture and University of Kahramanmaraş Sütçü İmam. In the first year, IAS was installedand its program code was written in CODESYS language and loaded into PLC and tested in the workshop. In the second year, the system was also tested irrigating 11 years old dwarf pear during irrigation season. Water depth in Class A Pan was measured using one pressure transducer at 10:00 am. IAS started to irrigate Dwarf pear orchard at 10:10 am during irrigation season when total evaporation from Class A Pan reached about 35 mm. Irrigation management treatment was created as 120%, 100%, 80%, 60% and 40% application of 35 mm evaporation from Class A Pan. Using randomly block design, there were totally 5 irrigation treatments, namely, I_{120}**,** I_{100}, I_{80}, I_{60}, and I_{40} and which were replicated 3 times. Irrigation started in June and terminated in October. Irrigation automation system successfully completed the test conducted in both workshop in 2014 and also pear orchard during irrigation season in 2015 in accordance with program code. As a result of study, it could be stated that IAS could decrease labor and labor cost of irrigation and increase irrigation water use efficiency. If the IAS is used by famers, crop production cost would lessen and farmer income would increase.

Keywords: *PLC, automation, irrigation, pear.*

DETERMINATION OF BIOGAS PRODUCTION POTENTIAL AND ENERGY VALUE FROM ANIMAL MANURE IN TURKEY (AFYONKARAHİSAR PROVINCIAL EXAMPLE)

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Abstract

The aim of this study was to determine biogas amount and the energy value, being produced from animal manure in Afyonkarahisar (or Afyon) province, Turkey. For this purpose, biogas potential is calculated considering the number of cattle and laying hens. Afyonkarahisar has a total of about 350 thousand cattle, 5 thousand buffalo, and 18.5 million laying hens. The annual total of 4 million tons of manure is obtained from these animals in the province. There are 3.5 million tons of cattle manure, 51.5 thousand buffalo manure, and 540 thousand tons of laying hens manure. Annually 84.8 million m^3 of biogas can be produced from the usable amount of this manure. The heating value of biogas produced from this manure is about 1.9 PJ. The electricity production from this biogas is about 214 GWh_{el}. These values can provide 16.6% of Afyonkarahisar's annual electrical energy consumption (1,284 GWh_{el}). The distribution of these calculated amounts by districts was mapped. When districts are arranged according to amount of biogas production, the top ten Afyonkarahisar districts are Central district (27.7%), Bolvadin (10.2%), Başmakçı (9.6%), Sinanpaşa (7.4%), Sandıklı (7.2%), Çay (6.8%), Şuhut (6%), İhsaniye (4.6%), Emirdağ (4.1%) and Dinar (3.7%).

Keywords: *Biogas potential, Animal manure, Turkey, Afyonkarahisar*

CHANGES IN SOIL PHYSICAL PROPERTIES WITH HAZELNUT HUSK AND TOBACCO WASTE APPLICATIONS

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Abstract

Recycling organic wastes has been attention to sustain soil quality in agricultural fields recently. In this study, the effects of hazelnut husk and tobacco waste on soil physical properties such as, bulk density, aggregate stability and saturated hydraulic conductivity were investigated. After incorporating 5% rate of hazelnut husk and tobacco waste into a clay loam soil, soil samples were incubated 18weeks under greenhouse conditions. Both organic waste treatments significantly increased organic matter content, aggregate stability and saturated hydraulic conductivity of soil while they decreased soil bulk densities compared with the control. Soil organic matter content had significant positive correlations with aggregate stability (0.667*) and saturated hydraulic conductivity (0.700*) and a significant negative correlation with bulk density (-0.844**). It was found that hazelnut husk and tobacco waste can be recycled into farmlands and used as a soil conditioner to improve soil physical properties and to prevent soil degradation.

Keywords: *Hazelnut husk, tobacco, bulk density, aggregate stability, permeability*

RESERVOIR TILLAGE TECHNIQUE

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Abstract

Many countries located in arid and semi-arid regions have water scarcity problems due to low rainfall and uneven distribution throughout the season. On the other hand, soil erosion is a serious environmental problem in some region of the world due to intensive rainfalls and the arid and semi-arid regions. Therefore, soil and water conservation is so important in these areas. Different type of soil tillage techniques such as reduced tillage, mulch tillage, ridge tillage, strip tillage, no-till, direct seed and reservoir tillage had been developed to conserve soil and water. Reservoir tillage has been defined as a system in which a large number of depressions or small reservoirs are formed to hold rain or sprinkler applied water. Reservoirs are formed on whole soil surface, between rows or in furrows using different types of equipment or equipment combinations. These equipment are commercially available and their prices are reasonable. Reservoir tillage is used to control both runoff and soil erosion. It can be used with many crops such as potato, corn, sugar beet, cotton, sunflower, sorghum, tomatoe and wheat. Studies have showed that reservoir tillage could increase soil water content, enhance infiltration, reduce soil erosion and increase crop yield. The purpose of this paper is to explain reservoir tillage technique and introduce equipment used for this technique.

Keywords: *Reservoir tillage technique, Runoff, Soil erosion, Soil and water conservation*

POTENTIAL USES OF SPENT MUSHROOM SUBSTRATE IN AGRICULTURE

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Abstract

The world mushroom industry has expanded rapidly in the last decade. Total mushroom production was 9.926.966 ton in 2013 in the world. The commercial production of edible and medicinal mushrooms is carried out on substrates formulated with animal manure and lignocellulose materials from different sources (such as wheat straw, sawdust, cotton seed hulls and etc), either alone or mixed with each other. The substrate left after the mushrooms have been harvested is known as spent mushroom substrate (SMS). SMS is a nutrient rich in organic by-product of the mushroom industry. Five (5) kg of SMS will be generated from the production of 1 kg of mushrooms. At least 50 million tons of spent mushroom substrate is produced annually in the world. On the other hand, SMS contain high level of organic material and salts. These contents of SMS may result in environmental pollution if dumped as waste. Therefore it has to be properly disposed of to avoid environmental problems, such as water and soil contamination. In parallel with this, the question of what can be done with it raises. This paper reviews the potential uses of spent mushroom compost as a substrate in horticulture or as an energy feedstock for ruminants.

Keywords: *Edible mushroom, spent mushroom substrate, compost, feedstock, ruminant*

EFFECT OF WATER HOLDING POLYMERS AND WATER RESTRICTION ON GROWTH OF TOMATO CULTIVATED IN DIFFERENT SOILLESS CULTURES

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Abstract

This study was conducted to determine the effects of water holding polymers and water restriction on growth parameters of tomato (*Lycopersicon esculentum* Mill.) cultivated by different soilless culture techniques. The experiment was designed as a randomized plot in factorial designs (2x3x3) withthreereplication. Two soilless cultures (perlite and cocopeat), three levels of water holding polymers (0, 2, 4 g gel per pot) and three levels of irrigations based on the percentage of drainage (I_1: the amount of water given until 30% of the water becomes drainage, I_2: 75% of I_1, I_3: 50% of I_1 applications were examined as the pot experiment in the greenhouse. Plant height, stem diameter, number of leaves, early yield, fresh and dry weight of stem and root were measured at the end of day of trial.The results revealed that; (1) there were no phytotoxic effects of water holding polymers on the growth and development of the tomatoes, (2) water holding polymers improved the general growth status of tomatoes, and (3) the best tomato growth was obtained by treatment of 4 g water holding polymers + I_2 water application in cocopeat soilless culture. In conclusion, water holding polymer application provided minimumwater saving of 25%.

Keywords: *Water holding polymers, water restriction, soilless culture, tomato*

ASSESSMENT OF LARGE SCALE IRRIGATION SCHEMES USING IRRIGATION INTENSITY INDICATOR IN TURKEY

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Abstract

Irrigation management is one of the key factors for the sustainability of irrigated agriculture. There has been a good number of performance indicators developed for the assessment of irrigation schemes. The most important one among them is the irrigation intensity indicator. In this paper, obtained the data that regarding irrigated area and command area that is transferred irrigation schemes for 2015. This data was used to calculate irrigation intensity. In this study, three climatic zones (Continental, Mediterranean and Black Sea) fourteen irrigation schemes, more than 20.000 ha of command area for each scheme, were assessed. The average irrigation intensity of the irrigation schemes in Turkey is around 62%. Of the 14 irrigation schemes assessed in this study, 5 of them are found to be below the national average in terms of their irrigation intensities. The most important factors that determine the non-irrigated lands in the irrigation schemes include fallowing, socio-economical reasons and sufficient rainfall.The average values of these irrigation intensities for the transferred irrigation schemes were always higher than that of the government-operated schemes. This study suggest that the transfer of the SHW-operated schemes to the water use associations must be initiated and encouraged, in addition to the set up of legal procedures for participatory irrigation management, in order to cope with the possible operation and maintenance (O&M) problems of irrigation schemes. In order to mitigate the factors reducing the irrigation intensity, the agricultural publications intended for farmers and the policies in favor of irrigated farming practices should be materialized.

Keywords: *Irrigation scheme, Irrigation intensity, Cluster analysis, Water users associations*

EFFECT OF DIFFERENT ORGANIC WASTES ON MICROBIAL PROPERTIES OF MAIZE (*Zea Mays Indendata*) RHIZOSPHERE AND ROOT FREE SOIL

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Abstract

This study was carried out in order to determine the effects of various organic wastes (tobacco production waste, wheat straw, tea waste and hazelnut husk) under greenhouse conditions on microbial biomass C (Cmic) and basal respiration (BSR) in clay loam soil and rhizosphere (*Zea mays indandata*)soil of maize plant. The organic wastes were thoroughly mixed with the soil at a rate equivalent to 50 g kg^{-1} on air-dried weight basis. Experimental design was randomized plot with the replications in greenhouse. The moisture content in soil was maintained around 60 % of maximum water holding capacity by weighing the pots every day. Changes in the Cmic and BSR were determined in the soil and rhizosphere (*Zea mays indendata*) samples and root free soil taken in 15, 30, 45, 60, 75 and 90 days after the experiment was conducted. At the end of experiment, all organic waste added soil increased Cmic and BSR in comparison with the control ($P<0,01$)at all experimental periods. Moreover, Cmic and BSR in rhizosphere soil were higher than in root free soil at all organic waste application ($P<0,01$).Increased amount of organic wastes had different effects on Cmic and BSR trend ($P<0,01$).The most increases are in the Cmic and BSR in the soil treated with wastes of tea and waste of tobacco production with supplying of low initial C/N ratio compared to the other organic wastes.

Keywords: *Organic waste, Soil, Rhizosphere, Microbial biomass, Basal soil respiration*.

CFD MODELLING OF AIR VELOCITY IN A TRACTOR CABIN FOR WINTER CONDITIONS

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Abstract

In this study, distribution of air velocity in a tractor cabin was analysed with Computational Fluid Dynamic method. Spatial distributions of air velocity on different planes were determined in the tractor cabin. Materials were tractor with air-conditioned cabin, Testo 435 air velocity sensor. Air velocity were modelled and measured in a tractor cabin for winter conditions. ANSYS Fluent software was used to estimate distribution models of ambient factors. Estimated and measured data were compared each other. Measurements were realised when driver was inside and outside temperature 8^{o}C for winter condition. One sensor was used for air velocity measurements in this research. Number of the elements in mesh was 1074644. Types of meshes were prismatic and hexagonal. Air has a certain temperature in the model. There was heat flux from surface of engine and human body. In addition, convection and radiation heat transfer was accepted in the CFD models. Mean measured and estimated air velocity for winter conditions were calculated as 4.1 m/s and 4.15 m/s, respectively. Mean difference between measurements and CFD model estimations was 0.05 m/s. Accuracy of the model estimation was 11.18%.

Keywords: *Tractor, cabin, modelling, Computational Fluid Dynamics, air velocity*

COMPARISON WITH EMPIRICAL METHODS OF ACTUAL WATER CONSUMPTION VALUES DETERMINED FOR SUGAR BEET (*BETA VULGARIS* L.) IN THE KIRŞEHIR PROVINCE CONDITIONS, TURKEY

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Abstract

The efficient and economical use of water in agricultural areas is an extremely important element. Evapotranspiration, which has a very important place in plant-atmosphere cycle, is an indispensable element for agricultural area and planning, construction and operation of the irrigation projects. The study was carried out during the period 2012-2013 in the district Çukurçayır of Kırşehir Province of Turkey. In the study, the evaporation values measured from the Class A Pan were used to determine the irrigation water requirements of the sugar beet grown in Kırşehir conditions. For this purpose, it was used the three different plant-pan coefficients aimed of the water shortage. The actual evapotranspirations of treatments were determined with the gravimetric method. The values of evapotranspiration obtained in the present study were compared with estimation methods of some evapotranspiration (FAO-56 Penman Monteith, FAO-24 and USDA-SCS Blaney Criddle, Radiation (R-FAO), Hargreaves-Samani (HS) by utilizing the region's climate data. In the comparison; correlation coefficients of the relationships between actual ET and estimated ET, the ratio of calculated ET using different methods to the measured actual ET as percentage, and root mean square error (RMS) were considered to determine the most appropriate of estimation methods. Results indicated that the Blaney Cridle (USDA-SCS Modifikasyonu) and FAO A Pan methods are appropriate alternatives for estimation of ETo under climatic conditions of Kırşehir, Turkey. Results showed that empirical methods used for estimation of plant water consumption were compatible with direct measurement methods.

Keywords: *Evapotranspiration, empirical method, sugar beet, Kırşehir province*

GIS BASED LAND USE MODELLING USING SOIL DATA: A CASE STUDY IN THE SURUC PLAIN, SOUTHEASTERN TURKEY

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Abstract

The aim of this study was to develop land use model for Suruc Plain using detailed soil, climate, topographical and spatial land values data. For modeling, detailed soil maps data, topography, geology, climate and socio-economic factors were loaded into a geographic information system (GIS). Soil parameters representing the land characteristics were converted into raster formats and attribute tables. A Digital Elevation Model (DEM) was generated using topographical maps and they were converted into raster format. Aspect (slope direction), slope, and elevation layers were extracted from the DEM. Climate data, consisting of minimum, maximum, and mean temperatures and precipitation, obtained from 16 weather stations were loaded into the GIS media and converted to a map by using geostatistical analyses methods. All these databases in the GIS media were used to model land suitability classes. The model was designed using the Model Builder tools using more files regarding suitable land use type. The analysis suggested that the model allows using various data in the GIS media and it is easily/quickly utilizable and works efficiently for decision making in land use evaluations at agricultural plains.

Keywords: *Soil Information Management, Geostatistics, Land Use Evaluation Modeling*

THE APPLICATION OF ENVIRONMENTALLY FRIENDLY PREVENTIVE MEASURES TECHNOLOGIES TO PRESEVE FRESH VEGETABLES

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Abstract

Plants are constantly in contact with the soil and other natural environment. That`s why on plants surface and in its tissues we can always find origins of microorganisms, which, under favorable conditions, multiply rapidly undermining the quality and security of harvested products. This fact poses a danger to human and livestock health.Stored vegetables are cleaned, sorted, washed and dried before supplying to trade networks. In order to reduce mycological contamination on washable vegetables surface, it is appropriate to use ozone, which acts as a disinfectant and extends the safe storage period. Rinsing carrots with ozonated water (concentration of ozone – 1.5 mg L^{-1}) for 5 minutes during preparation for a market and then storing them under favourable conditions it is possible to maintain their quality for longer period of time than washing them with tap water. Moreover, chemicals as chlorine or similar are not used; these usually get back into the sewage systems or environment. Moreover, chemicals such as chlorine or similar which usually get back into the sewage system or environment are not used. Rinsing of the samples with ozonated water had minimal influence on variation of weight.

Keywords: *Ozone, ozonized water, vegetables, mold population.*

PHYSICAL AND CHEMICAL CHARACTERISTICS OF RAW WASTEWATER FROM MEAT PROCESSING PLANTS IN ALBANIA

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Abstract

Food industry is a large consumer of water, both as an ingredient as well as for technological purposes. Though food industry doesn't pose any severe environmental threatening in soil or air pollution it produces a large quantity of wastewater which needs to be treated before their discharge in the surrounding environment. In particular, the meat processing industry is one of the major consumers of freshwater besides food and beverage processing facilities, which makes meat processing plants a significant producer of wastewater effluents.Such effluents characterized by high chemical oxygen demand, biological oxygen demand, nutrients, and organic and inorganic contents, if discharged without proper treatment, pollute severely receiving water bodies and disrupts complete ecosystem. Thus, appropriate treatment methods are required to meet the effluent discharge standards. This paper presents the data obtained from the physical chemical analysis performed in wastewater effluent produced from meat processing plants in Albania. Frequent wastewater samplings have been made according to peak plant production. The daily composite samplings have been made to the effluent flow before mixture with the municipal waste water. All samples were analyzed in duplicate for COD, BOD, suspended solid content, pH, chlorides, total nitrogen and phosphorus, oils and grease content. Analyses were done according to methods outlined in MetodiAnalitici per le Acque(APAT). The data collected were compared to the existing Albanian Norms outlined in the respective Albanian Regulation for meat processing plants and some alternatives for effluent wastewater treatment are given as well.

Keywords: *Meat processing plant, wastewater, effluent, characteristics, effect.*

EFFECTS OF RAINFALL VARIATIONS ON GROWTH OF ALEPPO PINE (PINUS HALPENSIS MILL.)

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Abstract

The present work concerns a dendroclimatological approachof Aleppo pine (*Pinus halpensis MILL*) in the Tlemcen region (Algeria, south side of the Mediterranean). Indeed, in this type of climate, characterized by two seasons (respectively, wet-cold, and hot-dry), the trees are globally, more sensitive to water balance to that of thermal balance. The dry atmosphere of the mediterranean countries is not only due to the weakness of the total rainfall. What causes biological and hydrological drought is the small number of precipitation days and dwindling as temperatures rise. The species chosen for this study is the Aleppo pine (*Pinus halpensis*.MILL), very responded in the mediterranean basin. The basic task was to take samples of wood and sections of carrots in the trunks of young and old trees. Determining the year of formation of each circle is defined. Years characteristics, positive and negative allowed us to develop the inter dating profile or "final synchronization." The analysis of radial growth and reports of relative differences of successive rings (ERC) shows a clear down ward trend in young trees. Mean sensitivity (MS) and inter dating coefficients (SR) respective to young trees and older confirm the relatively high dependence of the first rainfall particularly climatic factors.

Keywords: *Pinus halepensis*, *radial growth*, *synchronization*

SEX RATIO IN LOCAL POPULATION OF SPECIES *Chondrostoma phoxinus* Heckel, 1843 (Teleostei: Ostaryophysi, Cyprinidae) FROM Buško LAKE

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Abstract

Within species with separated male and female sex, the sex ratio is one of the significant features of the population. The specified aspect of the sexual differentiation is represented in the development of needs for fertilization and realization of total population size and minimal presentation of genetic drift and inbreeding effect. The species *Chondrostoma phoxinus* Heckel, 1843 (known as The Minnow Nase) is described based on samples from Sinj (Croatia), and later it has been found on the territory of Bosnia and Herzegovina, more precisely in Buško Lake. Material, individuals *Chondrostoma phoxinus* Heckel, 1843, has been periodically collected from April 2003 to September in 2004 and during 2008 to 2009 with standard ichthyology methods. The noticed differences are analyzed with chi-square test. In the summed sample from 2003 to 2004 (marked as the first subsample) there were 71 units of the Minnow Nase: 51 males and 20 females (0,7183:0,2817). Summed sample from 2008 and 2009 (marked as the second subsample) included 252 units of Minnow Nase, 87 males and 118 females (0,4244:0,5756), while for 47 units we could not determine the sex. From the specified data it is possible to determine imbalance in the subsamples (first subsample: 2,55:1,00 with chi-square 13,56 and probability of random finding of the noticed differences $P<0,001$; second subsample: 0,74: 1,00 with chi-square 2,50 and probability of random finding of the noticed differences $0,2<p<0,01$) between males and females in samples. However, total sample of 276 individuals have been represented with perfect ratio of 138 males and 138 females and ideal *sexratio* 1:1.

Keywords: *Chondrostoma phoxinus, Minnow Nase, Buško Lake, sex ratio.*

SEVERITY, MAGNITUDE AND DURATION OF DROUGHTS IN BOSNIA AND HERZEGOVINA USING STANDARDIZED PRECIPITATION EVAPOTRANSPIRATION INDEX (SPEI)

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Abstract

Drought in Bosnia and Herzegovina (B&H) is mostly analyzed using water deficit obtained from agro-hydrological balance; a ratio between precipitation or actual evapotranspiration (AET) to potential evapotranspiration (PET); and more recently using Standardized Precipitation Index (SPI).The main objective of this research is to use the relatively new multiscalar drought index, Standardized Precipitation Evapotranspiration Index (SPEI) to analyze severity, magnitude, and duration of drought periods in B&H. SPEI is based on precipitation and evapotranspiration data and it has the advantage of combing multiscalar character with the capacity to include the effects of variability in atmospheric water demand on draught assessment. Evapotranspiration is calculated with Penman-Monteith method, the standard international procedure for computing reference or potential evapotranspiration (ET_0).In order to assess all four types of drought, SPEI is calculated for shorter (1, 3 and 6 months) and longer (12 and 24 months) time scales. Weather stations with long-term continuous climate data records were selected - 13 stations across B&H in total, from which the climate data for 50-year period (1961 – 2010) were collected. A crucial advantage of SPEI over other drought indices previously used in B&H and its use of potential evapotranspiration and multiscalar characteristics, enabling identification of different drought types.By using Standardized Precipitation Evapotranspiration Index (SPEI) it was found that severity, magnitude and duration of drought periods in B&H vary depending on the location and time scale for which drought was calculated. Presence of more severe long lasting droughts in period after 1986 was found for all 13 analyzed locations across B&H.

Keywords: *Bosnia and Herzegovina, drought, SPEI.*

APPLICATION OF INTERO MODEL FOR SOIL LOSS ESTIMATION CASE STUDY: S7-1 WATERSHED OF SHIRINDAREH RIVER BASIN, IRAN

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Abstract

Soil erosion is a naturally occurring process that affects all landforms. In agriculture, soil erosion refers to the wearing a way of a field's topsoil by the natural physical forces of water and wind. It may be a slow process that continues relatively unnoticed, or it may occur at an alarming rate causing serious loss of topsoil. As the measuring of soil erosion is costly and time consuming process, therefore soil erosion models have been used more and more to estimate soil erosion as well as sediment yield. For calculation of the sediment yield in the S7-1 Watershed of Shirindareh river, Iran we used the IntErO model based on the EPM method. Calculated peak discharge from the S7-1 Watershed was 75 m^3s^{-1} for the incidence of 100 years and the net soil loss was 11034 m^3km^{-2}, specific 242 m^3 km^{-2} per year. The results of the present study and previous experiences of the other researchers revealed that the IntErO model can be used to estimate soil loss in the other regions similar to Shirindareh watershed.

Keywords: *Soil erosion, IntErO Model, sediment yield, Shirindareh watershed.*

CHLORINE IN RENEWABLE FUELS - MOBILITY AND EFECTIVENESS OF BINDING IN THE BOILER FURNACE

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Abstract

The aim of this study is to identify the transformation of chlorine during the combustion process of biomass fuels and waste, and the possibility of its binding in the boiler. The forms of chlorine in the biomass (animals waste) and waste are quite different. Biomass is mainly a chlorine carrier in inorganic combinations. In waste, apart from mineral bindings, chlorine is bound in organic compounds. It affects the behavior of this element in the boiler: the way, the speed and the form in which it is released from the combustible material. This in turn is reflected in its removal (binding) from the gas space of the combustion chamber.

This paper presents the results of chlorine migration and binding by lime sorbent in industrial, two-stage combustion installation (I^0 - gasification, II^0- afterburning), during the combustion of fuel formed from municipal and industrial waste. Fuel choice was dictated by the fact that rational management of waste is about their maximum recovery and recycling (in this case the energy recycling). As a binding material hydrated lime was used. Purposefulness of studying the physicochemical and functional properties of solid fuels formed from waste is justified by the fact that only fuels that meet specific technical and operational requirements, including emission, can be used directly in energy sector.

Keywords: *Waste, chlorine, calorific value, combustion.*

BIOLOGICAL PROPERTIES OF POSTAGROGENIC SODDY SHALLOW CLAY LOAM PODZOLIC SOIL IN THE PREDURALIE

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Abstract

There are a lot of fallow lands in Russia as a result of social-economic crisis started in 1990. Different recovery successions are formed and influence on the genesis and properties of postagrogenic soils. However, to date, sufficient data about changing properties of postagrogenic soils have not been collected yet. It was the aim of this study to evaluate the recovery of biological properties of a postagrogenic soddy shallow loam podzolic soil after discontinuation 17 years ago. Since 1995, in this benchmark station, research on monitoring soil fertility was conducted. Soil respiration and enzyme activities were determined in summer 2015 to study edaphic changes. Soil samples were taken from the arable horizon (0-25 cm) of the following plots: (I) haymaking, (II) secondary forest. In plot (II) CO_2 discharge, determined every two weeks, and urease activity averaged to 3.9±0.4 kg $CO_2 \times ha^{-1} \times h^{-1}$ and 8.5 ±1.4 mg $NH_3 \times 24h^{-1} \times 10g^{-1}$, respectively. They indicate more favorable conditions of soil biota and soil fertility. Expressing the negative effect of severe disturbance on soil biota, they were less in plot (I): averaging to 6.6±0.4 kg $CO_2 \times ha^{-1} \times h^{-1}$, and to 21.7 ±3.7 mg $NH_3 \times 24h^{-1} \times 10g^{-1}$, respectively. The invertase activity was proportional related to content of organic matter. In the plot I, the activity was 55.8 ±1.6 mg glucose$\times 24h^{-1} \times g^{-1}$ soil; in variant (II) 32.0 ±0,3 mg glucose$\times 24h^{-1} \times g^{-1}$ soil. It is further proposed that fallow under grasses facilitates the restoration of soil functionality better than secondary forest.

Keywords: *Enzyme activity, organic matter, fallows.*

THE IMPORTANCE OF ECOTOURISM FOR RURAL DEVELOPMENT OF MAČVA REGION, SERBIA

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Abstract

A geographical region Mačva (Serbia) is situated between the rivers Drina and Sava. It is a lowland area, characterized by fertile soil and because of that the main driving force for rural development of the region is agricultural production. However, Mačva is famous for its natural resources which present an important potential for developing one of the most popular tourist field in the world – ecotourism. This field of tourism is in accordance with sustainable development and environmental protection. One of its aims is to improve the life quality of local population as well as to educate the visitors when natural resources and their importance are in question. One of the most famous and visited center of ecotourism is a natural resort "Zasavica". Beside it, Mačva has many unused potentials which should be included in its offer. In order to contribute the rural development of the whole region, both in ecological and sustainable way, a lot of efforts should be done: recognizing new centers of ecotourism, their promotion, investing in their infrastructure, as well as proclamation of new protected areas and widening already existing ones. The objective of this review paper is to observe potentials for ecotourism in Mačva, to propose measures for further progress in this area and to highlight the importance of this type of tourism for rural development in the region.

Keywords: *Mačva region, ecotourism, rural development*

ELECTROMAGNETIC INDUCTION METHODS FOR VISUALIZING THE SPATIAL VARIABILITY OF SOIL SALINITY.

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Abstract

Soil salinization is a worldwide increasing concern. Tools for anticipating the risk of salinity development and salinity monitoring tools are applicable for effective management of irrigated agricultural fields under arid and semiarid climate, as well as for designing actions for reclamation of areas degraded by salinization. Electromagnetic induction (EMI) techniques are successfully used for soil salinity assessment, allowing high resolution mapping, not affordable by other means. This study was carried out in a side an endorreic salt lake at Southeast Spain (Salinas, Alicante). A small area of 10 by 10 meters with variation in micro-topography was investigated. The EM38 apparatus used for this study works injecting a primary magnetic field and measuring the secondary magnetic fields appearing in conductors into the soil (minerals and ionic solutions). In vertical modethe signal contribution comes mainly from the deepest part of profile (EMv), whereas in horizontal mode the signal contribution comes mainly fromthe upper part(EMh). Measurements of 36 EMv and EMh were done by duplicate in a regular squared grid and five soil profiles were sampled every 5 centimetres until 1 metre depth and analysed at laboratory. Profiles showed high $CaCO_3$ content buffering the soil pH, and increasing salinity until 50 cm, with later constant values. Post processing and calibration of the signals allowedthe preparation of high resolution map of soil salinity (ECe) for different depths, evidencing the existing salinity gradients at sub-metric scale. This info was used for relating salinity values to plants condition and natural vegetation distribution.

Keywords: *Electromagnetic induction, soil salinity.*

ASSESSMENT OF HEAVY METAL CONTAMINATION IN SEDIMENTS AND VEGETATION OF THE KARAVASTA LAGOON, ALBANIA

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Abstract

The intensive agricultural production around the area of Karavasta Lagoon in Albania and the discharge of Semani and Shkumbini Rivers in vicinity to it could affect the environmental quality of the wetland and its ability to sustain the living organisms. This paper aims to estimate the quality of water and sediments of the Karavasta Lagoon, through measuring the physicochemical parameters and the presence of heavy metals. Samples of surface water and bottom sediments have been collected in different specific points in the Lagoon in the spring season of 2013 and have been analyzed for their concentration of heavy metals such as Pb, Cr, Cu, Cd, and Hg. The results show high levels of Cr pollution, followed by Cu and Pb and highlight the need for further monitoring of the physicochemical parameters. The application of Enrichment Factor (EF) suggests that Cr originates from the alluvium brought by Shkumbini River that flows through ultramafic areas in Albania rich in this metal, whereas Cu and Pb come from the agricultural drainage channels, urban effluents and tributaries.

Keywords: *Heavy metals, sediment contamination, water quality, Karavasta Lagoon, vegetation.*

SOILS OF EASTERN HERZEGOVINA AND WRB CLASSIFICATION SYSTEM

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Abstract

The World Reference Base for Soil Resources (WRB) is the internationally-accepted soil classification system.In our age of increasing globalisation, however, international communication has become an urgent requirement. The WRB is intended to serve as a common denominator of national soil classification systems to facilitate such international communication.The aim of this study is to determine the characteristics of soil investigations of certain types of soil, using the example of eastern Herzegovina, harmonization of the national classification system of soil, with WRB classification, in order to adapt the existing system and become comparable with the WRB classification system and allow communication at the international level.Field research was carried out in 2010 to 2015. A total of 44 profiles of soil were open on the surface, which covers about 30,000 hectares. The external and internal morphology is described for all pedological profiles (Munsell Soil Color Charts, 1954), soil samples in a disturbed state were taken for all genetic horizons. Laboratory testing of physical and chemical properties of the soil were carried out according to generally accepted methodsin laboratory Faculty of Agriculture in East Sarajevo, Bosnia and Herzegovina.WRB classification will provide a high degree of comparability, but also the international applicability of the results.The paper, based on detailed field and laboratory tests, show the cartographic unit area of eastern Herzegovina to the classification system of the World reference base for soil (WRB) and according to the criteria of classification of land that is now applied in the BiH (Resulović, 2008)and Serbia (Soil classification of Yugoslavia, Škorić et al., 1985).WRB classification will provide a high degree of comparability, but also the international applicability of the results.

Keywords*: Soils of Eastern Herzegovina, WRB classification, Soil classification of Yugoslavia*

THE TOTAL CONTENT OF CADMIUM IN DUMPS OF EASTERN HERZEGOVINA

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Abstract

Among the many damages to soil, contamination of soil with heavy metals draws the most attention. Heavy metals in the soil do not dissolve like many other pollutants, so the decontamination of soil is by rule a long-term process with great investments that lasts even for decades.The paper presents the results of studies on the total content of cadmium (CD) in soils, soils of dumps in the process of re-cultivation, slag, ash and mullock dumps mine and thermal power plant in Gacko. The study includes areas that are determined as areas of possible contamination.Extraction of traces of total content of heavy metals, BAS ISO 11047: 2000, was done in laboratory Faculty of Agriculture.In all tested samples of the total content of cadmium is below maximally allowable concentration (MAC), corrected limit value and well below the remediation values. The available data in the field of research of soil damage and destroyed farmland by various activities, where the extraction of mineral resources by surface mining leads, date back to the period of 20 or 25 years ago. It is obvious that the lasting conflicts in interests and rights of soil disposal in the technical and in ecological areas are gaining in importance. This is one of the important motives for undertaking research activities in Herzegovina, to shed light, as much as possible, on the current situation in the interests of individual land users.

Keywords: *Total content of cadmium, maximally allowable concentration, Eastern Herzegovina*

COMMUNITY-CORPORATE PARTNERSHIP: CASES OF COFFEE AND PEPPER PRODUCTION IN UPLAND CAMBODIA

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Abstract

Different approaches to development interventions in Cambodia have been tested to examine if they offers greater chance of ownership, benefits, and sustainability. Often, there have been hardly any claims when these factors are brought in. In one instance, community people are invited to advocate for their rights and access to land and forest resources invaded by powerful individuals or companies. Community people's motivation appears to be in despair when the achievements tend to be out of their reach. On the other hand, there are approaches focusing on the ground such as the community forestry program seeking to improve livelihoods in addition to environmental conservation; however, they remain far away from their dream because of the dependency on external support. This paper argues that there is an alternative to build a strong individual or household economic base before they start engaging in bigger issues. This lends itself to the concept of community-corporate partnership (CCP), which taps into available resources such as land from community people while capital and technical inputs from outside for collective production that is based on mutually agreed principle of shared benefits and losses. Cases of coffee and pepper production are being experimented over the past year with indigenous people in upland Mondulkiri Province. Over the period, there have been manifestations of shared understanding, trust, control of processes and challenges, which indicate a promising path to long term benefits. This has long term potential for strengthening community solidarity for defending their rights to land and natural resources they presently depend upon for their living.

Keywords: *Coffee, Pepper, Community, Corporate, Partnership, Sustainability, Cambodia.*

LIVELIHOOD SECURITY AND GOVERNANCE OF ARTISANAL SMALL-SCALE GOLD MINING IN CAMBODIAA VILLAGE CASE STUDY IN PREAH VIHEAR PROVINCE

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Abstract

At the start of the 21st century the mineral resources, identified by the French and Chinese geologists, including bauxite, carbonate rocks, gemstones, gold, manganese, phosphate, salt, silica, etc., were virtually untouched due to prolonged conflicts, and the lack of capital to invest. However, artisanal small-scale gold mining (ASGM) activities have occurred from time immemorial and provided villagers and in-migrants with important opportunity livelihood improvement through the exchange of learning and trading relationship with people from other culture. As Cambodia opens up market in their early 1990s, trade flows of commodities including gold has been in greater demand. Like most places in Cambodia, ASGM sites are often resorted to taking over by powerful individuals or companies for large scale or heavy machinery exploitation, as at least the Government approved mining investments worth US$ 181 million in 2005 and then rapidly increased to US$ 403 million in 2006. Local community people are often pushed aside or not allowed to enter the area for it is generally fenced with armed guards. Noticeably, the existing 2001 Mining Law does not provide an adequate legal framework for dealing responsibly with mining in indigenous areas. However, the study site in Preah Vihear Province offers insights on different levels of governance structure which facilitates the harmonious co-existence of corporate versus ASGM miners to become actively engaged in mining activity. The general claims from ASGM miners are that the activity has added up to their diverse activities contributed to the household economy.

Keywords: *Gold, Artisanal Small-scale Gold Miners, Governance, Cambodia.*

STANDARDIZATION OF METHYL ESTERIFICATION PROCESS FOR REFINED COTTONSEED OIL USING RESPONSE SURFACE METHODOLOGY

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Abstract

Production of methyl ester cotton seed oil has been accomplished from transesterification process in between cottonseed oil and methanol in the presence of potassium hydroxide (KOH). In this study, the transesterification process was standardized by applying the response surface methodology (RSM) with Box Benhken design for three variables. A quadratic polynomial second order equation was employed to investigate the operating conditions of transesterification to obtain a high conversion of biodiesel as well its kinematic viscosity as a function of methanol/oil molar ratio, catalyst concentration and reaction temperature.The process parameters such as molar ratio, catalyst concentration and reaction temperature were standardized to reduce its kinematic viscosity with maximum possible yield of methyl ester of cottonseed oil. It is recommended that cottonseed oil reacted with 6.9:1 molar ratio and 1.19 percent KOH at 57^0C reaction temperature for reaction time of 1h and then settled for 24h to get 98.31 percent yield with 4.85 cSt kinematic viscosity.

Keywords: *Biodiesel, transesterification, yield, cottonseed oil.*

OPTIMIZATION OF ENZYMATIC SACCHARIFICATION FOR QUALITY IMPROVEMENT OF BIO-OIL FROM RICE STRAW

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Abstract

The reducing sugar ranged from 25.1 to 34.8 g/L and glucose content ranged from 15.1 to 28.9g/L, lignin ranged from Bio-oil, another category of renewable energy has gained significantinterest of scientist in recent years. The major problem in production of bio-oil is its increase indensity with the passage of time. The reason for such phenomenon is the cross-linking of ligninwhich was bound to bio-oil after pyrolysis.The aim of this work was to reduce the content of lignin in rice straw and study the effects ofdecreased lignin content in bio-oil. Additionallyenzymatic saccharification of rice straw was alsoconducted after pre-treatment to estimate optimum conditions for bio-oil production. Theindependent variables for the optimization of enzymatic saccharification were, time (24, 48, 72hours), Enzymatic loading ratio (5:10, 10:10, 15:10), substrate concentration (4, 5, 6%w/v) weretaken into account. Designed experiments were conducted randomly to find the effect of thesevariables on reducing sugar, glucose concentration, lignin, ash, cellulose, hemicelluloses. Theanalysis of variance for each sample was calculated.The reducing sugar increased with increase in time and enzyme loading ratio while lignincontent increased with increase in substrate concentration48.1 to 51.1% w/w and 9.1 to 12.1w/w. Optimum value of levels of predicted variables obtained by compromise optimization of theresponses were; 64.8 h time, 15:10 enzyme loading ratio and 4.62 substrate concentrations.

Keywords: *Enzymatc saccharification, bio-oil, rice straw*

DEVELOPMENT OF A RESOURCE CONSERVATION MACHINE FOR SUGARCANE CULTIVATION

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Abstract

This paper deals with the development of Resource Conservation Machine for Sugarcane Cultivation. It is reported that poor yield of sugarcane is because of weed can range from 15 to 75 % depending upon field conditions. The initial 90 to 120 days are very critical for poor yield of sugarcane because of weeds. Therefore, these days are very important for weed management to ensure higher yield. In case of sugarcane crop although various type of machinery has been developed, however there is a need of resource conservation machine for better productivity by weeds incorporation and mulching operation.. The developed machine consists of a frame of 2440 mm length and 510 mm wide, the square pipe selected for frame is of 5 mm size. The tines which are 6 in numbers are attached at the front side and blades of trapezoidal shape with rounded corners were attached at the rear side of the frame. The length of blade is 650 mm and thickness is 5 mm. the blades were attached with the help of L shaped legs which were clamped to the frame. The adjustable clamps help to adjust the depth of blades during the operation. The main objective of this study is to find mathematically the thickness of the blade used at the rear end of the machine. The machine is able to perform the intercultural and mulching operation efficiently without damaging the sugarcane crop. Hence it very useful for the growth of sugarcane and saves both money, time and resource conservation as compared to manual and other intercultural methods.

Keywords: *Resource conservation, Sugarcane, Intercultural operation, Weeding Mulching.*

COMPARATIVE STUDY OF COLD PRESS AND ACCELERATED SOLVENT OIL EXTRACTION FROM *CAMELINA SATIVA* AND *BRASSICA CARINATA*

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Abstract

The aim of the current research was to compare the cold press (CP) and accelerated solvent extraction (ASE) methods for oil yield and qualities of non-edible *Camelina sativa and Brassica carinata* oilseeds. A full factorial design with three levels of extraction temperature (80, 100 and 120°C), and extraction time (40, 65 and 90 min) for ASE and three levels of screw frequency (15, 20 and 25 Hz), and nozzle diameter (5.6, 6.4 and 7.2 mm) for CP were used to extract the oil. Maximum oil yield for both the oilseeds was obtained at 100°C, 90 min for ASE and at 20 Hz, 5.6 mm for CP extraction. ASE produced 6-10% more oil recovery than that of CP for both the oilseeds. The heating values of oil extracted from both oilseeds using ASE and CP were found in the range of 39.4-40.5 MJ/kg and 39.7-40.8 MJ/kg, respectively. Solvent extracted camelina oil exhibited 23% less viscosity than that of cold pressed oil. Density of both the oils ranged from 906.5-930.1 kg/m^3, and 905.3-935.3 kg/m^3 for ASE and CP, respectively. Camelina oil was rich in linoleninc acid, whereas oleic acid was dominant free fatty acid in carinata oil regardless the extraction methods.ASE extracted oil was found more suitable for the upgradation to the biofuel.

Keywords: *Accelerated solvent extraction, cold press, camelina, carinata, viscosity*

STATUS OF NATURAL ECOSYSTEMS IN THE NORTH REGIONOF ECONOMIC DEVELOPMENT OF THE REPUBLIC OF MOLDOVA

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Abstract

Regional development in Moldova is a necessity assumed by Law no. 438-XVI from 28.12.2006. The regional development model provides the division of the country territory into 6 regions and is based on the country's sustainable economic development. In this regard, the natural areas protected by the state have a special role. Due to their special protection status they ensure the conservation of natural resources in the region.The work is focused on some aspects of the ecological status of state protected natural areas in the Northern Region. The results were obtained on the basis of a comprehensive study conducted during field expeditions and laboratory research over several years. There are highlighted valuable items specific for protection category, the ecological state of biotic and abiotic components and the human impact on protected natural areas in the region. As a result of the research it was found that the specific elements for the categories of investigated areas are in satisfactory condition and the transboundary sources are the main sources with negative impact on these studied areas. The investigated natural ecosystems, especially those located in the forestry sector, provide favourable conditions for a rich diversity of plant and animal species, among them rare species protected at the national and international level. Interconnection between biotic and abiotic components of protected areas and surrounding habitats, especially agrocoenoses ensure ecological balance in the region.

Keywords: *State protected natural areas, valuable items, human impact.*

SUSTAINABLE TOURISM AS A BASIS OF MANAGEMENT OF NATIONAL PARKS

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Abstract

Questions of modern tourism in the new millennium come down to two - the growth and sustainability. These two issues are the essence of future projections of tourism within the economic, social, cultural and ecological structure of communities, countries, regions of the world. Modern trends in tourism show the increasing role that sustainability has on this industry. Sustainable development is integral to the concept of national parks forming a new kind of tourism which is increasingly becoming the future of all forms of business. Environmentally conscious and informed demand leads to the creation of environmentally sound destination for eco-tourism, which is a specific segment of the tourism market. As a segment of ecotourism there are national parks that meet the desires and needs of demand that are even more differentiated from the needs and desires of typical ecotourists.

Keywords: *Tourism, sustainable development, marketing, national parks.*

SOIL LOSS ESTIMATION OF S7-2 CATCHMENT OF THE SHIRINDAREH WATERSHED, IRAN USING THE RIVER BASIN MODEL

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Abstract

This study aims to estimate the soil loss of S7-2 Watershed of Shirindareh River Basin in Iran, using a simple but comprehensive "River Basin" model for erosion classification and prediction of erosion potential. Peak discharge from the S7-2 Watershed was calculated on 65 m^3s^{-1} for the incidence of 100 years; the net soil loss on 4397 m^3km^{-2}, specific 178 m^3 km^{-2} per year. The results of the research and earlier application of the "River Basin" model in the studied area of the Shirindareh River Basin in Iran shown that this approach is a good tool for rapid assessment of erosion risk to support decision-making and policy development.

Keywords: *Soil erosion, River Basin Model, Sediment yield, Shirindareh watershed.*

MODELLING RESERVOIR SEDIMENTATION AT BIN EL OUIDANE DAM, MOROCCO

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Abstract

This study was conducted in the Oued El Abid watershed upstream of the Bin El Ouidane dam, in Tadla-Azilal province (Morocco) to quantify the dam siltation rates. To assess the annual soil erosion and the sediment yield the universal soil loss equation (USLE) was used. A geographic information system (GIS) was used to generate and integrate maps of the USLE factors. A spatial distribution of soil erosion in the Oued El Abid watershed was obtained. The soil erosion was determined for each rural commune in order to identify the soil erosion hotspot and estimate the amount of soil that has been transported downstream (Bin El Ouidane Dam).Soil erosion ranged from very limited values for flat and well covered areas to over 2100 t /ha/y in mountainous areas with sparse vegetation. The total annual soil loss within the watershed is estimated at 19.6 million tons per year. An equation of sediment delivery ratio (SDR) based on river gradient was calculated. It was found that the value of *SDR* at the outlet of the watershed Oued El Abid was 0.65 with a sediment yield of 12.74 million tons per year which affect the durability of the dam.

Keywords: *Soil, Erosion, USLE, GIS, SDR.*

FARMER MANAGED IRRIGATION SYSTEM AND ITS IMPACT ON WATER SERVICE DELIEVERY: A CASE OF SINDH-PAKISTAN

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Abstract

Irrigation system of Pakistan is the largest integrated irrigation network in the world. The system is fed by the waters of Indus River and its tributaries. The Sindh province has 13 million acres of irrigated lands in its three barrage command areas, built between 1932 and 1962. In 1997 the Government of Sindh started the reform of the management of the entire irrigation system. The Sindh Assembly approved an Act, shifting the responsibilities for the management of the irrigation and drainage infrastructure from the centralised Provincial Irrigation Department (PID) to the farmer managed water institutions known as Sindh Irrigation and Drainage Authority (SIDA), Area Water Boards (AWB) and Farmers' Organisations (FOs). The institutional structure proposed under SIDA Act was restructured through Sindh Water management Ordinance in 2002 with an objective to make the institutions more participatory and autonomous in its decision making and service delivery. The key process of Institutional Reforms has been carried out by implementing Participatory Irrigation Management (PIM) which has evolved and become generally accepted as a necessary aspect of productive and sustainable irrigation. The concern of this paper is to review the reform process and assess its role, impact especially in improving water service delivery under command of farmer managed system. The paper will also focus on the current reform, reform process, working of SIDA, FOs and AWBs and their strategy to address the issues and problems of farmers with respect to water distribution and governance.

Keywords: *Irrigation, water service, equity, reform, governance*

AGRO-CHEMICAL CHARACTERISTICS OF SOIL IN RASPBERRY-GROWING REGION OF IVANJICA (SERBIA)

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Abstract

Raspberry growing in certain parts of Serbia is rapidly developing owing to cost-effectiveness of production and specific physical-chemical characteristics of the soil, making it unsuitable for other types of fruit-growing. Analysis of soil samples from existing and prospective raspberry plantations reveals its heterogenic composition, depending on sampling site and actual method of land use. Prospective raspberry-growing land areas are characterised by strong substitution acidity (pH/KCl<4.5) in 52.8% samples, with non-carbonic composition present in 88.9% of samples and an approximately equal share of medium and high content of humus and total nitrogen in the humus horizon, compared to a considerable reduction of these parameters in the sub-humus horizon. The content of accessible phosphorus is <6 mg/100 g in 41.7% of humus horizonsamples, compared to 55.6% in sub-humus horizon, whereas accessible K_2O content ranged from low to medium supply required for raspberry cultivation. Soil under raspberry plantations shows presence of acidic soil reaction in the humus horizon, with 97.2% of non-carbon samples and a significant number of samples having a high content of humus and total nitrogen, as well as a high content of accessible phosphorus in the humus horizon in 77.8% of samples, as opposed to only 16.7% in soils of prospective raspberry plantations. The high content of accessible potassium was pronounced, reaching 94.4%. The presented results show that unfavourable agro-physical and agro-chemical composition of soil is compensated by high volumes of mineral and organic fertilizers, with potentially multiple impacts on environmental sustainability and productivity of raspberry plantations.

Keywords: *Agro-chemical analysis, Soil reaction, Phosphorus, Potassium, Raspberry.*

PHYSICAL ATTRIBUTES IN SOIL QUALITY FOR SUSTAINABLE SOIL MANAGEMENT

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Abstract

Soil is one of the most important natural resources and degraded due to intensive agricultural practices. Soil degredation decreases soil fertility with decreasing soil physical chemical and biological quality parameters. Management of physical soil quality parameters shapes the dynamic parts of soil chemical and biological quality. Basic physical soil quality indicators can be summariezed as soil texture, soil depth, infiltration, bulk density, water holding capacity, aggregate stability and penetration resistance. Recycling organic wastes in agricultural fields is important to improve soil physical parameters as a part of whole soil quality. Evaluating soil physical behaviours helps to decision for basic agricultural practice or crop patern in sustainable land management systems.

Keywords: *Soil quality, physical indicators, organic waste*

IMPORTANCE OF WATER HARVESTING PRACTICES ON WATER STORAGE IN RAİNFED AGRICULTURE AREAS IN SOUTHEASTERN OF TURKEY

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Abstract

The most important natural resource in arid areas, a large part of the rainfall is usually due to the loss of surface runoff and undergoing evaporation. Collecting rain water in order to ensure the sustainability of agricultural production should be evaluated. It is an old tradition in many countries of the world and water harvesting techniques used for thousands of years, have been developed in order to obtain drinking water and using/domestic water.Water harvesting systems in semi-arid areas, supporting of precipitation therefore, put in order increasing efficiency able to supply enough water. Water harvesting is the one way to take advantage of a tool that allows rain water in the between agricultural activities. Water harvesting practices increases the amount of water per unit of cultivated area. Water harvesting reduces environmental damage, increases vegetation cover and provides soil and water. It reduces soil and desertification and also increases agricultural production potential in dry areas. This study will focus on the importance of rainwater harvesting on soil moisture. One of the natural resources rainwater must collect in the soil and use it a beneficial way for the water plant is a great importance on climate change and global warming effects in dry region that has inadequate rainfall. Water harvesting techniques are useful and have to be promoted to local farmers to take advantage of rainwater for farming irrigation in sloping pistachio garden and put into practice in dry agriculture areas in Southeastern Anatolia Region in Turkey.

Keywords: *Soil Conservation, Water Conservation, Water Harvesting, Dry Areas.*

SPATIAL ANALYSES OF PLANT AVAILABLE PHOSPHORUS CONCENTRATION UNDER DIFFERENT MANAGEMENT PRACTICES

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Abstract

Phosphorus (P), a dynamic property of soil is one of the absolutely required nutrients for healthy plant growth. Parent materials as well as management practices in a region significantly affect plant available phosphorus (PAP) concentration of soils. The purpose of this study was to determine the PAP concentrations of soils under five different management practices and to analyze and map the spatial distribution of PAP using geostatistical techniques. Soil samples were collected from approximately the corners of 5km*5km size grid cells within 252.000 ha land in South Eastern Region of Turkey. Total of 110 disturbed samples were taken from 0-20 cm depths, and analyzed for PAP, particle size distribution (sand, silt and clay), soil reactions (pH), electrical conductivity (EC), organic matter (OM) and calcium carbonate content. The P_2O_5 concentration ranged from 11.6- 787.9 kg ha^{-1} with a mean value of 70.9 kg ha^{-1}. The highest P_2O_5 concentration was recorded in forest soils (mean 98.9 kg ha^{-1}) and the lowest P_2O_5 (mean 39.4 kg ha^{-1}) was obtained from soils located in pastures. The highest variation (CV=155.25%) of P concentration was recorded in wheat-barley fields (rainfed) and the lowest CV (CV 61.53%) was obtained in lentil fields (rainfed). Changes in parent material, climate and management practices in the study area probably contributed to the high variation of P concentration. The semivariogram of PAP best fitted to exponential model. The range of the influence calculated for the PAP was 7020 m. The value for nugget/sill of PAP was 2.77% that indicated a strong spatial autocorrelation. High range value and low nugget/sill ratio suggest that PAP concentration of soils wassignificantly influenced by intrinsic variations such as parent material. The formation of a hole effect structure in semivariogram of PAP indicates a form of cyclicity or periodicity in parent materials of soils.

Keywords: *Spatial analyses, phosphorus, management, geostatistics, mapping.*

FACTORS AFFECTING AVAILABLE PHOSPHORUS CONCENTRATION IN NATURALLY FORMED SALINE ALKALINE SOILS

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Abstract

Several factors affect the availability of phosphorus (P) concentration in soils. Understanding the factors affecting the soil P content is essential to appropriate use of P sources in agricultural production. This study was aimed to identify the factors important for the plant available P concentration of naturally formed saline alkaline soils and map the spatial distribution of P concentration. Soil samples were collected from 0-30 and 30-60 cm depths by field sampling in a 400m×400m grid. Total of 202 locations were sampled from 2650 ha land. Plant available P (PAP) concentration, soil texture (clay, silt and sand contents), calcium carbonate content, organic matter, soil pH, electrical conductivity, exchangeable Ca, Mg, Na and K, exchangeable sodium percentage and sodium adsorption ratio of soil samples were determined. The PAP concentration in 0-30 cm depth ranged from 2.98 to 89.72 mg kg^{-1} with an average value of 28.52 mg kg^{-1}. The PAP concentration of 30-60 cm soil depth was between 1.72 and 83.04 mg kg^{-1} with a mean value of 35.91 mg kg^{-1}. The correlation analyses revealed that available P had a significant negative relationship between clay, calcium carbonate and exchangeable Ca and Mg contents, whereas the P had significant positive correlation between sand and exchangeable K contents of soils. Relatively high clay (mean 52.4%) and low organic matter content (1.87%) of soils increased the P fixation and lowered the availability. In addition to this, high and pH and calcium carbonate content might have induced to the formation of tricalcium and trimagnesium phosphates which significantly reduce the availability of phosphorus. In such cases, plants will have difficulty to utilize the soil P and show the signs of P deficiency. Thus, spatial distribution maps of plant nutritions such as P are important to locate and alleviate the problems encountered in arid regions.

Keywords: *Alkalinity, Available P, Jeoistatistical, Salinty,Spatial variability.*

SPATIAL DISTRIBUTION OF SOIL SALINITY WITH DIFFERENT INTERPOLATION METHODS

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Abstract

Salinization is one of the most important limiting problems of plant growth in Turkey as it is in all over the World. Salinity differs from other soil characteristics in terms of spatial distribution structure and has mainly patchy distribution. Therefore, better management of salinity can only be achieved by mapping the salinity of soils. The purpose of this study was to determine the most acceptable method to estimate the values of attributes related to soil salinity in Çerikli Irrigation Planning Area located in central Turkey. The coverage area of study area is 14.924,00 ha. Disturbed soil samples were collected from 0-30 cm, 30-60 cm and 60-90 cm depths of 110 sampling locations. Soil samples were analyzed for soil pH, electrical conductivity (EC), sodium adsorption ratio and water extractable Ca, Mg, Na and K concentrations. The estimation performance of deterministic (Radial Basic Functions (RBF) and Inverse Distance Weighting (IDW)) and Stochastic (Ordinary Kriging, Simple Kriging and Universal Kriging) interpolation methods have been compared for the predication of soil salinity in the project area. Salinity /EC) in 0-30 cm depth ranged from 0.65 and 67.1 dS/m with a mean value of 8.90 dS/m, in 30-60 cm depth EC ranged from 0.86 dS/m and 79.9 dS/m, and in 60-90 cm depth EC ranged from 1.07 dS/m and 98.80 dS/m. The root mean square error (RMSE) of the methods was used to compare and determine the best method. The mean absolute error (MAE) value was used in case of having the same RMSE value. The RBF-ST provided the accurate results for the EC of 0-30 cm and 30-60 cm depths and the RBF-IM was the most appropriate method for 60-90 cm depth. The results obtained are helpful for making effective decisions for protection of soils and sustainability of agriculture. This study is a good example for mapping soil properties by geostatistical methods.

Keywords: *Salinity, Geostatistics, Deterministic, Stochastic, Mapping, Monitoring*

EVALUATION OF GROWTH AND CONDITION OF CARP *(Cyprinus carpio carpio)* POPULATION IN LAKE SKADAR

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Abstract

Growth parameters and condition factor of carp population *(Cyprinus carpio carpio, Linnaeus, 1758)* were estimated based on the data collected during the carp fishing season in the period June 2015 – March 2016 in the Albanian part of Skadar Lake. The samplings were made by catch from the local commercial fishery of the main fishing lake sites of Shiroka, Zogaj and Koplik. The total length of data for each month were composed together as a single time collection and grouped into length classes. The growth parameters of carp population obtained from length frequency distribution data were calculated $K=0.58\ yr^{-1}$ and $L_{\infty}=105.53$ cm. To overcome the bias in length-frequency data caused by the selectivity of the gear used, the size frequency of samples was corrected with the capture probabilities. The condition factor, average value of carp population was estimated at 1.323. The condition factor values estimated for each month of the study period showed fish well-being and that the prevailed environmental conditions were within the tolerance limits for the species. Length-weight relationship demonstrates that growth of carp population in most of the time period was isometric.

Keywords: *Carp population, growth parameters, Lake Skadar*

INTEGRATED MANAGEMENT OF WATER RESOURCES IN ALGERIA

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Abstract

To overcome the scarcity of water resources in Algeria, and improve the management of these resources, reforms have been introduced by the creation of 5 basin Agencies (ABH), and the "National integrated water resources management Agency" (AGIRE), for introducing the concept of "integrated water resources management". The aim of these reforms is to ensure durability, protection and proper management of water resources, knowing that the water resources are limited and unequally distributed in Algeria.

Good practices to develop in integrated management can be stated as follows: agricultural water saving; artificial recharge of aquifers; preservation of the water quality; reuse of treated wastewater in agriculture; mobilization of municipal storm water; establishment of a system of "monitoring and evaluation".

In order to experience these good practices, an experimental study was conducted in a pilot basin entitled "Program for integrated water resources management in the watershed Coastal Algiers".

The expected results of this program are: 1. Development of an integrated management plan for water resources in the Algerian coastal basin and setting up mechanisms for integrated data management. 2. Capacity building of different actors in the planning, management and use of water. 3- Completion of pilot schemes that enable better management and development of water resources.

In the conclusion of this study, encouraging results were obtained:

- Development of an operational Geographic Information System (GIS) for Coastal Algiers basin

- Identification of problems, and developing an integrated management plan

- Development of a sewerage scheme for the upstream portion of the river Mazafran.

- Training of 10 trainers.

- Support for the emergence of professional organizations

- Support for the creation of the association of irrigators of the East Mitidja

Keywords: *Integrated management, Economy of water, water quality, efficient management, Sustainability, exchange of information, resources protection, good practices, Algeria.*

STUDY OF OUTPUT LIPASES AND OTHER EXTRACELLULAR ENZYMES PRODUCED BY SOME STRAINS OF FLUORESCENT PSEUDOMONAS SPP..

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Abstract

Fluorescent *Pseudomonas* spp. can produce some secondary metabolites involved in biological activities. Among these secondary metabolites, some substances, like siderophores, extracellular enzymes with lipolytic activity (lipase and lecithinase), extracellular hydrolytic enzymes (amylase, pectinase, gelatinase, cellulase and chitinase) and HCN with antibiotic activity, provide a major advantage in the microbial antagonism to the producing strains. Production of enzymes with lipolytic activity was detected on three different solid culture media by their natural or artificial lipid substrate (olive oil, Tween 80, oleic acid). These media gave better results that it's comparable between wild strains and cultured. But hydrolysis of oleic acid is very important as the others media. These results were confirmed in the supernatant with the thin layer chromatography and electrophoresis. These bacterial strains have also confirmed their powers of production of other extracellular enzymes studied - amylases, pectinases, gelatinases and lecithinases. All strains synthesized siderophores; some strains have a single type of siderophore, while others have several siderophores. Cyanogenesis was found in six strains. This metabolite is a product of secondary metabolism, with a very important impact on biological control. The most active isolates were molecularly characterized using the partial sequencing of the 16S RNA regions, which were affiliated to three different species.

Keywords: *Pseudomonas spp. fluorescent, lipase, extracellular enzymes, secondary metabolites, HCN, siderophores*.

BIOCHEMICAL PROPERTIES IN RHIZOSPHERE OF *OLEA EUROPEA* L. AND *PUNICA GRANATUM* L. IN ARID SOIL

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Abstract

The protection of steppe environments, subjected to drought threatening vegetation cover disappearing, become an emergency. However, some perennials, such as *Olea europea* L. and *Punica granatum* L., had a renewed interest for populations. These crops are widely used in the development of land, following up a development program and protection of natural resources. The bioavailability‘s nutrients is enhanced in the rhizosphere by processes related to the root activity and microorganisms associated with it. The aim of this work was to study the root induced chemical changes occurring in the rhizosphere of *olive and punicag* that can influence the dynamic of phosphorus. For that we sampled in two orchards of eight years in south Algeria. Bulk, rhizospheric soils and leaves were collected. P-available was obtained by the method of Olsen and P-total extracted with $HClO_4$ concentred. The rhizosphere soil showed a significantly higher concentration of organic-carbon and total nitrogen. The concentrations of all phosphorus fractions in the rhizospheric soil were significantly lower than those in bulk soil. A P-available deficiency was measured in bulk and rhizospheric soil and confirmed by P-foliar. The uptake of phosphate by root induced a depletion of all P-fractions in the rhizosphere. Philips and Hayman’s technique applied to the root samples of trees in the both field showed in the cells of roots characteristic structures of arbuscular mycorrhizae like hyphal coils, arbuscules and vesicles. However, their frequency is higher in the root sample of Olea trees. The earliest lignification of active roots of the olive seems conduce to different strategies of land use. This work has allowed us to highlight several aspects of biological and ecological arbuscular mycorrhizal symbiosis among olea and punica trees in the two orchards.

Keywords*: Rhizosphere, mycorrhizae, phosphorus, Olea europea L., Punica granatum L., aridity*.

VIRTUAL WATER OF IMPORT AGRICULTURAL PRODUCTS: MEAN DECREASE OF THE PROBLEM OF WATER SHORTAGE IN ALGERIA

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Abstract

Algeria is ranked among the 17 countries worldwide that suffer most from lack of water. Indeed, with less than 300 m3 / capita / year of renewable water, Algeria has less than 30% of the theoretical scarcity threshold set by the World Bank in 1000 m3 /hab./an.

Being unable to expand its agricultural land UAA and /or increase irrigated areas, to fill the food gap, Algeria resort to massive food imports, especially cereals and their derivatives.

Added to these, it imports non-food agricultural products.

These imports, although they represent a major financial drain for the country, they have at least one positive aspect represented by the virtual impressive amounts of water they provide to Algeria estimated at over 40 billion m3 in 2012.

It is in this framework that guides our study in which we try to quantify these virtual amounts of water that contribute greatly to temporary relief in the country regarding water shortage problem.

Keywords: *Water scarcity, food security, water resources, virtual water, Algeria.*

HALOPHYTES STRESS ET ENVIRONNEMENT

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Abstract

Halophytes plants are able to complete their life cycle in moderately to strongly saline habitats. The mechanisms that confer the ability to grow in adverse conditions considered for crops are complex and operate at different levels (cell and tissue).In arid and semi-arid regions, the species of the genus *Atriplex* are of agronomic and ecological interest. Indeed, in addition to their good forage quality, they ensure the fixation and soil enrichment. These species are a very significant specific variability. Their responses to different stresses on nature and degree are also variable. In order to establish a state of research in this area for halophytes and especially those of Algeria, we appealed to many works on *Atriplex* species very of distant geographical origins in order to obtain a specific selection. The comparative analysis of their responses to various stresses shows an adaptive variability even more depending on the species that stress considered. This adaptive variability is related to the origin and habitat of each species.

Keywords: *Halophytes, abiotic stress, Atriplex, marginal land, environment.*

STUDY ON AGRO-ENVIROMMENTAL INDICATORS FOR DETERMINING LAND DEGRADATION AND THEIR IMPACT (PHYSICAL, CHEMICAL, BIOLOGICAL)

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Abstract

In the town of Tissemsilt (Algeria), the techniques of tillage those mechanized have shown their limits for the sustainable management of soil resources for two reasons, the insufficient matrix of the erosion and the loss of the stock in soil organic matter. In other words, these techniques aren't adapted to the pedoclimatic constraints of our study area. The techniques of tillage those which are mechanized engender excessive fragmentation, soil compaction, erosion, runoff, impoverishment and drying lands that don't allow a Sustainable Agricultural Development. The challenge is double, the culture systems hould permit the productions amelioration and at the same time the preservation of natural resources in the soil and the environment. This challenge can't be completely satisfied unless the no-tillage is performed at a high technological level. This technological development must concern the management of harvesting residues and at the seedling time, the crops implantation, the fertilization of fundus and the weeding practices (type of herbicide, dose and application). This technological development of crops chess in relation to the edaphic conditions. The direct seeding preserves the environment by reducing the loss of soil and nutrient elements and presents the treatment products for the quality improvement of the water and the air. The no-tillage is the privileged mean to combat water erosion and wind. In fact the cover by crops residues controls the losses in water by runoff and by wind.

Keysword: *Water, soil , degradation , town of Tissemsilt , agricultural development*

STUDY OF THE PHYSICAL AND CHEMICALS DEGRADATION OF AGRICULTURE SOILS IN HIGH PLATEAUS "THE CASE OF THE PROVINCE OF ALGERIA TISSEMSILT"

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Abstract

The plateau of Tissemsilt represents a case of most affected ecosystem in Algeria by degradation of its soil and water resources. It is a sandy coastal area covering over 78,100 hectares, characterized by a significant wind activity and, thus, a strong erosive power. Additionally to this erosive effect, the plateau is under strong urban concentration and economic activities: industry and port, which threaten as much its resources, that it is basic ecological balance. This work is a contribution to the diagnosis of the degradation state of the Tissemsilt plateau, subject to various industrial constraints that affected its agriculture soil. One important result of this approach is that the degradation of the Tissemsilt plateau exists in several forms, at the same time it remains undervalued because it has not benefited enough attention from scientists or even socio-economic operators. She half-opened, however, an investigation way is of primary importance on ecological and environmental impacts of rapid development conducted in the region, in the medium and long term.

Keywords : *Plateau of Tissemsilt, erosion, soil.*

EFFECT OF *NIGELLA SATIVA* OIL AND THYMOQUINONE ON MOTILITY OF CRYOPRESERVED OVINE SPERMATOZOA

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Abstract

Artificial insemination with frozen-thawed semen results in a low fertility rate in sheep farming.Black cumin (*Nigella sativa*) oil (extracted from seed) is an exceptionally rich source of antioxidants like, thymoquinone, α-tocopherol, etc. which may have the potential roles in cryosurvivability of ovine sperm. This study was to evaluate the effect of *Nigella sativa* oil (NSO) and thymoquinone on motility and kinetic characteristics of cryopreserved ovine spermatozoa. Semen samples collected from three proven fertile Merino rams were diluted with a Tris-based egg-yolk cryo-extender containing 10, 100, and 1000 μg/ml of NSO; 1, 10, and 20 μg/ml of thymoquinone and 1 mM of α-tocopherol, and cryopreserved as pellet (200 μl) for evaluation by computer assisted semen analysis technique. The results revealed that the percentage of total motility, progressive motility and bio-kinetic characteristics such as, average path velocity, curvilinear velocity and straight-line velocity were higher ($P<0.05$) in the sperm aliquots cryopreserved by NSO (100 μg/ml), α-tocopherol (1 mM) and thymoquinone (10 μg/ml) than that of the sperm aliquots treated without or with higher level of NSO (1000 μg/ml) and thymoquinone (20 μg/ml) up to 2 h of post-thaw incubation. Among the optimum level of NSO (100 μg/ml), α-tocopherol (1 mM) and thymoquinone (10 μg/ml), NSO (100 μg/ml) showed highest ($P<0.05$) values of total motility, progressive motility and bio-kinetic characteristics specially, average path velocity, curvilinear velocity and straight-line velocity. Therefore, the results suggest that NSO may be supplemented into the cryo-extender to improve the motility and bio-kinetic characteristics of post-thaw ovine spermatozoa.

Keywords: *Nigella sativa oil, Thymoquinone, Motility, Bio-kinetic characteristics, Cryopreserved ovine spermatozoa*

FORECAST OF AGRICULTURAL CALENDAR FOR CORN FROM GLOBAL CIRCULATION MODEL IN THE RUZIZI AREA (CONGO)

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Abstract

The world is facing several major challenges regarding answer to the current economic crisis and the development of appropriate strategies to mitigate the adverse effects of climate change. The objective of the study is to identify climate risks for maize (Zea Mays) and the development of an agricultural calendar from a global circulation model of the atmosphere. From meteorological data, an agro-climatic analysis was performed during the period 1995-2013 and a forecast from 2015 to 2045 has been done. Using the cropwater model, variable rainfall and temperature as well as the key parameters of the agricultural season which start and dates,

The GIS maps has been used for maps of area of presentation the length of the season and meeting the water needs were analyzed terms of risk of occurrence.

The results showed that corn is facing major agro-climatic risks from the shortening of the vegetative growth period consecutive to a screeching halt rains before the end of the rainy season which is one of the major agro-climatic constraints. From predicting Sham Gate-5 model, the agricultural calendar was adjusted to avoid the drop in rainfall observed in October and plan the sowing period at the end of October instead of September.

Keywords: *Models, corn, climate change, forecast.*

THE IMPACT OF HYDROGEOLOGICAL CONSTRAINS ON WATERSHED MANAGEMENT FOR DEVELOPING SOUTH MEDITERRANEAN COASTAL AREA: AN INTEGRATED APPROACH

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Abstract

There is a lot of watersheds south Mediterranean that debouch their water mostly in the sea. They have variable surface runoff related to hydrogeological constrains such as climate, geomorphology, slopes, geology, structure, soil, hydrology, surface and groundwater. They have generally typical landforms that are composed of table land, piedmont plain, vegetated wadis and coastal plain units. The groundwater are trapped mostly in Quaternary, Pliocene and Miocene that have water quality ranging from fresh to saline which used partially as supplementary irrigation.

Coastal plain is the more promising area of the watershed owing the occurrence of good soils, high quantity of rainfall, urban centers and intensive reclamation in compare other geomorphic units. Watershed management is very important to overcome poor distribution of rainfall in time, it is necessary to collect rainwater when it rains and store it for use; to meet the water needs in the subsequent dry period. This work is an integrated approach between the hydrogeological constrains and watershed to study the inter-relationships and build a new modeling framework that can be used for increase surface water collection to irrigate more areas and recharge the groundwater as well as change the life of peoples in poor countries. A representative watershed was selected for detail studies.

Keywords: *Hydrologic constrains, Watershed management, Mediterranean Sea, Coastal area.*

PROPER APPROACHES FOR THE INTEGRATED AGRICULTURE MANAGEMENT OF AFFECTED NATURAL SALT RESOURCESIN MARGINAL REGIONS OF THE MIDDLE EAST

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Abstract

Salinity is a major constraint to agriculture production, especially in the arid and semi-arid parts of Middle East (ME) region where many of the groundwater-based agro-ecosystems and more than 25% of river-based irrigated agricultural lands are affected by salinity and waterlogging. Such areas in the region are also extremely vulnerable to climate change impact (in particular, drought and high temperatures). It is important to prevent further degradation of such agro-ecosystems and sustain the livelihood of farmers living in marginal conditions. The aim of this paper is to find proper approaches for alternative production and management systems that are appropriate to the socioeconomic and environmental conditions in the region. In order to succeed in utilizing marginal land and water resources, agricultural practices, inputs and management must be modified to meet the special peculiarity of agriculture under saline conditions. Therefore, the paper focuses on two main important approaches for the integrated agriculture management of salt affected marginal environments in ME region: 1- Enhance crop diversification through identifying climate resilient crop varieties and accessions that tolerant the marginal and saline conditions, climate change impact and other factors restricting productivity. 2- Integrated Management Packages (IMP) for enhanced livestock production in marginal environments. Efforts to reduce animal feed costs would help to increase the profits of the production system and farm income. More information, methods and data concerning these approaches are presented in the paper. It is concluded that developing forage specialized farming systems based on salt-tolerant forages and marginal quality water can help to alleviate of the climate change and salinity impacts. Such approaches and systems will help ameliorate feed scarcity in small scale crop-livestock farms in a sustainable manner and will contribute to the diversifying of on-farm production, expansion of farm enterprises, securing farmers' income and consequently improving farmer's livelihood.

Keywords: *Salinity, climate changes, small farmers, crop diversification, livestock production*

SUPPORTING AND ENGAGING VOLUNTEERS IN PROTECTING PERI-URBAN AND REGIONAL ENVIRONMENT

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Abstract

Environmental volunteering involves a number of activities including monitoring, restoration and awareness raising elements. Volunteers can sometimes be the backbone of systematic management and conservation works in numerous places, especially in areas where state deficiencies are mostly apparent. However, much of this work remains unacknowledged and discredited, while the lack of equipment and infrastructure complicates their further contribution.

This paper presents a methodology on establishing a holistic approach in organizing, training and equipping volunteer organizations in cooperation with local authorities, so that they can obtain particular specializations in the promotion and protection or enhancement of the landscape. Meanwhile, a key parameter in this methodology is the development of a sustainable and social economy around these groups that can allow collective job creation along with landscape enhancement. Greece presents a critical wealth in such groups which is growing in crisis times, however, lacks the ability to organize them and positively manage their contribution, especially in regional areas presenting environmental downgrade. The key fields of intervention are identified through surveying and monitoring the landscape involving digital tools to document the data and organize actions and the needed human resources. Training volunteers in various specializations and educating them on their interaction with local authorities can achieve an important contribution in protecting peri-urban and regional environment. Standardization of voluntary actions can also demonstrate a positive impact – if adopted by the relevant local administration bodies, which can lead to further workplace development and better performance levels.

Keywords: *Environmental volunteering, landscape enhancement, infrastructure intervention, Greece.*

POLYMER COMPOSITES FOR MULCHING COATINGS

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Abstract

The film-forming composites from poly(vinylalcohol), cattle horn mealand glycerolare proposed in this presentation for the formation of coatings for mulching of plants cultivated in pots and containers.Poly(vinyl alcohol)was used as a binder. Horn meal was used as the nitrogen containing filler. Glycerol was used as a plasticizer.The effect of the particle size of horn meal on the mechanical properties, water vapour permeability, solubility of the films cast from the composites was studied. The decrease of the particle size of the filler leads to the increase of tensile strength and of elongation at break and to the decrease of water vapour permeability of the films. In addition, the decrease of the particle size of the filler leads to the increase of the amount of water soluble nitrogen in films.

The composites were used for the mulching of the tomato sprouts cultivated in pots. For the preparation of mulching coatings the liquid mulching composition was spread out on the surface of the growing media. After evaporation of water the polymer coatings, acting as the mulch films, were obtained. The effect of the particle size of horn meal in the mulching composition on the quality of mulch coatings, the rate of evaporation of water from the growing substrate and on plant growth was studied.It was established that the proposed mulch films retain moisture in the pots and stimulate growth of sprouts.

Keywords: *Polymer composites, Mulching coatings.*

STATUS OF NATURAL ECOSYSTEMS IN THE NORTH DEVELOPMENT REGION OF THE REPUBLIC OF MOLDOVA

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Abstract

Regional development in Moldova is a necessity assumed by Law no. 438-XVI from 28.12.2006. The regional development model provides the division of the country territory into 6 regions and is based on the country's sustainable economic development. In this regard, the natural areas protected by the state have a special role. Due to their special protection status they ensure the conservation of natural resources in the region.

The work is focused on some aspects of the ecological status of state protected natural areas in the Northern Region. The results were obtained on the basis of a comprehensive study conducted during field expeditions and laboratory research over several years. There are highlighted valuable items specific for protection category, the ecological state of biotic and abiotic components and the human impact on protected natural areas in the region.

As a result of the research it was found that the specific elements for the categories of investigated areas are in satisfactory condition and the transboundary sources are the main sources with negative impact on these studied areas. The investigated natural ecosystems, especially those located in the forestry sector, provide favourable conditions for a rich diversity of plant and animal species, among them rare species protected at the national and international level. Interconnection between biotic and abiotic components of protected areas and surrounding habitats, especially agrocoenoses, ensure ecological balance in the region.

Keywords: *State protected natural areas, valuable items, human impact.*

MOROCCAN CANNABIS SATIVA L. (KIF) AND ITS VALORIZATION IN SCIENTIFIC RESEARCH

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Abstract

The use of Cannabis (Cannabis sativa L.) seeds and leaves fiber for its agricultural interests and for its medicinal and psychoactive properties goes back to the origins of human civilizations. Multiple names and presentations exist: Cannabis, Weed, Indian Hemp, Kif, Ganja, marijuana or Marie Jeanne, charas, bhang, gandjah, dawamesk, takrouri, hashish... It is now grown worldwide legally and illegally, and the emergence of this culture has led several research centers around the world to focus their interest on this famous plant. This growing importance of the Cannabis plant has given us a very good reason to extend the scope of study on this emerging topic. Thus, for us this research is based on the valorization of bioactive molecules of the Moroccan cannabis and their therapeutic and food potential,with an innovative extraction component, transposed on an industrial scale having an impact on sustainable development and allowing an outlet to the transfer and exploitation of results. To our knowledge, few studies and scientific publications on Moroccan cannabis have been reported in the literature. Therefore, a survey was conducted in northern Morocco and has demonstrated that the KIF is the common name of Cannabis sativa L. in Morocco and it belongs to the family Cannabaceae and to Cannabis genus. It grows for several centuries in the central Rif in Morocco which is considered as an important source of that culture that can feed the world market. With two varieties widely grown "Beldia" and "Khardala", the region where the culture is concentrated covers approximately 20,000 km², representing 2.7% of the total area of the kingdom, and 6% of the population of Morocco, straddling three provinces. It is crossed from east to west by the Rif mountain chain, and characterized by a mild Mediterranean climate and rugged terrain, abundant but erratic rainfall, poor and highly erodible soils.

Keywords: *Cannabis sativa L.; Kif; Central Rif; recovery; scientific research.*

APPLICATION OF POLLUTION INDICES FOR EVALUATION OF HEAVY METALS IN AGRICULTURAL SOIL OF THE BÉNI-AMIR REGION (TADLA, MOROCCO)

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Abstract

The perimeter of Béni-Amir (Tadla region, Morocco) is characterized by large capacities hydric, agricultural and characteristics urban. These characteristics make the perimeter sensitive and vulnerable to various types of pollutions (industrial, urban and agricultural), which increasing day to day. Pollution indices, Index of geo-accumulation (Igeo) and Enrichment Factor (EF) were used in this study to investigate and to assess the degree of pollution in a polluted area under the effect of the agricultural practices. Soil samples were analysed to detect concentration of heavy metals. The concentrations of Cr, Cu, Zn, and Fe in soil extracts were analysed by ICP-AES (Inductively Coupled Plasma Atomic Emission Spectrometry). Results of soil analyses show that the area has been harmfully affected by the heavy metals: Cr, Zn, Cu and Fe, in order: Cr>Zn>Cu>Fe. The results of the Enrichment Factor show that Zn is classified in the third class indicating that the area is highly rich in this metal. In contrast, Cr and Cu are classified in second class indicating the moderate enrichment of these elements. The Geo-accumulation index indicates that the soils in most of studied stations were slightly polluted (classe.1). The results obtained of the indices of pollution of these heavy metals show that the zone is polluted.However, these trace metal assessment indices gives an idea about contamination of soils without the concept of toxicity related to each metal. There are more indices can be used as indicator for soils quality such pollution load index (PLI) and Contamination Factor (CF).

Keywords: *Heavy Metal, Soil Pollution, ICP-AES, Enrichment factor, Geo accumulation index.*

COUPLING A GIS-SEQ MODELS FOR ASSESSING THE IMPACT OF HUMAN ACTIVITIES ON WATER SURFACE QUALITY IN THE WATERSHED OUED AL-ABID (MOROCCO)

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Abstract

The sub-basin of the Oued El Abid present a very prominent place in water resources in Morocco, as it is the main tributary that feeds the Oum Er-Rbia river and contain one of the largest dams in Morocco and north Africa, the dam of Bin El ouidane. The significant value of this sub-basin to our kingdom, led us to make a very detailed study of the quality of its surface waters.To characterize the state of the water quality in oued Al Abid, we performed an analysis of physicochemicaland pollutions parameters. Afterward, based on the evaluation grid of the water surface quality (SEQ), we calculate a weighted index of each analyzed parameter. Those indexes help us to determinate the state of global quality for each station. Subsequently we proceeded to a spatiotemporal representation of this quality indexes using GIS software.These different physicochemical and pollution parameters were measured monthly in 16 sampling sites over a period of five months, from January to May 2016.The space-time monitoring of physicochemical (T°, conductivity, pH, sulfate, chloride, nitrite, nitrate, ammonium, Mg 2+ ...) and pollution parameters (dissolved oxygen, DB05, COD, TSS) showed that the water quality of oued Al Abid degrades from the dam Bin El ouidane to the outlet in Tarmast. This degradation is usually due to surrounding towns and centers of the river that cast their liquid and solid waste without any treatment in the Oued Al Abid.

Keywords: *GIS, SEQ, Oued Al Abid, quality, weighted index.*

AGRONOMIC VALUE OF WASTEWATER AND SUGAR BEET LIME SLUDGES CO-COMPOSTS ON RADISH CULTIVAR: PEROXIDASE ACTICITY CHANGES

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Abstract

Development of human activities, acceleration of economic development and the extensive programs of wastewater treatment plants construction leads to a considerable increase in the amount of sludge. Composting approach eliminates more or less rapidly biodegradable organic pollutants, but heavy metals (chromium, copper, iron, lead and zinc) persist in the environment and accumulate inevitably. They can migrate to the surface water or groundwater or enter the food chain via plants to be found in animals and possibly in humans. In this study, the treatment by composting the wastewater sludge with three different proportions of sugar beet lime sludge (0%, 20%,30%) and green waste permits to obtain a stable compost rich in mineral elements, having a pleasant smell and relatively hygienic. In order to evaluate the effects of the produced compost on the plant-soil system, three concentrations of composts (7, 14 and 28 t/ha) were used for seedlings radish cultivar. The results showed that the supply of compost improves the physical properties of soil and its agronomic quality. The biomass of cultivated radish plants increased consequently. Peroxidase activity was affected depending on the type of compost added and on the part of the plant (roots or leaves) according tothe controls (soil without compost and soil with manure).

Keywords: *Agriculture, Co-compost, Sugar beet lime sludge, Peroxidase activity, Wastewater sludge.*

HIGHER ORDER ACCUMULATION OF HEAVY METALS INVARIOUS PARTS OF MEDICINALLY IMPORTANT PLANTS ZIZYPHUS JUJUBA AND AMARANTHUS VIRIDUS

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Abstract

The effect of heavy metal content and their accumulation in various parts of medicinally important plants like *Zizyphus jujuba* and *Amaranthus viridus* grown in northern districts of Karak, Peshawar & Mardan in Khyber Pakhtunkhwa (KPK) province of Pakistan was investigated in relation to the assessment of zinc (Zn), lead (Pb), nickel (Ni), cadmium (Cd), copper (Cu), manganese (Mn), chromium (Cr) and iron Fe in soils. A significant correlation of the concentration of heavy metals in soils of the studied districts and the medicinal plants was observed. The metal transfer factor of the heavy metals was also calculated and it was observed that although the soil to plant metal transfer occurred increasingly, several other sources like air and water are also involved that necessitates strict regulatory and environment protection measures.

Keywords: *Zizyphus jujuba*, *Amaranthus viridus*, heavy metals, metal transfer factor, toxicity.

FARMER MANAGED IRRIGATION SYSTEM AND ITS IMPACT ON WATER SERVICE DELIEVERY: A CASE OF SINDH-PAKISTAN

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Abstract

Irrigation system of Pakistan is the largest integrated irrigation network in the world. The system is fed by the waters of Indus River and its tributaries. The Sindh province has 13 million acres of irrigated lands in its three barrage command areas, built between 1932 and 1962. In 1997 the Government of Sindh started the reform of the management of the entire irrigation system. The Sindh Assembly approved an Act, shifting the responsibilities for the management of the irrigation and drainage infrastructure from the centralised Provincial Irrigation Department (IPD) to the farmer managed water institutions known as Sindh Irrigation and Drainage Authority (SIDA), Area Water Boards (AWB) and Farmers' Organisations (FOs). The institutional structure proposed under SIDA Act was restructured through Sindh Water management Ordinance in 2002 with an objective to make the institutions more participatory and autonomous in its decision making and service delivery.

The key process of Institutional Reforms has been carried out by implementing Participatory Irrigation Management (PIM) which has evolved and become generally accepted as a necessary aspect of productive and sustainable irrigation. The concern of this paper is to review the reform process and assess its role, impact especially in improving water service delivery under command of farmer managed system. The paper will also focus on the current reform, reform process, working of SIDA, FOs and AWBs and their strategy to address the issues and problems of farmers with respect to water distribution and governance.

Keywords: *Irrigation, water-service,equity, reform governance*

THE FURNITURE ENTERPRISES WASTE WATER UTILIZATION IN AGROECOSYSTEMS

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Abstract

Furniture and woodworking enterprises waste water contain formaldehyde and urea-formaldehyde resin which possess disinfectant properties and also the composition of nutrients. This makes possible to substitute import fungicides by wastes. The annual volume of waste water in the Voronezh two plants is approximately 200 m^3.The grain production with waste water is more profitable by 25,8% due to replacing expensive disinfectant Celeste Top.Using of waste water as a fungicide for winter wheat seeds does not affect the processes of microbiological activity and does not disturb the functioning of soil-biotic complex agroecosystems. Using industrial wastes as alternative fungicide positively influenced not only productivity, but also its quality.

Keywords: *Waste water, urea-formaldehyde resin, agroecosystems.*

USAGE OF VERMITECHNOLOGY TO REDUCE THE RISK OF PESTICIDE RESIDUES IN AGRO WASTE FOR SUSTAINABLE AGRICULTURE

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Abstract

The markets in Thailand, fruit and vegetables have high risk for pesticide contamination. Uneatable and unusable parts of these goods transform to agrowaste. Therefore, the management, monitoring and assessment of pesticide residues risk in organic waste are needed for sustainable management and protection of human's health and the environment. This study aims to study usage ofvermitechnology to manage and reduce the risk of pesticide residues in agricultural waste. The agrowaste samples were collected from main markets in Northeast Thailand in the rainy winter and summer season. Altogether, 3 samples of organic waste from each market and 4 samples of agrowaste based on the typical composition of agrowaste and the compost, vermicompost and biological fermentation made from agrowaste were analyzed for pesticide residues by gas chromatography. The most frequently found pesticides were cypermethrinfollowed by chlorpyrifos, deltametrhrin, dicrotophos, diazinon and lambda-cyhalothrin, respectively (ranging from 0.044 to 2.608 mg/kg). Pesticide residue in agrowaste was found higher in winter season followed by summer and rainy season, respectively and was higher in kale followed by cabbages, lettuce and corn peel, respectively.The degradation of pesticide residues (cypermethrin chlorpyrifos and deltamethrin) in three types of composting was studied. After 60 days of composting process, the average degradation of cypermethrin in the compost, vermicompost and biological fermentation were 94, 100 and 91 % respectively, the average degradation of chlorpyrifos in the compost, vermicompost and biological fermentation were 72, 100 and 73%, respectively and the average degradation of deltamethrin were 100% in all composts.

Keywords: *Earthworm, Agriculture, Waste management, Bioremediation, Environmental Safety*

IMPACT OF DEFICIT IRRIGATION ON YIELD AND FRUIT QUALITY IN TABLE OLIVE (CV. MESKI) IN SOUTHERN TUNISIA

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Abstract

An experiment on deficit irrigation (DI) was performed in a drip-irrigated table olive orchard (cv. Meski) during 2013 and 2014 in farm field situated in Médenine, Tunisia. Four irrigation treatments were applied: Full irrigation (FI), which was irrigated at 100% of ETc for the whole season; DI75 and DI50 deficit irrigation treatments, which received 25 and 50% less water than FI. These treatments were compared with a farmer method (FM). Significant differences were found in fruit yield between DIs, FM and FI treatments. There were no significant differences between DI50 and FM treatments. WP was the highest in DI50 treatment and the lowest in Full strategy. FI treatment generated the highest net income and was found to be reasonable in areas with no water shortage. Under water scarcity conditions, DI75 treatment provides promising irrigation strategy for optimizing olive irrigation and increasing water productivity, allowing water savings up to 25% with some reduction in yield (11%) and net income (17%). The results would be helpful in adopting deficit irrigation in ways that enhance net financial returns.

Keywords: *Table olive, deficit irrigation, drip irrigation, yield, water productivity, net income, arid.*

EFFECT OF DIFFERENT VEGETATION ON SOIL PROPERTIES OF DYSTRIC CAMBISOL OF STARA PLANINA MOUNTAIN, SERBIA

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Abstract

Besides parent material, topography, weather and climate, biological factors (plants, animals and men) represent one of the soil formation factors that have huge influence on soil formation. While man has a great influence on agricultural soils, plants have the greatest impact on natural soils. Trough their life cycle, they directly and indirectly affects many of the soil processes. Properties of soil depend of type of plants that grow on it. In the literature it can be found that meadow and deciduous vegetation have positive effect, while conifer plants have a negative effect on soil properties. This paper presents the results of soil characteristics of soil type dystric cambisol at the site of the Stara Planina mountain near the village Temska near Pirot city in Serbia. Three different types of plants can be found at this location: coniferous, deciduous and meadows. Soil sampling was taken under the forests of Scots pine (Pinus sylvrestris L.) and black locust (Robinia pseudoacacia), as well as on area under the meadows. The depth of sampling was shallow (0-10 and 10-20 cm), and the parent material can be seen already on 20 cm. Based on results it can be said that tested soil has acid reaction with slight differences in the surface and deeper layers of soil, which can be a result of higher content of humus in the surface layer. In samples from meadow and deciduous forests humus content is higher than in localities under coniferous. Content of available phosphorus and potassium is largest under the meadow vegetation.

Keywords: *Soil characteristics, Plant influence, Dystric cambisol*

ACCUMULATION OF AVAILABLE Cu IN Ahp HORIZON OF DIFFERENT SOIL TYPES IN KRNJEVO (SERBIA) VITICULTURE AREA

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Abstract

Vineyard soils are under load of available copper due to long-time application of fungicides. We performed sampling and analysis of Rendzina and Gajnjaca soils in Krnjevo (Serbia) viticulture areathat is traditionally used in conventional viticulture production. Content of available Cu was determined in DTPA soil extraction by inductively coupled plasma optical emission spectroscopy (ICP-OES). Samples from Ahp horizon of Rendzina had available Cu content ranging from 3.13 ppm to 40.33 ppm, while in Gajnjaca it was from 2.33 to 38.79 ppm. Content of Cu was much lower in subsurface horizons. This is due to low mobility of copper and its complexation with soil organic matter. No soil profile had Cu content that exceeded 50 ppm - level which is considered to be potentially phytotoxic.

Keywords*: Rendzina, Gajnjaca, vineyard soil, available copper*

CONTENT OF NITROGEN AND EASILY MOBILE PHOSPHORUS AND POTASSIUM IN CALCOMELANOSOLS (LEPTOSOLS) FROM RAJAC

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Abstract

This paper presents results of nitrogen content and easily mobile forms of phosphorus and potassium in various evolution phases of Calcomelanosol (Leptosols) from Rajac (Serbia). We analyzed 46 soil profiles. Total nitrogen content was determined by semimicro-Kjeldahl method, and content of easily mobile phosphorus and potassium by Egner-Riehm-Domingo method.Results showed that content of nitrogen was different in various evolution phases of Calcomelanosol, and it ranged between 0.277 to 1.609%. Level of available phosphorus was low, while level of available potassium was medium to high.

Keywords: *Calcomelanosol, nitrogen content, available phosphorus and potassium*

BIOINDIKATORS AND ENVIROMENTAL POLLUTION

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Abstract

Environmental pollution adversely affects on living things and environment. These things react differently to the deterioration of the ecosystem. While some of species moved from this environment some of resisting species remain. Most of the bioindicators,benthic organism, live at the sea bottom and slowly moves. To determine the contamination of the soil cryptostigmat mites and quality of water may be used as well as fish, benthic organisms algae, bacteria (indicator bacteria) and plankton (planktonic indicator species). For example; *Salmo trutta* (carp fish) is an indicator in low temperature oxygenated fresh water. In the same way, it the Oribatid mites humidity temperature can be used as an indicator because of its response to changes in the content of heavy metals and organic substances. In this article information about the use of indicator species and environmental pollution will be provided.

Keywords: *Bioindikator, carp fish, oribatid mites, pollution, environment.*

EFFECTS OF SOIL, WATER AND AIR POLLUTION ON AGRICULTURAL PRODUCTION

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Abstract

Since the beginning of the world, humankind has been nourished, protected, sheltered and reproduced in nature in which it lives. Starting from the early 19th century, the activities such as industrial and technological advancement, rapid growth of population, migration from rural areas to cities, unplanned urbanisation, tourism, unconscious use of input in agricultural production, nuclear trials, regional wars, destruction of natural areas, etc. and intervention by humankind to environment have caused nature to exceed its capacity to renew itself. Affecting all livings' health negatively, foreign materials have caused soil, air and water pollution which makes structural damages on alive and lifeless environment objects and ruins their qualities. This study aims to research the effects of soil, water and air pollution on product yield and quality in agricultural production of farmers using the Aksu river and the Karaçay and Erkenez watercourses feeding that river. Thus, 236 questionnaires were applied at the research area. According to the results of analysis, 25,0%, 33,7% and 22,3% of farmers stated that soil pollution, water pollution and air pollution, respectively, affected production pattern. The 49,4%, 55,8% and 61,3% of the farmers stated that soil pollution, water pollution and air pollution, respectively, affected product quality.

Keywords*:* *Soil pollution, water pollution, air pollution, Aksu river.*

DRAINAGE WATER QUALITY MANAGEMENT: SALINITY CHANGES UNDER THE LEACHING EFFECT IN SOIL TANKS

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Abstract

Solubility of salts and leaching fractions have different effects on drainage water quality. Knowing the quality of drainage water is extremely important for the reason that this water is transferred to various sources in terms of environmental factors and quality of water resources.

In this study, the changes of drainage water quality under lyzmeter (soil tanks) conditions using different irrigation water salinity and with different leaching fractions were studied. The study was carried out with sunflower in PVC soil columns with 40 cm diameter and 115 cm length with 3 different irrigations and 5 irrigation waters with different salinity level. The three irrigation treatments were 75%, 115% and 135% of the required irrigation water. The irrigation water salinities were 0.25 dS m^{-1} as control treatment, 1.5 and 3.0 dS m^{-1} with NaCl+$CaCl_2$ salts and 1.5 and 3.0 dS m^{-1} with NaCl+$CaSO_4$ salts as saline treatments.

Drainage water salinity (i.e. salinity components) has been changed related with the irrigation water salinities and leaching fractions. More soluble salts made the drainage water salinity higher than the less soluble salts in irrigation water. The more movable salinity components like chloride easily leached from the profile and accumulate in the drainage water. Drainage water salt load has been investigated as well. The more leaching volume applied the more salt has been moved off from the profile.

Keywords: *Irrigation water quality, drainage water quality, solubility of salts, leaching, drainage water quality management.*

POTENTIAL USE OF VNIRS METHOD FOR THE PREDICTION OF ORGANIC CARBON CONTENTS IN SALINE SOILS

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Abstract

Global climate change together with soil salinization is a common problem under arid and semi-arid climates. Salinization decreases in crop density and crop residues returning to soil. In saline soils, reductions of organic matter decomposition rates cause changes in the level of organic carbon and CO_2 emissions from soils. Therefore the determining organic carbon stocks in saline soils are important. Currently, no acceptable method exists to measure soil organic carbon (SOC) contents in the field and laboratory. The aim of the present study was to evaluate the potential of Visible Near Infrared Reflectance Spectroscopy (VNIRS) method for the prediction of soil organic carbon (SOC) concentrations in saline soils. VNIRS spectra of 100 soil samples with various levels of soil salinity were collected in spectral range from 350 to 2500 nm. Modified Partial Least Square Regression (PLSR) analysis was used to model the relationship between spectra and SOC obtained using traditional analyses methods. Calibration models developed with PLSR were tested using both cross validation and also independent validation samples. The best results were obtained using the first derivative of the spectra without scatter corrections. The results obtained from the experiment concluded that soil mineral compositions, texture, organic matter, $CaCO_3$ and salinity are affects on the reflection values. Good predictions were obtained for organic carbon contents in salt effected soils.

Keywords: *Soil salinity, soil organic carbon, VNIRS spectra, Partial least square regression*

GLOBAL CLIMATE CHANGE AND WATER USE IN AGRICULTURE

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Abstract

Sufficient and wastable water supply is very important for continuation of living beings lives, particularly, human life. In addition to its life-sustaining importance, it is widely used in a number of sectors such as agriculture, industry, etc. revealing its importance in economic terms, too.Agriculture is the leading sector in which water is used most and this used water is polluted and runs out. Climate change problem in the world has remained on the agenda for a long time with the effects of many factors like growing population, urbanization, and industrialization. While the biggest impact of climate change is seen as global warming, in agriculture sector, its detrimental effects are seen as drought. Climate change, which takes effect all around the world, also affects Turkey due to its geographical location, and this effect is seen as decrease in rainfall, increase in temperature, and depletion of natural water resources gradually.Approximately 75% of the water resources in Turkey are used in agriculture; and water preservation and effective use of it should be started here first.In terms of sustainability of natural resources and food security, reasonable use of water resources is needed. This is possible by raising farmers' awareness of issues such as climate change, drought, natural resources, and water use firstly through publications. At this point, there is a huge task for decision-maker mechanisms, because farmers are in the position of both managers and users in rural areas.In this study, climate change in the world and in Turkey, and its influences on water use in agriculture will be identified, and solution proposals on how to preserve water, which is one of the foremost inputs of agriculture and use it in an effective way will be tried to develop.

Keywords: *Climate Change, drought, agriculture, water.*

NEW APPROACHES FOR PULPING OF BIOMASS: ACETIC ACID-ETHYL ACETATE PULPING OF NON-WOODS

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Abstract

Air dried jute bast fibers were supplied from India. The jute fibers were cut to 4-5 cm in length, and they were used for all pulping trials. Thirty-five g. of sample were used for all pulping runs. At the end of the cooking, pulps were washed with the same chemical mixtures as used in cooking formulations. The mixture of acetic acid (HAc)/ethyl acetate (Etac)/water were used as pulping chemical with proportion of 70/15/15 (v/v%), respectively. A number of pulping experiments were run on three different temperature level (150; 175; 200 ^{o}C) and cooking time (30; 60; 90 min) conditions. A Sprout Waldron refiner was used for primary fibrillation of jute pulp prior to the PFI beating process. The pulps were refined in PFI mill until the specified level of freeness (= 300 ml CSF) was reached according to Tappi standard No. 248. Burst strength, Tear strength, Tensile strength, and kappa number were evaluated according to Tappi testing methods.After standard beating of unbleached jute pulps, standard test papers were made and tested for strength properties. In spite of increasing reaction time and temperature positive efects on delignification rate, it was realized that pulping higher than **150** ^{o}C and 30 min cooking time had detrimental effects on pulp strength properties.

Keywords: *Acetic acid, Ethyl acetate, Jute, Organosolv pulping*

USE OF QUANTIFIED COLOR PARAMETERS IN ESTIMATION OF SOIL PROPERTIES AND THEIR SPATIAL VARIATION IN KAZOVA PLAIN SOILS

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Abstract

Soil color is an indication of soil constituents and can be determined fastly and with little cost in the laboratory and field conditions. The purposes of this study were to investigate the relationship between soil characteristics and soil color parameters, and to determine and map the spatial structure of soil color parameters. Soil samples, collected from 400 locations at 0-30 cm and 30-60 cm soil depths were analyzed for soil color parameters and several physical and chemical characteristics. The correlation between soil brightness and organic matter yielded no significant relationship, whereas statistically strong positive and negative relationships ($P<0.01$) were obtained between "L" values and sand and clay values, respectively. Organic matter and "a" values for surface soils had important negative relationships. The strongest relationships for "a" values were obtained between permanent wilting capacity, field capacity and cation exchange capacity for both surface and subsurface soils. The yellowness indicator of "b" values for surface soils had strong positive relationship with clay and negative relationship with sand content. The relationships obtained indicated that yellowness decreased with increase in sand contents, and in contrast yellowness increased with increase in clay contents of soils. The values of "a" that represents the redness of soils had strong spatial dependency both in surface and subsurface soils of the study area. The brightness value "L" had moderate spatial dependency both at surface and subsurface soils. The lowest variability within the soil parameters determined both at surface and subsurface soils was obtained for the brightness "L" (CV <10%), while the greatest variability was obtained for the redness value "a" (CV>45%). The results obtained in this study indicated that soil color parameters are useful indicators to estimate some of the soil characteristics. The mapping of soil parameters provided valuable information on the distribution of color related soil characteristics in the area studied.

Keywords: *Soil color, Colorimeter, CIELAB, Geostatistics, Kazova plain.*

UNCERTAINITY OF SOIL MAP UNITS IN A SMALL SCALE SURVEYED LAND

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Abstract

Spatial variability in soil properties within map units is usually resulted from imprecise location of map unit boundaries or difficulties in further separation of soil boundaries. The purpose of this study was to describe the within-map unit variability of soil series. The study was conducted on a 107.1ha mixed orchard in Egirdir town of Tokat province, Turkey. Detailed soil surveys revealed three different soil series; Kizilcubuk clay loam, Bogazova clay loam, and Mucevre loam. Study area was divided into 50m*50m square grids and 103 soil cores were taken to 60 cm depth, sectioned into three depth increments. Soil samples were analyzed for particle size distribution (clay, silt and sand contents), organic matter, calcium carbonate, pH, EC, DTPA extractable zinc (Zn), iron (Fe), manganese (Mn) and cupper (Cu) concentrations. One way analyses of variance test for 0-30 cm depth revealed that soil series are significantly different from each other in terms of clay, sand, pH, calcium carbonate, Cu and Mn. Whereas EC, Fe, Zn and Silt contents were identical in three of the soil series. The EC values and silt contents of soil series were also similar in 30-60 cm depths. The lowest varied soil property in two depths of three soil series was soil pH. The Zn concentration of soil series had the highest variation among soil properties. Calcium carbonate contents of soils also had high coefficient of variation which probably resulted in high variation in particularly for micronutrients. Relatively high field scale variability of micronutrients concentrations and calcium carbonate content and moderate variability of sand content should be considered in fertilization, irrigation and species selection for growth.

Keywords: *Field scale variability, spatial variability, soil characteristics, precision agriculture.*

SOILLESS AGRICULTURE AND ITS IMPORTANCE IN URBAN AREAS

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Abstract

Soilless agriculture or in other words hydroponics is a kind of plant growing system, in which plants do not need any soil and they get necessary nutrients from mineral solutions. Because of not being in need of soil; the common problems coming with soil are not seen in hydroponics. So it does not require pesticides or herbicides. The absence of these two costly expenditures sharply decreases the cultivation costs. Moreover; by the absence of natural loses and leakage in the soil, lower amounts of fertilizer use are enough to grow plants and this also saves farmers money. Also in mineral solutions; plants make easier absorption with roots and grow faster. One of the major advantages of soilless agriculture is also that it can be easily done indoors where there is not enough space for soil based agriculture. So it is very suitable in urban areas. Growing plants in the area of local search in urban areas cause transportation, storage and marketing costs to fall and facilitate to reach cheaper, fresher and quality herbal products. Besides the increasing world population, agricultural fields remain constant and furthermore they are used in non-agriculture use. Also with global warming, climate changes and rising sea levels; in near future soilless cultivation will dominate food production all over the world. The countries which make investments and R&D on hydroponics will get the returns more than enough. Soilless agriculture will also be a natural solution to food shortages which the world is about to face in near future. In this paper, the advantages of soilless agriculture and the importance of its use in urban areas are discussed.

Keywords: *Agriculture, Hydroponics, Urban, Food*

FRAMEWORK AGREEMENT ON CLIMATE CHANGE AND HUMANS RESPONSIBILITIES

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Abstract

Climate change, which emerges as a result of global warming, is one of the main problems human being faces in 21st century. Because of its negative effects that can pose a big threat such as human health, ecosystems, even increase in new generations the climate change which is regarded as a problem causing very serious socio-economic results has much importance in the international platform especially in recent years. It is scientifically proven that countries located in Mediterranean Basin, including our own country, will be affected from climate change seriously. In Paris summit (2015) many countries agreed to support the agreement about the new climate regime. The emission increase rate was restricted by that. In other words, the aim of was to restrict the emission increase rate. Putting the law, accepted in COP 21 (2015), into force was agreed for the period from 2020 onwards. Our country thinks that the new system should be fair which evaluates every country with its own socio-economic data.In other words, all of the countries in the new regime should take responsibilities according to the principle "common but differentiated responsibilities" and "spesific opportunities and abilities". But the new protocol which will be accepted with the agreement should be in harmony with necessity and realities of the 21st century. The idea that responsibilities demand dynamic quality should be taken into consideration.In this study, strategies about climate change in Turkey and possible precautions that can be taken as a result of Paris summit are mentioned. Turkey is making the necessary arrangements in harmony with the development aims, improving the cooperation among other countries, joining the influential participation to the national and international studies in order to prevent previous negative experiences, compensate the current loss, leave a clean environment for the next generations.

Keywords: *Energy Policy, Climate Change, Paris Agreement, COP 21, Global Warming*

DETERMINATION OF THE POTENTIAL GROWING AREAS FOR SIIRT PISTACHIO (Pistacia vera), TAYFI GRAPE (Vitis vinifera L.) AND ZIVZIK POMEGRANATE (Punica granatum L.) IN SIIRT PROVINCE, TURKEY

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Abstract

Pistachio, grape and pomegranate are the main products that have economic importance in Siirt province and districts. In Turkey the pistachios are only grown in the Southeastern Anatolia Region. According to data from 2014, in the Siirt province, 28.5% of the total agricultural areas (223 299 da) are the fruit production areas (Anonymus,2014). Pistachio, grape and pomegranate cultivation is maintained in 86 % of these areas. Especially Siirt Pistachio (Pistacia vera), Tayfi grape (Vitis vinifera L.) and Zivzik pomegranate (Punica granatum L.) are unique to Siirt province and it is needed to focus on these products. Due to the presence of fertile lands and good climatic conditions it is expected that in coming years fruit production potential will increase in Siirt province.In this study parameters such as precipitation, temperature (maximum, minimum and average temperature), sunshine duration, soil structure, wind direction, slope, elevation, and irrigation facilities are used to determine the suitable fields for Siirt Pistachio (Pistacia vera), Tayfi grape (Vitis vinifera L.) and Zivzik pomegranate (Punica granatum L.) in Siirt province and districts. Satellite images of 2014 were used as a basis in determining criterion in the Geographic Information System (GIS). Geographic Information System is used for the inquiry and analysis, and Multi-Criteria Decision Analysis (CRCC) is used for the interpretation and solution. As a result, the study data have been entered into the Geographic Information Systems (GIS) database and in association with the Multi-Criteria Decision Analysis (CRCC) method, appropriate, inappropriate and partially appropriate areas are determined.

Keywords: *Fruit, GIS, CRCC, Siirt.*

PHYSICAL PROPERTIES OF FUEL BRIQUETTES MADE FROM HAZELNUT HUSK RESIDUES

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Abstract

Turkey is the biggest hazelnut producer and exporter in the world providing 75% of the world hazelnut production. Hazelnut husk is a biomass material, emerged after harvest and not evaluated. These are generally burned or leaved on lands. In this study, hazelnut husk residue was briquetted in a conical screw type briquetting machine with conical die and die-heater. Moisture content and geometric main diameter of ground hazelnut husk used in the experiment were 9% and 1.194 mm, respectively. In the study, briquette physical properties such as particle density, shatter resistance, tumbler resistance, compressive resistance and water resistance on the quality of briquettes, and briquette production capacity and energy consumption of briquetting machine were determined. Before testing, the briquettes were kept in a room at 24°C temperature and 60% relative humidity during 7 days. Briquettes were obtained at an external diameter of 56 mm with a central hole of 25 mm, and all surfaces of the briquettes was partially carbonized depending on die heating system during briquetting process. The average briquette production capacity and energy consumption of briquetting machine were 91.3 kg/h and 9.37 kWh, respectively. The result of physical tests showed that the briquettes were extremely high quality. The average particle density, shatter resistance, tumbler resistance, compressive resistance and water resistance of briquettes were found to be 1255 kg m^{-3}, 97.2%, 92.2%, 1550 N and 80.5%, respectively.

Keywords: *Briquette, Hazelnut Husk, Physical Properties.*

STUDIES ON THE USE OF ERDEMIR STEEL SLAG AS AGRICULTURAL AMENDMENTS

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Abstract

The agricultural soils on Black Sea are acidified to some extent due to the relatively high rainfall. These soils are very sensitive to acidification due to sandstone parent materials. Several thousand tons of slags are obtained as waste material from the Eregli steel industry that contain large quantities of silicates and carbonates as well as some oxides of Ca and therefore have a relatively high acid neutralizing capacity. The fertilizer value of slag has been evaluated because it contains iron-silico phosphates and significant amounts of iron. This research was carried out on both head lettuce (*Yates dale cv*) and leaf lettuce (*Green wave cv.*) in the province of Yalova in Turkey. Lettuce plants were grown in 5 different potting media containing various proportions of some substrates. The experiment was conducted in randomized plots experimental design each treatment consisting of three replicates. The experiment showed that the plants generally dried and died in the 40 and 20 % slag treatments after one or two month after sowed or transplanted because of the soil compaction. The plants have continued to live in the 5 and 10 % slag treatments. The 5 % slag additives (at low rates) of the growing medium as a volume can be used for acidic conditions for liming material.

Keywords: *Basic slag, head and leaf lettuce, growing media*

ATRIPLEX: PLANT FOR SALT AFFECTED SOILS

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Abstract

Soil salinity is one of the big issues of land degradation and increasingly threatens agricultural expansion and productivity in many countries such as Austalia, India, Pakistan, Egypt, Central Asia, South America, Mexico, The United States, and Khazakstan. Restoration of these soils requires high amounts of expenses and not economical importance considering to increasing world /country population. Instead of reclamation with chemicals or mechanical methods, the reintroduction of the plants which are already adopted salty condition become more popular. Atriplex species have very common application practices either fodder, forage or landscaping purposes for within the countries. Why Atriplex? It is halophyte and known as a salt tolerant plant able to survive under high salinity conditions, and has the ability to produce high biomass. There are many species of Atriplex. *Atriplex canescens* (salt bush), is one of them that is a perennial shrub, and it has been studied more extensively and showed good results. However, climate demand affects *Atriplex canescens* growth.

Keywords: *Salt affected soils, Atriplex*

AGRO-ECOLOGICAL ZONING WITHIN THE CONTEXT OF SPATIAL AND TEMPORAL CHARACTERISTICS OF LANDSCAPE: YAZIHAN PLAIN AND KURUÇAY LANDSCAPE CHARACTER AREAS AT MALATYA PROVINCE IN TURKEY

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Abstract

Agro-ecological zoning on the basis of features according to the needs of the agricultural plant can be considered as solely human needs centred being proportionally at insufficient efficiency for overall sustainability. As much as agricultural services of ecosystems, the landscape structures and functions in spatial and temporal point of views should be the definitive criteria for that kind of zoning, even as the most important base of decision making process, to be able to increase the efficiency and to reduce the environmental impacts of agricultural activities. Since those landscape characteristics are the dynamic features that form and sustain the agricultural services of the ecosystems, and reflect the characteristics of the rural human environment with its background agricultural knowledge and living patterns which are organically shaped in time span via close connection of people with nature. A new age approach for agro-ecological zoning within the context of spatial and temporal characteristics of the landscape is presented in this study with the case areas of Yazıhan Plain and Kuruçay Landscape Character Areas. Recent GIS and RS technologies together with field surveys for particularly occupancy analyses of the mappings are related to the analyses of landscape structure, function and change. Results show that the agricultural activities still have serious impacts on key ecological processes although executed agro-ecological zoning proves the suitability of agricultural fields for the plants that has been already cultivated for years. This presented approach for agricultural development provides the information that is necessary for including the rural lifestyle that humanity establish in the context of interaction with nature into the rural planning process; in other words, protecting the settled rural characteristics while it is, on the other hand, for a rural agricultural development in harmony with natural and cultural landscape characteristics and particularly sensitive to ecological processes.

Keywords: *Agro-ecological zoning, landscape character, ecological processes, rural planning*

USE OF SOLAR ENERGY ON AGRICULTURAL LANDS IN TURKEY

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Abstract

Changing climatic characteristics and increasing fossil originated fuels use steer global attention to sustainable energy systems. Emerging technologies, coming with decreasing costs and increasing efficiency, enhance usage of non-polluting renewable energy systems. Development in these clean technologies such as solar energy becomes strategic not only on economic advancement but also has a significant impact on agricultural improvement. While agricultural products and food prices in the world are in a downward trend, in Turkey they are still increasing above inflation values. One of the major reasons causing this situation is input costs. Especially, expensive electricity and fuel costs bring farmers heavy financial difficulties. On lots of agricultural lands, because of not having mains electricity, irrigation is done by using fueled generators. Today's' classic irrigation pumps are generally settled, only considering the points where the mains supply is located. And not estimating their efficiency and trying only to lower installation costs, increase the variable expenses, energy use and overall costs. These fossil fuelled energy suppliers are not only costly and noisy, but also have a continuous additional fuel expense. On the other hand, irrigations done with solar powered pumps are economic, silent and environment friendly. Additionally, when there is no need for electricity on agriculture land, redundant energy coming from solar system is sold to main network and brings extra profit to the farmer. Although installation costs of solar system seems expensive in the beginning, that investment will pay for itself in medium term. In this paper, the potential of solar energy, its use in agriculture and the role of extension is discussed.

Keywords: *Solar energy, agriculture, extension, Turkey.*

POLLUTANTS BEHAVIOR AND INTERACTION IN SOIL

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Abstract

Pollutants behavior and interaction with soil comprise various physical, chemical and biological processes that take place in all three (solid, gas, and liquid) components of the soil medium. These generally include three main groups of processes: 1. Retention on and within the soil body; 2. Infiltration, diffusion and transportation by soil solutions; 3. Alteration, transformation and initiation of chemical changes within the soil. Petroleum hydrocarbons are used to meet a big portion of energy demand that is needed to sustain the human life. Accidental release and leakage of petroleum hydrocarbons may cause soil and groundwater contamination and can have extremely serious consequences from both human and environmental health perspectives.In this study, information produced from numerous literatures insisted on how soils were polluted and could be remediated. Finally, knowing type and structure of pollutants and their interaction in soils are very important for determination of remediation technologies.

Keywords: *Pollutants behavior, petroleum, soil contamination*

RECYCLING AGRICULTURAL WASTES TO IMPROVE SOIL PHYSICAL PROPERTIES

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Abstract

Recycling agricultural wastes in natural resource management systems has been attention to sustain soil quality. In this study, the effects of hazelnut husk and tobacco waste on soil physical properties such as, bulk density, aggregate stability and saturated hydraulic conductivity were investigated. After incorporating 5% application rate of hazelnut husk and tobacco waste into a clay loam soil, soil samples were incubated about 5 months under greenhouse conditions. Both organic waste treatments significantly increased organic matter content, aggregate stability and saturated hydraulic conductivity values of soil while they decreased soil bulk densities compared with the control. It was found that hazelnut husk and tobacco waste can be recycled into farmlands as a soil conditioner material to improve soil physical properties and to prevent soil degradation.

Keywords: *Hazelnut husk, tobacco, bulk density, aggregate stability, permeability.*

5. ANIMAL HUSBANDRY

INTRA UTERINE POSITION AND CORPORAL DEVELOPMENT IN RABBIT

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Abstract

The objective of this work was to examine the effect of intra uterine position, vascularization and sex of rabbit fetuses at 25 d of pregnancy on their corporal composition. Fifty seven unilaterally ovariectomized multiparous rabbit does were used in this study. The females were mated and sacrificed at 25 d of pregnancy. Immediately after, the uterine horn was examined in order to count the number of blood vessels reaching each implantation site, the position of each fetus within the uterine horn (oviduct, middle or cervix) and their sex by direct examination of gonads. Only the females with litter size near to the mean of the population were used (n = 14). For each female, three fetuses were chosen (one from the oviduct position, one form the cervix position and the last one form the middle position). The fetuses (n = 42) were frozen and stored at -20 °C until analysis. Representative samples of ground matter were freeze dried and analysis for dry matter, humidity, protein, ash, lipids and energy contents. The intra uterine position did not affect the ash content, dry matter and rate of humidity. Conversely, the protein, energy and lipid contents were significantly higher for the fetuses in oviduct position compared to the other positions (+15 %; $P<0,05$). The fetuses with implantation sites receiving equal or more than 6 blood vessels showed higher percentage of protein (+9%, $P<0,05$), lipids (+13%; $P<0,05$) and energy contents (+16%; $P<0,05$) that those receiving less. Finally, there were no differences for all the parameters measured between fetuses of sex male and female. In conclusion, the fetuses from the oviduct position or receiving higher number of blood vessels should have high probability of live at birth related to higher fat and protein reserves.

Keywords: *Fetuses, intra uterine position, body composition, vascularisation.*

ANO-GENITAL DISTANCE AND ITS RELATIONS WITH SOME REPRODUCTIVE TRAITS IN RABBITS

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Abstract

The aim of this work was to test the effect of Ano-Genital Distance (AGD) on sexual behavior, litter size and its components (ovulation rate and prenatal mortality) and sex ratio (ratio of male pups to female pups at birth)in rabbit of local Algerian population before the mating. In total, 64 multiparous rabbit does were used in this experiment. At the moment of mating, the AGD was measured by three operators and the behavior of the females was noted. At 12 d *postcoïtum*, an endoscopy was realized on the pregnant females in order to measure the ovulation rate (number of non-hemorrhagic *corporalutea*) and the number of implanted embryos (live and resorbed). At kindling, the number of pups (live and dead) and their sex were noted. The females with larger AGD were more aggressive (25,4% *vs* 8%; P<0,01) but presented similar receptivity rate when compared to the females with shorter AGD (82 *vs* 86%; P>0,05). At 12 d of pregnancy, the effect of the AGD was not significant on the ovulation rate (9,22 *vs* 9,35; P>0,05). However, the females with larger AGD presented higher early embryonic and fetal mortalities than those with shorter AGD (+45% and +57% respectively; P<0,01). The females with larger AGD gave birth to almost 62% male pups. Conversely, the females with sorter AGD gave birth to about 41% male pups. In conclusion, the AGD in rabbits has influenced the majority of the traits related to reproduction and more hormonal investigations are necessary in order to understand more the origin of obtained results.

Keywords: *Rabbits, Ano-genital distance, ovulation, implanted embryos, litter size.*

RABBITS OF LOCAL ALGERIAN POPULATION: EXTERNAL MORPHOMETRY AND CARCASS TRAITS

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Abstract

This work was undertaken in order to identify the rabbits of local Algerian population by the study of their external morphometry and carcass characteristics. In total 220 rabbits from both sex and different ages (from 1 to 6 months) were used for the morphometry study. Total of 12 morphological traits were measured and used in comparison between young and adult on one hand and male and female on the other hand. Total of 60 male and female (30 per group) were sacrificed at the age of 6 months in order to study the traits of the carcass. The rabbit of local Algerian population is characterized by several colors of phenotypes. The weight of the rabbit at the adult age was 2622 ± 142g g allowing the classification of this population in category of small breed. The majority of the morphometric parameters measured in this study were influenced significantly by the age of the animal. There were no differences between males and females for the majority of the traits except for the distance between the eyes and the length of the head (+15% for the male; $P<0,05$). At the slaughtering, the females were slightly heavier than male (+8%; $P<0,05$) without any effect on the carcass yield. However, they presented more adiposity than males (+10 % for perirenal and inter scapular fat). This study is considered as preliminary research in order to characterize the rabbit of local Algerian population and more investigations by molecular methods seem necessary.

Keywords: *Rabbits, external morphometry, carcass traits*

EFFECT OF GENOTYPE ON GROWTH IN RABBITS

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Abstract

The objective of this work was to study the evolution of growth between weaning and slaughter in rabbits of two breeds (synthetic and local). A total of 50 rabbits were divided into two groups (n = 25 local rabbits; n = 25 synthetic rabbits). At weaning (d30), the animals were placed in individual cages of fattening to measure growth performances. Our results show that at weaning, the synthetic strain of rabbits exhibited a higher weight (+ 15%; P≤0.01). The growth curve of both breeds change in a similar manner with a peak which is observed between d72 and d79. Average daily gain weight was higher in synthetic rabbits compared to local (P≤0.05). The food intake has increased gradually throughout the fattening period and in favor of synthetic strain of rabbits. Moreover, the index of consumption changed proportionally to age, with farther degradation at the end of the fattening period. The weight of the carcass (hot and cold) was significantly higher in synthetic strain compared to local ones (1356 *vs* 1482g and 1294 *vs* 1402g respectively). The carcass yield was significantly greater in synthetic rabbits (69 *vs* 72%; p≤0,05). In conclusion, the majority of performances measured during this experience were significantly higher for the synthetic strain.

Keywords: *Local, synthetic rabbit, growth, carcass yield.*

STUDY OF THE UTERINE CAPACITY IN RABBITS OF LOCAL ALGERIAN POPULATION: FETAL AND PLACENTAL DEVELOPMENT

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Abstract

The purpose of this work was to study the effect of intra uterine crowding on fetal and placental developmentin the rabbits of local population. Total of 30 unilateral ovariectomized rabbit does were used. The females were mated and sacrificed at 25 d. The right ovary and the uterine tract were weighted and the number of *corporalutea* was recorded. The number of blood vessels reaching each implantation site was counted. The position and the status (live, dead or resorbed) of each fetus were noted. Each fetus was dissected and the weight of its digestive tract, liver, brain and brown adipose tissue were recorded and its sex was noted. Finally, the weight and the length of the empty uterine horn were recorded. The ovulation rate, the weight of the ovary and the number of implanted embryos were double related to compensatory hypertrophy of the remaining ovary. The fetuses in oviduct position were heavier (+ 5%; $P<0.05$), presented more brown adipose tissue (+ 22%; $P<0.05$) and placentas weight (+19%, 0.05) than those in other positions. The fetuses in middle position presented higher value of placenta efficiency (+10%; $P<0.05$). Available uterine space per fetus was significantly lower in the middle ($P<0.05$). There was no difference in the weight of maternal placenta among the different positions within uterine horn. In contrary to the fetal sex, all the traits measured in this study were influenced by the number of blood vessels and the best performances were noted for the fetuses receiving more than 6 blood vessels. The length and the weight of uterine horn were highly correlated to the number of implanted embryos ($R= 0.78$; $P<0.01$). In conclusion, the intra uterine position and vascularization have influenced the development of fetuses at 25 d of pregnancy.

Keywords: *Fetal development, uterine capacity, litter size, uterine crowding.*

EFFECTS OF A SEQUENTIAL FOOD CONTAINING BARLEY AND ENZYMES ON GROWTH PERFORMANCES OF BROILER CHICKEN

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Abstract

The aim of this study was to investigate the impact of sequential feeding (SF) incorporating whole grain barley and diet supplementation with enzymes (E) on growth performances and some physiological parameters of broiler chicken. A total of 1680 one-day-old chicks were equally divided into 4 experimental groups (7 replications of 60 animals): the controlgroup (C) was fed with a complete standard diet adapted to the age distributed continuously for 56 days ; the SF group received, from the 15th day of age, 2 separated and alternated diets (whole grain barley during a sequence of 6 hours/day and the standard diet during a 2nd sequence of 18h/d); the E group and ASE group were respectively, fed, continuously or in sequential mode, with the same complete standard diet supplemented with 0.1% of a commercial enzymatic preparation containing xylanases, ß-galactosidase, ß-glucanase, protease, pectinase and amylase. With or without incorporation of enzymes in the complete diet, the sequential feeding with barley reduced the weighty gain and the final live weights of chickens (-5%, $P<0.05$) and further decreased feed intake (-9%, $P<0.05$), thus improving feed efficiency transformation by about 4% ($P>0.06$). The addition of enzymes increased feed intake (+5%) and cumulated weight gain (+4%) of chickens fed with continuous mode ($P<0.05$) or in sequential mode ($P>0.07$). Moreover, weights of carcass and the proportion of the abdominal fat were not modified by the sequential feeding or by the feed supplementation with enzymes. These two treatments significantly improved the total number of lactobacillus (6%, $P<0.01$). Finally, the sequential feeding significantly reduced the plasmatic concentration of glucose, urea, creatinine and triglycerides and significantly increased that of cholesterol.

Keywords: *Broiler, sequential feeding, barley, enzymatic additive, growth performances.*

CHARACTERIZATION OF THE REPRODUCTION PERFORMANCES OF THE SYNTHETIC LINE OF RABBITS

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Abstract

In order to develop the rabbit meat production in Algeria, a synthetic rabbit line has been created since 2003. This line was produced by crossing females from local population to male from a French INRA line 2666. The aim of this study was to evaluate the reproduction performances of this line at the 7th generation of selection for litter size and body weight at 77 days. The data from 90 females were used in this study. The does were first mated at 4,5 months old and then 10-12 days after each parturition. The experiment was conducted at the Technical Algerian Institute of Animal breeding (Itelv) from December 2013 to March 2015. The weight of the does at the first presentation was 3500 g with high variation between females. In the synthetic line, the litter size at birth was 9,4 kits with a high rate of mortality (10%). The prolificacy of the females was significantly influenced by the season in one hand (high in autumn and low in summer) and the parity of the female in other hand (increased in the multiparous compare to the nulliparous and primiparous). In our experimental conditions, we have recorded a high mortality between birth and weaning related manly to the heterogeneity in the weight of the kits inside of the same litter. At the age of slaughtering (77days), the mean of the boy weight of the rabbits was 1500g with little variation between seasons.

Keywords: *Rabbit, synthetic line, Algeria, litter size, weight.*

EARLY STAGES OF EMBRYO DEVELOPMENT IN THE SYNTHETIC LINE OF RABBITS

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Abstract

The objective of this work was to study the early embryo development and survival at the 8th generation of selection for litter size at birth and the body weight at 77 days in the synthetic line of rabbit. 40 females were divided in two groups. The females were first mated at 18 weeks of age and thereafter 10 days after parturition. On their fifth gestation, the females were mated and sacrificed at 48h *postcoïtum* (G48h = 20 females) or 72h *postcoïtum* (G72h = 20). Immediately after, the entire reproductive tract was removed. The ovaries were weighted and the ovulation rate was estimated as the number of *corporahemorrhagica* (*C.H.*). The oviduct and the first one-third of the uterine horn were flushed with 5 mL of 150 mM ammonium bicarbonate solution at room temperature. After recovery, the total numbers of embryos and oocytes were recorded. The classification of the recovered embryos was carried out by 2 operators using a binocular stereoscopic microscope. The females of the synthetic line have shown higher ovulation and fertilization rates (13,5 *C.H.* and 94%). At 48h *postcoïtum*, almost embryos were classified as early morulae (41%). In other side, the number of embryos with 8 and 16C was respectively 28% and 19%. At this stage, in our experimental conditions, we did not find any morulae compact. However, the females form the G72h presented a higher percentage of compact morulae than early morulae (63 *vs.* 22%). The percentage of early blastocyst was very low (6%). Finally, we have found a similar percentage of abnormal embryos and early embryo survival between both groups of females. In conclusion, at 48 or 72h *postcoïtum*, the rabbits of the synthetic line have presented lower embryo development compare to several rabbit strains and breeds.

Keywords: *Embryos, synthetic line, Algeria, genetic, embryo survival.*

ECOLOGY OF ORTHOPTEROIDS IN THREE DIFFERENT ENVIRONMENTS AT THE HUNTING RESERVE OF ZERALDA (ALGERIA).

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Abstract

Orthopteroids forms an important part of terrestrial biomass, it is largely represented and generally abundant; insects often distinguished by their loyalty to a habitat type.

Our study was conducted during one year in three different areas at the hunting reserve of Zéralda(cereal, verge of apricot treeandwasteland).

The sampling method is that of the quadrat count and the placement of Barber pots which allows us to sample individuals from certain hygrophilous species of small sizes.

The obtained results revealed the presence of 33 species of Orthopteroids spread over seven families and 17 different sub-families. The number of species identified based on the sampled areas are 25, 22 and 27, respectively, for the cereal, the apricot orchard and wasteland environments.

The order of Orthoptera is the most dominant with a percentage of 98.76% compared to other orders of inventory Orthopteroids.

The frequency of occurrence shows that the cereal environment contained 3 ubiquitous species, the *A. strepens* and *P. giornai* (100%), and *A. turrita* with a frequency of 91.67%. The species *O. Tibialis* was recorded with a constant presence (66.67%). However, 11 species were noted as regular and 10 as accessory species. At the apricot orchard tree, two species (*A. strepens* and *P. Giornai)* were ubiquitous, with a rate of 92% each. No constant species were noted. The rest of the species were either regular or accessory species. Similarly, no constant species were identified at the level of the wasteland. However, *A. turrita, A. strepens* and *P. giornai* still remained omnipresent at the level of the environment, with frequencies of 91.67%, 83.33% and 91.67%, respectively.

Keywords: *Orthoptera, Frequency, Ecology, Zéralda.*

DIFFERENCE IN CUTICLE COMPONENT AND IMMUNOCOMPETENCE IN NURSE AND FORAGER WORKER HONEYBEE (*APIS MELLIFERA L)*

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Abstract

The aim of this work is to study the difference of physiology between the worker bee nurse and forager (*Apis mellifera intermissa*). The chosen physiological characteristics were the component of the cuticle (protein-chitin content) and the measure of the efficiency of immune system (the total number of haemocytes (THC), the normal haemocytes and the relative mass of fat body). The THC is widely used as an indicator of cellular immunocompetence of insects. The normal haemocytes, also referred to immunocytes, indicate the integrity of cellular immune system. The fat body is an indirect measurement of induced humoral immunocompetence. The THC and the normal haemocytes were determined by the method described by Amdam *et al.*, (2004). For the estimation of the cuticular abdominal protein-chitin content, the method described by Berghiche *et al.*, (2007) was employed. The relative mass of fat body was determined using an ether extraction method according to Doums *et al*., (2002) and Wilson-Rich *et a*l., (2008). The results show that a considerable percentage of a cuticular protein and a decrease of chitin was observed in nurse compared to forager. The older bees exhibited a strong reduction in the immun parameters.

Keywords: *Apis mellifera intermissa, cuticle component, immunocompetence*.

OVARIAN STATUS AND PLASMA ASSAY OF E2 AND P4 AT MATING TIME ACCORDING TO THE RECEPTIVITY IN LOCAL RABBIT POPULATION

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Abstract

The objective of this study was to investigate the ovarian status and plasma concentration of E2 and P4according to rabbit femalesexual receptivity. A total of 60 rabbit does were divided into three homogeneous groups of 20 rabbits each, depending on the test of presentation to the buck: group 1: R+(receptive), group 2: R- + AM (non-receptive followed by an assisted mating) and group 3: R- + AM+ 0.2 ml of GnRH(non-receptive +AM +injection of 0.2ml of GnRH). Slaughtering has been carried out in the following 14h *postcoitum*. The number of corpora luteavaries significantly depending on the stage*post coitum* ($P < 0.05$). The first ovulation was observed from 10h *p.c.* At 12h and 14h *p.c.*, the number of corpora lutea is significantly higher than in other stages. The ovulation rate was significantly influenced by the receptivity of does and *p.c.* stage. Female does (R +) ovulate more frequently than the R-, the GnRH treatment has delayedovulation rate in R-. The plasma concentration of E2 (estimated to average 221 pg / ml) was significantly influenced by the receptivity. The E2 plasma concentration is higher in rabbit does R+ (+ 48%; $p < 0.05$) almost throughout the observation period (0h to 14h *p.c).*The P4 concentration was 1.25 ng / ml and between 0 to 8hr *p.c*its average rate was 2.12 ng / ml. It undergoes a drastic fall at the time of ovulation (10h p.c): 0.69 ng / ml. In conclusion, female receptivity and GnRH influence the frequency of ovulation and the plasma concentration of E2 in nulliparous Algerian rabbit local population.

Keywords: *Rabbit, ovarian, ovulation, hormon, GnRH*

RABBIT BREEDING IN ALGERIA: CHARACTERIZATION OF SEMEN OF THREE RABBIT BREEDS AND ARTIFICIAL INSEMINATION

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Abstract

This work aims to study the quantitative and qualitative characteristics of the semen of 3 rabbit breeds, and to compare zootechnicalperformancesrelated to reproduction in females conducted by natural mating (NM) or artificial insemination (AI). Thirty males aged of5-6 months was divided into 3 groups, 10 in each (local population, Californian, hybrid).Throughout the experiment, two successive ejaculates were collected twicea week during6 weeks. Furthermore, 20 nulliparous rabbits were divided into two groups 10 in each (group of females artificially inseminated (AI) and group of females conducted in natural mating(NM)). No significant differences were revealed among 3 male groups for the average ejaculate volume (1.11 ± 0.43; p> 0.05), pH (7.16 ± 0.18) and individual motility (2.36 ± 0.4; p> 0.05). However, bucks of the local population showed significantly higher massale motility compared to that recorded in hybrid rabbits (+ 30%; p <0.05), and Californian rabbits (+ 27%, p <0.05). The average concentration of sperm was comparable between hybrids and Californian rabbits, but significantly lower in local rabbits (-30%, p <0.05). The fertility rate was 76.92% against 53.84% in NM and AI respectively. The total number of kitsnewborn was higher in NM compared to AI (6.5 ± 1.25 *vs.* 5.42 ± 1.90, a difference of 16%). The recorded difference was not significant (p> 0.05). The stillbirth rate was void in both groups of females. The number of weaned rabbits and mortality between birth and weaning were 4.6 ± 1.50 and 38.80% and 4 ± 1.2 and 35.71% in NM and IA respectively. The use of artificial insemination in Algeria for the first time has given very encouraging results, however further works on more effective and more advanced parities seem necessary.

Keywords: *Rabbit, semen, fertility, biotechnology*

THE RELATIONSHIP BETWEEN ANO-GENITAL DISTANCE AND SEXUAL BEHAVIOR IN RABBIT OF LOCAL ALGERIANPOPULATION

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Abstract

Some studies in rabbit have shownthe existence of direct relations between the Ano-Genital Distance (AGD) and the chin marking behavior.In order to study the effect of the Ano-Genital Distance (AGD) on the chin marking behavior, 20 rabbit bucks from the local population, aged of 6.5 months and weighing between 2200 and 3100gwere used in this experiment. The observations on the animals,at first, focused onthe length of the AGD, the chin marking, the male behavior towards the female and the male libido.The average AGD was 13.66 ± 1.84 mm. We distinguished11 males with a higher AGD (14.90±1.04) and 9 males with a small AGD (12.12±1.35). The AGD had a high effect on the chin marking behavior. Rabbit bucks with higher AGD have marked their territory (62.16)more than males with a small AGD (52.31).The activity of aggressiveness and mounting seems to be more important in rabbit bucks with high AGD than small AGD (15% *vs* 10% and 25% *vs* 15% respectively).The relationship between the weight and the AGDwasvery weak (r = 0.23).Males with high AGD ejaculate more rapidly than small AGD (10.98s*vs*8.85s).In conclusion, in themales with large AGD compared to those with asmall AGD, the spontaneous chin marking was significantly higher, aggressiveness, mounting and libido were more important.

Keywords: *Chinmarking,behavior, rabbit, AGD*

METHOD OF MOVING HIVES WHEN PREPARING HONEYBEE COLONIES FOR ACACIA FLOW

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Abstract

The acacia is the most significant honey plant on the territory of the Republic of Srpska (RS).From the very beginning, honeybee colonies have been good at using acacia flow in the best possible way. The objective of this paper is to examine the influence of moving hives as an important method in preparing honeybee colonies for acacia flow, in order to increase the total yield of honey in an apiary and at the same time to use good productive queen bees to a greater extent. The research was made in an experimental apiary of the Faculty of Agriculture in Banja Luka in April, May and July 2010. Twelve (12) hives were chosen for the research and divided in strong, medium and weak honeybee colonies. Strength of a honeybee colony was determined by the number of bees in a beehive and the percentage of surface area related to honey, pollen, bee nests as well as how many hive frames were occupied. As a condition for maximal readiness of honeybee colonies for the following acacia flow, colonies were fed with sugar syrup in the period from 6thApril 2010 to 10thMay 2010. During the experiment, the weather favoured the growth of the honeybee colonies. Based on the results, it can be concluded that the method of moving hives leads to an increase in the surface area of honey, pollen and bee nests, while the honeybee colonies remain strong. The number of scout bees in the colonies increased when additional colonies were added by the method of moving hives, which also increased productive results in the apiary. This practice is not very often used in the RS but it is very efficient and can be used all year long.

Key words: *Acacia flow, honeybee colony, yield, moving hives*

SAFETY AND USE OF ROYAL JELLY

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Abstract

Based on local and international literature, this paper gives an overview of chemical composition and the importance of royal jelly for bees and humans. The significance of production, keeping and apitherapy usage is highlighted. Royal jelly, a rare and expensive substance, earned its name as considered to be an ideal food containing everything we need for growth, development and normal bodily functions. Royal jelly is white to pale yellow in colour, a thick and non-transparent substance with a distinctive aroma and a slightly spicy acidic-sweet taste. The complex chemical structure produced by young nurse bees is food for larvae and the queen bee. Jelly is created in milk glands of worker bees and can be produced only by young bees within the first 14 days after hatching. Royal jelly is rich in vitamins B1-thiamine, B2- riboflavin, B6- pyridoxine, B12- nicotinic acid, pantothenic acid, biotin, inositol, niacin and acetylcholine. Jelly can be successfully produced in all hive types which have equal frames in brood and food chambers. This paper describes working with a colony without a queen bee and the results are better than expected.In production activities and sales, royal jelly should satisfy the following conditions: no more than 70% of water, i.e. 30% of dry substance should contain 11% of protein. Royal jelly is used not only for treatment but also for prevention of many diseases.

Keywords*: Royal jelly, milk glands, production, beekeeping, apitherapy*

A COMPARATIVE ANALYSIS OF THE EXTERIOR IN LOCAL GOAT BREEDS FROM SOUTHWEST BULGARIA

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Abstract

In the last 15 -20 years there has been a higher interest in the skins of the Kalofer longhaired goats, used for making mummer's costumes, typical for Southwest Bulgaria. As a result, very valuable animals from this indigenous goat breed were brought from its tipycal habitat (Kalofer region); some of them were killed for their skin, and others left for breeding, mainly in Southwest Bulgaria (Blagoevgrad region). This region(Blagoevgrad region) , however, is a natural habitat of another local breed – the Bulgarian Screw-horned long-haired goat. Coexistence and breeding in purebred status of these two indigenous goat breeds, requires clearly distinguished breed types of both of them. For this purpose, we tracedtypical specimens, whith a clearly expressed breed type of Kalofer long-haired and Bulgarian screw-horned goats, reared in herds in Southwest Bulgaria. Full exterior measurements of 100 goats (50 of each breed) and 40 bucks (20 of each breed) were made. The Kalofer long-haired goat is larger than the Bulgarian Screw-horned long-haired goat - the height at the withers in the females, was - 70.76 cm and 66.9 cm, respectively. The height at the withers in the bucks was - 82.2 cm and 73.4 cm, respectively. The differences expressed a high degree of probability. The Bulgarian Screw-horned goat has a light stretched format (bucks' stretchabillity index was 106.3), while the Kalofer long-haired goat has a square format (bucks' stretchabillity index was100.3). The Kalofer long-haired goat has more massive bones (index for the development of bones was 12.99) than the Bulgarian Srew-horned goat (index for the development of bones - 12.12). The differences expressed a high degree of probability.

Keywords: *Goat breeding, Autohthonous breeds, local goat breeds, exterior measurements, exterior indices*

EFFECTS OF DIFFERENT FEED RESTRICTION REGIMES ON PERFORMANCE AND ASCITES DEVELOPMENT IN BROILER CHICKENS

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Abstract

The present study was conducted to evaluate the effects of early feed restriction or meal feeding on performance and ascites (pulmonary hypertension syndrome) parameters in male broiler chickens. One-day-old broilers were fed a commercial corn-soybean meal based diet meeting NRC (1994) requirement. The treatments were *ad libitum* (AL), Feed restriction (provide daily maintenance energy requirement) from 7 to 14d, Feed restriction (support 50% of the normal growth rate) from 7 to 14 d, Meal feeding from 7 to 14 d and Meal feeding from 7 to21d. Body weight, feed intake, and feed conversion ratio were measured weekly. Heart weight as a percentage of body weight (PHWT) and right/total ventricle weight ratio (RV/TV) was recorded at the end of the experiment. Five replicate groups of 12 broilers were allocated to each treatment. Results indicated that feed restriction reduced weight gain compared to AL or MF regimes ($P<0.05$) at the end of experiment. Broilers subjected to feed restriction regimes consumed less feed than either AL or MF ($P<0.05$). There were no significant differences between MF and AL groups in weight gain and feed intake. At the end of experiment, Feed conversion was improved for birds in MF14. Heart and RV/TV values were not significantly affected by the feed restriction (FR and MF) regimes.

Keywords: *Feed Restriction, Performance, Ascites, Broiler Chickens.*

EFFECTS OF VEGETARIAN DIET WITH SPIRULINA ON THE GUT FUNCTIONAND NEUROENDOCRINE SYSTEM CELLS OF ZEBRAFISH

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Abstract

The gastrointestinal function in vertebrates is influenced both by stressors, such as fasting and refeeding, both by hormonal factors. Different types of diet effect on neuroendocrine cells and enzyme secretion. The aim of this study was to determine the effect of the diet based on *Spirulina*, microalgae known for its nutraceutical properties. The short-term food deprivation and refeedingin adult zebrafish (*Danio rerio*), vertebrate whose genomeissimilar to the human. It was investigated in order to elucidate the gastrointestinal expression of oligopeptide transporter (PepT1) and ghrelin (GHR) and the mechanism compensatory growth. PepT1 is responsible for absorbing oligopeptides through a brush border membrane of intestinal mucosa. GHR is a brain-gut peptide in fish and mammals, stimulating growth hormone secretion and regulating appetite. Samplings were repeated following 2 and 5 days of fasting and 2 and 5 days ofrefeeding with Sera *Spirulina* tabs,in which the major constituent is *Spirulina* sp. which brings 50.2% in protein. The morphological analysis and immunohistochemical determination of PepT-1 and GHR by Western blot were carried out. The intestinal tract of control specimens shows the normal morphology of the digestive tract. Fasting caused structural changes in folds and constriction of the intestinal lumen. Western blot analysis revealed a reduction in PepT-1 levels after fasting and an increase after refeeding, reaching very high levels after 5 days, compared to the control. The levels of GHR decreased after food deprivation, while increased gradually after refeeding.

The significant increase in expression of PepT1 in the refeeding fish, following fasting, suggests a physiological mechanism of compensatory growth for enhanced absorption efficiency and might influence GHR secretion. The microalga Spirulina, for its nutraceutical properties, is an excellent candidate for breeding of animals and the human diet.

Keywords: *Zebrafish, digestive tract, Spirulina sp., PepT1, GHR, compensatorygrowth.*

MORPHOLOGICALDIVERSITY OF NATIVE HONEY BEES SUBSPECIES (*APIS MELLIFERA MACEDONICA*) ON THE TERRITORY OF REPUBLIC OF MACEDONIA

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Abstract

The Macedonian honey bee (*Apis mellifera macedonica*)is a native honey bee subspecies on the territory of Republic of Macedonia, eastern Albania, north Greece, Bulgaria and south Serbia (Ruttner, 1988; Uzunov *et al*., 2009; Uzunov *et al*., 2014; Francis *et al*., 2014; Nedic *et al*., 2014). However, based on the mentioned molecular and morphological studies almost all reported for evident population diversity. Historically, due to illegal importation and propagation of queens the honey bee population in Macedonia was under genetic pressure, dominantly from *A. m. carnica* and also possibly from *A. m. ligustica*. In the Republic of Macedonia *A. m. macedonica* is officially recognized by the legislation as a native subspecies of honey bees, which impose regular monitoring of this population.

The Faculty of Agricultural Sciences and Food (Laboratory for honey bee biology and beekeeping) is responsible institution for monitoring the diversity of honey bee population in Macedonia which activities were implemented under the framework of the National program for protection of biological diversity of livestock.

In 2014, as a part of the mentioned program, young worker bees (n=2250) were sampled from 14 apiaries from different regions in the country. The samples were subject to morphometrical analysis of 20 characteristicsof the forewing venation.

The results from this study confirmed previous reports about the morphological diversity of *A. m. macedonica* on the territory of Republic of Macedonia.

Keywords: *Honeybees, Apis mellifera macedonica, morphological diversity, Republic of Macedonia.*

THE EFFECT OF MYCOTOXIN ADSORBENTS ON SOME SELECTED PARAMETERS OF BOAR SEMEN

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Abstract

The studies were carried out at the State Enterprise for Pig Selection and Hybridization "Moldsungibrid" (Republic of Moldova), from 18.03.2014 till 06.08.2014, using boars of Landrace, Yorkshire, Duroc and Pietrain breeds in order to understand the impact of the enterosorbent "Primix-Alfasorb" on breeding boars' semen production. During the first period of the experiment the adsorbent was not added to the boars' diet; during the second period of the experiment (60 days) the basic compound feed (BF) was supplemented with the preparation "Primix-Alfasorb" at the level of 300 g/t; during the final (third) period (40 days) the animals were again fed to basic feed. It was observed that, when the breeding boars were fed on compound feed supplemented with the additive «Primix-Alfasorb» at the level of 300g/t, the ejaculate volume increased, namely: during the second period of the experiment – in the boars of Landrace breed ($p < 0.05$), and during the third period – in the boars of Pietrain breed ($p < 0.1$). The total number of spermatozoa in the ejaculate was 139,54 milliard in Duroc boars, and up to 201,39 milliard in the boars of Pietrain breed. During the third period of the experiment, this index was high in the boars of all the breeds. As to the concentration of the spermatozoa, it was higher in Yorkshire boars by 13.52, 14.14 and 0.58%.

Keywords: *Breeding Boar, Sperm Production, Sperm Dose, Sow, Adsorbent*

THE MOST IMPORTANT WELFARE ISSUES ON DAIRY FARMS IN SERBIA

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Abstract

The aim of this study was to discover and highlight the most important welfare issues on dairy farms in Serbia as well as to suggest measures for their elimination. The assessment was done according to Welfare Quality® Assessment Protocol for Cattle on 16 selected commercial dairy farms in which the cows of Simmental and Holstein-Friesian breeds were reared (N=4833). Welfare state on each farm was evaluated by measures that indicate insurance of appropriate feeding, housing, health and behavior. Overall score (0-100 points) enabled final categorization of farms into one of four welfare categories (unacceptable, acceptable, enhanced and excellent).Based on results,half of the farms were assigned to acceptable and other half to enhanced welfare category. Housing conditions on the majority of farms (63%) were assessed as unacceptable (≤20 points) due to poor hygiene and discomfort. Cows were kept tied continuously on more than one third of farms which, together with lack of pasture (17 days/year on average), restrict their comfort and freedom of movement.This may be also linked to low scored behavioral insurance (32points), especially inability to express its natural forms (6.7 points).Health condition was estimated as acceptable, but endangered welfare by high incidence of laminitis (38%), dystocia (4.2%) and mortality (6.7%). Commonly performed dehorning procedure (79%) without anesthetic/analgesic application caused considerable pain and stress in affected animals. Overall assessment score(2.5/5) showed the need for improvement in all areas of dairy cows' welfare, especially in terms of their housing and management.

Keywords: *Welfare assessment, Feeding, Housing, Health, Behavior*

GROWTH RATE FOR RABBITS SUPPLEMENTED WITH MARALFALFA GRASS (*PENNISETUM SP.),* ELEPHANT GRASS (*PENNISETUM PURPUREUM*) AND HYDROPONICALLY-GROWN BARLEY (*HORDEUM VULGARE*)

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Abstract

In tropical, semi-arid, and arid areas, animal production is increasingly reliant on supplemental feeding, especially during energetically expensive reproductive seasons. The cost of many traditional feeds restricts their use in many countries, and producers are therefore turning to alternative feed sources. The voluntary intake, feed conversion rate and growth rate of rabbits fed commercial diets supplemented with Maralfalfa (*Pennisetum sp.),* Elephant grass (*Pennisetum purpureum*) and hydroponically-grown barley (*Hordeum vulgare*) were assessed. The research was conducted on 24 New Zealander rabbits of 35 days of age and 950 g of weight. The animals were housed in four different pens and were randomly assigned for four different diets in each group, forming 4 lots (L) with 3 males and 3 females each. The 4 diets comprised: L1 Commercial diet, L2 Commercial diet + Maralfalfa grass (*Pennisetum sp*.), L3 Commercial diet + Elephant grass (*Pennisetum purpureum*) and L4 Commercial diet + hydroponically-grown barley (*Hordeum vulgare*). In all groups, the feed and refusals were weighed and recorded daily during 15 days. Then the total feed intake, feed conversion rate was calculated. Each animal from lot 1 gained 626.6 g and 41.7 g ADG, from lot 2 gained 544 g and 36.3g ADG, from lot 3 gained 556.6 g and 37.1 g of ADG, and from lot 4 each animal gained 503.3 gr and 33.5 g ADG. The average body weight (BW) per lot at the end of the study was as follows: 1613 g (L1), 1504 g (L2), 1526 g (L3) and 1476 g (L4). The highest BW and ADG were obtained in L1(commercial diet); L2 and L3 gave the similar results, and the lowest BW and ADG were obtained in L4 (hydroponically-grown crops).

Keywords: *Rabbits, feed fattening, Maralfalfa grass, Elephant grass, hydroponically-groen barley.*

GROWTH RATE AND FATTENING OF BARRED PLYMOUTH ROCK HYBRID MALE CHICKS

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Abstract

The objective of the trial was to evaluate the fattening and growth rate of Barred Plymouth Rock hybrid male chicks. Frequently, females are used as laying hens, whereas there is lack of commercial interest for males due to their slow growth and size. This study is based on the search for a commercial purpose of these males, either as future Picantones or Capones. The growth rate and fattening, feed intake, weight gain and feed conversion rate of those males was assessed to find a more suitable commercial alternative using commercial diets.

The trial was conducted on 100 one-day old Barred Plymouth Rock hybrid male chicks. The trial was divided into 3 phases. The first phase investigated the chicks during Day 0-21 , the second phase during Day 22-49 and the third phase during Day 50-63. In each of these phases the individual weight of chicks, daily weight gain, feed consumption and feed conversion rate were determined . Initial weight in the first day of life was 37.1 g, and when the trial ended after 63 days (9 week) the average weight of 58 chicks, was 826.09 g.

Keywords: *Fattening chicks, Barred Plymouth Rock, growth gain*

EFFECTS OF BACTERIAL INOCULANTS ON NUTRITIVE VALUE OF BARLEY SILAGE

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Abstract

Bacterial inoculants containing lactic acid bacteria or bacterial culture called microbial inoculant as silage additives have been used intensively in making silage, and these additives are considered as biotechnological silage additives. In this study, three different barley silage treatment groups were prepared as control, inoculant A (Sill-All) and inoculant B (Pioneer 11G22) groups contained bacterial inoculants. Inoculants were added to silages at the level of $1.5x10^7$ cfu/g. Analysed for, pH, dry matter, crude protein, crude fat, crude ash, crude fiber, NDF and ADF levels were determined at the end of 56-day period. Significant ($P<0.05$) differences were observed among control and inoculant silage groups for pH, crude fiber, NDF and ADF values. In conclusion the result obtained in the study showed that bacterial inoculant, inclusion especially to the barley silage, improve feeding value under our experimental condition.

Keywords: *Barley silage, bacterial inoculants, feed value.*

COMPARISON OF FLESH COLOUR ASSESSMENT METHODS FOR THREE DIFFERENT SALMONID SPECIES IN TURKISH MARKET

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Abstract

Red/pink flesh colour is the most important visual quality characteristic in wild brown trout (WBT), farmed Atlantic salmon (FAS) and farmed Rainbow trout (FRT). The present study was conducted to investigate the relationship between flesh colour and total carotenoid concentration (TCC) of three fish species. Linear relationships were observed between colour parameters, DSM *Salmo*Fan card and TCCs. Redness (a*) was mostly correlated with TCC of the fish fillets.

Compared to other two species, FAS had the highest TCC (8.68 mg/kg) and DSM *Salmo*Fan card score (28,98). TCC of trout flesh proportionally increased with increasing redness intensity (a*) whereas the brightness (L*) decreased. FRT have several marketing problems in Turkey. Flesh visual colour properties of salmonids can be solved by meeting the demands of consumers. In order to meet these demands, the data in this study suggested that the DSM SalmoFan card and TCC of FRT flesh should be at least 22 and above 4 mg/kg, respectively.

Keywords: *Salmonids, flesh colour, Salmo Fan Card, total carotenoid concentration, colorimetric analysis.*

MOLECULAR DETECTION OF PROTOZOAN PATHOGENS IN COMMERCIAL BUMBLEBEE(*B. terrestris* L.)

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Abstract

Bumblebees are important pollinators of greenhouse and field crops. They are therefore reared commercially on a large scale. *Bombus terrestris* is the most reared bumble bee species for commercial pollination since 1987 and has been used outside its natural distribution area. Commercially produced *B. terrestris* colonies often have higher levels of pathogens than wild bumble bee populations. These pathogens can spread to wild bees and may lead to decline in wild bee species. The most commonly reported bumblebee protozoan pathogens are the microsporodium *Nosema bombi*,*Crithidia bombi*and*Apicystis bombi.* These parasites have also detrimental effects on colonization, survival and reproduction of *B. terrestris* queens. Therefore, the correct identification of *B. terrestris* parasites is very important. Nowadays, in order to identify infected bumblebees, various molecular methods have been developed to provide highly sensitive, reliable and fast results. In this study, a total of 130 *B. terrestris* queens who died in the colony initiation period after diapauses were obtained from the commercial company. DNA was extracted from bumblebee gut tissues using a modified Chelex 100 method. ITSf2/r2, Nbombi-SSU-Jf1/Jr1 and SSU-rRNA-Ff1/Rr1b primer pairs for *N. bombi*, SEF/SER, CB-ITS1-F / CB-ITS1-R primer pairs for *C. bombi* and NeoF/NeoR, ApBF1/ ApUR2 primer pairs for *A.bombi* were tested by PCR amplification, but these parasites were not detected in the examined samples. In conclusion, more samples should be investigated to detect infected bumblebees with *N. bombi, C. bombi* and *A. bombi.*

Keywords: *Bumblebee, PCR, Nosema bombi, Crithidia bombi, Apicystisbombi*

SEXUAL SYNCHRONIZATION IN COWS AND HEIFERS THROUGH TWO DIFFERENT VAGINAL DEVICES

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Abstract

Artificial insemination is the most important biotechnological method. An important factors affecting the success of artificial insemination is the correct detection of oestrous period.In order to overcome this problem various oestrus synchronization methods were used in cattle. In the present study, fieldwork was conducted in three groups using two different vaginal devices. Group I consisted of Holstein cows (n=12) aging3-6, gave at least one birth and had an average milk yield of 26,3± 2,34 kg. Intravaginal silicon devices containing 1.0 g progesterone (DIB) were inserted in this group.Group II consisted of heifers (n=13) which aging 18-22 months and did not have any pathologic findings and intravaginal implant (CIDR) was performed on these heifers.Group III consisted of heifers (n=45) aging 18-22 months and did not have any pathologic findings.Intravaginal silicon devicescontaining 1.0 g progesterone were inserted into these heifers. Implants were kept for 10 days in all groups and, one day before the removal of the implants, 2000 IU PMSG (Folligon) and 5 ml prostaglandin, (Dinolitic) were injected into all animals.Twenty four hours after the removal of the implants, 1500 İÜ hCG (Chorulon) was injected and at the 48^{th} and 24^{th} hours, without considering rutting, insemination was performed. As a result, the rates of pregnancy achieved in Group I, Group II and Group III were 58,33 %, 38,46 % and 13,33 %, respectively. It is thought that the rates are low in the heifer groups since heifers were at the beginning of reproductive life and could not display the follicular development necessary for this excessive amount of hormones or this intense application of hormones might have caused ovulation problems.

Keywords: *Oestrus synchronization, Cow, Artificial insemination.*

SELECTION OF COVARIANCE STRUCTURES IN REPEATED DATA WITH EQUAL AND UNEQUAL TIME INTERVALS

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Abstract

The aim of this study was to examine statistical performance of some covariance structures specified for analyzing repeated measures data with equal and unequal time intervals. For this purpose, agricultural data on barley, alfalfa and maize silage yields (kg/da) for 7 geographic regions of Turkey were obtained from Turkish Statistical Institute (TUIK) database. Data sets used in the study were formed in two different ways. Data from the period 2013-2015 were employed based on equal time intervals, and data on the years 2010, 2011 and 2015 were analyzed on the basis of unequal time intervals. For both data sets, 6 different covariance structures such as CS, UN, AR(1), VC, TOEP and SP(POW) were adopted within the scope of general linear mixed models. In selection of most suitable covariance structure to data sets, goodness of fit criteria like AIC and BIC were employed. While the most suitable covariance structure in the data set with equal time intervals was determined as AR(1), the most suitable covariance structure in the data set with unequal time intervals was found as SP(POW). As a result, equal or unequal time intervals in regard to repeated measurements should be taken into account as a determinative factor in the detection of the most appropriate one among candidate covariance structures. Also, it is advised that use of mixed models permits ones to provide a powerful solution in the statistical evaluation of repeated measures data.

Keywords: *Repeated data, Covariance structures, Mixed model*

THE EFFECT OF AGE ON FEAR REACTIONS AND MATERNAL BEHAVIOR SCORE IN NORDUZ EWES

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Abstract

The aim of this study was to determine the effect of age on fear reactions and maternal behavior score (MBS) in sheep. Sixty Norduz ewes at 2, 3 and 4-years-old age were subjected to arena and isolation box tests to determine fear reactions. MBSs of these ewes and their lambs' first week survival rate also were recorded. Approach-avoidance situation was generated for 5-min period with a human and flock-mates in the arena test. Animal's inherent fear of isolation was determined by using isolation box. Twelve fear related variables including locomotor and vocal activities and exploration behaviors were recorded individually in arena test. Movements and vocalizations were recorded in isolation box test. MBS was determined based on the proximity of the ewe while her lamb was tagged. Findings showed that 2 years old ewes had more locomotor activity (more fearful) than older ewes in arena test ($p < 0.05$). The isolation box test scores were found similar among groups. MBS tended to be higher (good mothering) in 3 and 4 years old ewes than younger ewes ($p = 0.075$). Litter survival within a week of birth was found similar among age groups. In conclusion, age is important factor for fear reaction while has limited effect on MBS in ewes.

Keywords: *Age, Fear test, Mothering, Sheep*

IDENTIFICATION AND PHENOTYPIC CHARACTERIZATION OF FIVE LOCAL CATTLE OF BUSHA TYPE FARMED IN ALBANIA AND KOSOVO

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Abstract

Busha autochthonous cattle are spread out mainly in the borders between Albania and Kosovo and Kosovo and Macedonia. It is classified in the group of short horn breeds. Most of Busha population is found in remote mountainous areas, and it is well adapted to extensive farming system. Five local populations of Busha cattle type are identified until now in Kosovo and Albania. Their number per farm, rearing system, morphology andmorphometrical measurements was registered according to Food and Agriculture Organization guidelines (2012). Albanian populations are characterized by small body size, big head, broad forehead, medium size ears with a lot of hairs inside inward back, and short horns. The data from previous study shows that average milk yield is 300-400 kg per cow and in some cases up to 60-700 kg. Lactation length is 4-5 months. These caws in Kosovo are bigger in body size, comparable in frontal width, shaped and longer horns and ears.The average milk production is 1500-1800 kg per lactation. Lactation length is 240-280 days. Discriminate analysis was used to elaborate morphometric measures. Based on data collected until now three groups are formed with distinguished distances: the first group, Back Rjoll herd of Albania; second group Dragosh herd located in Gjakove, Kosovo and third group Zherger herd of Gjilani, Kososvo. These are preliminary results because the number of measured animals was limited. Increase in the number of monitored animals for population will improve the prediction accuracy of genetic distances between them, as bases for breeding program for their in situ conservation.

Keywords: *Busha cattle, morphometric measurement, local differentiation.*

PRELIMINARY DATA ON GROSS MARGIN ANALYZE OF DAIRY FARMS IN KOSOVO

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Abstract

The purpose of the study was to analyze the economic efficiency of dairy farms in Kosovo. This was a descriptive and quantitative survey and the target population was the dairy farmers registered with the Kosovo Paying Agency. The random sampling technique was used to select the respondents (n=138). Two methods of data analysis were used, namely; descriptive statistics, and gross margin analysis. The annual farm income, the cost of milk production, and the problems faced by the farms were studied. Data on milk production, farm expenses and returns, use of milking machine, artificial insemination, fodder production, and feed bought in the market for each farm were recorded during 2015.The milk cost ranged from 0,166 to 0,696 euro cents/kg and milk price ranged from 0,220 to 0,600 euro cents/kg. About 12 percent of the farms are selling the milk directly to the market getting a higher price than selling to processors. In variable cost, feed took the highest share by 69,2 percent. The Gross Margin per Cow, for all the farms monitored, have positive values: 76.1 Euro/cow for the GMpC milk+meat and 4.17 Euro/cow for the GMpC milk. However 35,5% of the farms have negative values for the GMpC milk+meat while 12,3% of the farms have negative values for GMpC milk. This is one of the reasons, emphasized by MAFRD, that the analysis of the competitiveness of agriculture of Kosovo shows that currently only a small share of farms can compete in the regional market, EU and international level.

Keywords: *Dairy farm**,** gross margin, farm income, income per cow, medium and large sized farms.*

THE EFFECTS OF MICROBIAL PHYTASE ON IMPROVING OF GROWTH PERFORMANCE AND DIETARY PHYTATE-PHOSPHORUS UTILIZATION BY PIGLETS.

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Abstract

Pigs and poultry diets are primarily on cereals, legumes and oilseed products. About two-thirds of phosphorus (P) in these feedstuffs occur as phytates (mio-inositol hekxakisphosphate, InsP6), the salts of phytic acid. Phytate P in plants is a mixed calcium-magnesium-potassium salt of phytic acid that is present as chelate and solubility is very low. Phosphorus in this form is poorly digestible/available for simple-stomached animals. The aim of this study was to test the effects of the microbial phytase (NATUPHOS) on the performance parameters and faecal excretion phosphorus of piglets.The microbial phytase preparation (*Aspergillus niger*, NATUPHOS) was supplemented to a basal ration 750 FTU/kg feed and the effects on growth performance of weaned piglets were studied. The supplementation of microbial phytase improved slightly daily weight gain, feed conversion ratio and increases the digestibility and bioavailability of phosphorus from phytate, reduces the amount of inorganic phosphorus needed to maximize growth and bone mineralization and markedly reduces fecal excretion of phosphorus. Overall a positive effect of the microbial phytase on performance parameters was observed. TheP-excretion in the faeces was reduced by 20%.

Keywords: *Faeces, Microbial phytase, P-reduction, Performance parameters, Piglets.*

UTILIZATION OF ENZYMES IN NON RUMINANT'S ANIMAL NUTRITION, AS A BIOTECHNOLOGY FOR REDUCING POSPHORUS IN ANIMAL MANURE

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Abstract

One of the important reasons of soil and water pollution in Albania is the agricultural techniques and animal manures. Soil and water arecompounding parts of agriculture and face the risks of presenting pollution problems of environmental equilibrium change. Nevertheless the agriculture is always in front of difficulties from the influence of agronomic techniques and the animal wastes.Excessive animal manure and fertilizer inputs do cause various environmental problems, related to the accumulation and elevated leaching, runoff of nutrients (N and P) and heavy metal to ground water and surface water.This is particularly true in areas where animal production has been geographically concentrated. The P-excretion on the pigs and poultry faeces is potential source for soil and water pollution, due to his high level on the subsoil water and destruction of the ecosystem.Interest in phytase for non-ruminant animals take place in regions, where soil and groundwater pollution due to animal wastes is a serious problem and phosphorus is a major concern. The aim of this study was to test the effects of the microbial phytase (*Aspergillus niger*, NATUPHOS) 750 FTU/kg on the increase of P availability and animal performance, as well as in the reducing of environmental pollution. The microbial phytase preparation (*Aspergillus niger*, was supplemented to a basal ration 750 FTU/kg feed and the effects on P digestibility and animal performance have been well documented.The P-excretion was reduced by 20-25%.

Keywords: *Livestock development, Environment, Water and soil pollution, Animal manure, Enzymes.*

THE EFFECT OF LAYERS FEED SUPPLEMENTATION WITH ORGANIC SELENIUM ON THE QUANTITATIVE AND QUALITATIVE INDICATORS OF PRODUCTION

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Abstract

The experiment was conducted for a period of 13 weeks in a poultry farm near Podujevo. 400 Lohman Brown layers, were divided into four groups as following: Control Group (C), Experiment 1 (E1), Experiment 2 (E2) and Experiment 3 (E3). The same food formula was applied for the four groups, but if the control group was fed with the basic diet, the food formula of the consequent other three was supplemented with Organic Selenium (Se) Sel-Plex®, Alltech, inc., 0.2, 0.3 and 0.4 ppm respectively. During the experimental period the following parameters were consistently recorded, monitored and evaluated: live weight, egg production, egg mass, egg quality and food conversion ratio (FCR). At the end of the study, it was concluded that different levels of organic selenium did not significantly influenced ($P < 0.05$ level) neither on the egg production nor on the egg's quality and on the body weight. In the group supplemented with 0.4ppm Selenium, a tendency for the production increased and FCR's improvement was observed. The increasing dose of Se in the food, as it was observed, had a tendency to improve egg weight. E3 group eggs resulted in a higher weight; 3.7, 3.6 and 2.1% respectively than Control one, E1 and E2. The egg mass, slightly improved in the group supplemented with 0.4 ppm Selenium.

Keywords: *Selenium, poultry production, egg production, egg weight, chicken*

EVALUATION OF THE RESISTANCE OF THE MITE *VARROA DESTRUCTOR* TO THE AMITRAZ IN COLONIES OF HONEY BEES (*APIS MELLIFERA*) IN ALGERIA

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Abstract

*Varroa*mite has become a major concern of beekeepers in Algeria since the discovery of the first cases of infestation in the year 1982. Amitrazis the predominant compound used in Algeria to control *V. destructor,* its constant application has caused the appearance of resistant mite populations to this product in several parts of the world. This study was conducted to detect the possible existence of populations of resistant mites to Amitrea in Algeria. To determine the mites mortality percentage to the Amitraz, they were exposed to a trips of 2.5 x 1.0 cm. Varroa mortality in apiaries treated with Amitraz was 39.23%, lower than the 87.40% mortality obtained in apiaries that only received an alternative treatment. A significant difference (P >0.05) was found between two mortality of Varroa. These results show for the first time the existence of *Varroa destructor* populations resistant to Amitraz in Algeria.

Keywords: *Amitraz, Varroa destructor, resistance, Algeria.*

IMPACT OF THAWING TEMPERATURE ON QUALITY PARAMETERS OF BULL'S SEMEN

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Abstract

Aim of study was to examine the impact of thawing temperature on quality parameters of bull's semen. A total of 120 commercial doses of deep-frozen bull's semen, originated from three Simmental bulls, were examined. Semen was thawed at 38°C for 30 seconds (n=60 doses, 20 from each bull) or at 50°C for 15 seconds (n=60 doses, 20 from each bull). Thawing temperature did not have effect on average percent of progressive motility and sperm concentration (66.08% and 24.03x10^6at 38^OC, vs. 66.05% and 24.11 x10^6at 50^oC, respectively). Live sperm percent and dead sperm percent in each bull's semen samples was lower after thawing at lower temperature (55.74%, 44.14% and 55.29% vs. 56.08%, 44.67% and 57.68%; 6.78%, 10.67% and 4.26% vs. 7.88%, 10.90% and 5.72%, respectively).Percent of sperms died during staining in each bull's semen samples was lower after thawing at lower temperature (20.02%, 21.92% and 27.13% vs. 20.83%, 23.31% and 25.67%, respectively).Total percent of damaged sperms in each bull's semen samples was higher after thawing on lower temperature (17.46%, 23.27% and 13.31% vs. 15.20%, 21.10% and 10,99%, respectively).Percent of sperms with intact membrane damage in each bull's semen samples was higher after thawing at lower temperature (49.67%, 53.12% and 45.97% vs.41.39%, 46.03% and 43.15%, respectively), contrary to percent of sperms with other types of damage (50,33%, 46,88% and 54,03% vs.58,61%, 53,96% and 56.85%, respectively).Our results indicate positive impact of higher thawing temperatures on bull's semen quality parameters, and consequently its fertilisation ability.

Keywords: *Bull's semen, thawing temperature, quality.*

IMPACT OF THAWING TEMPERATURE ON MOTILITY PARAMETERS OF BULL'S SEMEN

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Abstract

Aim of study was to examine the impact of thawing temperature on motility parameters of bull's sperms after thawing. A total of 120 commercial doses of deep-frozen bull's semen, originated from three Simmental bulls, were examined. Semen was thawed at 38°C for 30 seconds (n=60 doses, 20 from each bull) or at 50°C for 15 seconds (n=60 doses, 20 from each bull). Motility parameters of sperms (Curvilinear Velocity, VCL, µm/s; Straight Line Velocity, VSL, µm/s; Average Path Velocity, VAP, µm/s, Amplitude of Lateral Head Displacement, µm) were determined as an average for 20 thawed doses of each bull on each of two thawing temperatures, by using Computer Assisted Sperm Analysis (CASA) program in NIS Elements software. All sperm motility parameters in all three bulls were significantly higher at higher thawing temperature (VCL 59.99±0.11, 58.96±0.13 and 56.87±0.16 vs. 52.89±0.14, 52.66±0.13 and 51.99±0.17 µm/s, $p<0.001$; VSL 52.58±0.11, 49.32±0.12 and 43.33±0.15 vs. 43.28±0.14, 42.13±0.14 and 40.69±0.16 µm/s, $p<0.001$; VAP 53.96±0.11, 51.00±0.12 and 45.37±0.14 vs. 44.85±0.14, 43.78±0.13 and 42.72±0.16 µm/s, $p<0.001$; ALH 4.07±0.02, 3.90±0.02 and 4.12±0.03 vs. 3.70±0.02, 3.77±0.02 and 3.51±0.02 µm, $p<0.001$, respectively). Our results indicate positive impact of higher thawing temperature on bull sperm motility parameters, as an indicators of their fertilisation ability.

Keywords: *Bull's sperm, thawing temperature, motility.*

TOTAL BILIRUBIN CONCENTRATION AND AST ACTIVITY IN SERUM OF SIMMENTAL COWS IN DIFFERENT GEOGRAPHIC REGIONS OF BOSNIA AND HERZEGOVINA

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Abstract

The objective of this study was to evaluate serum bilirubin concentration and AST activity in Simmental cows in two different geographic regions (Lijevce Polje lowlands and high altitude Nevesinje). A total of 42 healthy cows, 21 per farm, were tested. Cows were allocated to three groups viz. late pregnant or dry cows (7 animals), cows in the first days post-calving (7 animals), and cows in the second to third month of lactation (7 animals). The study was conducted during the autumn-winter period (2008) and repeated during spring (2009) involving the same cows. Blood samples were collected for analysis by puncture of the coccygeal vein (vena coccigea) using sterile needles into sterile single-use vacuette blood collection tubes without an anticoagulant. After 24 hour storage at room temperature, serum was separated, deep-frozen, and transported within 48 days to the laboratory for further biochemical assays.Blood (serum) bilirubin concentration was within the physiological range in all experimental cows in both locations. The results related to AST activity showed a slight increase above the physiological limit in all groups of cows, with late pregnant cows (Nevesinje location, winter period) exhibiting significantly higher values.

Keywords: *Concentration, Serum, Geographic area, Bilirubin, AST*

POTENTIAL TARGET SPECIES FOR SURVEILLANCE ON A BOVINE TUBERCULOSIS ENDEMIC AREA

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Abstract

The main threat for bovine tuberculosis (bTB) officially free qualification of cattle herds is the presence of a wildlife reservoir species around livestock farms. Without a regular and systematic surveillance, the epidemiological risk caused by the disease cannot be estimated; hereby plan of action is hard to work out. In Hungary, the Southwestern part of the country is known as a bTB endemic area. Our study aimed to identify those species, which can be a target of a systematic surveillance. For this purpose, we investigated 238 specimens of six species between 2014 and 2016 to look for visible lesions of bTB; and then we cultured all investigated specimens. During evisceration we carried out a visual-only game meat inspection, and then we collected lymph nodes (submandibular, retropharyngeal, tracheobronchial, mediastinal, hepatic, mesenteric) and submitted those to bacteriological examination. Our results confirmed that the wild boar *(Sus scrofa)* and the red fox *(Vulpes vulpes)* showed the highest infection prevalence inside the endemic area (21.7% and 22.2%, respectively), although during our investigation, the red fox never showed visible lesions of bTB. Nevertheless, among wild boars, the prevalence of post-mortem lesions proved to be 63.4%. All of the examined wild boar carcasses with visible lesions contained lesions inside the submandibular lymph node, as well. These findings suggest that wild boar can be a good target species for bTB surveillance. The observation that the submandibular lymph node was affected in each case, suggests that game meat processing plants, where the head can be accessible, should be a place of a systematic surveillance on bTB in wildlife.

Keywords: *Bovine tuberculosis, Wildlife, Surveillance, Hungary.*

ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN INNOVATION OF LIVESTOCK SYSTEMS AND TERRITORY PROMOTION. A CASE STUDY OF CALABRIA REGION, ITALY

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Abstract

A big theme at the centre of the global debate but also national one is the environmental issue also linked to intensification of agricultural-livestock production systems. The intensification trend appears to be closely related to the strong demographic and economic growth verified worldwide in recent years. According to forecasts, in 2050 population will reach 9 billion people; taking into account that today records a total of 859 million people living in a state of food insecurity, it obviously increases the demand for animal protein.The methodology of the paper is an empirical approach. By the theoretical framework of the livestock innovative systems and the strategy of valorisation of the internal area the authors produce a concrete possible project to implement at the level of the Calabria Region.The research, ultimately promoting Livestock Innovative Systems, engages in a consistent manner the Strategic Plan for the internal areas of the Calabria Region. Therefore, it aims to strengthen the potential of this region, stemming in particular from the great variability and diversity that characterizes the Region and that can be a great competitive advantage. This paper points out finally that such action must be pursued through the introduction of all possible innovations concerning the production process and the marketing and promotion, as well as services for productive activities, to the world of work and society. The authors conclude that all of this is possible to achieve with a massive introduction of ICT.

Keywords: *Livestock Management, Sustainable Development,Promotion of Territory, ICT, Local Food Chain*

AUTOCHTHONOUS DAIRY PRODUCTS IN MACEDONIA

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Abstract

The base of the dairy production in each country is consisted by the autochthonous dairy products which have been produced with the usage of production techniques and philosophies indigenous to their specific territory. All world-famous cheeses and other dairy products started with unique histories that were passed on from one generation to the next. Today, however, those histories and traditional methods are being replaced by large industrial facilities that produce cheeses that are far from their place of origin, using methods that are far from traditional.Production of autochthonous dairy products in the Republic of Macedonia is concentrated in small rural households and is characterized by variability in technological processes and the finished product attributes. These products, made from raw milk, are superior to industrially manufactured products in several categories, such as: sensory properties, quantity of proteolysis and lipolysis, representation of NSLAB in ripening, maturation time and authenticity of taste.This paper refers to the most traditionally-produced Macedonian cheeses: Belo sirenje (White brined cheese), Kashkaval, Bieno sirenje (Beaten cheese), Vareno sirenje (Cooked cheese), Strigle, Urda (Ricotta cheese), Kiselo mleko (Sour milk), Soleno kiselo mleko (Salty sour milk), Matenica (Buttermilk), Bulamach, Ovchenik, Provara, and Mast (Rendered butter).These dairy products represent an essential part of Macedonian cuisine, and their protection of origin will give greater value and facilitate better positioning in the market against their industrial competitors. The preservation of these products will allow greater economic and social development for more of the country's regions, enhanced animal husbandry and better recognition of Macedonia by global tourism.

Keywords: *Autochthonous dairy products, traditional production, cheese, Macedonia, protection*.

MASTITIS PATHOGENS AND THEIR ANTIMICROBIAL SUSCEPTIBILITY IN EARLY LACTATING DAIRY COWS

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Abstract

A two years cross-sectional longitudinal survey was carried out for determination of udder pathogens prevalence and their antimicrobial profile in one commercial dairy farm. Dairy cowswere selected in relation to date of calving and period of early lactation in order to minimize environmental impact. A udder quarters milk samples were obtained from totally 211 black-white dairy cows.Thequarter milk-sampleswere screening using the California Mastitis Test (CMT) for detection of abnormal milk secretion (AMS) and from quarters with AMS were obtained milk-samples for microbiological examination in order to detect intramammary infections (IMI). The milk-samples were obtained in two periods: period from beginning of lactation until 21st day in lactation and period from 22nd to 42nd day in lactation. The prevalence of IMIin period from beginning of lactation until 21st day in lactation and period from 22nd to 42nd day in lactation was 4.03% and 4.38%, respectively. Based on CMT, there was found totally 162 udder quarters with AMS. From these quarters, the overall proportion of microbiological negative quarters was 56.17% and mastitis pathogens were isolated from 43.83% of udder quarters, from which the dominant mastitis pathogens were:*Streptococcus agalactiae (*19.14%), *Enterococcus spp.*(8.02%), *Candida non-albicans*(6.79%), *Staphylococcus aureus*(6.17%), *Escherichia coli*(1.85%), *Aspergilus niger*(1.23%)and*Pseudomonas aeruginosa* (0.62%). The results indicated that contagious pathogens were the most common patogens of IMI in early lactation. There was significant difference in the prevalence of intramammary infection (χ^2=35.136, df=1, p<0.001) when comparing the front and rear udder quarters. The isolated bacteria were examined for determination of susceptibility to 27 most used antimicrobial agents for mastitis treatment. The most resistant strain was *Staphylococcus aureus.*

Keywords: *Dairy cow, intramammary infection, lactation*

EFFECTS OF NON-GENETIC FACTORS ON DAILY MILK PRODUCTION IN AWASSI BREED OF SHEEP IN MACEDONIA

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Abstract

Several basic –fixed factors on daily milk yield have been examined in total of 132 Awassi breed sheep, during two – year production period (2011 and 2012). The examination includes the following factors: lactation number, lactation type, date of milk recording, number of newborn lambs, month or year of milk recording and length of suckling period. Their influence on individual milk yield measured in morning, afternoon and evening milking, total daily milk yield and percentage of milk fat has been examined. A total of 904 lactation tests in sheep, aged from first to eight lactation were included in the research. All data were analyzed using a multi-factorial fixed model. The influence of certain factors was studied using the F-test. Analyzes were made using the SSPS set of programs.Most of the factors (number of lactation, date of milk recording, month or year of milk recording and length of suckling period), except the number of newborn lambs or fertility, had a highly significant influence ($P<0.01$) on daily milk production (milk from the morning, afternoon and evening and total amount of milk, as well as % of milk fat) in examined breed of sheep.Highest daily milk production was determined among sheep in sixth lactation and lowest among those in eighth lactation. On the other hand, the highest percentage of milk fat was determined among sheep in seventh lactation and the lowest among those in second lactation. Three types of lactation curve were identified in examined sheep of which most abundant is the one with one peak. These data suggest that the Awassi breed, as breed with high milk production, retains the level of high and standard milk production to an older age, which is a prerequisite for profitable and sustainable livestock production.

Keywords: *Awassi, daily milk yield, influence of factors, lactation curve*

STUDIES ON THE EXPRESSION OF GAMMA GLUTAMYLCYSTEINE SYNTHETASE FROM BLOOD STREAM *TRYPANOSOMA BRUCEI BRUCEI* USING PROKARYOTIC AND EUKARYOTIC SYSTEMS

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Abstract

Gamma glutamylcysteine synthetase (γGCS) is the rate-limiting step enzyme in the biosynthesis of the free radical scavenger GSH and $T(SH)_2$. Studies on the expression of this enzyme from *Trypanosoma brucei brucei*(*T.b.b*) was carried out in prokaryotic and eukaryotic systems. The full coding sequence ofγGCS gene from *T.b.b* was amplified and cloned into three forms of expression vector pVAX- modifications leading to cell-surface bound, secreted or cytosolic versions of γGCS. Each recombinant plasmid was used to transform *E. coli* XL I Blue and plasmid DNA prepared from positive clones for *in vitro* transfection of HepG2 cells. Transient expression of expected intra and extracellular targeting of *T.b.b* γGCS was confirmed by immunoflourescence. For expression in bacteria, *T.b.b* γGCS gene was cloned into pET28a vector with a His-MBP at the N-terminus and STREP tag at the C-terminus to transform competent *E. coli* Rosetta. Recombinant protein expression was induced from a single colony using Isopropyl-β-D- thiogalactoside (IPTG). The expressed MBPγGCS fusion protein was purified using Ni-NTA and Strep-Tactin purification systems. Sodium Dodecyl Sulfate-Polyacrylamide Gel Electrophoresis (SDS-PAGE) revealed the predicted molecular weight of the recombinant MBPγGCS as 141kDa. These findings are significant to the search for potential DNA vaccine targets against African trypanosomiasis.

Keywords: *African trypanosomiasis, gene expression, γ-glutamylcysteine synthetase, DNA, vaccine*

TRENDS IN POLISH INTERNATIONAL TRADE IN EGGS PRODUCTS IN THE PERIOD 2006-2015

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Abstract

The main aim of this article is to present the Polish eggs market after accession to the European Union (EU) in the context of foreign trade in eggs products. In the last decade, there has been an increase in the positive trade balance for eggs products and slow processes of concentration of eggs production in Poland. The increase in exports was possible by substantially reducing domestic consumption, which contributed to the improvement of Polish self-sufficiency in the production of eggs. In addition, in the first years after joining the EU, Polish eggs possessed a price advantage on the EU market, and in subsequent years the average prices of Polish eggs were close to average EU prices of eggs. In the analyzed period, Poland was a net exporter of the eggs products. This article is valuable not only to the eggs producers, processing industry of eggs, and customers, but also to the Polish economic policy.The study used a comparative analysis in time and an analysis of the structure of exports and imports of egg products, with particular emphasis on the commodity structure of exports and imports of eggs products. The article includes an analysis of the geographical structure of exports and imports of egg products. The study covers the period 2006-2015. The data comes mainly from the Polish Ministry of Finance and the Central Statistical Office.

Keywords: *Eggs market, foreign trade in eggs, Poland, hen-laying*

THE EFFECT OF APPLIED CROSSBREEDING ON INCREASING OF MILK PRODUCTION IN SHEEP

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Abstract

The aim of the research was to identify new methods to increase milk production in sheep. An evaluation of milk production at Țigaie local breed, in comparison with half-breed females from crossbreeding of local breed sheep with Awassi rams (Aw x Ti) and with Lacaune (La x Ti) was conducted. Estimation of milk production was done according to given by International Committee for Animal Recording (AT method) and statistical analysis was performed using the Restricted Maximum Likelihood method. Mean milk production in Aw x Tiewes was 29,28% higher than in local breed Țigaie, and 32.20% higher than in La x Ti ewes. Differences of milk yield found in three groups of animals were very significant ($p<0.001$). Based on obtained results it could be concluded that crossbreeding of Țigaie with Awassi breed rams had a better effect on increasing of milk production than crossbreeding with Lacaune breed rams.

Keywords: *Țigaie sheep, milk yield,crossbreeding*

THE RATE OF INFECTION OF DOMESTIC AND WILD CARNIVORES BY TAENIA HYDATIGENA CESTODES IN KABARDINO-BALKARIA

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Abstract

The results of monitoring of rates of infection by Taenia hydatigena in domestic and wild carnivores were given. Our work revealed the widespread prevalence of the infection both in domestic and wild canids (wolves, jackals, foxes). In 2011-2015 15 domestic, 43 stray and 33 pasture dogs were examend by the method of complete helminthological autopsy. All these dogs (irrespective of their keeping conditions or economic purpose) were infected by Taenia hydatigena and the extensity of infection (EI) was very high. The highest EI was registered in stray dogs (100%) and pasture dogs (94%); in domestic dogs EI was slightly lower (73.3%). The analysis of the rate of infection by Taenia hydatigena in 27 wolves, 38 jackals and 21 foxes was carried out by a similar method. EI in these animals was 29.6; 36.8 and 23.8%, respectively.It was found that dogs aged 1 to 4 years were most susceptible to infection by Taenia hydatigena; the high EI was maintained all year round and no marked seasonal changes were observed. Nevertheless, it was possible to note a slight increase of infection rate in the fall. It was connected with a period of mass slaughter of sheep and uncontrolled feeding dogs by animal organs infected by Taenia hydatigena larvae, which aggravated epizootological situation. The obtained results allow us to conclude that concerning this helminthosis the epizootological process is developing dynamically. High rates of infection in stray dogs and pasture dogs (in presence of their intermediate hosts – sheep or other farm animals) provide not only dynamics, but also biological activity and protection of parasitic system for a long time.

Keywords: *Taenia hydatigena, domestic and wild carnivores, infection, epizootology*

PATHOLOGY OF TESTES CELLS IN WHITE MICE AFTER IMPACT OF EPRINOMECTIN

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Abstract

Avermectines are new class of antibiotics with acaricidal and anthelmintic activity. New medicine containing macrocyclic lactones is Eprimec. One milliliter of Eprimeccontains10mg of Eprinomectin as active substance. The aim of our study was to determine the extent of karyopatic and cytotoxic effects of that preparation to cell division process in testes of white mice.The materials for the study were the non-linear white mice –males18 - 22 g. Experimental group of mice received a dose of 200 micrograms of active compound per 1 kg of weight or 10 mg / ml of Eprinomectin by single subcutaneous injection. The control group of animals remained intact.Each group consisted of 8 mice.The animals were slaughtered at 12 hours after drug administration. Testes of mice were isolated, smears – imprints were prepared that are fixed by May - Grunewald and stained with azure - eosin by Romanovsky. Glass slides with testes cells were viewed under a microscopeand implemented to count the number of dividing cells, take into account the shape, size and color of the nuclei.Analysis of the frequency of occurrence of karyopatic disorders and cytotoxic effects of cells were performed separately and lying sprawled cells with counting at least 1000 cells in each glass slide. Analyzing the data, we concluded that on the basis of Eprinomectin formulations significantly reduce the activity of cell division, but it is toxic and cause serious karyopatic changes in the cells of the testes nonlinear white mice, indicating that the negative effects on the reproductive system of males.

Keywords: *Antiparasiticmedications, Eprinomectin, karyopatic effects.*

EFFECT OF SOMATIC *ANISAKIS SIMPLEX* EXTRACTTO DEVELOPMENT CHICK EMBRYOS

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Abstract

Helminthes have embryotoxic and teratogenic effects to host's cells and tissues. Investigations were carried out mainly on embryo and fetus in mammals. Blaszkowska, J.(1998); Kadlubowski R.(2000) conducted studies of in chick embryos.Dose-dependent effect is also studied and found that small doses cause embryotoxic effect, while higher doses - teratogenic. *Anisakis simplex* antigens have also embryotoxiceffect has been found.The aim of our research was to examine the effect of *A. simplex* somatic antigen to the development of chick embryos in its experimental introduction in various ways and at different stages of embryogenesis. For the study chicken embryos were used at different stages of embryogenesis: 7.5, 10.5 and 12.5 days. Methods for introducing antigen chicken embryos: in the allantois cavity, on-chorion allantois membrane and yolk sac at 0.2 ml. The autopsy was performed on embryos 2 and 8 days.The eggs and embryos were weighed and evaluated the embryonic development. As a result of the first experience the greatest change observed by mass, and when administered in the development of antigen in both yolk sac on day 2 (1.68 ± 0.06, unlike control 2.25 ± 0.20), and at 8 days (9.97 ± 6.21 in the experiment versus 14.89 ± 0.78 in the control), respectively.In the second experimenteggs were usedat 1 and 5 day incubation embryos. The antigen was administered in both cases also in the yolk sac at a dose of 0.2 ml. In the second experiment there was a delay in the development of both cases at autopsy after 2 days in non-incubated eggs missing the development of, unlike the control, the development of which 48 hours corresponded; including 5 daily observed decrease in weight 0.88 ± 0.22, against 1.05 ± 0.05 and 8 daysin a similar way.As a result of experiments on the effect of the *Anisakis simplex* somatic antigen on the development of chick embryos embryotoxic action installed. Thus antigen has the greatest effect on development of early embryos and putting it into the yolk sac.

Keywords: *Anisakis simplex* antigen, chicken embryos, embryotoxic, teratogenic.

PROTECTIVE ACTIVITY OF RONCOLEUKIN® - IN COMBINED DRUG AGAINST SECONDARY ECHINOCOCCOSIS MULTILOCULARIS INFECTION

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Abstract

To assess the protective efficiency of immunization against secondary alveolar echinococcosis, with an antigen from Echinococcus multilocularis protoscolexes in combination with Roncoleukin® - recombinant interleukin-2 (rIL-2) immunostimulation, an assay was carried out on 48 white outbred mice. These were divided into four groups of twelve mice each.The antigen was isolated from the metabolism products of Echinococcus multilocularis protoscolexes, cultured in RPMI–1640 medium enriched with 6% fetal bovine serum in a CO_2 incubator. The mice were immunized via two subcutaneous injections, administered with a ten day. The formulations consisted of antigen protein (60 µg) and/or rIL-2 (180IU/per mouse) in 0.2 ml of sterile 0.9% NaCl per injection. The group 1 were treated with the Roncoleukin®; the group 2 - Roncoleukin® and antigen formulation. The group 3 received the antigen and the group 4 were the control, receiving 0.2 ml of sterile 0.9% NaCl. After a 20 day regimen, the groups were inoculated with a dose of 750 ± 50 units of Echinococcus multilocularis protoscolexesper mouse. After 90 days of incubation, the mice were euthanized and dissected for evaluation. The maximum protection was obtained in mice immunized with the combination of antigen and Roncoleukin® (83,3%). The protective effectin the group immunized by protoscolex antigen was 66,7%; in the group treated with Roncoleukin® was 58,3%.In conclusion, the use of immunostimulation in combination with specific antigens for the immunoprophylaxis against experimentalalveolar echinococcosis has a synergistic effect.

Keywords: *Echinococcus multilocularis, immunomodulatory, antigen protective effect*

INTRA AND INTER-POPULATION VARIABILITY OF HIND WINGS ANGLES IN HONEYBEE FROM SERBIA

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Abstract

The nervature of honey bee wings is constructed from chitine and its function is to support and strengthen the honeybee wings. The linear distances and angles that are formed by branching wing nervature are considered to be very accurate taxonomic parameters and are extensively researched through morphometric studies. The aim of this study was to determine the variability within and between honeybee colonies of morphometric parameters of the angles between the nerves on the hind right wing. Three angles were measured on prepared hind right wings (W1, W2 and W3). The study included 20 honeybee colonies from apiary of the Institute for forage crops (Serbia) and the measurements were done on 50 individual honeybees per colony. Each individual honeybee colony presents individual population due to its isolation and different genetic heritage in relation to other colonies. Using descriptive and ANOVA statistics it was determined that there was variability between colonies, meaning that there was clearly distinguished homogenous groups. Considering angles W1 and W3 two homogenous groups were distinguished, while the angle W2 showed the existence of three homogenous groups. The intrapopulation variability was relatively, where the angle W3 had the highest average coefficient of variance.

Key words: *Honeybee, variability, angles, morphometry*

RED CLOVER QUALITY AFFECTED BY CULTIVAR, CUT AND STAGE OF GROWTH

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Abstract

Forage quality is affected by many independent factors including maturity, crop species, harvest and storage, environment, soil fertility and variety. Generally, red clover varieties differ in quality according to ploidy level and earliness. This paper provides measurements of the chemical composition of the red clover (a diploid – K 39 and a tetraploid – K 32 cultivar) in different development stages from the first to the third crop production cycle during the second year of growth in the field of Institute for forage crops, city ofKruševac (Serbia). The experiment was designed as three factorial trials: a – cultivar, b – cut and c – stage of development by randomized block system in three replicates. The diploid cultivar of red clover, K 39, had higher content of CP (Crude Protein), NDF (Neutral Detergent Fiber) and ADF (Acid Detergent Fiber) than tetraploid cultivar, K 32, but lower DDM (Digestibility Dry Matter), DMI (Dry Matter Intake) and RFV (Relative Feed Value). The highest content of CP was observed in the third cut (195.5 g kg^{-1} DM), whereas the highest content of NDF and ADF was in the first cut (512.1 g kg^{-1} and 377.5 g kg^{-1} DM, respectively). The results of this investigation indicated that DDM, DMI and RFV declined with advancing maturity, whereas content of NDF and ADF increased. All factors of investigation showed a significant statistical influence on investigated quality parameters. The achieved results show that red clover quality was the best in the third production cycle.

Keywords: *Red clover, forage quality, Relative Feed Value*

CLASSIFICATION OF SCIENTIFIC INTEREST IN SERBIAN ANIMAL HUSBANDRY

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Abstract

In this study, the term "a national scientific paper" refers to an article published in a national journal belonging to category M50. In addition to the categorization for the purpose of quantification of scientific and research results, scientific papers are classified according to the Universal Decimal Classification (UDC) scheme and system. In the UDC, animal husbandry and breeding in general are placed under agriculture and related sciences and techniques. Given the above, the aim of this study was to quantitatively show scientific interests in the field of animal husbandry and breeding in general at the national level, based on the categorization of journals and classification of scientific papers. M51, M52 and M53 national journals and UDC codes assigned to published articles were used for the analysis. All national journals dedicated to scientific research that meet the requirements of bibliometric analysis were covered. Within these journals, all articles published in the past few years (from 2009. to 2014.) and containing UDC codes beginning with 636 were analyzed. Apart from the fact that UDC is an important scheme and a highly flexible classification system based on which national catalogues and national bibliographies are being organized, the results of this study can be used in creating new and more complex scientific questions arising from current and future problems. Overall, despite the fact that scientific interest in animal husbandry and breeding in general is focused on economically important animal species, the results of the present study may stimulate future research into neglected areas.

Keywords: *Categorization, comparison, livestock rearing, UDC.*

TOLERANCE OF HONEY BEES ON COMMON JUNIPER (*Juniperus communis*) AND SCOTS PINE (*Pinus silvestris*) ESSENTIAL OILS

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Abstract

The need to provide welfare of bees in alternative systems of the fight against pests without application of chemicals influenced our investigation of application of different substances of natural origin on the honey bees. In order to perceive the common juniper (*Juniperus communis*) and scots pine (*Pinus silvestris*) essential oils of honey bee tolerance and contact residual toxicity was examined in the laboratory conditions. The chemical composition of the oils was determined by standard GC and GC/MC methods. Different doses of the essential oils dissolved in acetone (10 – 40 µl/Petri dish) were applied in Petri dishes and left to dry for 20 minute at a room temperature. Following this period of time, ten honey bees were added in each Petri dish in four replications and maintained in controlled conditions. Survival of examined honey bees was recorded two times, after 24 h and 48 h. The most prominent toxic effect on the examined honey bees was observed with application of 24 µl/Petri dish of common juniper oil and with dose of 15 µl/Petri dish of scots pine oil. Recorded biological activities of the oils tested in different doses, revealed the opportunity to proceed with further investigation by selecting the most appropriate variants for further investigation on both, honey bee and honey bee mite *Varroa destructor*.

Keywords: *Apis mellifera, essential oils, residual contact toxicity.*

THE EFFECT OF THE USE OF CRUDE SOYBEAN IN THE FINAL MIXTURES FOR BROILER CHICKEN ON CHEMICAL AND AMINO ACID COMPOSITION OF MEAT

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Abstract

The aim of this study was to determine the effects of using different varieties and levels of participation of raw soybeans in the final mixtures for broiler chickens on chemical and amino acid composition of dark and white meat. The research was conducted at the experimental farm of the Institute for Animal Husbandry in Zemun using Hubbard F15 heavy line hybrid broilers.A total of 2000 one-day broilers were distributed in 40 equal boxes reared on deep litter (50 chickens per box, 4 boxes replicates per treatment diet). Chickens in all groups had uniform requirements in terms of population density, food area, temperature and light. Until the age of 35 days all birds in the experiment were fed the same diets. The study was carried out on chickens at the age of 35-42 days, according to the principle of two-factorial trial 2 x 5 (2 varieties of domestic varieties x 5 levels of participation of raw grains in the mixture) with a total of 10 treatments. At the end of the experiment, 6 broilers per each tested treatment and gender were randomly selected, a total of 120 chickens, from which the sample of breasts and thigh muscle tissue was taken after the slaughter in order to determine the quality of the meat. It was established that increased concentration of trypsin inhibitor in the final mixtures for chicken had no negative impact on the quality of meat (basic chemical and amino acid composition of dark and white meat).

Keywords: *Nutrition, soybean, trypsin inhibitors, broiler chicken, chemical and amino acid composition of meat*

CARCASS AND MEAT QUALITY IN RELATION TO THE POLYMORPHISM IN PORCINE *MYF4* GENE

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Abstract

The aim of this study was to analyse the associations between polymorphism in porcine myogenin gene (*MYF4*) and economically important traits in relation to the carcass and meat quality of pigs. The genomic DNA samples were taken from in total 180 crossbreeds (Large White x Landrace). The detection of polymorphism in *MYF4* gene were performed in order to evaluate its effect on back fat thickness, proportion of valuable meat parts, MLT area and proportion of thigh. The genotyping of analysed individuals was carried out by means PCR-RFLP method and restriction endonuclease *Msp*I. The allele frequencies were as follows: A 0.75 and B 0.25. A prevalence of AA genotype (59%) compared to AB (33%) and BB genotypes (8%) were detected in analysed crossbreed population. The observed average value of heterozygosity (0.33) and positive value of the Wright's F_{IS} index (0.12) similarly reflected the higher proportion of homozygous genotype in populations. The effect of *MYF4* gene polymorphism on selected phenotypic traits has been tested using one-way ANOVA procedure. The statistical analysis showed only non-significant results. Due to the polygenic character of selected phenotypic traits the involvement of other candidate genes and increase of sample size could clarify the role of *MYF4* gene in porcine carcass and meat quality regulation. The study, which is based on molecular variability of livestock genetic resources, is necessary for the genetic improvement and understanding of relations between markers and trait of interest.

Keywords: *Genetic variability, myogenin gene, meat quality, SNP, pig.*

PHOTOMETRIC EVALUATION OF EFFECT OF CLAW DISORDERS ON CLAW CONFORMATION

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Abstract

The aim of the study was to evaluate the influence of claw disorders on claw conformation by computerimage analysis. The occurrence of claw disorders, as interdigital dermatitis and heel erosion, digital dermatitis and separately sole ulcer were observed. The measurements of lateral right claw (n=127) after functional trimming were evaluated. Computer image analysis in NIS Elements and the statistical analysis in SAS were performed.Following average values of claw conformation were found: claw angle 54.22 °, claw length 8.11 cm, heel index 4.15 cm, claw height 6.97 cm, diagonal 13.17 cm, claw width 5.26 cm, total area 42.86 cm^2 and functional area 27.87 cm^2. Analysed group of cows consisted of 9 cows affected by interdigital dermatitis and heel erosion, 11 by digital dermatitis and 12 by sole ulcer. Healthy cows had statistical significantly ($P<0.05$) larger total area and functional area than cows affected by digital dermatitis, but high statistical significantly ($P<0.01$) smaller total area than cows affected by sole ulcer. The highest positive correlations were found in claw length to claw height and of total area to functional area. Study has proved that the photometry of the claw can be successfully implemented into dairy management, with results significantly reflecting impact of disorders on claw formation.

Keywords: *Photometry, claw disorder, claw conformation.*

THE DEGREE OF GENETIC ADMIXTURE WITHIN SPECIES FROM GENUS *CERVUS*

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Abstract

The aim of present study is to estimate the level of admixture within species originating from genus *Cervus* (family *Cervidae*) that can reflect not only their phylogeny origin, but mainly the impact of introgression and hybridization in Red deer population inhabit the forest area of Slovakia. It was happened over the last few centuries. Recently, the introduction and hybridization by non-native species is considered as the major risk of diversity loss within autochthonous Red deer populations in area of Central Europe. The genomic data were obtained from in total 61 animals (species *A. axis*, *D. dama*, *C. elaphus*, *C. Nippon*, *C. canadensis*) based on applying the cross-species SNP genotyping (Illumina BovineSNP50 BeadChip). The quality control of genotyping data has been performed to eliminate any SNPs with genotyping errors (loci with >10% missing genotypes), less informative markers (MAF<0.01) and markers deviating from Hardy-Weinberg equilibrium limit of 0.0001. From totally 43.21% of successfully genotyped markers up to 843 were informative for subsequent estimation. As expected the presence of admixed individuals was found within Red deer and Wapiti populations, but the signal of cross-species admixture was low. The membership probabilities of individuals were higher than 90% within each of analysed cervid group. Our study showed that the Slovak Red deer population can provide valuable gene pool within Central European deer populations in respect to the management of genetic resources conservation strategies.

Keywords: *Deer, diversity, cross-species genotyping, hybridization.*

SPATIAL STRUCTURE OF THE LIPIZZAN HORSE GENE POOL BASED ON MICROSATELLITE VARIATIONS ANALYSIS

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Abstract

The aim of this study was to determine the current state of genetic diversity and to assess the substructure and spatial structure at individual level based on analysis of microsatellite variations within Lipizzan horse population. The genomic DNA samples were obtained from totally 418 horses, originating from Slovenian (357) and Slovak (61) studs. A set of 13 microsatellite markers (*AHT4*, *AHT5*, *ASB2*, *HMS1*, *HMS2*, *HMS3*, *HMS6*, *HMS7*, *HTG10*, *HTG4*, *HTG6*, *HTG7*, and *VHL20*) have been used for analysis of genetic variability. Across all microsatellite loci the average number of alleles 6.65 and effective allele number at level 3.37 were found. The obtained Shannon's information index (I=1.37) indicated high degree within population genetic diversity. The prevalence of heterozygous genotype in sample confirmed also the average value of observed heterozygosity (H_o=0.67) and F_{IS} index (-0.026). The most of the genetic variation in sample was conserved within individuals (95%) and the subdivision of horse populations explained only 4%. Similarly, the obtained pairwise values of F_{ST} index (0.02) and Nei's genetic identity (0.90) reflected mainly common ancestors used in breeding history of both population. But the principal coordinate analysis showed the division of individuals into the two separate clusters according to the studs where they come from. The membership probability resulted from spatial structure analysis suggested that the frequencies of alleles varied across the two regions that indicated the evidence of strong distinction in relation to the current breeding status of analysed populations and strategy of studs.

Keywords: *Diversity, genetic markers, Lipizzan, population substructure.*

GENOMIC DETERMINATION OF THE MOST IMPORTANT FATHER LINES OF SLOVAK PINZGAU COWS

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Abstract

The aim of this study was to assess genetic structure of Slovak Pinzgau population based on polymorphism at molecular markers using statistical methods. Female offspring of 12 mostfrequently used bulls in Slovak Pinzgau breeding programme were investigated. Pinzgau cattle were found to have a high level of diversity, supported by the number of alleles observed across loci (average 5.31, range 2-11) and by the high within-breed expected heterozygosity (average 0.66, range 0.64-0.73). The state of genetic diversity is satisfying and standard for local populations. Detection of 12 possible subpopulation structures provided us with detailed information of the genetic structure. The Bayesian approach was applied, detecting three, as the most probable number of clusters. The similarity of each subpopulation using microsatellites was confirmed also by high-throughput molecular data. The observed inbreeding (F_{ROH}=2.3%) was higher than that expected based on pedigree data (F_{PED}=0.4%) due to the limited number of available generations in pedigree data.One of the most important steps in development of efficient autochthonous breed protection programs is characterization of genetic variability and assessment of the population structure.The chosen set of microsatellites confirmed the suitability in determination of the subpopulations of Pinzgau cattle in Slovakia. The state of genetic diversity at more detailed level was successfully performed using bovineSNP50 BeadChip.

Keywords: *Genetic differentiation, microsatellites, Pinzgau cattle, SNP chip, structure.*

EFFECTS OF TANNIN-RICH EXTRACT (FARMATAN) ON GROWTH PERFORMANCE, CARCASSES AND MEAT QUALITY TRAITS OF FATTENING BOARS

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Abstract

In the past, tannins are often described to have negative effects on animals, such as feed intake depression and growth reduction, as they reduce digestibility of proteins and lower the activity of digestive enzymes. On the other hand, health enhancing properties, such as antibacterial, anti-parasitic, antioxidant, antidiarrheal and anticancerogenic were also confirmed. The effect of tannin supplementation on growth performance, carcasses and meat quality traits of fattening boars was studied. A total of 51 entire males which were divided in four groups: control group (BEK-2, 12.9 MJ ME/kg, 15 % proteins with no tannin supplement, T0, n=12), and tree groups feed with same diet supplemented with 1 % tannin Farmatan® (Tanin Sevnica d.d., Sevnica, Slovenia) supplementation (T1, n=13), 2 % tannin Farmatan® supplementation (T2, n=13) and 3 % tannin Farmatan® supplementation (T3, n=13) were studied. Boars were housed in group pens and the study was carried out respecting the Slovenian law on animal protection. Experiment started when boars reached approx. 60 kg of live weight, entered the fattening stage and received experimental diets. Increased body weight ($P < 0.002$) and daily gain ($P < 0.000$), was followed with addition of tannin supplementation. Addition of tannin supplementation increased carcass weight ($P < 0.005$) and for meat parameters, thawing ($P < 0.000$) and cooking ($P < 0.001$) loss was statistically decreased between T0 and T1, T2 and T3, whereas difference between T1 and T2 group was not noticed. Present results suggest that 3% tannin supplementation in boars diet had significant influence on body weight and daily gain, carcass and meat quality traits.

Keywords: *Hydrolysable tannins; growth performance traits; carcass and meat traits; entire males*

TANNIN CONTENT AND CHEMICAL COMPOSITION OF UNCONVENTIONAL AND CONVENTIONAL FEED FOR RUMINANTS.

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Abstract

An interesting challenge for animal nutrition scientists is introduce alternative feedstuffs that would help them overcome the issues of environmental harshness and the forages high production costs in tropical, subtropical and arid areas. The objective of this study was to contribute to the characterization of nutritional potential of unconventional and conventional feed with special attention to the profiles of phenolic compounds and condensed tannin, which could cause effects on meat and milk composition, when consumed in large quantities by animals. The species were: *Opuntia ficus-indica, Agave Americano, Arundo donax*, used for farmers to feed animals from wild populations and *Triticum spp, Avena spp, Hordeum spp* and *Pisum spp*, species natives cultivated as forages for animals, from seeds of species conserved by farmers in the Canary Islands (Spain). Nutrient content and the profiles in secondary compounds would differ between species and that their quantity and qualitative interactions would influence nutritive value. Crude protein (CP) was: 4.2% (*Opuntia ficus-indica*), 6.7% (*Agave Americano*), 10.7% (*Arundo donax*), 11.2% (*Hordeum spp*), 12.6 % (*Triticum spp*), 13.9% (*Avena spp)* and 18.4%, *Pisum spp*). Condensed tannins ranged from 0.0% (Opuntia ficus-indica) to 2% (*Pisum spp*), and total phenols from 0.6% (*Hordeum spp)* to 9.2% (*Pisum spp*). Organic matter digestibility (OMD) ranged from 46% (*Triticum spp*) to 88.6% (*Agave Americano*). Based on IVOMD, digestible energy of the different species was estimated to range from 6.5 to 11.8 MJ DE/kg DM. Current results support the thesis that, some alternative local feedstuffs have potential to be used in ruminant feeding strategies.

Keywords: *Opuntia, Agave, Pisum, Hordeum, Arundo.*

CHEMICAL COMPOSITION AND TANNIN CONTENT OF AGRO-INDUSTRIAL BY-PRODUCTS AS SUITABLE FOR RUMINANT FEED.

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Abstract

In recent years, the use of agro-industrial by-products in animal nutrition has been successfully adopted as a strategy for reducing feeding costs and also coping with a need for recycling of waste material that is costly to be disposed of. Agro-industrial by-products are cheap and widely available in Mediterranean countries, and suitable for sheep and goat nutrition. Many of these alternative feed resources contain secondary compounds, such as tannins. For instance, tannin-containing feeds could cause effects on meat and milk quality, when consumed in large quantities by animals (Vasta et al., 2008).The objective of this study was to contribute to the characterization of nutritional potential of some agro-industrial by-products informally used in Mediterranean countries for ruminant feeding. The species selected were: *Vitis vinífera* (vine plant), *Ipomea batata(*sweet potato*), Musa acuminata* (banana by-products), *Cucúrbita pepo* (pumpkin), *Solanum lycopersicum* (tomato plant)and *Olea europaea* (*olive* plant). Crude protein (CP) ranged from 10% on banana by-products to 21% on *Cucúrbita pepo* leaves, whereas neutral detergent fiber (NDF) ranged between 26.5% on *Cucúrbita pepo* and 58% on banana leaves. Condensed tannins ranged from 0.10% onbanana by-products to 1.2% on olive plant, and total phenols ranged from 0.50% onbanana by-products and 7.3% on olive plants. The organic matter digestibility (OMD) ranged from 43% banana by-products to 85% on *Cucúrbita pepo*. Current results show that some agro-industrial by-products have potential to be used in the ruminant feeding system, supplementing the existing diets.

Keywords:*Vitis, Ipomea, Musa, Cucúrbita, Solanum.*

INFLUENCE OF BITUMINARIA BITUMINOSA FEED FORM (FRESH AND DRIED) ON PREFERENCE AND VOLUNTARY INTAKE IN POULTRY

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Abstract

Preference and feed intake on poultry is normally affected by physical feed form and require attention when producing poultry diets. Tedera or psoralea (Bituminaria bituminosa C.H Stirt) is a drought tolerant legume that grows in African and Mediterranean areas traditionally used as forage for ruminant with high protein and nutritive value. This study was conducted to evaluate the effects of tedera feed form on voluntary intake and preference in male growing chicks. The two dietary forms of tedera offered were fresh and dried, with the same particle size during 15 consecutive days. The preference and voluntary intake were investigated with a total of 10 chicks divided on five replicates (n=2) and compared with the control group (only commercial diet). Two chicks from each group (control and experimental) were randomly chosen for blood sampling at the end of the study. Control group average daily feed intake (ADFI) shown significant differences compared to tedera group. However, average daily gain (ADG) did not. Hematocrit and total plasma protein values from each group were similar. However, this research demonstrated that the intake was affected by the tedera feed form (dry or fresh): the poultry preference for fresh tedera was significantly higher than for dry tedera ($p<0.01$).

Keywords: *Bituminaria bituminosa, feed-form, poultry diets, preference, intake.*

UNSATURATED TO SATURATED FATTY ACIDS RATIO ADJUSTMENTIN DIETS ON DIGESTIBILITY AND PERFORMANCE OF GROWING PIGS

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Abstract

Fat and oils are the most concentrated energy source for pigs. Various fat sources differ considerably in their physical-chemical characteristics and fatty acid profile. Therefore, the current study aimed to evaluate the effect of diets containing 3% fat with different ratios of unsaturated to saturated fatty acids (U:S) on the nutrient digestibility, energy utilization and growth performance of growing pigs. In experiment 1, a total of 6 crossbred, castrated male pigs (Duroc × Large White × Landrace) were used to determine the nutrient digestibility and energy utilization according to a repeated 3 × 3 Latin square design. Each of the two pigs was fed with one of the three diets containing 3% fat with a U:S ratio of 3, 4 or 5, respectively. No differences ($P>0.05$) in the nutrient digestibility were observed among groups, but the highest digestible and metabolizable energy ($P<0.05$) appeared in pigs receiving the dietary U:S ratio of 4. In experiment 2, a total of 30 pigs (with an equal number of entire males and females) were allotted into 3 groups in a randomized complete block design. Pigs were fed a diet without fat (T1), or the diets containing 3% fat with U:S ratio of 4 (T2) or 5 (T3), respectively. Although there were no significant difference in any growth criteria, average daily gain and feed conversion ratio was slightly improved ($P>0.05$) in the T2 group. In conclusion, the present results suggest that diets containing 3% fat with a U:S ratio of 4 is optimal for improving energy utilization in growing pigs and results in a slight enhancement of performance.

Keywords: *Digestibility, Energy utilization, Fatty acids profile, Growing pigs, Growth performance.*

THE USE OF CRUDE PALM OIL IN FINISHING PIGS' DIET: EFFECTS ON GROWTH PERFORMANCE AND NUTRIENT DIGESTIBILITY

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Abstract

The goalof this study was to evaluate the effect of including crude palm oil (CPO)in the diet of finishing pigs in terms ofgrowth performance and nutrient digestibility. In the first experiment, 40 barrows and 40 gilts (Duroc×LargeWhite×Landrace)were dividedintofivegroups using a randomized complete block design. CPO, soybean oil (SBO) and poultry fat (PF) were mixed and divided into CPOmix11 (CPO 50% + PF 50%), CPOmix13 (CPO 50% + SBO 50%), CPOmix21 (CPO 75% + PF 25%) and CPOmix23 (CPO 83% + PF 17%). Each group of pigs was randomly fed two diets at50-80and 80-100 kgBW. Group 1comprised the pigs fed diet10 (without oil inclusion) and diet20 (without oil inclusion). Group 2comprised the pigs fed diet11 (1%CPOmix11) and diet21 (1% CPOmix21). Group 3comprised the pigs fed diet13 (3% CPOmix13) and diet23 (3% CPOmix23). Group 4comprised the pigs fed diet10 and diet 21. Group 5comprised the pigs fed diet10 and diet23. The results showed that the pigs fed diet23 (Group 5) at80-100 kgBWtended to have the greatest performance and lowest feed cost. In the second experiment, nutrient digestibility was examined in six barrows (initial 50 kgBW) using a 3×3 double Latin square design. Each set of two pigs was randomly fed diet10, diet11 or diet13. The highest ($P<0.01$) digestibility of dry matter, protein, crude fiber and ash and the greatest ($P<0.01$) digestible energy and metabolizable energy were found in diet13. The inclusion of 3% CPOmix23 in the diet at80-100 kgBW might improve finishing pig performance, and the 3% of CPOmix13 in the diet improved nutrient digestibility.

Keywords: *Crude palm oil, finishing pigs, growth performance, nutrient digestibility*

DETERMINATION OF SOME EGGS TRAITS OF WHITE AND BRONZE TURKEYS IN A FREE-RANGE SYSTEM

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Abstract

The study was conducted to determine some egg traits of white and bronze turkeys (*Meleagrisgallopavo*) reared in a free-range system. A total of 144 female turkeys (72 white and 72 bronze) were used for this study. The turkeys between 32 and 55 weeks of age were used. For measuring egg production and mortality of turkeys, egg weight, shape index, shell weight and shell thickness. In both genotypes, egg production was decreased by age. Moreover, the white turkeys were more vulnerable to free-range conditions in terms of legs problems and consequent liability. The white turkeys laid heavier eggs than the bronze ones (88.7 g vs 80.27, $P<0.05$). All determined egg parameters were different in the white turkeys compared to those in the bronze turkeys. Furthermore, as animals were getting older, egg weight of both white and bronze turkeys were increased. However, their shell weight and thickness were decreased by age. To conclude, the bronze turkeys showed better performance and egg quality traits compared to the white turkeys.

Keywords: *Egg, free-range, genotype, Turkey.*

EFFECTS OF PARTIAL REPLACEMENT OF FISH MEAL BY DDGS ON BLOOD HEMATOLOGICAL AND BIOCHEMICAL PARAMETERS OF RAINBOW TROUT

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Abstract

The present study investigated the effects of distillers dried grains with solubles (DDGS) meal as a partial replacement to fish meal on hematological and serum biochemical parameters of rainbowtrout (*Oncorhynchus mykiss*)fry. Four isoproteic (45.47% CP) and isocaloric (3570 kcal DE/kg) diets were formulated: DDGS0 as a control group and DDGS10, DDGS20 and DDDGS30 which included 0%, 10%, 20% and 30% DDGS meal, respectively. Fish were stocked in each of 12 fiberglass tanks with a water volume of 200 litres and a flow rate of 10 litres/min.The fish were fed to apparent satiation three times daily for 84 days. Blood sample of two fishfromeach tank (6 fish per treatment; mean fish weight 103.9 g)was drawn gently fromthe caudalvein by 5-mL sterile syringe.The first part of the collected blood was transferredto a tube coated with EDTA as anticoagulant andwas used for hematological indices. The second part was transferred to an tube without EDTA for serum biochemical indices. At the end of experiment, DDGS had no significant ($P>0.05$)effect on hematological parameters such as RBC,WBC,hemoglobin, hematocrit, MCV, MCHand MCHC. Significant decreases ($P<0.05$) in the biochemical parameters such as glucose were found with increasing in DDGS, whereas alkaline phosphatase, alanine aminotransferase, total protein, albumin, globulin, triglyceride, cholesterol, blood urea nitrogen, and creatinine concentrations were not significantly different between groups ($P>0.05$). Partial replacement of fish meal with DDGS could not affect haematological and biochemical parameters (except glucose) in rainbow trout.

Keywords: *Fish meal, DDGS, Rainbow trout,Haematological, Biochemical*

EFFECTS OF NATURAL PIGMENT SOURCES AND STORAGE DURATIONS ON EGG QUALITY

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Abstract

Egg and egg quality is one of the most important issues for egg industry and consumers worldwide. This review contains the information of the internal and external quality of eggs, effects of storage conditions and natural pigment sources on hen's egg. Internal quality of egg has been measured for many years as albumen height (Haugh Unit) and weight, yolk index and air cell. The external quality of egg has been measured as egg weight, egg shape, shell thickness, breaking strength and specific gravity. And Haugh Unit was evaluated to reveal albumen quality. Environmental factors such as storage time and temperature affected egg quality. During storage of egg, vitelline membrane quality will decrease. Therefore, egg yolk elasticity will be destroyed and finally broken up. Strain and age of laying hens are also important parameters that affect egg quality.Egg yolk is the most important criterion taken into account by consumers and it has been preferred close to amber to red-yellow in many countries. According to consumer preferences to obtain the yellow egg yolk, synthetic or natural pigment sources are used in diets. Yellow color is obtained from yellow-lutein and zeaxanthin-gold (marigold, alfalfa etc.). Red color is provided by substances such as capsanthin and capsorubin (red pepper etc.). This review focuses on the hen's egg and effects of natural pigment sources and storage conditions on egg quality.

Keywords: *Egg quality, storage, egg yolk color, red pepper*

IMPORTANCE OF HUMAN RESOURCES ACTIVITIES IN THE FISH MEAL AND FISH OIL FACTORIES IN THE LIGHT OF TECHNOLOGICAL DEVELOPMENTS

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Abstract

Nowadays, the technological progress is affecting many industries. One of them is the aquaculture industry. In this study, it is aimed to exert the significance of the human resources in the production of the fish meal and fish oil factories which is an important component of the aquaculture industry in order to be adequate both by quality and by quantity for the social necessities and based on the science and modern technologies.The population of the survey is composed of the owners of fish meal and fish oil factories operating in Turkey, professional managers and other employees in these factories. In this research, with questionnaire method, data gathering is provided. Descriptive statistical methods have been used for the purpose of determining the relationships among the variables. Regarding sex, 16% of the employees involved in research are female; employers/managers are all male. In companies, considering the question whether there is a separate department carrying out human resources activities it is found that 44% of companies have human resources department and 23% of companies perform this function through administrative department.Male employers/managers consider themselves as persons using technology in about 73%. To hire new staff in business, a priority criterion is recruitment of staff to implement technological improvements. It is assumed that the technological progress and the human resources can be used more effectively with the help of implementing theory based on information acquired from research findings. Like any other industry, the most important resource for the fisheries and aquaculture industry to stay sustainable and be in competition with the other industries, is the qualified human resources. Thus, it is suggested that the education and training of the human resources should be an event of special interest.

Keywords: *Fish meal and fish oil factories, technology, human resources management.*

EFFECT OF ENSILING MILK THISTLE (*SILYBUM MARIANUM* L. GAERTH) WITH MOLASSES OR UREA ON SILAGE QUALITY AND *IN VITRO* DIGESTIBILITY

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Abstract

The aim of this study was to effects of the addition of 5% molasses or 0.5% urea into milk thistle on silage nutrient content, pH, lactic acid (LA),acetic acid (AA) and butyric acid (BA) concentrations and *in vitro* digestibility with Ankom Daisy II method. The addition of urea to milk thistle silage significantly (P<0.05) increased crude protein (CP) and ether extract (EE) content, but decreased the organic matter (OM) content compared with control. While the addition of urea to milk thistle increased acetic acid concentration of silages, molasses addition to milk thistle decreased the butyric acid concentration compared to control (P<0.05). The lactic acid concentrations in milk thistle silages were not affected by treatments.The quality classes of milk thistle silage with or without additives were considered as "fair-quality". *In vitro* digestibilities of CP in milk thistle silages were increased by addition of additives, but NDF digestibilty was decreased compared the control. The addition of molasses increased OM digestibility and energy value of silages compared with control (P<0.05).In conclusion, urea addition to milk thistle at 0.5% level improved the CP and EE content and *in vitro* OM digestibility of the silages. The addition of 5% molassesto milk thistle silages improved the *in vitro* digestibility of OM and CP content and energy values of the silages.

Keywords: *Milk thistle, silage quality, in vitro digestibility, molasses, urea.*

HONEY BEE BIOLOGY IN TURKEY

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Abstract

Honey bee (Apis mellifera L.) provides honey and honey products which contribute to a healthy diet to human. Honey bees are common live social insects which are called as colony. They provide 85% of pollination among whole pollination of the World. From this side honey bees are crucial for maintaining of nature life. Anatolia which is Asian part of Turkey is one of the most important bee husbandry centre which is origin of several bee breeds. Those breeds are Anatolian Bee (Apis mellifera anatolica Maa, 1953)which is the most common breed, Caucasian Bee (Apis mellifera caucasia Gorbachew, 1916),Armenian Bee (Apis mellifera armenica Skorikov, 1929), Persian Bee(Apis mellifera meda Skorikov, 1929), and Macedonian Bee (Apis mellifera macedonia Ruttner, 1988). In this review morphology, biology, colony structure and social life of honey bees which live in Turkey were summarized.

Keywords: *Apis mellifera anatoliaca*, native breed, genetic resource, genetics, morphology.

NATIVE DOG BREEDS OF TURKEY

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Abstract

This paper describes eleven such, five of which are molossers, one is a sighthound, two are scenthounds, one is watch dog and two are small Spitz types. Two of the molossers (Kangal and Akbash) have local breed societies or associations and are well known and have breed societies internationally but are not recognized by the Fédération Cynoloqique Internationale (FCI). One molosser (Kars) is registered by the Turkish Standards Institute and another (Koyun) has been recently identified. Karaman is another molosser type dog and has been identified yet. The sighthound (Tazi) is similar to other Near and Middle East greyhounds. The scenthound (Tarsus Catalburun also known in English as Fork-nose and Turkish Pointer) is little known outside Turkey but is celebrated in its home area for its skills and is finding employment as a sniffer dog for narcotics, explosives and live and dead people. The other scenthound of Turkish Chaser Dog of Zagar is the last registered dog breed by the Turkish Standards Institute. The Spitz-type (Dikkulak and Fino of Tonya) is employed mainly as a household guard dog as are two other breeds of indeterminate type. Zerdava dog is a watch dog and locally bred in northeast of Turkey.

Keywords: *Working dogs, morphometry, breed societies, animal legislation, welfare*

BEHAVIORAL PATTERNS OF GOATS

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Abstract

Goat is one of the species widespread raised among the domestic animals. Goats are raised in many different environments almost everywhere in the world. It is important to have knowledge relating to goat and other livestock behavior to ensure better health care, nutrition and environment conditions. Knowledge and interpretation of animal behaviour will also enable a rise in yield levels. The rise will provide income to farmers and protein to consumers. The position of the animal in the social hierarchy also affects productivity. In this sense, an animal can be assumed to be unproductive due to being lower in the social hierarchy. Knowledge of animal behavior is important for safety and for decreasing the stress on both the producer and the animal. In this way, animal from being excluded from breeding stock, it may be incorporation again. In this review, the aim was to reveal the various types of goat behavior in order to perform the raising of goat farming easily and improve yield.

Keywords: *Goat, Behavior patterns*

IMPORTANCE OF THE GOAT BREEDING IN SOUTHEASTERN ANATOLIA REGION (TURKEY)

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Abstract

Due to many reasons, the number of goats has decreased in nearly 20 years in Turkey. However, economic and geographical conditions are very suitable for effective goat breeding in Turkey. The 17.3% of Turkey's goat population is raised in the Southeastern Anatolia Region (SAR). The bred of goat in the Southeastern Anatolia Region is hair goat and a small number of mohair goat. Goat breeding business are usually located on mountainous and rugged terrain. The coat color of hair goats is mostly black. Goat breeding is usually conducted in tandem with sheep raising, while there are some albeit few farmers which only breed goats. The milking is performed almost entirely by hand. Kilis goat, originated in Southeastern Anatolian, are the major dairy breeds which have an important role in the regional economy. The purpose of this study was to determine the present situation of goat breeding in the Southeastern Anatolian Region of Turkey. It is thought that the results of this research will form important database for future research about development of goat breeding in the Southeastern Anatolia.

Keywords: *Turkey, Southeastern Anatolia, Goat, Production trait*

DETECTION OF β-LACTOGLOBULIN GENE POLYMORPHISM OF RAISED HAIR GOATS IN ANTALYA PROVINCE BY USING PCR-RFLP METHOD

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Abstract

Goats one of the most important domestic livestock species and can adapt to extreme climatic and mountain conditions. Goat breeding is the livelihood especially for small farmers living in harsh condition in Turkey like developing countries.DNA technologies have been used extensively in livestock production like in many fields. DNA technologies are used improving of the quality and quantity of economically important traits (reproduction, meat, milk yields etc.) with selection. Genetic polymorphisms are playing an increasingly important role as genetic markers in many fields of animal breeding. β-lactoglobulin (β-LG) is one important protein related to milk quality in different ruminant species. Digestion with *Sac*II restriction enzyme of exon 7 the β-LG gene reveals three different genotypes (AA-S_2S_2, AB-S_1S_2 and BB-S_1S_1) associated with milk quality and yield in goat breeds. Polymorphism in β -LG gene can be use for milk yield and quality in Marker Assisted Selection.In this study, β -LG gene polymorphism was investigated by using PCR-RFLP methods. In total70 samples were used from four populations reared in different regions of Antalyaprovince from Turkey. The amplified products were observed as 426 bp size at exon 7 in β-LG gene. These PCR products were digested with *Sac*II restriction enzyme.As a result of PCR-RFLP analysis, frequencies of A and B alleles in β-LG gene were 0.545 and 0.455 respectively, while genotypic frequencies for AA, AB and BB were 0.285, 0.529 and 0.186 respectively.

Keywords: β-lactoglobulin, PCR-RFLP, Polymorphism, Hair Goat, Turkey

EFFECT OF NON-GENETIC FACTORS ON 305-DAYS MILK YIELD IN SIMMENTAL COWS REARED IN SUBTROPICAL CLIMATE CONDITION

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Abstract

This study was carried out to determine 305-days milk yield of Simental cows grown in a private farm in Çorum private center (Black Sea Region of Turkey) which is classified as subtropical climate region according to Trewarta climate classification and as CSB according to Köppen-Gieger system, and to investigate effects of non–genetics factors on these parameters. For this purpose, a total of 1904 lactations records of 706 Simmental cow raised at Çorum province particular farm between 2001 and 2014 were used. Eight age groups were formed beginning from 2 years and ending 9 years and older for calving age, 4 groups for calving season, 14 groups (between 2001 and 2014) for calving year, 2 groups for birth type, and 2 groups for parity. The 305-days milk yield was estimated from milk yields. To determine non-genetic effects of calving years, lactation number, calving season, calving age, birth type, and parity on 305-days milk yield, general linear model was applied by using SAS program. Duncan's multiple range tests was used for multiple comparisons in important subgroups. In this research, 305-days milk yield were detected as 6060.30 kg. The effect of calving year, lactation number, calving age, birth type and parity on 305-days milk yield were statistically determined with different levels of significance ($P<0.001$, $P<0.05$, $P<0.05$, $P<0.05$, $P<0.001$, respectively); but the effect of calving season on 305-days milk yield was statistically determined non-significant ($P>0.05$). Consequently, when Simmental cows are applied ideal growing conditions and care-feeding, milk yield parameters at world standards can generally be obtained in subtropical climates.

Keywords: *Simmental cow, 305days milk yields, non-genetic factors.*

INTESTINAL PARASITES OF *SALMO OHRIDANUS*(STEINDACHNER, 1892) FROM OHRID LAKE

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Abstract

With the aim to investigate the presence of parasites in the gastrointestinal tract of Ohrid belvica (*Salmo ohridanus,* Steindachner, 1892), investigations were conducted on individuals captured in vegetative and reproductive development period of Ohrid belvica, on three localities of Ohrid Lake (located between southwestern Macedonia and eastern Albania): Kalista, Kaneo and Elesec, on depth from 45 to 70 m. Tests were performed on a total of 60 samples with average body mass from 90 to 100 g and average total body length from 217 to 225 mm. It has been established the presence of the following parasites in the gut content of fish: *Cyathocephalus truncatus* (Class Cestoda), *Pseudocapillaria salvelini* and *Salmonema ephemeridarum* (Class Nematoda). *Cyathocephalus truncatus* was present on the locality Kalista, in both stages of the development of Ohrid belvica, and on the locality Elesec only in the reproductive stage. *Pseudocapillaria salvelini* was registered in the samples from locality Kalista and Kaneo in both stages of the development of Ohrid belvica. *Salmonema ephemeridarum*was found in the vegetative stage of Ohrid belvica only in locality Elesec.The presence of parasites was higher during the reproductive phase of development of the Ohrid belvica, i.e during the winter, unlike during the vegetative phase, actually autumn. The highest proportion (100% of the tested fish) of tapeworm *Cyathocephalus truncatus*was found during the reproductive phase of the individuals from the locality Kalista.

Keywords: *Lake Ohrid,Salmo ohridanus, intestinal parasites*

THE EFFECT OF REPLACING CORN AND SOYA BEANS BY WHITE SORGHUM AND HORSE BEANS ON RUMEN METABOLISM AND IN SITU DEGRADABILITY IN SHEEP

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Abstract

Four 4.5±1.2 years old male Sicilo-Sarde local sheep ruminally cannulated and with live weight 45.25±3.5kg were used to evaluate the effect of replacing corn and soya beans by white sorghum and horse beans on the parameters of facies fermentation, protozoa and degradability. Each animal received, during a first period of the experience, 1.5 kg of oat hay and 500 g of concentrate (C) to basis of corn (43.3%), barley (25%), soybean meal (17.7%) and mineral and vitamin supplement CMV (4%). Then, in the second period, these rams received 1.5 kg of oat hay and 500 g of concentrate (S) to basis of white sorghum (66%), horse beans (30%) and mineral and vitamin supplement CMV (4%). The rams were lodged in in individual pens. The result of the replacing revealed that feed intake was not significantly affected (1.54vs. 1.53 kg DM/d, for C and S, respectively). Rumen pH was significant ($P<0.05$) before the distribution of the morning feed and 2 hours after while the diet doesn't affect it after in 5 and 8 hours. Ammonia nitrogen and gas production were not affect by the diet ($P>0.05$) The dry matter digestibility was significant ($P<0.05$) in 3, 6, 12, and 36 hours but the diet didn't affect it in 24 and 48 hours. Total ciliate protozoa counts was little higher for (C) than (S) while the different genus of protozoa were comparable for (C) and (S) but the diet did not affect the number and genus of protozoa.

Keywords: *Sicilo-Sarde Rams, local feed resources, facies fermentation, degradability*

FEASIBILITY STUDY ON USING ZIGBEE NETWORKS IN AGRICULTURAL APPLICATIONS

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Abstract

With the recent developments on internet and communication technology, IoT (Internet of Things) applications are being common in agriculture. ZigBee is an IEEE 802.15.4-based specification for a suite of high-level communication protocols used to create personal area networks with small, low-power digital radios. A ZigBee network can be created as Star, Tree, Cluster Tree and Mesh topologies. These topologies make ZigBee networks suitable for agricultural applications. With low power consumption and encrypted data transfer, ZigBee networks are also suitable for IoT applications.

In this study; a system which collects data from bee hives via ZigBee network is designed. Solar powered under-hive units measure weight, temperature and relative humidity of hives and send all data to network coordinator with communicating one another. Designed system is a low-power, low-cost field data acquisition system which can be used in any agricultural application. Remote control over ZigBee networks are also possible to use in agricultural fields and farm management. With fuzzy logic, autonomous smart farms can be developed.

Keywords: *Internet of things, ZigBee, Bee hive, Wireless Sensor Networks*

PRODUCTIVE PERFORMANCE OF LAYING HENS FED BY DIETARY MYCOTOXINS BINDER MIN-A-ZEL®

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Abstract

Aim of the research was to investigate the influence of mycotoxins binder Min-a-Zel in laying hens nutrition on eggs laying intensity and hen's productive performance. Total of 1000 laying hens of hybrid line ISA Brown in 26th week of production, equally divided in four dietary treatments, each consisted of 250 hens, in 50 replicates per one treatment were used, respectively. Hens were held in battery cage system of 5 hens per one cage. During the experiment which lasted for 210 days, hens were fed with diets containing 17.0% of crude protein and 11.4 MJ kg^{-1} of metabolisable energy. Dietary treatments were as follows: T1 – control treatment (Regular Patent co. doo laying hens dietary mixture KN17), T2 (control treatment + 0.2% Min-a-Zel), T3 (control treatment + 0.3% Min-a-Zel) and T4 (control treatment + 0.5% Min-a-Zel). Results shows that the dietary addition of mycotoxins binder Min-a-Zel in laying hens nutrition led to a statistically significant differences ($p<0.05$) in increasing productive performance of hens. Average feed consumption ranged from 137.0 (T4) to 141.5 g day^{-1} (T1) per average hen. The highest eggs laying intensity of 88.6% was reordered in treatment T4 with addition of 0.5%, followed by 85.4% off laying eggs intensity in treatment T3 with addition of 0.3% of Min-a-Zel in diet. The same trend is observed regarding the number of produced eggs from 1.0 kg of consumed feed which ranged from 6.32 eggs in treatment T4 to 6.02 eggs in treatment T1 with statistically significant differences ($p<0.05$). Based on the obtained results it can be concluded that the addition of 0.5% and 0.3% of Min-a-Zel in laying hens nutrition led to increased production results and laying eggs intensity of 3.99% in treatment T4 compared to control treatment without dietary addition of mycotoxins binder Min-a-Zel.

Keywords: *Mycotoixins, adsorbents, poultry, nutrition, hens.*

A PRELIMINARY STUDY OF HATCHING PERFORMANCES OF *Salmo trutta labrax* AND *Salmo macrostigma* HYBRIDS

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Abstract

In recent years, interspecies hybridization researches have been considerably improved due to, especially, their economic advantages for aquaculture. In this study, cultivation potential of trout species; (*Salmo trutta labrax* (Sl) and *Salmo macrostigma*)hybrids distributed in the Black Sea Region of Turkey were investigated. Fertilization, hatching, larval survival rates, incubation efficiency and duration of eyeing and hatching of the species and their hybrids were compared. Larvae reached eyed eggs and hatching stage after 23 days (234 daydegree) and 39 days (398 daydegree) for ♀SlxSl♂; 34 days (374 daydegree) and 38 days (418 daydegree) for ♀SlxSr♂; 37 days (392 daydegree); 40 days (424 daydegree) for ♀SrxSl♂; 27 days (306 daydegree) and 38 days (433 daydegree) for ♀SrxSr♂. Fertilization, hatching, larval survival rates and incubation efficiency ranged between 93,99-97,69; 22,05-55,81; 55,26-61,93; 21,54-54,51 respectively. Consequently, it was observed that the pure lines of trout species and their hybrids are quite convenient and suitable for the aquaculture as an alternative form.

Keywords: *Hatching, hybrid, larvae, brown trout.*

EFFECTS OF DIFFERENT ADDITIVIES ON THE FERMENTATION AND AEROBIC STABILITY OF THE GRASS SILAGE

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Abstract

This study was carried out to determine the effects of lactic acid bacteria and lactic acid bacteria+enzyme mixture , molasses and inoculants as silage additives, on the fermentation and aerobic stability of grass silage. Study, a control group (neat), molasses as additives, microbial inoculants and microbial inoculants + enzyme (MICROBIOS (Lactobacillus plantarum, Lactobacillus brevis, Propionibacterium shermanii, Enterococcus faecium, Bacillus subsitus, Pediococcus acidilactici and alpha-amylase (A.oryza A) , cellulase and Hemicellulase (A. Niger). The material was ensiled in silos type of glass containers. Each application consists of 3 parallel. Fermentation 2, 7, 21, 60 and the pH drop over 60 days and samples of dry matter, crude protein, crude fiber, ADF, NDF, ADL, NH_3-N, soluble carbonhydrates, lactic acid analyzes were performed. According to the analysis; control, molasses, enzyme + inoculant and inoculant groups of KM 26,59 ± 0.26, 26.47 ± 0.19, 7.00 ± 0,15, 26,65 ± 0.27 pH 4,75±0,00, 4,38±0,01, 4,29±0,01, 4,04±0,02 NH3-N: 76.20 ± 0.35, 78.37 ± 0.52, 76.50 ± 0.48, 78.83 ± 0.38 found. Grass silage, mixtured with microbial inoculant, molasses, microbial inoculant + molasses were determined the best silage with respect to fermentation and aerobic stability.

Keywords: *Grass, silage, enzyme, inoculant*

HISTOLOGICAL EFFECTS OF AMMONIUM SULFATE ON THE COMMON TOAD, *Bufo bufo*

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Abstract

The common toad,*Bufo bufo* has a wide distribution associated with human habitats. It is useful to know sensitivity of *Bufo bufo*tadpoles regarding agrochemicals (pesticides,herbicides, fertilizers, hormones and other chemical growth agents). Ammonium sulfate is commonly used as a fertilizer in Black Sea Region, Turkey. In this study, we evaluated the liver histopathology of *Bufo bufo* tadpoles after acute toxicological test for different concentrations of ammonium sulfate (0, 250, 500, 750 and 1000 mg/L). Before the histopathological examination, tadpoles were exposed to ammonium sulfate solution for 96 hrs. and 5 replications per concentration were performed. Histopathological changes between groups were tested by Kruskal-Wallis test. We observed significant differences among treatment groups in terms of epithelial degeneration, vacuolization, edema, necrosis, melanin pigmentation and increase of connective tissue and dilatation ($p<0.05$). Tissue integrity is destroyed in applied concentrations. High vacuolization and dilatation were seen in 750 and 1000 mg/L concentrations. The results of this study underscore the importance of investigation of the levels of these agricultural fertilizer in temporary ponds where tadpoles maintain their metamorphose.

Keywords: *Histapathology, Liver, Acute toxicology, Turkey.*

PRELIMINARY DATA ON DAIRY FARMERS' LEVEL OF EDUCATION:THE CASE OF ALBANIA

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Abstract

The objective of this exploratory study was to assess the impact of farmers' education on dairy farming knowledge, national food safety standards, animal diseases, and farm production practices. Farmers' lack of awareness is likely a contributing factor to food standards not being met in most cases. 144 interviews were carried out on randomly selected larger farms. These farms were selected from Shkodra and Lushnje regions; and the data were collected through face-to-face interviews and personal visits based on a structured questionnaire. In regard with knowledge about Brucellosis and TBC diseases, significant differences were found among farmers (higher level of education compared with primary education) 50-58.6% vs 25.6-27.9%, respectively. In addition, the farmers with a higher level of education use more milking machines and cooling tanksthanthe farmers with a lower level of education. The farmers with a higher education level have a slightly better result (yet not significant)for animal identification, farm register, food safety standards and institutions, etc. Based on these and other findings, extension and veterinary services must plan and implement activitiesthat increase farmers'awareness. They also need to commence teaching and training programs for dairy farmers, specifically targeted at improving safety standards at farm level. Finally, public and donors' farmer-support schemes should be strongly linked to the implementation of food safety standards.

Keywords: *Education level, dairy farming, dairy farming knowledge, Albania.*

THE EFFECT OF THE AGE ON SOME OF THE REPRODUCTIVE TRAITS IN HOLSTEIN-FRIESIAN COWS

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Abstract

In order to investigate the effect of the age of cows on some of the reproductive traits, 30 Holstein-Friesian cows, cultivated on the 'Spreča' farm in Kalesija, have been investigated. Based on the data obtained from the records for 30 cows, these reproductive features have been analyzed: age of cows during their first conception, gestation length, duration of service period and inter-calving interval and the weight of calves in the first three calving, or first two lactations. According to the analyses and statistic processing of mentioned reproductive parameters, the conclusion is that the average age of cows during their first conception was 22,29 month and the average gestation, for both genders, was longer for the second conception. The average duration of service period and inter-calving interval was 172,88 days and 448,98 days, after which it can be concluded that these parameters lasted long. Male calves, in all three calving, were heavier than female calves and when it comes to both genders, the highest average weight of calves was in the second calving (42,53 kg).

Keywords*: Age, reproductive traits, Holstein-Friesian cows.*

EFFECTS OF EGG WEIGHT AND SHAPE INDEX ON INCUBATION RESULTS OF THE WHITE ITALIAN GOOSE

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Abstract

Based on the monitored and acquired results related to reproductive traits of the parent flock of the White Italian Goose kept on the private commercial farm "Trijesnjica", Bijeljina, Republic of Srpska, following was established: fertilisation of eggs was 88.99 %; hatchability of goslings from laid and fertilised eggs was 79.00 % and 89.77 %, respectively; average egg mass before incubation was 169.31 g; average egg width was 5.84 cm, and average length 8.90 cm; average egg shape index for both sequenceswas 66.51 %;average mass of one-day old gooslings 112.50 g; absolute correlation was established between average egg mass before incubation and mass of one day old goslings, in both sequencesand calculated phenotype correlation coeficients (r_p = 0.958 – first sequenceand r_p = 0.988 – second sequence**)** were statistically confirmed at P < 0.001; in both sequences, a very weak positive correlation was established between egg mass and shape index, with the correlation coefficient between these traits (r_p = 0.154) not statistically significant in the first sequence (P > 0.05), while in the second sequence the correlation coefficient (r_p = 0.197) was statistically confirmed at P < 0.05.

Keywords: *Goose, egg waight, incubation,gosling, corelation.*

INFLUENCE OF PLANT OILS ON CERTAIN PHYSICO-CHEMICAL CHARACTERISTICS OF FRANKFURTERS

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Abstract

With the aim the effect of pork adipose tissue substitution with plant oils and fats in poultry frankfurters production to be investigated, six variants of frankfurters were produced: control – with pork fat, with olive oil, rapeseed oil, sunflower oil, palm fat and a mixture of 12% rapeseed oil and 8% palm fat. Cooking loss, pH-value and basic chemical composition were tested on the final product. It was found that palm and pork fat, as well as sunflower oil significantly ($P<0.01$) influenced the reduction of cooking loss of frankfurters. Frankfurters with palm fat, a mixture of 12% rapeseed oil and 8% palm fat and those with rapeseed oil had a lower pH than the other three variants ($P<0.01$). Regarding the content of water and ash there were no significant differences, while in the content of protein there was significant difference ($P <0.01$) only between variants with pork fat and sunflower oil. Frankfurters with olive oil and those with pork fat had significantly ($P<0.01$) higher fat content than all the other variants. Frankfurters with palm fat contained significantly ($P<0.01$) lower fat percentage compared to other variants, except that with a mixture of 12% rapeseed oil and 8% palm fat. Total pork fat replacement with plant oils and fats in poultry frankfurters production is possible.

Keywords: *Frankfurters, plant oils, cooking loss, pH, chemical composition*

TAENIIDOSES IN DOGS AND LARVAL CESTODOSES IN SHEEPAT FARMS IN KABARDINO-BALKARIA

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Abstract

Taking into account the fact that infected dogs were the main sourse of infection of sheep by *Taenia hydatigena larvae* we conducted research in this field in different climatic zones of Kabardino-Balkaria paying special attention to pasture, domestic and stray dogs. The results of coproskopic analysis of these 3 categories of dogs were given for different climatic zones of the republic. 44 domestic, 55 pasture and 29 stray dogs were tested. Coproscopic analysis showed that the rate of infection in different dogs by parasites of the family *Taeniidae* on average reached 45.5% in domestic dogs, 76.03% – in pasture dogs and 90.5% in stray dogs. In order to determine species composition of helminths 19 dogs were tested by the method of postmortem examination. The results of this test also showed high extensity of infection (EI) in dogs by *Taenia hydatigena* and *Echinococcus granulosus* which amounted to 73.3% and 57.9%, respectively.Studies carried out at slaughter houses in different regions of the republic demonstrated that *cystic hydatidosis* and *Taenia hydatigena larvae* in sheep were registered at all farms. According to the results of our work the average EI by *E. granulosus larvae* and *T. hydatigena larvae* amounted to 33.0% and 24.6% respectively in the region. Based on the analysis of the obtained data we found out that EI of sheep by *Taenia hydatigena larvae* was almost as high as in the case of *larval hydatidosis* and also was a widespread helminthosis at farms of Kabardino-Balkaria. Such a situation depended on the high rates of infection by *E. granulosus* and *T. hydatigena* in dogs.

Keywords: *Taenia hydatigena, Echinococcus granulosus, dog, sheep, infection.*

PROTECTIVE EFFECT OF IMMUNOSTIMULATORY DRUGS IN EXPERIMENTAL TRICHINOSIS OF MICE

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Abstract

The immunostimulatory drugs in recent years are widely used for helminthiasis in veterinary medicine. In our study we evaluated the protective effect of cycloferon and roncoleukin in experimental trichinosis of mice. We used 30 mice weighting 16-18 g, divided into 3 groups of 10 animals in each. The first group was injected with cycloferon; the second group was injected with roncoleukin; the third control group was injected with 0.9% NaCl. The drugs were injected twice with an interval of 48 hours. The cycloferon was injected intramuscularly in the dose of 2,16 mg/mouse. The roncoleukin was injected subcutaneously in the dose of 100 U/mouse. After 48 hours the mice were infected by T. spiralis larvae in the dose of 80±5 larvae/mouse. Analysis of the data indicates that in the experiment in the application of these drugs has been significant protective effect. The number of T. spiralis larvae detected in animals was 733.5 ±25.1 and 869.5 ±16.61 larvae/mouse respectively. This was 6.1 and 5.2 times less than in the mice of control group (4485 ± 430.6 larvae/mouse). Based on this, we consider it expedient to continue the study of immunostimulatory drugs in the complex immunoprophylaxis of trichinosis.

Keywords: *Immunostimulatory drugs, Trichinosis, Immunoprophylaxis.*

USING OF CYPHENOTHRIN FOR ECTOPARASITOSES TREATMENT FARM ANIMALS

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Summary

In the laboratory of arachnoentomology of FGBNU «Skryabin All-Russian Scientific Research Institute of Fundamental and Applied Parasitology» the formulation of «d-cyphenothrin 5%-emulsion» was complied and composition of this medicinal product was prepared in the form of an emulsion. The drug belongs to anti-parasitic medications and is active for animal myiasis and acarinoses.Tests of various concentrations of aqueous solutions of the drug «d-cyphenothrin 5%-emulsion» were completed. The aqueous solutions of 0025%, 0.005% and 0.01% concentrations with rate of application of 50 - 100 ml per animal were tested. The results have shown that concentration of 0.005% of working solution is optimal and gives a high acaricidal effect.100%-therapeutic effect was confirmed by using concentration of 0.005% working aqueous solution of drug «d-cyphenothrin 5%-emulsion» in working environment when sheep scab and cattle ixodidosis take places. Persistence of acaricidal drug action was 30 days after a single application in case of ixodidosis. During and after the treatment of the animals no abnormalities were observed.

Keywords: *D-cyphenothrin, ixodidosis, psoroptosis, sheep, cattle.*

THE RATIONALE OF THE COMPLEX IMMUNOMETABOLIC ANTISEPTIC MEDICINE DEVELOPMENT IN VETERINARY MEDICINE

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Abstract

In connection with the problem of metabolic and immune processes the question of new immunometabolic medications is an actual problem in modern applied immunology and biochemistry.A big number of metabolic medications and immune stimulators are developed, but a little number of them got admission in practical veterinary medicine because of the imperfection of the stimulating effect or unidirectional mechanism of impact. This circumstance was the reason to do research in order to develop complex immunometabolic medicine that has antiseptic and detoxification impact. Succinic acid was used as a metabolic component. Metabolic activity was reinforced by immune stimulator ACDF №2. The third component was formalin. The task of the research was to study immunometabolic characteristics of formol, succinic biostimulator, at 30 days age piglets dividing them into 3 groups. The first group was made a shot of sodium succinat. The second – a shot of formol. The third one was a control group. The obtained data during this research showed quite high stimulating impact of formol – succinic biostimulator on metabolic and immune processes at weaned age piglets. This was the reason to carry on research of the medicine in the system of prevention measures in order to control animal diseases in the conditions of industrial pig breeding.

Keywords: *Metabolism, resistance, prevention measures, immunometabolic characteristics, formol-succinic stimulator*.

DIAGNOSIS OF METABOLIC DISORDERS IN TRANSITIONAL DAIRY COWS BASED ON CHANGES IN CHARACTERISTIC BLOOD BIOCHEMICAL INDICATORS

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Abstract

The objective of this experiment istodiagnosethe metabolic disorders of late pregnant and early lactation dairy cows based on changes in characteristic blood biochemical indicators.Blood samples were collected from 15 late pregnant cows and 15 early lactation cows to measure beta-hydroxybutyrate (BHB), non-esterified fatty acids (NEFA), triglycerides (TG), glucose, and the activity of aspartatetransaminase (AST). Cows in early lactation had significantly higher ($p<0.05$) levels of serum BHB, NEFA and AST, and lower ($p<0.05$) glucose and TG compared to late pregnant cows. High lipomobilization (NEFA > 0.4 mmol/l) was detected in 6 (40%) of early lactation cows but in none of late pregnant cows, while subclinical ketosis (BHB > 1.2 mmol/l) was detected in 14 (94.4%) of early lactation cows and 4 (26.6%) of late pregnant cows. AST activities above 100 U/l were detected in 2 early lactation cows and in none of late pregnant cows. TG levels below 0.12 mmol/l and glucose below 2.5 mmol/l were found in 7 (44%) and 10 (66.6%) of early lactation cows, respectively, and in none of late pregnant cows. Results on blood serum levels of glucose, TG, BHB, NEFA and AST in early lactation cows suggest metabolic disorders associated with ketosis, and some degree of hepatic lesions, probably due to fat infiltration. These serum parameters may have a key role in diagnosethe metabolic disorders of late pregnant and early lactation dairy cows.

Keywords: *Blood metabolites, subclinical ketosis, hepatic lipidosis, dairy cows, transitional period*

DYNAMICS OF ACIDITY AND ITS IMPACT ON RHEOLOGICAL PROPERTIES OF INDUSTRIAL PRODUCTION OF SJENIČKI CHEESE

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Abstract

Sjenički cheese belongs to the group of white cheese in brine from the Republic of Serbia. The brine is used as a preservative. All types of cheeses in this group are characterized by expressed acidity of curd mass ie. low pH values, which contribute to the brittle structure of the cheese. These rheological properties are the result of cheese making technology, high content of whey, storage and ripening conditions. Acidity is an important parameter of cheese chemical composition , on which depends mineral composition , and altogether with proteins, it affects the firmness and elasticity of the curd, and the impact on the course and depth of ripening. Considering this, the research aimed to determine cheese pH-value directly after manufacture, and then to monitor rate of change after 15, 30 and 45 days of ripening. The results showed that all three types of cheese are characterized by low pH and high acidity, brittle and fragile texture and ripe cheese consistency . After production an average pH value amounted 6.68 for cow milk cheese; mixed cheese (cow and sheep milk cheese) 6.62; and sheep milk cheese 6.73. All three types of cheese,where ripening period was 45 days, had continuously reduced pH values. At the end of the set period of ripening, all types of cheese had the following averaged pH values : cow mil cheese 4.24; mixed cheese (cow and sheep milk cheese) 4.39; and sheep milk cheese 4.87.

Key words: *Sjenički cheese, acidity, rheological properties.*

SURVIVAL ANALYSIS AND APPLICATION IN ANIMAL SCIENCE

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Abstract

Survival analysis is a commonly used method in medical fields. It is a tool for examining possibilities of an eventdefined by the researcher and time until that eventoccurs. In medical fields, it is generally used to determine the length of time until the symptoms occurred, the response to the treatment or death. Additionally, it is used in industrial area in order to determine the first-failure-lifespan or total-economical-lifespan of machinery. Although it is rarely seen in agricultural researches, survival analysis has the potential to take place in many agricultural applications. In this study, life curves obtained by survival analysis, Kaplan-Meier method, and log-rank are compared along with a numerical example of quails data in animal science. For the last sixteenth week, in first group, survival probability and cumulative survival probability were become 0.991 and 0.9236 respectively. In second group, these probabilities were also become 0.993 and 0.897.In that example, log-rank value was obtained as 4.7 and the null hypothesis of similar survival plots was rejected ($P<0.05$).

Keywords: *Survival analysis, Kaplan-Meier, log-rank*

THE STRUCTURE ANALYSES OF LONG TERM SELECTED JAPANESE QUAIL LINES USING 15 SSR MARKERS

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Abstract

Japanese quail is still used as a model for many poultry research because of its well-known features. Microsatellite markers are the most widely used molecular markers, especially due to their relative ease of scoring and ability to exhibit high levels of polymorphism. The objective of the research was to determine genetic diversity and population genetic structures of selected Japanese quail lines (HBW1, HBW2, LBW and L) throughout 15th generations and control (C). A total of 69 individuals from five quail lines were genotyped by fifteen microsatellite markers. Phylogenetic dendrogram showed that the quail lines clearly defined by used microsatellite markers. Bayesian model based clustering gave support to the results of phylogenetic tree.As expected, the number of clusters was found to be same as the number of the studied lines which was five. Most of the individuals were visualized within their own clusters. However, it is clearly that they still carry the common genetic markers. Moreover, this genetic frame reflects what we found among the individuals genetic diversity. These results reflect that the set of studied markers can be used effectively to capture the magnitude of genetic variability in selected Japanese quail lines. Also, for formation of markers and alleles which are specific to the divergence lines, it was clear that studies of selection should be longer.

Keywords: *SSR Markers, Genetic Diversity, Selection, Japanese quail.*

GENETIC POLYMORPHISM AT CSN1S2 LOCUS IN HAIR GOATS REARED IN ANTALYA

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Abstract

Casein polymorphisms are related to milk quality and milk composition.In goat milk, four casein (αS1, αS2, β and k-casein) coded by four autosomal gene were identified. One of these casein is calcium-sensitive casein 2 (αS2-CN) coded by CSN1S2 gene.Presence of seven alleles (A, B, C, D, E, F and O) has been identified at CSN1S2 locus. In this study, three different alleles ($CSN1S2^F$, $CSN1S2^O$and $CSN1S2^D$) at CSN1S2 locus in Hair goats were investigated by PCR-RFLP method. In total, 70 samples were used from four populations reared in different regions of Antalya. Digestion results with Alw26I restriction enzyme showed that specific F/F genotype (0.057), F/N genotype (0.157) and N/Ngenotype (0.786) where N non F allele (one of A,B,C,D,E and O alleles).Also O and D alleles couldn't be determined at CSN1S2 locus, according to digestion of *Nco*I restriction enzyme. F allele at CSN1S2 locus has been shown in Hair goats reared in Turkey for the first time.

Keywords: *Casein,* CSN1S2, PCR-RFLP, Polymorphism, Hair Goat

CHARACTERIZATION OF THE REPRODUCTION PERFORMANCES OF THE SYNTHETIC LINE OF RABBITS

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Abstract

In order to develop the rabbit meat production in Algeria, a synthetic rabbit line has been created since 2003. This line was produced by crossing females from local population to male from a French INRA line 2666. The aim of this study was to evaluate the reproduction performances of this line at the 7th generation of selection for litter size and body weight at 77 days. The data from 90 females were used in this study. The does were first mated at 4,5 months old and then 10-12 days after each parturition. The experiment was conducted at the Technical Algerian Institute of Animal breeding (Itelv) from December 2013 to March 2015. The weight of the does at the first presentation was 3500 g with high variation between females. In the synthetic line, the litter size at birth was 9,4 kits with a high rate of mortality (10%). The prolificacy of the females was significantly influenced by the season in one hand (high in autumn and low in summer) and the parity of the female in other hand (increased in the multiparous compare to the nulliparous and primiparous). In our experimental conditions, we have recorded a high mortality between birth and weaning related manly to the heterogeneity in the weight of the kits inside of the same litter. At the age of slaughtering (77days), the mean of the boy weight of the rabbits was 1500g with little variation between seasons.

Keywords: *Rabbit, synthetic line, Algeria, litter size, weight*.

QUALITATIVE DATA AND DISTRIBUTION OF THE OOCYSTS EXCRETION IN THE RABBIT *ORYCTOLAGUS CUNICULUS* LINNÉ, 1758 IN KABYLIA (ALGERIA)

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Abstract

In order to list coccidia from the genus *Eimeria*, the agents of rabbit coccidiosis (*Oryctolagus cuniculus* Linné , 1758), a survey on cuniculture was conducted in Kabylia (Algeria). The study was carried out in three intensive breeding farms chosen according to the relief and climate. The first farm, Ouacifs (1), is situated in the mountains; the second farm, Makouda (2), is placed in the high lands; and the third, Tigzirt (3), is located on the Mediterranean coast. Several soft stool samples were taken. Faeces were processed by a coprological examination and the analysis revealed the presence of seven species: *Eimeria stiedae* Leeuwenhoek, 1674**,** *E. magna* Pérard, 1925**,** *E. media* Kessel,1929 **,** *E.coecicola* Cheissin1947**,** *E. vejdovskyi* Pakandl**,**1988**,** *E. flavescens* Marotel and Guilhon**,**1941 and *E.irresidua* Kessel and Jankiewicz**,** 1931. A statistical test was used to establish the distribution of these species between the three stations. The results show the presence of four *Eimeria* assemblies related to the breeding sites and of which the highest availability goes in favour of a group that is equidistant to the three stations.

Keywords : *Altitude, coccidiosis, stool, distribution, Kabylia, rabbits.*

STUDY OF THE VARIATION OF MILK PRODUCTION IN RELATION TO STRUCTURAL CHANGES IN THE MAMMARY GLAND AND PROLACTIN LEVEL IN RABBIT DOES

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Abstract

The aim of this work is to study the quantitative and qualitative changes in primipare milk related to histological changes in the mammary gland and prolactin levels in rabbits of synthetic strain during a lactation cycle. Thirty (30) primiparous rabbits does of synthetic strain were used. The quantitative and qualitative aspects of milk production have been determined. The mammary glands of six (6) females were removed for histological study. The analysis showed a variation of the quantity of milk produced during the three weeks of lactation. Biochemical parameters measured on the milk samples reveal differences of concentration in protein and fat content. The results helped to explain the high growth rate of pups and low mortality of young rabbits recorded during this phase. Histological changes of the mammary gland showed changes depending on the week of lactation. The pic of prolactin is observed during this lactation.

Keywords: *Milk, rabbit, mammary gland, prolactin, fat, protein.*

ASSESSMENT OF INHUMANE AND CRUEL TREATMENTS ON WORKING MULES AND DONKEYS

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Abstract

Mules and donkeys are very important as draught animals and are frequently used to pull carts and carry loads in Pakistan. Mules have been considered to be superior to horses on the basis of their endurance, quality of hooves, feed requirement and longevity of life/working life span, while donkeys have become very popular draught animal because of their ability to work under very unusual conditions. In spite of their important role, these animals are raised under harsh conditions. It is unfortunate that these animals are not well cared for, thus reducing their working capabilities. A protocol was developed to assess different inhumanness and cruelties from 1200 working mules and donkeys around Faisalabad city using direct interview with owner and physical verification and assessment from animals and surrounding environment. Only 4.7 % of mules and donkey owners provided rest to their animals when got injured while 25.3 % provided short-term rest while leftover continuously worked their equines (70.0%). Working 10 hours/day during summer and winter season was noticed and use of leather harness was also high (89.7 %). Harnesses were often (73.7 %) found in bad condition. Improper fitting of harness and saddles caused 80.7 % injuries, while 15 % were due to the use of goads and spiked sticks. Housing in open areas was in 64.7 % cases, while 63.0 % owners did not provide any blanket/cloth at night to their equines, regardless of the severity of weather. Well and in time shoeing was done by 80.0 % owners, while 18.7 % owners in summer and 22.7 % in winter proceeded late in this regard, when excessive wear and tear had seen. Trimming of mules and donkeys was done by 93 % of the owners in summer and winter season. About 14 and 22 % owners did not groom their animals in summer and winter season, respectively. The welfare of these animals required improvement by careful task scheduling, making use of the cooler parts of the day and using improved implements and machinery.

Keywords: *Assessment, Cruelty, Donkeys, Inhumaneness,Mules*

REGIONAL MODEL OF MILKING HERD MANAGEMENT IN THE CONTEXT OF ICAR GUIDELINES

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Abstract

Regional model of highly-productive genetic resources formation and management in dairy cattle breeding was developed at the Stavropol State Agrarian University in the context of guidelines from the International Committee for Animal Recording (ICAR). The model involves organization of control and assistant, expert and valuation departments, reference laboratory for raw milk quality assessment and laboratory for genetic control.

Interaction within the system «regional selective and technological center – milk producer» was honed in the leading breeding farms of the Stavropol region with total livestock population equal to 21 thousand units including 7.5 thousand cows and following average productivity indices: for the Ayrshire breed - 5870 kg of milk during lactation with 3.98% fat content and 3.23% protein content; for the Holstein breed – 7204 kg of milk during lactation with 4.17% fat content and 3.05% protein content. AlltechnologicalandlaboratoryequipmentusedmeetsICARrequirements. The results obtained were recorded in the Russian selection program SELEX and were applied for milking herd management: diet improvement and health monitoring, assessment of stud stock breeding abilities and stud bull selection. The developed model of milking herd management was presented in ICAR Secretariat, received high appraisal there and is to be applied in livestock breeding in the Russian Federation.

Keywords: *Model of milking herd management, ICAR guidelines*

HISTOLOGIC DIAGNOSTICS OF RESPIRATORY SWINE DISEASES

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Abstract

Infectious swine respiratory diseases cause significant losses in all countries with developed swine industry. The most common diseases include porcine reproductive and respiratory syndrome (PRRS), porcine circovirus (PCV) infection, porcine influenza, pseudorabies. These infections are complicated by involvement of bacteria and mycoplasma. Together, these pathogens can cause complex respiratory pathologies, including post weaning multi-system syndrome (PWMS), porcine dermatitis and nephropathy syndrome (PDNS). In the herds that are infected by PRRSV and PCV type II, between 40-70% of animals could be affected by respiratory diseases. The most susceptible animals are piglets at 2-3 months of age. Histological studies can contribute to our understanding of complex respiratory syndromes of pigs. We studied histological changes in the diseased pigs using paraffin embedding method and frozen tissues with cryostat. The tissue slices were stained with hematoxylin and eosin. Analysis of the organs and tissues of the piglets with PRRS that were also infected with PCV-II, revealed pathological changes in all parenchymathous organs, epithelial tissues of lungs, bronchi, intestines. Changes in structure and cell composition were revealed in lymphoid tissues. Wide spread hemorrhagic lesions were found in lung parenchyma and the lumen of the bronchus, along with oedema of mucosal layers and necrosis of respiratory epithelium and lamina propria. The localized hemorrhagic foci and necrosis of uriniferous epithelium were found in kidneys. An oedema of the tunica adventitia of follicular veins and necrotic foci of parenchyma were found in a lymph node.

Keywords: *PCV-II, PRRSV, histology, pathomorphology, diagnosis, piglets, pigs.*

INFLUENCE OF BIO-50 ANTIOXIDANT ON THE FUNCTIONAL CONDITION OF ENDOCRINE GLANDS AT REPAIR PIGS

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Abstract

Technology stresses and other environment aversive factors, accompanying the process of pig growing and fattening, cause animals growth retardation and development, diseases and production loss. In spite of the successes in the area of animal reproductive physiology, many questions connected with establishment of pig sexual function are still under consideration. The research objective was to study the influence of antioxidant Bio-50 (Био-50) on functional characteristics of hypophysis, epiphysis, adrenal glands, ovaries and thyroid gland of pigs during fledging years of sexual function. To find out the influence of antioxidant Bio-50 on the functional status of internal secretion glands of replacement gilts two groups of gilts counterparts were formed. Preparation Bio-50 was introduced into fodder composition at the enterprise by manual mixing immediately before feeding, every day in the period from 82 – 84 days old to fertile insemination. The research material was blood that was obtained from gilts before puberty, and with beginning of sexual cyclicity in the period of excitement stage, suppression and stabilization. In blood we determined the content of hormones that reflected the functional status of hypophysis, epiphysis, adrenal glands, ovaries and thyroid gland. It is proved that establishment of female animal sexual function is characterized with the cascade of functional and behavioral processes. At the same time some biological changes pass in this animal development phase discretely and they can be appreciated quantitatively. The other can be less obvious and their estimation is more complicated. On the ground of content analysis of gonadotropic and ovarian hormones in gilt blood in the period of sexual function formation it was concluded that the application of antioxidant Bio-50 allows accelerating of sow sexual function establishment. When using the preparation sexual function establishment is completed to the second cycle unlike the animals of the first control group – the 3^{th} – 5^{th} cycles.

Keywords: *Pigs, antioxidant, hormones, reproductive function, blood, sexual cycle, puberty.*

HEART DISEASES IN HORSES AND THEIR ELECTROCARDIOGRAPHIC MANIFESTATION

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Abstract

The detection of pathology of the heart in horses can seriously limit the possibilities of its use. Therefore, in practice, the timely detection of pathology of the heart is essential. Our work shows the value of available clinical techniques to diagnose pathology of the heart in horses. These methods aregeneral inspection, method of observation of animals and, of course, listening to the heart. Special attention is given to electrocardiography (ECG). ECG plays a key role in the differential diagnosis of the heart diseases. In our study we found several types of arrhythmias, changes in the morphology of waves and intervals of ECG in horses with heart disease.

Keywords: *Heart disease, horses, electrocardiography*.

FINDINGS OF LUNG DISEASE IN PIGS

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Abstract

Pig respiratory diseases inflict great economic damage by direct losses. These diseases lead to financial losses as a result of an increase in mortality rates, reduction in daily gain and weight loss, increase of costs of food and medical expenses. As a result, the daily production of large quantities of gases, water vapor, heat and bioaerosol particles, directly affect the change of the physical and chemical composition of the air inside the building and thus on the body of pigs. The pig respiratory system diseases are regular companions of intensive production.The frequency of respiratory diseases increased enormously in the last 30 years. The aim is to establish the morphological changes in the lungs of pigs after the autopsy of dead pigsand to determine the morphometric features of the lung with a particular pathology.All examined by autopsypigs are from a farm withunsatisfactory zoohygienic conditions. A total of 500 examined lungs, 300 were examined during the summer, while the 200 lungs were examined in the winter. In the summer, it was 91.33% lung with pathomorphological changes, while in the winter period, the percentage was 91%. These large percentages of pathological lung changes indicate a necessary removing all non-specific factors that contribute growth of respiratory pathogens and prevent their maintenance in the herds.

Keywords: *Pigs, lung disease, zoo hygienic condition.*

SPECIES DIVERSITY OF TICKS (ACARI: IXODIDAE) ON THE HUNTING DOGS IN VOJVODINA PROVINCE (SERBIA)

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Abstract

Various species of ticks are commonly found on the hunting dogs, due to dogs frequent exposure to the tick habitats. Acquiring the blood meal, ticks could transmit numerous infective pathogens, which may cause severe diseases of mammals. Therefore, the dogs are exposed to the increased risk of the tick borne diseases, and play a crucial role in transferring ticks from the forest to the urban ecosystems. The aim of this study was to determine tick species diversity and abundance on the hunting dogs. The study was conducted at five hunting grounds in Vojvodina province, during 2014 and 2015. The total number of 742 tick specimens were collected from 184 hunting dogs. Six species from four genera were identified: *Ixodes ricinus*, *Dermacentor marginatus*, *D. reticulatus*, *Rhipicephalus sanguineus*, *R. bursa* and *Haemaphysalis punctata*. The species found at all five localities was *I. ricinus*. However, *D. reticulatus* was the most abundant on the dogs (38.14%), followed by *I. ricinus* (22.51%). The other species were far less represented *D. marginatus* (14.02%), *R. sanguineus* (11.05%) *H. punctata* (10.65%) and *R. bursa* (3.63%). The highest prevalence of infested dogs was during spring (46%), and the lowest in winter (8%). The detected tick species are proven vectors of infective pathogens, such as *Borrelia sp.* and *Babesia sp*. Therefore, the continuous monitoring of tick species collected from their hosts and from the vegetation in the particular ecosystems are necessary in order to preserve human and animal health.

Keywords: *Ticks, Hunting dogs, Dermacentor reticulatus, Prevalence.*

SEASONAL DYNAMICS AND POPULATION AGE STRUCTURE OF STRIPED FIELD MOUSE (APODEMUS AGRARIUS PALLAS 1771) IN VOJVODINA PROVINCE IN SERBIA

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Abstract

The striped field mouse (*Apodemus agrarius* Pallas, 1771) is a very common rodent species found in agricultural fields, shrubby vegetation and in the vicinity of the rivers and irrigation canals in Vojvodina province. The estimation of the age structure striped field mouse populations are crucial for the assessment of the potential population outbreaks. The body weight is directly proportional to the rodent age and with additional features could be used in the estimation of the maturity and the reproductive potential.The study was conducted from 2011 to 2014, three times per year, at four localities in Vojvodina province: Apatin, Bogojevo, Labudnjača and Čelarevo. The total number of trapped animals was 933. Each individual was weighted and the body and tail length were measured. According to obtained measurements, specimens were classified intoseven age groups. The results were statistically analyzed using ANOVA and Fisher's post-hoc test.According to one-way ANOVA, high statistical significances were determined for the influence of localities, seasonal aspects, age groups and years as the independent variables (p_l=0.000006, p_{sa}=0.000000, p_{ag}=0.000000, p_y=0.007890 for $p<0.01$). The age structure pyramids at all four localities were stationary or expending, which indicates the possibility of outbreaks. The stability or potential population outbreaks are determined by the rates of natality and mortality in certain habitats, changing the age structure pyramids, which is of the great importance for the prognosis of striped field mouse appearance in agroecosystems, potential plant damage and yield loss.

Keywords: *Striped field mouse, age structure, agroecosystems.*

LIFE STAGES DOMINANCE OF RED MITE (DERMANYSSUS GALLINAE DE GEER, 1778) IN LAYING HENS

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Abstract

Red mite (*Dermanyssus gallinae* De Geer, 1778), is the obligatory haematophagous parasite, notorious for feeding on the resting birds at night. The mites usually feed around the breast and legs of the hens, causing blood loss, anaemia, pain, itch, irritation and decrease in egg production. After acquiring the blood meal, they hide in cracks and crevices away from the daylight, where they mate and lay eggs. The red mite developmental cycle is consisted of five life stages: egg, larva, protonymph, deutonymph and adult. Only protonymphs, deutonymphs and females feed on hosts blood, while males feed occasionally. Under favorable conditions this life cycle could be completed within seven days, so populations grow rapidly. The study was conducted under production conditions on a farm with 2000 laying hens of line Isa Brown with severe mite infestation using modified traps. The most abundant were nymphs (up to 79.94% per trap). In most of the traps, one fourth of the total number were females (up to 24.01% per trap). The unfed stages were present in a small number in all collected traps (up to 1.75%). With extremely high reproductive potential a red mite population could double its abundance in 6 days under optimal conditions with overlapping developmental stages. The complex bioecology of red mite make the suppression and control measures almost impossible to conduct and apply in order to protect the health of laying hens.

Keywords: *Red mite, Dermanyssus gallinae, laying hens.*

INFLUENCE OF ASCORBIC ACID ON SOME PHYSIOLOGICAL INDICATORS AND MEAT QUALITY TRAITS OF ROAD TRANSPORT STRESSED LAMBS

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Abstract

This study determined pre-slaughter ascorbic acid (AA) administration on some physiological indicators, slaughter-carcass characteristics and meat quality traits of road transport stressed lambs. The animal material consisted of 18 six-month-old Norduz male lambs. Eighteen lambs were divided into 3 groups as follow T0: not transportation, T3: 3 h transportation, T3+C: 125 mg/kg AA administration prior to 3 h transportation. The live weight loss and rectal temperature were similar while there were significant differences among groups regarding some biochemical parameters. Cortisol and glucose concentrations significantly increased by transportation ($p < 0.05$) and T3 lambs had higher glucose concentrations than T0 lambs ($p < 0.01$). Oxidative status in lambs, as determined by serum malondialdehyde levels, did not differ among groups. No differences were determined at slaughter and carcass characteristics among groups. However, some meat quality traits were negatively influenced by transportation. Muscle glycogen content of T3 lambs was significantly lower ($p < 0.01$) than T0 and T3+C lambs while ultimate pH in T3 and T3+C lambs tended to be higher than T0 lambs ($p = 0.06$). T3 and T3+C lambs had darker meat than T0 lambs whereas other color parameters and water-holding capacity were similar among groups. Mean Warner-Bratzler Shear Force value in T0 lambs was lower than that of T3 lambs ($p < 0.01$). Overall, 3 h transportation altered levels of some physiological stress indicators and negatively affected meat quality traits. The administration of AA to lambs prior to transportation could partly reduce the adverse effects of road transportation stress.

Keywords: *Ascorbic acid, Stress, Transport, MDA*

DIFFERENT SYNBIOTIC DOSE FEEDING EFFECT ON THE CALF DIGESTIVE CHANNEL HEALTH, WEIGHT GAIN AND INTESTINAL MICROFLORA

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Abstract

Looking for alternative means of antibiotics, which could contribute to a faster increase in live weight of calves and their healthier development, prebiotics, are being studied as one of the alternatives. The study is aimed to find out how different inulin dose in synbiotic composition influences the efficiency of feed additives. Research has been supported by the National research programme AgroBioRes (2014-2017). Depending on synbiotic recipes, we fed 3 different quantities of prebiotics (inulin) and industrially produced probiotics *E.faecium*. We formed four treatment groups: SinG6, SinG12, SinG24 and the control group (CoG). Every day faecal mass consistency visual inspection (points 0-3). The study was carried out in live weight gain analysis. We found that the dose fed to calves in all synbiotic groups, but particularly in SinG24 group, gave significant ($p<0.05$) increase in the average live weight when compared with the CoG. Faecal mass microbial inspection showed that with the animal growth, the number of colonies of enterococci increased. By analyzing all three synbiotic dose feeding effects, we can acknowledge that the samples from the calves, to which the smallest prebiotics (SinG6) dose were fed, showed the same high level of enterococci colonies increase as with four times higher dose of prebiotics (SinG24). Despite the fact that the biggest live weight gain was in calves with the highest dose of prebiotics in synbiotic, the other animal groups showed an excellent state of health and live weight gain.

Keywords: *Feeding effect, calf digestive channel, weight gain, intestinal microflora*

6. RURAL DEVELOPMENT AND AGRO-ECONOMY

LOCAL AGRICULTURAL PRODUCTS: IMPORTANT LEVERS FOR LOCAL DEVELOPMENT OF MOUNTAIN AREAS IN ALGERIA

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Abstract

Mountain areas were always geographical spaces and symbolic places of a dynamic agricultural production and promotion of a variety of high-quality agricultural products. These products have – in the past - ensured food security of an important and growing population, but they also helped to make known territories, know-how and cultural and heritage performances, specific to mountain areas.

The populations of these areas have gradually learned to develop techniques and "specific" products developed from an interaction between local know-how and specific natural resources (soil, climate...); those must provide added value in markets and better consideration among consumers. But the emergence of local initiatives, in the direction of the development of local resources, has been difficult to build indisadvantaged mountainous areas of northern Algeria. The participation and involvement of local stakeholders (farmers, contractors, project owners; economic operators, rural communities' representatives, elected institutions, local administrations...) was low and modest; the strategic choices of those stakeholders have often operated outside the logic of local development.

It is time to reverse this process by establishing support system for better organization of professionals in the framework of "local production systems". Rehabilitation and enhancement of territories, and promotion of production systems of local products (articulated in basic and strategic sectors) then become carrying ways to promote local development.

Keywords: *Northern Algeria, mountain areas, local products, local development, local production system*

PARTICIPATORY MANAGEMENT: AN EFFICIENT APPROACH TO OPTIMIZE THE PRODUCTION OF GOODS AND SERCICES OF WODLANDS IN NATIOBNAL PARK OF CHREA, ALGERIA

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Abstract

The participatory management is an approach that leads to a joint management of the solutions adopted to meet needs and expectations. As part of development programs of mountain areas, the participatory management means also the promotion of anew model of governance that would give more weight and more responsibilities to local structures and actors. This is to encourage the participation of stakeholders in efforts to promote self-development and promotion of local products.

This communication is a part of a Mediterranean project to optimize the production of goods and services of woodlands in mountain areas1. The overall goal of the project is to support and improve governance models in a pilot site in Northern mountainous area of Algeria; a site classified as a Biosphere Reserve (by UNESCO)- the National Park of Chréa -;a site rich in plant,animal and human resources. The choice of the site was also facing an opportunity that would be offered by multiple opportunities for value of its goods and services, by promoting the involvement and participation of local stakeholders. This work also aims to bring new ideas and introducing new woodland management design as it attempts to highlight the needs and expectations of local people in solving risk and valuation of assets. This study finally identifies a series of agricultural and rural services to enhance and promote as local products and services.

Keywords: *Participatory management, governance, woodlands, mountain areas, local products, forest goods and services.*

FARMERS' SHARE OF MONEY SPENT ON FOOD IN AUSTRIA

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Abstract

There has been renewed interest in the farmer's share of retail food sales recently, in the wake of sharp fluctuations in farm-gate or retail prices. Statistics on farmers' shares were already being developed decades ago and recent updates are a response to these fluctuations. We define the farm share as the average portion from each monetary unit spent on food by consumers that is received by farmers for their agricultural commodities. The same calculation gives the marketing margin, which is the remainder. Calculations show that the farmer's share from retail food sales has been on the decline for more than 60 years. Therefore, the gap between farmers' share and marketing margin is widening. This paper presents (i) the development of the farmers' share for Austria mainly for the period 1995 to 2013 and, where data is available, from 1971 onwards and(ii) compares the results with the developments in Germany and the United States as well as Switzerland. For Austria, two calculation methods are shown: the Agristat method (developed in Switzerland) and the method of the Austrian Institute of Economic Research (WIFO). Both calculations are based on official statistical data (Economic Accounts for Agriculture, National Accounts and trade data) but use different approaches. This paper uses the findings of these calculations to hypothesize on necessary areas for future research.

Keywords: *Farm-to-retail price spread,farmers' share, marketing margin, Austria*

GASTRONOMY, A CULTURAL HERITAGE FOR OUR PRESENT AND FUTURE TIME. AN IMPORTANT PROTECTION FOR OUR TERRITORY, OUR AGRICULTURE AND OUR WELFARE

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Abstract

The environment, beautiful landscapes, good air, andagriculture with local products are the most important assets we have in our countries. They have great economic potential, but are not well exploited in some regions. In recent years, the agro-food sector has been the focus of interest in terms of the development of these places, and we could start to develop our territory from this cultural heritage. Smaller farms that cannot compete on price, must rely on the quality of their products with local, traditional and cultural characteristics (product placement techniques and production techniques), as a differentiating factor for positioning in market niches that would reward their typicality and originality. Today, the rediscovery of food is comparable to a journey, a way of living. It is a reference point for a deep culture of high level and preserves the most important values for people. Agricultural products, recipes and methods of preparation have been passed down for centuries, rediscovered and represented with great joy by those who are aware that good food should not be used solely to satisfy the palate and stomach. The products of our land are very important in building our ethnic identity, both individual and collective. For these reasons, they have an ethical, social, religious, and existential symbolism that goes beyond the economic sphere. And then we can write: gastronomy is culture. Today, it is a desired and loved culture that moves the economy. Gastronomy is rich in history, tradition, customs and "know-how" that occurred across generations: how small producers live and grow, how they work, it is about the mastery of men and women, respect for the land and for the territory. It is intimately linked with our world.

Keywords*: Agriculture, gastronomy, culture, territory*

ENERGY EFFICIENCY FOOD RETAILERS

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Abstract

In this paper the emphasis is put on the specifics of energy efficiency impact on the profitability of the service sector, with special insight into food retail. The theoretical and methodological presentations are illustrated by applying the comparative approach, on the original empirical data of food retailers. Because of the importance of energy costs in the retail food, it is important to take appropriate measures to ensure their reduction as a very important factor in increasing profits. These measures may be of a different nature. Thus, for example, sustainable ways to save energy costs in the retail food are: efficient lighting, cooling, heating, energy management and initiative for increasing the renewable energy sources use. This certainly includes the use of new energy efficient technologies and construction of energy efficient office buildings and stores in food retail sector (with continual improvement of existing ones).Energy costs are significant component of operating costs and profits in trade, especially in food retailing. The size and structure of energy costs in retail is influenced by numerous controlled and uncontrolled factors (climate zones, location, age and isolation of building, the size of store, type of commodity, energy system, caring staff, energy prices, the amount of energy consumed and others). Acquaintance of the effects of individual factors is important for efficient energy management in (food) retail. In recent years, the key factor for improving energy efficiency in (food) retail is usage of renewable energy sources. Due to this, the goal of global retailers in perspective is more use of renewable energy sources in total energy consumption. Likewise, it is the reduction of carbon dioxide with respect to energy consumption. All this will decrease the energy costs of the global retailers. (JEL classification: Q40, Q44, Q32, Q57)

Keywords: *Energy intensity, renewable energy sources, energy management, green energy, final energy consumption*

AGRO- BIODIVERSITY IN BULGARIAN HOME GARDEN

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Abstract

An important task of each country is the protection of old local varieties, forms and populations of crops. The native plant resources have preferred taste, as a part of the cultural heritage of each nation, disease resistance, a greater flexibility and a better adaptability to the conditions, where they traditionally are grown or still are grown. A significant portion of these resources is stored in the gene bank of Institute of Plant Genetic Resources- Sadovo as a preventive measure for their protection. These are mainly crop groups of grain cereals, legumes, forages and vegetables. The greatest number of samples is represented by cultures such as - durum wheat, corn, beans, peppers, pumpkins. Local materials from *ex situ* seed collection date back to 1954 and continue through expeditionary operations to present day. The main places where *in vivo* may still be found from local species diversity are home gardens.The Bulgarian home garden can be defined as a micro system that has a high degree of plant species diversity of vegetables, grain legumes, fruit species, some medicinal and aromatic plants vines, alfalfa, flowers, spices and other placed in different combinations in different parts of the country. The seeds are inherited in families; they are transmitted or received from neighbours, friends, colleagues from the same village or from adjacent locations at regional level. Some types of vegetables (tomatoes, peppers, watermelons, melons, onions, garlic, etc.) that are still grown have more limited presence of varieties in Bulgarian origin. I imported varieties and hybrids are use very often, but there are such which have passed from hand to hand or they are created by local people.

Maintenance and preservation in time of old varieties and shapes is very closely linked to their traditional use, habits, dialect, sentiment, family celebrations, religious traditions/ habits.

The purpose of the paper is to draw a picture of the current state of the existing agro-biodiversity in the home garden and to identify the opportunities for its preservation and conservation according to the Bulgarian tradition and taste preferences.

Keywords: *Bulgarian home garden, agro-biodiversity,ex situ,preservation and conservation*

TOWARDS SUSTAINABLE FOOD SYSTEMS: A HOLISTIC, INTERDISCIPLINARY AND SYSTEMIC APPROACH

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Abstract

One of the biggest challenges facing humanity is achieving sustainable food security in the face of population growth, resource scarcity, ecosystem degradation and climate change. Transitioning towards sustainable food systems (SFS) is a must for achieving sustainable development. This review paper highlightsthe need to adopt a holistic, multidimensional, interdisciplinary and systemic approach for better understanding food systems, which is a prerequisite for fostering transition towards sustainability. A better understanding of food systems means comprehending issues at play from 'farm to fork'*i.e.* production (crop,animal, seafood), processing, trade and distribution, and consumption. For gaining a full awareness also cross-cutting issues such as gender, innovation and technology should be considered. Such a deep knowledge and consequent corrective actions are crucial to address the multiple challenges and dysfunctions of the current global food system such as food insecurity, obesity,food waste,climate change,biodiversity loss,land degradation,water depletion,deforestation,market concentration andfood heritage erosion. It is fundamental to foster transition towards sustainable and resilient food systems to achieve sustainable food and nutrition security for present and future generations. All dimensions (environment, economy, society and culture, nutrition and health) of food sustainability should be tackled while considering policy and governance. Different food consumption and production models can help speeding up journey towards sustainability. These include, *inter alia*, organic agriculture and different alternative food systems allowing to link consumption production such as urban agriculture, community-supported agriculture and short food chains.While the challenge is titanic, there is a menu of options that can be jointly used to foster shift towards SFS such as sustainable and eco-functional intensification, sustainable diets, food loss and waste reduction. Nevertheless, a holistic and systemic approach is necessary to develop a systems thinking for generating interdisciplinary knowledge needed to support transition towardssustainable food systems.

Keywords: *Food systems, Sustainability, Systemic approach, Multidimensionality, Systems thinking*

MICROCREDIT AND FARMER PRODUCTIVITY IN OSUN STATE NIGERIA.

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Abstract

This research looked at micro-credit and farmers' productivity in Osun State;140 respondents were interviewed using structured questionnaires. Micro-credit sources identified in the study area were money lenders, rotational savings associations, farmers in partnership business, banks, co-operatives, non-governmental organizations and Ministry of Agriculture. Data obtained was analyzed using descriptive and Tobit regression model. The Tobit regression model carried out showed that there was a highly significant relationship between age(0.989), household size(0.623 significant at 1%), farming experience(0.858 significant at 5%), loan conditions(1.29 significant at 10%), interest rate(0.387 significant at 1%) and loan duration(0.281 significant at 1%) on the acquisition of credit by the farmers in increasing their productivity (income). The mean amount of loan given by the credit providers per season is within the range of (₦20, 000 to ₦100, 000) and the loan duration is for a year. Income generated by the farmers was used as a measure of productivity and the minimum per season was ₦ 20,000. Interest rate which was expected to have a negative relationship with credit acquisition was however discovered to be positively correlated based on the Tobit regression results. It was deduced based on this study that majority of the farmers patronize informal sources of credit and to them the loaning conditions and durations given by these sources are highly favourable compared to the formal sources. However the amount of credit taken from these sources is smaller when compared to that from the formal credit providers.

Keywords: *Micro-credit, Productivity, Tobit Regression model, Osun State, Nigeria.*

THE IMPORTANCE OF RURAL AREAS FOR RURAL TOURISM DEVELOPMENT OF SERBIA

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Abstract

The largest part of theSerbian territory (around 85%) belongs to the so-called rural areas, with a variety of ecosystem and biodiversity. The share of populationlivingin the countryside is around 55%. Rural tourism has been identified as a key factor that can help in promoting Serbian rural areas as ecological oases with specific cultural, national and historic heritage. Grosso modo, rural tourism represents every tourism activity that takes place in rural areas.The basic premise on which is based this paper is that rural areas have significant potential for rural tourism development and for sustainable economic development of Serbia. Starting from this premise, authors analyze the basiccharacteristics of rural tourism, rural areasof Serbia and their real touristic potential.Work is based on several methods: induction and deduction, the method of analysis and synthesis, comparative method as well as historical method.

Although the Serbian rural areas spread over a large part of its territory, they are facing numerous problems.Based on the results of the research conducted within the rural areas on the territory of Serbia, it was concluded that Serbian rural areas are characterized by a high degree of differentiation. This differentiation is reflected also in the field of social development, demographic trends, economic development, quality of life, environmental and other characteristics.

Keywords: *Rural areas, rural tourism, ecology, sustainability, rural development.*

ACCREDITATION IN HIGHER EDUCATION IH THE FIELD OF AGRICULTURE

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Abstract

Commission for accreditation and quality assurance (CAQA) is the national body for quality assurance (QA) in higher education in Serbia founded in 2006. Since then CAQA has developed standards and procedures and implemented 2 cycles of accreditation of higher education institutions (HEIs) and study programs (SPs) and one cycle of external quality control (audit) of HEIs. In 2013 CAQA become full member of 2 European associations for quality assurance in higher education: ENQA and EQAR. This confirmed that national system of QA in higher education is in compliance with European standards and guidelines (ESG). CAQA has also analysed the impact of its activities by comparative analysis of accreditation outcomes in 2 cycles of accreditation in several thematic and system-wide analysis including 2 sectorial analysis (1,2). This paper presents such analysis for the field of agriculture and related areas. Here we review HEI and SP number in state and private sector, their regional distribution, number of students enrolled in the first year, type of studies (professional or academic), level of studies (basic, master and PhD) and some key indicators. Comparative analysis of these parameters is made for 2 accreditation cycles: the first cycle done in the period 2007-2011 and the second cycle done in the period 2012-2016.

Keywords: *CAQA, Accreditation, Higher education, QA, Agriculture*

FARMERS FERTILIZING HABITS AND VIEW POINT TO SOIL ANALYSIS SUPPORT IN TURKEY: A CASE STUDY OF HARRAN PLAIN

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Abstract

Soil fertility is an element of soil productivity affected many variability such as minerals, organic minerals and plant nutrient elements. Other elements of the soil productivity can stay the same for years, but the soil fertility is continuously in a change during the agricultural activities. A suitable fertilizing program for cultivation ın accordance with the needs of the plant grown should be made. Nowadays, use of fertilizers is considered as necessary agricultural technology, because soil restores nutrients. However, before fertilizing, soil analysis should be performed carefully. After then, fertilizer should be given to soil. Under the current conditions (plant sowing, irrigation, etc.), for the continuation of sustainability, improvement of soil quality is necessary as soon as possible. For this purpose farmers are encourage to perform suitable and sufficient fertilization. Alternative organic resource reserves in Turkey must be use. In this respect, Food, Agriculture and Livestock Ministry start to pay support for soil analysis in 2006 in addition to direct income support to encourage accurate and adequate fertilization and soil analysis. Intensive agricultural activities, lack of additional monoculture and soil organic matter cause significant abrasion of soil and decrease the quality of 80% in Harran Plain. This study was conducted in Şanliurfa Harran Plain including 150 farmers in April 2016. In this study, socio-demographic characteristics and behaviors of the farmers related to soil analysis and fertilizer, and attitudes to agricultural support were evaluated. Also, suggestions for support fertilizer model in Turkey were improved.

Keywords: *Agricultural pollution, soil analysis, fertilizer support*

NUTRITIONAL VALUE OF FISH SOUP FROM CULTURED TROUT (*Oncorhynchus mykiss*)

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Abstract

Fish soup is mainly produced from fish processing waste such as filleting by-products and commonly consumed around the world. It is known as nutritious product due to its nutritional value and functional properties. In this study, we have formulized a fish soup from cultured trout (*Oncorhynchus mykiss*). Proximate composition, fatty acid profile, mineral contents, some vitamin contents and carotenoid contents were examined. The results showed that trout soup contains about 90.35% moisture, 5.55% crude protein, 1.91% total fat, 1.05 minerals, 1.14% carbohydrates. The energy value was low as 43.55 kcal/100g. Low saturated fat was determined and highly polyunsaturated fatty acid contents were observed. About 9% of polyunsaturated fatty acids were accounted as omega 3 fatty acids. The values of B1, B2 and B3 were found as 17.5, 24.5 and 74.5 µg/100g, respectively. The levels of lutein was determined as 109.5 µg/100g, beta carotene as 342.5 µg/100g, and lycopene as 82.5 µg/100 g. Results for mineral contents showed that values of Ca, Na, K and Mg were higher than other minerals identified in this study for the fish soup. The results imply that trout fish soup has high nutritional value and also it is suitable for low energy diet due to its low energy value.

Keywords: *Fish soup, Nutritional value, Trout*

Acknowledgement

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THE SHORTAGE OF AGRICULTURAL LABOUR FORCE IN ALGERIA: A CASE STUDY

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Abstract

In Algeria, over the past fifteen years, more and more farmers are complaining about the lack of labor. To measure the phenomenon, give plausible explanations and report the behavior of farmers facing this problem, two surveys were conducted with farmers in two rural areas geographically and climatically very different: one covers an agro-pastoral area and the other an irrigated plain. After compilation and analysis of the surveys, it appears that the lack of labor is felt by the majority of farmers, especially by those who have no, or little, family labor. There are several causes to this: the state aid to the unemployed that does not encourage them to accept agricultural work, remuneration levels made by farmers are perceived as unattractive, the employment opportunities in the informal sector are numerous and provide interesting and earned income with less effort than that required by the agricultural work. Farmers are responding to this by increasing the mechanization of their work.

Keywords: *Algeria, Agricultural Workers, Rural Development*

COMPARATIVE ANALYSIS OF AGRICULTURAL PRODUCTION SYSTEMS PERFORMANCES: CASE OF MILLET AND SORGHUM IN MALI.

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Abstract

This study was carried out to compare the performances of agricultural production systems based on millet and sorghum in Sahelian and sudano-Sahelian areas of Mali in 2014. The two systems compared were production techniques of micro-dosing fertilizer and traditional cropping called conventional cropping system of millet and sorghum. One hundred and eight farmers (108) were selected and interviewed in the two areas. The techniques of micro-dosing used were manual and mechanical fertilizers distribution. The tools used for analysis were descriptive statistics (frequency, average, standard deviation) and analytical method (ANOVA). The software's used were EXCEL, SPSS 20 and STAGRAPHICS. The results of this survey show significant differences of mean at the plots levels. The production system based on fertilizer micro-dosing techniques is more efficient than traditional system of millet and sorghum through high yielding, lowing costs of fertilizers, diminution of farming operation work times and, high net profit at the plot level. The percent of yield obtained with manual technique is 41% and 52% with mechanical distribution (placement) for millet and respectively for sorghum 45% and 56%. The calculated cost ratio values (CRV>1) show that micro-dosing techniques are profitable for millet and sorghum production.

Keywords: *Performance, production systems, millet and sorghum, Sahelian and sudano-Sahelian areas, Mali.*

URBAN AGRICULTURE AS A PLANNING TOOL FOR ACHIEVING SUSTAINABLE URBAN DEVELOPMENT

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Abstract

Diminishing population process causes new spatial changes in the urban environment. Local authorities of depopulated settlements are facing the challenge of managing the existing urban infrastructure with decreasing consumers and tax incomes. The question is raised about how to ensure high quality of life of the remaining residents. According to the United Nations (UN, 2015), Bulgaria will lose 27.9 % of its population until 2050, as a comparison Japanese population will decline by 15.1%. The projections lead towards specific changes in urban planning practices and shift the focus from city development to city shrinkage. Hence, the implementation of urban agriculture as a tool for creating viable cities and sustainable local communities could be expected to ensure food security, social inclusion and employment. The study aim is to propose responses to shrinking phenomena and to discuss benefits of urban agriculture development for binding local communities. In order to achieve this aim, three objectives are set: (i) to identify research and practical experience in the field of urban agriculture in Japan; (ii) to analyse the Japanese local authorities approach in facing declining and aging population consequences; and (iii) to discuss its transferability to Bulgarian planning practice. Started in 2010 in Kashiwa city, Japan, Kashiniwa program is innovative local governance system for tackling vacant lots in shrinking cities. The case study method was chosen for researching the planning approaches developed and implemented in Japan, such as urban agricultural planning method for establishing and maintaining green open spaces and building sustainable local community.

Keywords: *Urban agriculture, Shrinking city, Spatial planning, Sustainable urban development*

TOWARDS A NEW CONCEPT FOR THE AGRICULTURAL LAND-USE PLANNING IN THE NEW SOCIO-ECONOMIC CONDITIONS IN BULGARIA

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Abstract

The goal of this paper is to present a new concept for Agricultural Land-Use Planning as a land-administration activity in today's market economy. The planning process consists of preparing projects for land use in the agricultural territories. Agricultural Land-Use Planning is developed for the purpose of materializing and stabilizing land tenure, for environmental protection and for ensuring efficient farm economy. The current market economy conditions are new to the country. So far, land management has served the principles of the centralized planned economy under the totalitarian governance of the land. The main deficiencies of that governance are connected with the alienation of land owners from their properties and the liquidation of their interest in land stewardship. Another problem has been the occurrence of soil degradation processes as a consequence of extreme soil exhaustion. The cooperative land cultivation in the past prevented land-use planning from addressing the issues of land tenure. The socio-economic conditions of today's market economy pose new challenges to the Agricultural Land-Use Planning due to differing and compliance the interests in the public and private sectors. The strategy has to be constructed in such a way that it simultaneously secures land-tenure, environmental protection, and the farms' economic prosperity. This brings together a number of activities such as research and assessment of soil quality, agricultural cadaster, appraisal of land property, soil protection and soil fertility, environmental and landscapes protection, agricultural land structure design, etc. Based on a survey conducted among professionals and farmers, and on the authors' critical approach, a new concept for the Agricultural Land-Use Planning as a socio-economic activity has been developed. A number of design activities in the dynamic market environment are included, as well. The paper is written in the form of a comparison between the two socio-economic systems (centrally planned land-use and cooperative land cultivation systems) and contains the main highlights of the new concept.

Keywords: *Land policy, Land legislation Agricultural Land-Use Planning, Land tenure, Land protection*

PROTECTION AND PROMOTION OF DOMESTIC EGG PRODUCTION:EXAMPLES FROM THE REPUBLIC OF CROATIA

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Abstract

Food production has a strategic importance for the economy of any country, including the Republic of Croatia. Unfortunately, the food market is not sufficiently developed. On the one hand there are problems with product placement on the market while on the other hand the external trade balance is also unfavorable, because the imports of agricultural products are increasing.For that very reason and with the aim of protecting and promoting domestic agricultural production there is a strong need for the introduction of food marketing. The application of all elements of the marketing mix - product, price, place and promotion - will create distinctive products.The main goal of marketing projects and putting recognizable labels on domestic agricultural products is to promote domestic production, as well as informing consumers about the origin of products, with the aim of protecting and strengthening the agricultural production in the Republic of Croatia.Several institutions in the country are working in the field of food marketing, and one of them is the Croatian Agricultural Agency. Department of market and agricultural food marketing, in Croatian Agricultural Agency, has developed eight marketing projects so far, and one of themwhich will be described in this paper is branding fresh eggs for human consumption with protected label *Eggs from Croatianfarms.*The paper contains a positive example of consuming domestic local products produced on Croatian farms, and we will also show the path of egg production, and provide the research results of egg producers whose products are labeled with the protected label.

Keywords: *Food marketing, domestic production, label, eggs*

SOCIAL NETWORK SITES UTILIZED IN AGRICULTURAL EXTENSION SERVICES IN KINGDOM OF SAUDI ARABIA

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Abstract

The purposes of this research are to: i) Measure the degree of utilization of Social Networks (SNS) (Facebook, Twitter, Instgram, Google Plus, LinkedIn, Flicker,Tumblr, Hi5, Whatsapp,Snapchat, and Youtube) among agricultural extension personnel in Kingdom of Saudi Arabia (KSA), ii) Identify the role of SNSs in provision of extension services from the viewpoint of respondents, and iii) Recommend interventions needed to enhance the utilization of SNSs in provision of extension services. An online survey with 55 agricultural extension personnel represent 22% of the total number of extension personnel in KSA (250 personnel) was conducted in April-May 2016, frequencies and percentages were used for data presentation. Sample was young (82% are less than 45 years old) and rather highly educated (75% were have university degree or postgraduate studies). Results show that the majority of respondents (60%) have a medium level of SNS utilization, while the remaining 40% were divided equally between low and high levels of utility. More than two-fifths (46%) declared that they highly prefer using SNS in contacting farmers, and the same percentage indicated that SNS is highly facilitate their work circumstances. Most of respondents (85%), stated that SNSs have positive impact in facilitation of extension personnel communication capacities, most of them (96%) indicated the high and medium positive impact of SNSs in the extension employee's acquiring knowledge. Also, most of respondents (91%) stated that SNSs were helped them in achieving their work tasks with medium and highly base. Study recommends and concludes some interventions for better SNS-based extension services in KSA.

Keywords: *Social Media, Online survey, Agricultural Extension, KSA.*

MOVING TOWARDS SUSTAINABLE RURAL DEVELOPMENT: GENDER EQUALITY AND RURAL WOMEN EMPOWERMENT

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Abstract

On the international women's day 8 march 2016, the world reaffirms that gender equality is first of all human right. Women have the right to live in dignity and enjoy the same rights and opportunities as men. However, despite many international agreements affirming their human rights, women all over the world have less access to the economy, credit, training and employment than men. They are far less likely than men to be politically active and to have access to leadership positions. Such persistent gender inequalities incur high costs for many countries around the world and particularly the developing ones. Great strides have been made to reduce gender gaps and improve the states of women and girls over past three decades, yet, significant gender gaps remain across sectors in all countries and are often greater among the poor developing ones and particularly in rural areas where socio economic disparities between men and women are the most acute. Experiences gained and learned lessons are evidently showing how important is the role played by rural women in improving economic growth, increasing food production and achieving sustainable development of their communities. Aware of this, nowadays to improve gender equality and to promote women empowerment an increasing wide range of institutions from business, civil society and governments have committed resources, rhetoric and political capital to realize both goals, but, due to the surrounding difficulties, the progress is still limited far away from the expectations. The presented paper will mainly focus on describing the needed actions to be implemented for moving towards sustainable rural development through the promotion of gender equality and rural women empowerment.

Keywords: *Rural development, gender equity, women empowerment, needed actions.*

EVALUATION OF IMPACT OF EARTHQUAKE ON AGRICULTURE IN NEPAL BASED ON REMOTE SENSING

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Abstract

The big earthquake happening in April 2015 killed over 9000 people in Nepal. The effect of earthquake affected not only safety of local people but also agricultural field. Agricultural economy dominates in income of local people. Therefore, restoration of agricultural areas is required for improving life of locals. However, lack of information about agricultural areas is the main problem for local government to assess and restore damaged agricultural areas. Remote sensing was applied to access damaged agricultural field due to its advantages in observing responds of environment without temporal and spatial restriction. Accordingly, the objective of the study is to evaluate disaster risks based on data from questionnaire survey, remote sensing and geographic information system (GIS) in agricultural areas of Nepal. Firstly, we conducted questionnaire survey about thirty indicators of agriculture-related issues. Moreover, based on USLE (Universal Soil Loss Equation), soil erosion risk was compared between before and after the earthquake. To clarify the relation between soil erosion risk and land-use, land-use map was created based on Worldview-3. Finally, statistical analysis was conducted based on the collected data. From the results of field survey and analysis, it turned out that there was little damage on agricultural areas but huge damage on houses and barns in the villages in the research site. It is attributed to the vulnerable house materials. Soil erosion risk, that has been little observed in agricultural area, decreased in forest area and increased in residential area compared to the pre-earthquake time. From the statistical analysis, multi regression analysis was applied and age of house and elevation was computed as dominant factors of building damage in the research site. It is suggested that it is important to improve house materials in the villages and increase vegetation cover to prevent from further soil erosion in the research site.

Keywords: *GIS, Remote sensing, Soil erosion, Worldview-3*

RURAL ECONOMIC DEVELOPMENT STRATEGY THROUGH PRIORITY RURAL SECTORS IN THE REPUBLIC OF MACEDONIA

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Abstract

The rural areas of development strategy is an inhabited territory where the social, economic and residential evolutions are led within the framework of an integrated and prospective project of development. The rural pole is not a small town, an agglomeration, but they are treatedas a whole and guided by an integrated project of territory. Initially,this studyare focused to priority regional sub-sectors in R. Macedonia in order to identifythe major weaknesses to be addressed and potentials to be boosted. Furthermore, the elaboration refers to assessmentdevelopment strategy of priority economic sectors in the rural areas,defining the main problems, possible solutions to solve them.The analysis of the regional differences is also included in the paper as well as the differentiation and prioritisation in itself . In terms of the structural adjustment through priority rural areas of the country's, theemphasis of study will be placed in particular on increased production competitivenessand higher quality of products. For that goal have to pay attention to measures at improving thecompetitiveness of economically viable agricultural holdings and foodindustry in selected sub-sectors through proper investment policies.

Keywords: *Rural, strategy, development, policy,sectors, strategy.*

ECONOMIC DIVERSIFICATION OF RURAL HOUSEHOLDS IN THE REPUBLIC OF MACEDONIA

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Abstract

Sustainable rural development is vital to the national social and economic situation of the Republic of Macedonia since 43% of the population lives in rural areas, which make up 86.7% of the total territory. Most of the rural households are engaged in agriculture (primarily family farms) and very small portion in other activities. Agricultural wages tend to be significantly lower than other sectors and almost half of the labour force is consisting from unpaid family members. To that end, modern understanding of rural development exceeds the concept that agriculture is the only non-urban element of territorial areas and move to a broader concept that refers to all resources of the territory and its entire economic structure: natural and human resources, crafts, small industrial facilities, tourism, recreation, etc. The goal of this paper is to review the new direction of rural development in Macedonia - income diversification, focused on contribution of non-farm activities to total rural household incomes. The methods of descriptive statistics of data analysis were used to process official data for incomes, from the State Statistical Office. The findings demonstrate that the number of rural households with incomes from non-agricultural activities accounts for only 16%, with highest proportion (69%) of households with share of only up to 10% of non-farm incomes in total turnover. Policy for strengthening of the conditions for development of the rural diversification activities, as one of the tool for economic stability of rural households, is recommended to be one of the highest governmental strategic priorities for rural development.

Keywords: *Rural development, income, diversification*

VALUE NETWORK OF THE PERSIAN LIME IN MEXICO

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Abstract

Mexico produces the three most important types of lime: Mexican, Persian, and Italian. Persian lime (*Citrus latifolia*) is the second most important in planted area. Forty-six percent of the production is intended for export. The objective of this research was to analyze the Persian lime value network of the packing and exporting companies. It was conducted at the main Persian lime producing area, located in the central coastal region of the Gulf of Mexico. As an average, the sampled companies were using 55% of their packing capacity. Most of them (83%) work all year long. They have been from 6 to 15 years in operation. They employed a mean of 41 people, thus they are medium-size enterprises. Fourteen actors were complementing their business in production and marketing. The relationship between packers and the small lime producing farmers was very inequitable. Low prices were common for Persian lime producers. The fruits they were packing came mainly from local producers (90%). Their main export destinations were: United States, Europe, Canada, and Japan. Other regions are increasing Persian lime production, threatening the marketing of the farmers of the central coast of the Gulf of Mexico.

Keywords: *Citrus latifolia, citrus, packing companies.*

INTEGRATED AND SUSTAINABLE MANAGEMENT OF OLIVE TREE IN THE GHARB REGION OF MOROCCO.

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Abstract

In the Gharb region of Morocco, the olive grove occupies about 30,000 ha, of which almost all (88%) is located in the north area of Sidi Kacem province. The olive grove of the Gharb is largely (92%) dominated by the dual purpose ‘‘Moroccan Picholine’’ variety, characterized by its olive and olive oil quality and adaptability to various soil and climatic conditions. The 23,583 tons of produced olives are largely (75%) designed to extract olive oil.The new strategy of the Green Morocco Plan (GMP) has given considerable importance to small farmers (Pillar II), aiming at upgrading agriculture solidarity, fighting poverty and improving the standard of living of small farmers. The number of recipients in the Gharb region is of about 1,300 farmers of which 250 beneficiaries are concerned by the *‘‘Integrating of Climate Change in the Implementation of the Green Morocco Plan*’’ (PICCPMV) project, funded by the Global Environment Facility. This region has been identified as being vulnerable to climate change and with significant agricultural potential.The main aim of this project is the conversion of perimeters with the low-yielding cereal crop, located in remote and marginal areas, and the development of olive tree plantations.New agricultural technologies for adaptation to climate change would enhance the resilience of the olive groves to the change. Integrated management, plant material, inputs and supplemental irrigation, identified as priority technologies, are considered in the Pillar II projects of GMP. These technologies with a positive environmental impact would result in a mitigation of the effects of climate change and improve irrigation water efficiency.

Keywords*: Climate change, Morocco, Olive tree, PICCPMV, Supplemental Irrigation.*

EVALUATING THE ADOPTION LEVEL OF SUSTAINABLE LAND MANAGEMENT PRACTICES AMONG FARMERS IN NIGERIA: OSUN STATE EXPERIENCE

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Abstract

Environmental issues have been a global concern for decades with different strategies being used to overcome the menace. This study identified and categorized the specific Sustainable Land Management (SLM) practices introduced to beneficiaries of FADAMA III (FADAMA is a Hausa language for swampy land) in Nigeria; determined the level of adoption and the factors influencing the adoption with a view to improving the level. Multistage and proportionate sampling techniques were used to select 256 farmers from eight Local Government Areas (LGAs). Quantitative data were collected from the farmers. Data were analysed with frequency, percentage, mean and standard deviation while correlation and factor analyses were used to make inferences and isolate crucial factors influencing adoption of the SLM practices. Results revealed that 36 SLM practices were introduced to the farmers which were categorized as crop management-related, livestock management related, forest management, water conservation-related, alternative and off-farm SLM practices. Farmers with high level of adoption (43.7%) were more than those with low level (33.9%). Seven factors: farming experience, economic, educational, accessibility to inputs, personal and family characteristics, and soil fertility status were identified to influence adoption of SLM practices. The study concluded that the level of adoption of SLM practices was still low in Nigeria.

Keywords: *Adoption, Sustainable Land Management, Farmers*

REJUVENATION OF INDIGENOUS KNOWLEDGE SYSTEMS: A DRIVER OF SUSTAINABLE DEVELOPMENT IN NIGERIA

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Abstract

For decades, local people of southwest Nigeria have depended so much on their native knowledge for survival and economic empowerment and replete with different types of Indigenous Knowledge Systems (IKS) which in the past formed a core part of the indigenous economy. IKS is viewed as the baseline for the evolvement of modern technology and repository of culture and tradition which is an enviable tool in sustainable development. This article explores IKS as a driver of sustainable development in Nigeria. Qualitative techniques were used such as in depth and focus group interviews and a critical discourse analysis was used to review relevant literature. The major thrust of this study, therefore, is to capture first, how IKS which was virile in the past, eventually sank into the abyss and second how IKS could be revived as a basis for modern technological advancement. The factors which retarded the progress of IKS were also investigated. Solutions were provided on how to correct inherent danger in over dependence on vertical approach to IKS development at the expense of horizontal approach. The study recommended that for the rejuvenation of IKS to be effective in Nigeria, the government should go back to the drawing board by evolving a pragmatic national policy on indigenous technology.

Keywords: *Revival, indigenous technology, modern technology, national policy, progress*

LAND ISSUE AROUND THE LANDS RECOVERED IN THE REGION OF TAHOUA IN NIGER

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Abstract

The present reflection analyzes the situation of farmlands and pastoral lands in the region of Tahoua in Niger in connection with the environmental conditions in a context marked by considerable regional demographic growth of 4.6% in 2012. These hinder the efforts of the country in the wrestling against food insecurity. It also analyzes the land stakes in this particular case, the intervention of the programs of recoveries of lands and the strategies developed by actors to guarantee their food security. It results from the synthesis of direct observations and from the inquiries on ground. The investigation realized in 2010 concerned 420 households distributed in twenty selected villages following a reasoned sampling and according to demographic weight of eight (8) departments of the region. The objective is to measure the impact of the land dynamics in fighting against the food insecurity and poverty of women in the region of Tahoua. It emerges from this study that 3% of the households without land; in spite of the average of nine (9) individuals by households, or approximately 2.62 hectares by field. The surfaces of fields vary from 0.11 to 17 hectares. Fields are located on trays, in the slum and at the level of dunes in agricultural zone. We attend an emergence of fields beyond the north end of the cultures. Most of the forest lands were transformed into areas of pasture, then into fields of culture after the development interventions.

Keywords: *Land tax, Lands got back, Tahoua, Niger.*

POSITION OF THE POLISH FOOD PROCESSING IN THE FOOD CHAIN

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Abstract

Polish food industry is one of the main components of the food economy. It is the largest recipient of unprocessed agricultural commodities, and, at the same time, the main supplier to the food trade (bothe wholesale and retail). The importance of the food industry is also due to the fact that processing plants integrate the entities involved at all stages of food chain (from farm to table). This proces is favored by a steady increase of Polish agriculture marketability, as well as the growing demand for highly-processed foods. In the past decade, has occured a rapid growth of the Polish food industry. The number of processing plants certified to sell their products on the EU market has significantly increased. It was also noted a large (more than three-quarters) increase in the sold production value of the whole food industry (including tobacco). After the Polish accession to the European Union a strong growth of food exports took place. Its value, in the years 2004-2014, accounted for more than a half of the sold production value of the whole food industry. At present, the Polish food industry employs approx. 415 thousand. people, while its share in the creation of GDP (measured by gross value added) is fairly stable at 2.7-2.9% on average.The main objective of the study was to determine the position of Polish food industry in the food chain.

Key words: *Food industry, food processing, agriculture, trade, Poland.*

MILK PRICES IN THE EUROPEAN UNION BY 2025 AND PROJECTION OF THE PROFITABILITY OF MILK PRODUCTION IN POLAND IN 2020

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Abstract

In Europe, more than 70% of milk production falls on the European Union countries. Among the largest milk producers in the EU, Poland ranks fourth. The abolition of quotas for milk production and increase in supply to the market contributed to the decline in milk prices. The aim of the study is to determine the impact of the rate of change in prices of agricultural inputs and changes in milk yield of cows and milk prices on the profitability of milk production in Poland projected for 2020. The sample consisted of 169 farms which in 2014-2015 kept an average of 27 cows. In 2015, the index of the profitability of milk production amounted to 130.7%, and in comparison to 2014 it decreased by 18.4 percentage point.The results projection for 2020 show an improvement in milk yield of cows (by 12.4%) and milk prices (by 15.4%). Stronger growth in the revenues (by 29.1%) than the cost of keeping cows (by 15.5%) will stimulate the improvement of economic results. The index of the profitability of milk production will increase by 15.4 percentage points, and income per cow by 73.3%. This means that it will be at a level similar to 2014. Research shows that fluctuations in selling prices of milk are possible (+/-8.7%). Despite this, the milk production will continue to be profitable. Results of this study are consistent with the projection of the European Commission, which provides for an increase in milk prices and milk production in the EU.

Keywords: *Milk production, prices of milk, profitability of milk in 2020, Poland*

KNOWLEDGE-BASED ECONOMY: THE POLISH CASE

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Abstract

Knowledge is considered a basic factor defining the scope of economic growth and an improvement in efficiency and at the same time the level of competitive advantages in the present world. Virtually key features of knowledge-based economy are narrowed to a common use of information and communication technologies, implementation of innovations and increasing role of human capital. The implementation of knowledge-based economy assumptions was approved as a common objective of development in the European Union (EU). In the Strategy 2020, the development model concerns three mutually complementing priorities, i.e. intelligent development based on knowledge and innovations, sustainable development and the development supporting social inclusion. Poland occupies one of the lowest positions among the EU countries in the world and the EU ranking in respect of the knowledge-based economy development.Relatively low level of the indicators concerning knowledge-based development in Polish economy and other new member countries largely reflects the situation in agriculture. The pace of innovative progress in agriculture is much lower than in other sectors of Polish economy.The support for "intelligent" development of agriculture in Poland is provided by the Rural Development Program (RDP). Over the period 2014-2020, the share of total support for the activities targeted at the implementation of first pillar of the Strategy 2020 (intelligent development) is fixed at 40% of the total RDP budget.Broad implementation of innovative solutions and knowledge-based actions to Polish agriculture requires primarily the rise in financial allocations for R&D and better use of the EU support.

Keywords: *Position of Poland in the EU, indicators, agriculture, support*

GLOBAL FOOD MARKET – NEW FACTORS INFLUENCING DEVELOPMENT

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Abstract

During the long period before 2002 the global index of real food prices showed downward tendency. This resulted from the dynamic economic growth, technological progress and supporting of agriculture in many OECD countries. The supply factors mainly determined global food price levels. Meeting food needs in developing countries was highly dependent onimports. This increased the role of food exporting countries which drove towards liberalization of international trade.In the years of sharp price increase followed by financial crisis, the new market forces appeared such as: support granted to biofuels in US and EU, competition for land of food and non-food agricultural products, links between food and fuel markets, increase in demand for food in emerging economies. In effect demand factors determining food market development prevailed over the supply ones. However, the duality existing in the global economic system has been also spreading to the global food sector. The developing countries could hardly benefit from high prices on international agricultural markets because they had no potential to start additional production in a short time. Price transmission from the global food market to local agricultural sectors was insufficient as well. This has brought about the loss of reliabilities of free market as a source of food for states with scaresnational food supply. The policy response of many developing countries has resulted in tendencies to increase self-sufficiency in food production.

Keywords: *Global food market, factors, development, food price crisis*

POSSIBILITIES DEVELOPMENT OF NEW RISK MANAGEMENT TOOLS IN AGRICULTURE

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Abstract

The experience of countries of the Community clearly indicate that the existing risk management instruments (including insurance subsidized) are not fully utilized, and what more do not guarantee fully the financial stability of farms. Hence appear the new needs for innovative risk management tools in agriculture.The aim of the study will attempt to assess past experience in the implementation of risk management tools (including agricultural insurance subsidized) in Poland in terms of the possible the development of new risk management instruments. For the analysis of the legal status were used the Polish insurance regulations and EU legislation in the range of the functioning of risk management tools recommended by the CAP. Conducted analyzes indicate that the market for crop insurance and livestock is poorly used by Polish farmers. It is estimated that only 12% of farms in Poland insures the their crops. In the case of animals the situation is even more unfavorable, because in Poland we have insured only 5% of the animals. Moreover, the level of the utilization of subsidies for agricultural insurance is low. The analysis shows that many farmers do not decide to buy insurance. Lack of comprehensive system solutions for the protection of risk in agriculture will force the need to introduce the new instruments such as the: indexed insurance, Mutual Fund (MF) or Income Stabilisation Fund (ISF).

Keywords: *Risk management tools, Risk management in agriculture, Common Agricultural Policy, Poland.*

CONDITIONS OF AGRICULTURAL LAND PRICES DEVELOPMENT IN POLAND

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Abstract

The aim of the paper has been to diagnose factors determining agricultural land prices, classifying them and determining which of them plays the most important role. The considerations were based on selected subject literature, the results of researches conducted by other authors, as well as analysis of statistical data from the Central Statistical Office of Poland and Eurostat. Factors determining agricultural land prices in Poland can be divided into two groups: 2) Market: supply and demand for agricultural land allotted to agricultural production; supply and demand for agricultural land that can be, in compliance with the binding law, allotted to purposes other than agricultural; simultaneous functioning of two market segments - private (on which a majority of land trading is conducted among farmers) as well as the state market segment – the Stock of Agricultural Property of the State Treasury managed, on behalf of the owner - the State Treasury, by the state institution - the Agricultural Property Agency; profitability of agricultural production. 2) Non-market: historical conditions – dominance of private property in Polish agriculture, both in the market economy and in the previous economic system; tradition, culture - passing farms from generation to generation; Poland's accession to the European Union and covering Polish farmers with common agricultural policy instruments; ending the transitional period of purchasing Polish agricultural properties by foreigners on 1 May 2016. After this period, the hitherto limitations (special permits) for foreigners in purchasing agricultural properties in Poland were lifted.

Keywords: *Agricultural Property Agency (APA), price of agricultural land, agricultural land market*

IRRIGATION WATER QUALITY IN ALENTEJO (PORTUGAL) STUDY OF THE IRRIGATION PERIMETER OF THE RESERVOIR OF ROXO

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Abstract

Alentejo is a region of Portugal located in the south of the country and the main economic activity is agriculture. In Alentejo the precipitation is very irregular. The problem of droughts often occurs.The Alqueva reservoir is the biggest reservoir in Europe and provides water for more than 120,000 hectares for agriculture. Before the use of the reservoir, the main agricultural products were cereals. Now farmers grow vegetables and they make an intensive culture of olive trees and almond trees.The Roxo reservoir is one of those will receive water from Alqueva in 2016. The increase of water in quantitative and qualitative terms can provide very significant increases in the growth of the soil production that we must monetize in the best way.The aim of this study was evaluate the quality of water resulting from the monitoring carried out during 2014/2015 in the hydraulic system and in the drainage network of the irrigation perimeter of Roxo's reservoir to be made a more sustainable management of irrigated area. The main conclusions were as follows: i) the water of the irrigation channel and drainage network show a mild to moderate degree of salinity risk; ii) doesn't show characteristics to modify the soil infiltration conditions; iii) indicates degree of restriction slight to moderate due to the amounts of Na^+ and Cl^-; iv) the drainage network presents toxicity due the chlorides and boron; v) the ammonia nitrogen and nitrate values were low. The application of nitrogenous fertilizers seems to influence the results.

Keywords: *Irrigation water quality, Sustainable management,Droughts, Alentejo, Portugal.*

IMPACT OF TOURISM DESTINATION ENVIRONMENT ON COMPETITIVENESS OF RURAL DESTINATIONS IN VOJVODINA (SERBIA) AND HUNGARY

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Abstract

The competitiveness of tourism destination is conditioned or limited by the influence of many factors that appear outside of a destination or are in its immediate environment. In accordance with the strategic management concepts, elements of the external environment of rural tourist destinations are analyzed on two levels: macro and micro.The aim of this paper is to explore how destination environment – economic stability, characteristics of demand and socio-cultural changes, community participation and attitudes, cooperation between stakeholders in tourism (intra-industry interactions) and incentives and financial support for the development of tourism by the government and local authorities- affects competitiveness of rural tourism destinations in Vojvodina (Serbia) and selected counties in Hungary. Tourismexperts fromSerbia (136) and Hungary(138) wereasked to evaluatethe current conditionof 17 attributes which affect thecompetitiveness ofrural tourismdestinations.Likert scaleof five marks was used in order to determine the effect of the environment on the competitiveness ofVojvodina/Hungary as aruraltourism destination.Selected tourism experts were interviewed from September 2015 until the end of January 2016.The research in this paper examined the relative importance of actions taken by the industry stakeholders and government efforts to improve the competitiveness of the sector. It was found that companies have a greater impact, because they have a major role in providing services to visitors and enable tourists to experience the rural areas, while state and provincial institutions are responsible for managing and supervising the work of different rural tourism enterprises and providing appropriate support.

Keywords: *Rural destination, Competitiveness, Vojvodina (Serbia), Hungary*

AGRICULTURAL COOPERATIVE AS A FACTOR OF INCREASING AGRICULTURAL PRODUCTION IN NORTHERN KOSOVO

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Abstract

Agriculture has always been the primary activity of the inhabitants of Serbian enclave in northern Kosovo. Among agricultural sectors dominated by farming, there are good conditions for fruit growing, especially for the production of berries (raspberries, blackberries, blueberries).The mountainous landscape of the entire territory of northern Kosovo favours the development of animal husbandry.Qualitative method of observation and analysis method, were used during field research carried out in 2015.to examines the current operations of agricultural holdings. Using the method of synthesis, a solution for more harmonious economic development and prosperity of the Serbian population in the enclave in the north of Kosovo and Metohia is given in the paper.The authors upon research in the field suggest the reconstruction of existing and formation of new cooperatives in order to develop agriculture in the Serbian enclave in northern Kosovo in the field of production, processing , supply of inputs, services and marketing. Agricultural cooperatives despite the economic functions play a dominant role in the overall development of Serbian communities in northern Kosovo.

Keywords: *Agricultural cooperatives, production, economic development.*

SERVICES IN RURAL TOURISM IN THE REPUBLIC OF SERBIA

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Abstract

The Republic of Serbia has comparative advantages for the development of rural tourism and the affirmation of the development of this type of tourism is supported if we observe the availability of resources, the relative development of agriculture as well as the possibility of rural development based on a multisectoral approach. The aim of this paper is to present the types of services provided by rural tourism subjects in the Republic of Serbia. In order to analyze the characteristics, authors have realized survey covering 104 rural tourism subjects in the 11 districts in the Republic of Serbia. The database of the National Association “Rural Tourism of Serbia” is used to form the sample. The sample was formed by random sampling. The instrument used in the study is a questionnaire. Methods that are used in this paper are: methods of analysis and synthesis, comparative method, field research and statistical methods. For the statistical analysis of data obtained by survey research, methods of descriptive statistical analysis and χ^2 (Chi-square) test are used and the SPPS software package. The authors analyze the results of research and propose measures and actions.

Keywords: *Rural tourism subjects, services, the Republic of Serbia*

THE POTENTIALS AND PERSPECTIVES OF ORGANIC AGRICULTURE IN FRUŠKA GORA (VOJVODINA PROVINCE, SERBIA)

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Abstract

The authors analyze the potential and future trends of organic agriculture in the area of Fruška gora national park. A special characteristic of this area is the presence of a national park and conservation area that require the application of sustainable solutions in the management of this area. Due to the specific nature-climatic and economic conditions, Fruška gora has an extraordinary potential for the application of organic agricultural production. Production potentials of this region are located in its protection zone in the following branches of production: fruit growing, viticulture, vegetable growing, animal husbandry, beekeeping, fishing, and medicinal herbs growing. However, despite the existing potentials, organic agricultural production in Fruška gora is at the beginning of development. The authors point out several significant factors that affect the further development of organic agriculture in Fruška gora. One of these factors is the inadequate sustainable management of this area so that organic agricultural production is not sufficiently represented and economically valorized in Fruška gora. Some of the other limiting factors of underdeveloped organic agricultural production in Fruška gora are the insufficient education of producers about organic production systems, inadequate level of incentives and subsidizing of organic farming, the insufficient number of processing and distribution companies, unfavourable demographic trends, insufficient organization of agricultural producers, etc. In order to define the optimum strategies for the further development of organic agriculture, the authors suggest a potential TOWS matrix.

Keywords: *Organic agriculture, potentials, perspective, Fruška gora, Vojvodina.*

OPTIMIZATION MODEL OF VEGETABLE PRODUCTION STRUCTURE IN SERBIA

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Abstract

Indoor vegetable production, or production in greenhouses enables year-round production, the combined off-season production, greater control of diseases and pests, but also significantly greater production value compared to open field crop production. The aim of this paper is to determine such a structure of vegetable production in greenhouses that will realize the maximum financial result considering various biotechnological, production, technological and market constraints. In this context, model for optimization of vegetable production structure in greenhouses was formulated, and at the same time, model analysis and model solving was made using the method of linear programming and the software package "LINDO". Model was analyzed in three variants, depending on the selected optimality criterion: maximization of net income (variant I), maximization of economics of production (variant II), minimum deviation from the extreme values (variant III). The results show the optimal sowing - planting structure for all three variants of defined model; the participation of certain groups of crops in the overall sowing - planting structure; the required number of working hours in the observed months of working peaks; that variant I achieves the highest net income for defined limiting conditions (4.216.867 din); that variant II achieves the highest economics of production (2,25), while variant I and variant III generate the same economics of production (2,20).Moreover, variant I realized the greatest value of production (7.080.300 din), but also the highest variable (2.863.433 din) and total costs (3.263.433 din). Published data of various experimental paperworks were used for this analysis, as well as data from the accounting records of the farms and data of Statistical Office of the Republic of Serbia.

Keywords: *Vegetable production, Optimization, Model, Greenhouse*

AGRICULTURAL ADVISORY SERVICES AS A FACTOR OF ECONOMIC DEVELOPMENT OF AGRICULTURE IN NORTH KOSOVO

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Abstract

The best way to implement scientific achievements in agricultural production in practice on country farms is through the Agricultural Extension Service. The main objective of the Agricultural Extension Service is education and training of farmers to improve production and other economic indicators on the farm. In Serbia there is state organized and financed Agricultural Extension Service and this advisory model is currently in accordance with the socio-economic conditions due to the fact that agriculture in Serbia is almost entirely organized on the family farms. The authors analyze the current state of Agricultural Extension Service in Serbia by the method of descriptive statistics. Particularly they analyzed the work of Agricultural Extension Service in the north of Kosovo. To assess the overall situation of Agricultural Extension Service in Serbia was used the available statistical data, and to analyze the work of the *Agricultural Extension Service Kosovska Mitrovica*, data of this institution was used. Agricultural advisory and professional services of the Republic of Serbia today number 34 with 251 advisors; 22 departments and 166 advisorson the territory of central Serbia and 12 departments and 85 advisors in the area of Autonomous Province (AP) of Vojvodina. In the area of northern Kosovo, Agricultural Extension Service encourages the development of agriculture and improves the economic effects on the farm, contributing to the education of farmers and the need is to involve as many farmers as possible.

Keywords: *Advisors, Agricultural Extension Service, economic development*

SELECTION OF FARMS FOR THE FARM ACCOUNTANCY DATA NETWORKSYSTEM IN THE REPUBLIC OF SERBIA

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Abstract

The aim of this paper is to analyze the process of selecting farms in the Farm Accountancy Data Network (FADN). All European Union countries through the FADN system collect technical, financial and economic data from over 82 thousand farms. In some countries, FADN system was introduced back in 1965. Over the years FADN has developed as a unique system that provides information on agriculture in the member states; FADN is arranged by the common EU regulations. The biggest challenges within FADN system is the implementation of the methodology for the selection of farms in terms of the number, type and certain economic size, as well as the motivation of farmers to agree to be part of the system. FADN research is a very complex and delicate one because the collected data include all activities on farms during the twelve-month period. Selected farms from which are received detailed financial information are very important sectors of agriculture and therefore represent an important source of information for agricultural policy. The collection of FADN data can provide valid data to be used for the purpose of managing agricultural holdings and therefore is valuable tool for farm advisory services and farmers' associations assisting farmers in improving the profitability and competitiveness. Methodology for farm selection has to be standardized at the level of the European Union and the candidate countries for accession. Standardized and uniform sample allows standardized results which can be compared between countries. Results of this study showed the importance of the process of selection of farms in FADN which includes a methodology development and implementation of the chosen methodology.

Keywords: *FADN, selection plan, farm sample, agriculture.*

IMPACT OF LAND SIZE ON PRODUCTIVITY, INCOME AND PROFITS FROM PEPPER CULTIVATION IN SRI LANKA

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Abstract

Pepper is an important spice crop grown in Matale District of Sri Lanka, for exports and domestic consumption. Varieties of pepper grown are Sri Lankan local variety and 'Panniyur'. Pepper production had shown variations over the years due to poor management and low productivity. This study analyzed and compared the production levels and costs, income and profitability of pepper cultivation among small and large scale pepper farmers. A stratified random sample of 120 farmers, consisting of 76 small famers (<5 acre farms) and 44 large farmers (>5 acre farms) were selected for study. A pre-tested questionnaire was used for data collection. Descriptive statistics and mean comparisons were performed. The average extent of land under pepper cultivation was significantly different ($P<0.01$) with 3.49 acres for small farms and 8.85 acres for large farms, and 66% of lands were under local pepper varieties. Fertilizer was the only input applied by both group of farmers. The mean yield of pepper was 636 kgs and 560 kgs per acre for small and large farms respectively and did not differ significantly. Mean comparison showed that there was a significant difference ($P<0.01$) in cost of production, income from pepper sales and profits from pepper between small and large farmers. There were no significant differences in farm gate prices received for raw and processed pepper by small and large scale farmers. It can be concluded that there is significant differences between small and large scale pepper farmers in the extent cultivated, incomes received, cost of production and profits earned, while there is no differences in the prices received for raw and processed pepper.

Keywords: *Pepper, productivity, income, profits, Sri Lanka.*

THE CONCENTRATION ANALYSIS OF AGRICULTURAL SECTOR IN TURKEY: ARE THERE ANY CHANGES IN THE PERIOD 2010 - 2015?

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Abstract

Despite the regional policies taken into agenda in all development plans in Turkey, inter-regional imbalances could not be resolved .Dynamics of the region must be examined in detai lto resolve the inter-regional imbalance problems and in the lightof these data differing policies should be developed in each specific region.Thus, detailed studies are needed on basis of regions and provinces. It is critically important to establish the priorities in agro-food production for utilizing the resources effectively and for competing against others like in Turkey whose agro-food sector is relatively dominant both in terms of population and employment. Therefore, it is aimed to determine the sectorial priorities in agriculture for using geographic concentration coefficient analysis in agricultural sub-sectors in Turkey.Inthiscontext, considering the Nomenclature of Territorial Units for Statistics (NUTS) - Level 2 (26 regions), the weight of employmentstructureofruralareasinTurkeywill beanalyzedfor eachregion.Location coefficients will be calculated for each sector by comparing the population that is living in rural areasandworkinginagricultural,industrialandservicesectors,withsectorvaluesofTurkey's ruralareas.Later,agriculturalsector will be analyzedonthebasisofsub-sectorforLevel2 regions. These analyses will be done for both 2010 and 2015 to compare the differences during this period. The reason of these diversities between mentioned time periods will be clarified by utilizing the agricultural policy applications in Turkey.

Keywords: *Regional Development, Geographic Concentration Coefficient, Location coefficient*

DETERMINANTS OF RURAL TOURISM: A CASE STUDY OF KASTAMONU, TURKEY

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Abstract

Tourism is an economic event that provides a balance between natural, social, cultural and economic values. It is a sector that leads to recognition of other communities and individuals. In Turkey, the draw of tourism is primarily the sun in the summer; tourism is perceived as a type of triangle formed by the sea and sand. In recent years, in rural areas of Turkey, rural tourismhas beenadopted as a new approach that shows rapid progress. The rapid progress is what makes rural tourism be included in the regional analysis. Rural tourism must say that talking about the importance of making the regional analysis. This study examines the status of rural tourism areas and aims to determine the existing and potential rural tourism value of Kastamonu by the GIS method. GIS modeling of mapped areas shows the rural tourism potential of the area. Identification of regional opportunities for rural tourism in general is very important in terms of determining more realistic tourism strategies. The development potential of rural tourism is determined based off of the detailsof the strengths and weaknesses of the region, exposing the threats and opportunities. The main aim of this study is based on this idea. Turkey will be an important area in terms of rural tourism. This study will evaluate the rural tourism potential of Turkey in 2023 based ona study of the Kastamonu province, highlight the importance of the tourism strategy and make recommendations for improvement.

Keywords: *Rural tourism, Kastamonu, GIS, SDG 2015-2030*

STATUS OF AGRICULTURAL TOOLS AND MACHINERY CAPITAL IN TURKISH AGRICULTURAL ESTABLISHMENTS AND EVALUATION OF ADEQUACY

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Abstract

The active capital in agricultural enterprises consists of land (farm) capital and tenant capital. One of the most important elements of the tenants capital is tools and machinery capital. The presence of the tools and machinery capital repeatedly helps to provide employment in the manufacturing of many products in agricultural establishments. This capital is mainly assessed as lifeless stock or inventory. Capital consisting of all kinds of the tools and machinery is found to increase the success of work in business and makes indirect impact on production. The tools and machinery capital in accordance with the activities of agricultural enterprises is essential to work with sufficient capacity and regularity.In this study, we discuss the conditions of tools and machinery capital in the agricultural sector of Turkey. Quite a number of studies have been carried out on machinery capital. Some secondary data have been obtained for the purpose of this study. One of the most important database belong to the tools and machinery capital of Turkish Statistical Institute and other different Institutions and Organizations in national and international arena. The data obtained would be used to evaluate the level of the tools and machinery capital in the agricultural sector and appropriate proposals suggested.

Keywords: *Agricultural tools and machinery, Tractor and the combine harvester statistics, Turkey*

FRUIT GROWING IN EAST MARMARA REGION OF TURKEY: KOCAELI SAMPLE FROM PAST TO FUTURE

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Abstract

Turkey is one of the main fruit producing countries in the world, which is bestowed with very good topography, soil, and climate conditions that highly support growing of fruit cultivars. In Turkey, more than 85 fruit species are grown naturally. The East Marmara Region had been an important transmission route of trade and cultural interaction through the regions of the Asia and Europe during the past. This study used a questionnaire to obtain data from 97 enterprises about the situation of fruit culture and also employed secondary data of fruit production for the Kocaeli Province, and investigated fruit cultivation opportunities. The information about current and past grown cultivars, technical conditions, and traditions was collected via face-to-face interviews with growers. Frequency distributions, variance analysis, and chi-square tests were performed by using SPSS 22 data analysis program. The results arepresented as percentages. In the study, the main problems, we determined, are industrialization and unplanned construction, which have negatively impacted fruit culture. The reported facts in favor of fruit cultivation are increasing awareness of nature and mechanization. Walnut and sweet cherry production has potential value for the future.

Keywords: *Kocaeli, East Marmara Region, Turkey, fruit growers, questionnaire, survey*

DESIGN OF A SMALL-SIZE MILKING PARLOR AND ITS MANAGEMENTVIA PROGRAMMABLE DIGITAL CONTROLLERS

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Abstract

In extracting the highest possible amount of milk from a dairy animal, it is important that the functional and structural features of the milking machines used do not cause irritation to the animal or discomfort to their udders. To ensure that the highest quality of milk is extracted from the milking machines, it is key that a hygienic milking process is employed using hygienic devices. As part of this hygienic process, system cleaning is performed through imitation milking, where milking clusters are attached to artificial milking liners that are connected to a washing boiler, instead of a milking animal. With the system operating in washing mode, detergent and rinse water, rather than milk, are delivered through hoses. The use of a fully automated milking system to minimize errors and reduce the amount of human labor involved in the milking process benefits both manufacturers and consumers. In this paper, a 2x5 (for ten animals) milking unit, operated using Programmable Logic Controllers (PLCs) was designed. The necessary power and control circuits were controlled by software installed on the PLC. With this technology, the milking process can be programmed to automatically stop once the milking is completed.The operator can intervene to stop the system. The system can also be operated manually.

Keywords: *Milking parlor, Programmable Logic Controller, Automatic Washing System*

AGRICULTURAL PRODUCTION IN THE CONTEXT OF INDUSTRIALIZATION AND FOOD SECURITY IN VIETNAM

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Abstract

Since 1990s the bloom of industrialization and urbanization brings the changes of social and economic issue of Vietnam rural areas. During this process, rural households have reduced agricultural land for cultivating. From the status of food producers now they become food consumers. Through surveying 215 households in Bac Ninh province, the study shows that that industrialization and land conversion process affected household food security in several aspects: the lost of agricultural land and surplus agricultural production decrease; unguaranteed decent work for peasants and high living cost; the decline of living quality and food safety. Food consumption of the family has shifted from self-reliance to the way that more depend on market which increases food expense propotion on household budget. However, spending more on food does not mean satisfied since the suspiciousness of food quality. Household food security becomes more vulnerable, especially for households that have limited access to land and incapability of finding stable jobs. One of the strategies of rural households is diversify their livelihoods, accepted multi-spacial household model. And when income from non-farm jobs could relatively supply enough their need of cash, they would rather consume high quality food than grow and sell high yielding variable. Rural households move back to the local traditional agricultural activities to ensure their own food quality.

Keywords: *Industrialization, land conversion, food security, agricultural activities, rural development*

DEVELOPING GOAT KID MEAT VALUE CHAIN BASED ON GEOGRAPHIC INDICATIONS: AN APPROACH FOR RURAL DEVELOPMENT IN ALBANIA

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Abstract

Albania is well known for its very rich in its agro-biodiversity. In the North of Albania, the Hasi goat breed is a good example of using agro-biodiversity as a resource for local development. Animals of this breed have a clear genetic profile, are well-adapted to harsh conditions and to abundant pastoral and sylvio-pastoral resources in the karstic plain. Products as goat kid meat and milk have e good reputation. In order to address the territorial dimension of local value chains; Geographical Indication (GI) was identified as a possible adequate sign of sustainability and origin to be developed. The objective of this work is to identify the specifics of the product (Hasi goat kid meat) in order to complete a successful GI building process and direct support to the value chains. For this purpose it was implemented a territory-based study mainly based on bibliography, interviews of farmers but also morphological measurements of animals. Four main points of attention have been identified; (1) a strong delimitation of the area of origin based on geo-morphological criteria where sinkhole agricultural and forage production is an important part of this; (2) the specificities of the breed including genotypic and phenotypic characteristics as well as the quality and reputation of its products, especially kid-meat goat. (3) the environmental issue and management of the pastoral resources in naturalist terms and their relation to the quality of meat;(4) the traditional management, breeding system and pastoral practices; and specifications to be potentially included in the Code of Practice (of the GI).

Keywords: *Albania, Geographic Indication, Territory, Value chain, Hasi goat*

THE COMPETITIVE POSITIONS OF POLAND AND OF THE COUNTRIES OF THE WESTERN BALKANS IN AGRI-FOOD TRADE WITH THE EUROPEAN UNION

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Abstract

The aim of the paper is to compare the competitive positions of Poland and of six countries of the Western Balkans (Albania, Bosnia and Herzegovina, Croatia, Macedonia, Montenegro and Serbia) in their trade in agri-food products with the European Union (EU) in 2010–2015. To this end, the synthetic trade competitiveness index (CI) was created, being the arithmetic average of two normalised indices of the competitive position, i.e. the trade coverage index (TC) and the Balassa revealed comparative advantages index (RCA). The study is based on the trade data from the WITS – *World Integrated Trade Solution* database(Comtrade, HS – Harmonised System 2002), expressed in USD. Agri-food products are understood as products classified in chapters 01–24 of the Harmonised Commodity Description and Coding System (HS). The research results show that only in trade of 5 product groups no country from the Western Balkans competed with Poland in the EU market. In other product groups which were competitive in Polish exports Poland competed in the EU market with some of the Western Balkan countries.

Keywords: *Poland, Western Balkans, competitive position, agri-food products*

THE COMPETITIVENESS OF POLISH FOOD PRODUCTS ON THE INTERNATIONAL MARKET

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Abstract

The enlargement of the European Union (EU) resulted in a significant increase in trade in agri-food products within the EU, particularly among the new Member States. The purpose of this article is to evaluate to what extent an increase in trade in Poland's agri-food products, which took place between 2003 and 2014, translated into the strengthening of its position in EU trade in agri-food products. First, there is a brief presentation of results of Polish foreign trade in agri-food products, broken down into agricultural products and food industry products, that are the main subject of Polish foreign trade. Then, the paper presents Poland's position in agri-food trade after accession and among 28 European Union Member States. Furthermore, changes in the level of competitiveness in Polish exports were assessed on the basis of two indices: the revealed comparative advantage index (RCA) and the trade coverage index (TC). The analysis was conducted on the basis of trade data from the WITS Comtrade database, expressed in USD.

Keywords: *Food industry, foreign trade, competitiveness, competitive position*

INNOVATION DIRECTIONS OF EFFECTIVE AGRO-INDUSTRIAL ACTIVITIES

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Abstract

The bodies of the Russian Federation's state management, scientific society, agri-business face the challenges of searching for new directions to provide effective development of agro-industrial activities in the modern conditions of increased competition. Severity of problems in development of the Russian agro-industry is caused by the complex of climatic, historical, economic factors.The need for creation and justification of conceptual alternatives based on forming innovative directions for support of effective development causes application of both new and improved management decisions technologies and updated basis criteria and parameters of their introduction with appropriate adoptive mechanisms on territorial levels and in the industry. The objective of the paper is to justify innovative directions of provision effective agrarian activities. The analysis of economic literature, regulatory basis shows the certain reserve with potential to increase the efficiency of domestic agro-industrial production. Analysis of the Russian Federation's agro-industrial complex condition allows assuming that the main hindrance factor in extended introduction of innovations is persistent non-solvency of agrarian enterprises and lack of required means at research institutions to promote their developments. Implementation of innovative directions for effective development of agro-industrial complex enables proving conceptual alternatives and forecasting result capacity of their use for aspects of rural development, improving mechanism of reducing negative anthropogenic influence on environment and ecosystem rehabilitation.

Keywords: *Agro-industrial complex, innovations, sustainable development of rural areas, biotechnologies, import substitution.*

DISTRIBUTION CHANNELS OF APPLES IN THE REPUBLIC OF SERBIA

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Abstract

This paper aims at analysing distribution channels of apples in the Republic of Serbia in 2015, with particular focus on export of fresh apples. Apple production of Serbia in 2015 is increased compared to the year before. Concurrently, apple export is increased when comparing the same intervals. Apples found in export originate mostly from orchards owned by big companies or from a well known fruit growing regions in Serbia (Grocka and Smederevo). Introduction and popularisation of Ultra Low Oxygen (ULO) keeping facilities had the big part in export development in Serbia since 2005. Efficiency of all business decisions is affected by choice of marketing channel. Serbia is a leading regional producer and exporter of apples. One of the biggest export problems is obsolete assortment. The most common variety is ”Ajdared”, followed by Golden Delicious, Red Delicious and Granny Smith. Other varieties are less frequent. Apples can be found in different types of distribution channels, such as processing, selling at green market, wholesale or retail, but more than a half of apple production is exported and this percent increases every year. Large quantities of fresh apples are processed into apple juice. Other types of processed apples products are puree, jams, dried apples, and apple brandy. These product categories has low share in total quantities of processed apple products in Serbia.

Keywords: *Distribution channels, apples, export, Serbia*

THE SENSITIVITY OF NET FARM INCOME IN THE ZLATIBOR DISTRICT (SERBIA) TO CHANGES IN GOVERNMENT SUPPORT

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Abstract

In this paper we have analysed the impact of the changes in government support on net income of the agricultural holdings in Zlatibor district in the period 2015 - 2016. In 2015 total subsidies per ha for crop production were approximately EUR 100, while in 2016 they have been reduced to only EUR 33. Subsidies for dairy and livestock production have also been changed compared to the previous year. Objective of this paper is to demonstrate out the immediate consequences of these changes by pointing out their impact on the farmer's income and farming structure in the short time. Starting hypothesis is that these sudden changes in agricultural policy measures will have negative effects on farm net income and farming practices.

Methodology used for writing this paper consists of the structure and sensitivity analysis of the net income, based on existing data and the data collected directly from agricultural holdings in Zlatibor district.Results show that farm net income will be reduced, as a consequence of reduced subsidies. Second, reactions on the farm activities show that the farmers are unable to adjust to sudden changes in government support and there is a clear need to have more sensitive policy measures. Also are presented the factors that need to be reconsidered in creation of agricultural policy measures and expectations from the latest changes in agricultural policy.

Keywords: *Subsidies, Serbia, agricultural policy, farm net income*.

ECONOMIC BUSINESS ANALYSISOF DAIRES FROM PESTER AREA

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Abstract

This paper presents the results of business analysis from the dairy areas of Pester which produces, purchases, processes and sales milk and milk products. The analysis of business results involves business incomes and expenses of financing and financial incomes and expenses, i.e. financial result from continuing operations for the period from 2011 to 2014. year, while other income and expenses are excluded for they are generally unique, and as such are not essential for the survival and growth of the company.The goal of the analysis is to identify untapped potentials and current problems, and more rational use of available resources in order to improve the business.In this paper were used the original dairy data (financial report for the period from 2010 to 2013, and related accounting records). The main conclusion is that the dairy despite the achieved business results hasn't fully exploited the resources at its disposal.

Keywords*: Business analysis, business result, business risk, dairy*

ENZYMATIC PRE-TREATMENT FOR QUALITY IMPROVEMENT OF BIO-OIL FROM SUGARCANE RESIDUE

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Abstract

The lingo cellulose post-harvest sugarcane residue (tops + leaves) is a good feedstock for bio-oil production after conversion of its insoluble carbohydrates, mainly cellulose, to simple sugars. Main focus of the present investigation was therefore, to reduce the lignin content and to determine the optimum conditions, for enzymatic pre-treatment of post-harvest sugarcane residue using enzyme cellulose with β-glucosidase after physical and alkaline pre-treatment.The independent variables for enzymatic pre-treatment of sugarcane residue,, time (24, 48, 72h) enzyme loading ratio (5:10, 10:10, 15:10) and substrate concentration (1.5, 2.5, 3.5% w/v) were taken into account. Designed experiments were conducted randomly to find the effect of these variables on reducing sugar, glucose concentration, lignin, ash, cellulose and hemicelluloses. Data obtained from RSM were subjected to the analysis of variance (ANOVA) and analysed using a second order polynomial equation.The reducing sugars increased with increase in time, enzyme loading ratio and substrate concentration (48h, 10:10, 2.5%) and then decreased while lignin decreased with increasing enzyme loading ratio. The reducing sugar varied from 30.1 to 39.8 g/L and glucose concentration was in range of 20.1 to 33.9 g/L while lignin varied from 7.2 to 10.3% w/w and ash ranged from 6.6 to 8.6% w/w while the cellulose ranged from 55.3 to 52.5% w/w and hemicelluloses varied from 9.2 to 6.4% w/w/ Under optimized conditions (substrate concentration 2.11% w/v, time 64.56 h and enzyme loading ratio of 15:10).

Keywords: *Enzymatic pre.treatment, bio.oil, sugarcane residue*

ALGERIAN DAIRY SECTOR ANALYSIS: DEFICIT ASPECTS AND PERSPECTIVES

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Abstract

Algeria is the largest country in Africa and the tenth largest in the world. Because of feed traditions, it is considered among the major consuming countries of milk and derivatives in Maghreb. The average milk consumption is estimated from 110 to 115 liter/year/inhabitant. However, this demand of milk, cannot be justified solely by the high rate of population growth, urbanization and improvement of the purchasing power of the population. Local raw milk production, covers about only 40% of demand, reaching the threshold of 3.6 billion liters in 2015, an increase of 84% compared to 2000, which coincides with the launch of the National agricultural development plan. This study aimed to contribute to the understanding of the constraints of the local dairy production sector and integration of the local raw milk in the industrial chain, through an analysis of milk powder imports data, dairy products and milk derivatives, collection rates, the distribution of the effective dairy herd during the past decade.The results of statistical data analysis, dealing with the field of external trade, showed that the dairy industry is highly dependent on the world milk market; it is based primarily on the recombination of the imported milk powder, which creates a total disconnection of the local raw milk production. Despite the action plans, milk production is low, with a marginal collection rate, not exceeding 15% essentially. It is ensured by improved breeds of import cattle, unequally distributed across the territory, concentrated in the coastal areas.

Keywords: *Milk, Production, Livestock, Consumption, Import*

EVOLUTION OF THE LOCAL FARMING SYSTEMS AND THE ECONOMIC POTENTIAL OF ORGANIC DAIRY PRODUCTSIN THE ALBANIAN MOUNTAINOUS AREAS

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Abstract

The Albanian agrarian reforms towards the market economy in 1991 after the fall of communism have pushed farmers to adapt their local farming systems. In the considered territory (municipality of Vithkuq, Korçe District) the average size of the farm is 1,22 ha. The reduction of the population has been accompanied by a sharp increase in the herd size and new dynamics in the local production systems. This mountainous territory has a specific knowledge and know-how especially in livestock farming systems. As the farm size is very small and the summer pastures very rich, the family livestock farming is one of the main sources of family income for the local farmers. As at the national level, this territory suffered by a demographic desertification after the fall of communism. After the first decade of the economic transition the herd size has increased each year since 2000 meanwhile since 2005 a reduction of the population by 56% has been observed. The increased demand for both dairy and meat products has caused a sharp increase in the herd size but also new dynamics in the local production systems (Çili *et al,* 2013) and value chain reorganization. The bargaining power in the milk and meat value chain is asymmetric and the current dynamics of the value chain does not position the products in a niche market capable of engaging a virtuous circle for a good remuneration of the producers and for the reproduction of the natural resources. The main questions to be discussed are about how to supporting the farmers for a better market integration and a better valorization of their local products. According to the (Organic data network, 2016), around 39 producers are considered as organic in Albania and only 0.04% of all arable land is used for organic agriculture. Among the Balkan countries, with 515 ha only Albania is one of the countries with the smallest surface devoted to certified organic agriculture. In this country, mountainous reliefs are dominant and a wide range of agro-ecological zones can be observed. One of the most important activities in the Albanian agrifood sector is the dairy industry (MAFCP, 2014).In the plains, dairy cattle production is dominant, whereas in the hills and mountains, sheep and goat production is more appropriate and developed. Contrasting relief and typical Mediterranean pastures mainly explain the predominance of small ruminants in the mountainous area of Albania. As farms are quite small and alpine pastures are rich, the livestock is the key activity of the farming system and therefore, the main sources for the smallholders in the mountain areas. Researchers consider animal products as a key resource for an endogenous local development. (Bernard *et al*., 2014; Bombaj *et al.*, 2016)

Keywords: *Local Farming Systems; Livestock Systems; Mountainous Area, Albania, Organic Dairy Products*

IRRIGATED FOOD SYSTEMS IN MARADI, REPUBLIC OF NIGER: A COMPARISON BETWEEN OPERATING ACCOUNTS

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Abstract

In Niger, mostfood systems are based on pluvial crops (millet, sorghum and cowpea). However, during the last decade, agricultural policy and technical and financial partners focused on increasing the productivity of irrigated food products. The region of Maradi, located in the Centre-South of Niger, is an area traditionally dedicated to agriculture. Some parts of this region are particularly adapted for irrigation, especially the Goulbi of Kaba and the Goulbi of Maradi valleys.The goal of this study is to establish the socio-economic situation of the main irrigated food productions, based on the following indicators: (i) the crop management technics used; (ii) the results of the operating account; and (iii) the comparisonbetween the village and the adoption of new technic (farmer field school). This paper is based on direct surveysconducted in three areas of the Maradi's region: Soumarana (commune of Safo, department of Madarounfa); N'Yelwa (commune of Madarounfa, department of Madarounfa); Madarounfa (commune of Madarounfa, department of Guidan Roumdji). The software used is Minitab and Excel. The results highlight a good perspective for the irrigation system but this food system is conditioned by the petroleum price and some other input (fertilizer and seed). The operating accounts show that irrigation is a non-negligible income source, which increases the resilience of the farmers.

Keywords: *Maradi, irrigated food system, operating account.*

EU COMMON AGRICULTURAL POLICY AND AGRICULTURAL POLICY OF THE REPUBLIC OF SRPSKA

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Abstract

One of the most challenging issues for the countries that are in the process of accession to the European Union is the reform of agriculture, precisely agricultural policy and its compliance with the Common Agricultural Policy of the European Union (CAP). The strategic orientation of the Republic of Srpska and Bosnia and Herzegovina is a full EU member status, which is defined with signatory to the Stabilization and Accession Agreement in 2008 and confirmed with Application for membership in the European Union, submitted in February 2016. Considering the upcoming accession negotiation process, the reformation of agricultural sector is necessary in all areas of development: production, policy and legal framework and institutional development. Until 2015 Republic Srpska made and adopted two key strategic documents, that determine the directions, objectives and measures for developing of agriculture and rural areas. Recently the Republic of Srpska adopted a new strategic plan for the development of agriculture and rural areas for the period 2015- 2020. Considering that agriculture budget represents a first indicator of the countries sector priorities, objective of this paper is to provide analysis of agricultural policy through the agricultural budget of the Republic of Srpska and its compliance with Common Agricultural Policy of the EU. Comparative analysis is related to the period 2006 – 2014 using EU methodology for the classification of agricultural measures (pillars and axis). Research results show that the structure of measures and scope of budgetary support, defined within agricultural policy of the Republic of Srpska is not compatible with Common Agricultural Policy of the EU.

Keywords: *Agriculture, agricultural policy, Republic of Srpska, European Union*

PREVALENCE OF CENTRAL OBESITY IN SCHOOL STUDENTS (AGED 8-16 YEARS) OF RURAL SOUTHERN WEST BENGAL, INDIA: BASED ON ANTHROPOMETRICAL STUDIES

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Abstract

Prime focus of the study was to reveal the prevalence of central obesity (CO) in school students (age group 8-16 years) using anthropometric indicators. Interschool survey of four large primary and secondary schools of rural southern West Bengal (WB) North 24 Parganas were done, representative for the cross sectional study. Total 551 subjects were screened (based on PCI) among 690 students among which 283 are boys and 268 girls. The major indicators and indices considered here are BMI, waist circumference (WC), hip circumference (HC), waist-hip ratio (WHR), waist-height ratio (WHtR), and conicity index (C.I.), respectively. The main outcome measure is to reveal the prevalence of central obesity among students aged 8-16 years. One way ANOVA was performed to test the differences in mean anthropometric characteristics for age and gender. Pearson's correlations were done to find out the trends of the anthropometric indices with age. Statistical analysis was performed by using SPSS v. 16. Findings of the study highlighted that BMI is the best indicator of overall obesity, whereas WC, WHR, WHtR and C.I are very good indicators of central obesity, which are the probable precursors of cardiovascular diseases (CDVs), Kidney diseases, diabetes, hypertension etc. in adulthood. Growth of hip is higher than waist in both genders. WHR and WHtR show a negative correlation with age. Girls' waist and hip grow rapidly than boys' upto 12-13 years, boys outperformed after that. Girls exhibit a greater WHtR and C.I. than boys.

Keywords: *Central obesity, BMI, WHR, WHtR, conicity index, waist circumference, hip circumference, cardiovascular diseases, hypertension, diabetes, kidney diseases, rural school students, Southern West Bengal*

A COMPREHENSIVE STUDY ON AGE AT MENARCHE AND SOMATIC INDICES BETWEEN BENGALI PRE-MENARCHE AND POST-MENARCHE RURAL SECONDARY SCHOOL GIRLS

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Abstract

The objective of this comparative study was to reveal the age of onset of menarche (as a possible outcome of precocious puberty) of rural Bengali girls in southern West Bengal (North 24 Parganas) and to investigate differences in Somatic indices like BMI and central obesity; waist circumference (WC), hip circumference (HC), waist-hip ratio (WHR) and conicity index (C.I.). Interschool survey of four large primary and secondary schools of rural southern West Bengal (WB), 24 pgs (N) were done, representative for the cross sectional study. Total 551 subjects were screened (based on PCI) among 690 students among which 283 are boys and 268 girls. One way ANOVA was performed to test the differences in mean anthropometric characteristics for age and gender. Pearson's correlations have been done to find out the trends of the anthropometric indices with age. Statistical analysis was performed by using SPSS v. 16. The findings of the study highlighted that due to precocious puberty, age of onset of menarche is preceded to 9 years (3.72%), and median age is 12 years (37.77%) in the subjects studied. Significance differences in mean height weight and BMI found between pre and post menarche girls. But menarche has no effect on the two indices of central body fat distribution; waist –hip ratio (WHR) and conicity index (C.I.).

Keywords: *Menarche, onset age, puberty, pre-menarche, post-menarche, central obesity, height, weight, waist circumference, hip circumference, BMI, WHR, secondary school children, West Bengal*

LOCAL SUSTAINABLE DEVELOPMENT:THE 21TH CENTURY PARADIGM OF SMART COMMUNITIES AND SMART TERRITORIES.

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Abstract

The Sustainable Development Goals 2015-2030 approved 25th September 2015 by the United Nation General Assembly insists in the 2- *End hunger, achieve food security and improved nutrition, and promote sustainable agriculture* and in the 8-*Promote Sustained, Inclusive and Sustainable Economic Growth, Full and Productive Employment and Decent Work for All.* Both of thematтributes us the task to build up a model of development which take into account the potentiality of each area. This work , after an analysis of the role of Commons and the options proposed by EU with the Bottom Up and Community Led Local Development(CLLD), propose a new governance instrument of the Territorial Management Contracts (TMC) based on-Drivers-Pressure-State-Impact-Response approach (DPSIR). The authors demonstrate, with several comparison, that from the hold Management of the Commons, thanks to the experience of the Local Action Group (LAG) and with the new CLLD approach of the Leader Program, is it possible to reach a new Governance of the TMC, in which the diffusion of the ICT is a concrete way for Local Community to design their own future in a Sustainable Strategy Approach .The paper point out that the Smart Communities in a Smart Territories are the new paradigm for the 21th Century of the Local Sustainable Development.

Keywords: *Local Communities, Sustainable Development , Local Development ,ICT, Smart Communities, Smart land*

MARKET PERFORMANCE OF SELECTED PEPPER SPICES IN IBADAN METROPOLIS, OYO STATE, NIGERIA

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Abstract

Hot pepper – *Capsicum frutescens* (HP), Black Pepper – *Piper guineense* (BP), Alligator pepper – *Affframomum melegueta* (AP) and Guinea pepper - *Xylopia aethiopica* (GP) were assessed in year 2014 for their market performance in Ibadan, Oyo State, Nigeria. Eighty spice marketers were interviewed using astructured questionnaire which captured the socio-economic characteristics and marketing indices for the selected spices from four (4) prominent markets in Ibadan namely; Bodija, Bode, Aleshinloye, and Oje markets respectively. Data were analyzed using descriptive statistics, marketing efficiency and regression analysis. Results showed that 96% of the marketers were women with most been middle-aged (46.3%) and married (81.3%). About 53% of the marketers had an average family size of between 1 and 5 people and the highest educational attainment was the primary education (38.8%). The marketing efficiency analysis revealed that spices with the highest average total revenue in the four markets sampled were in the descending order black pepper > alligator pepper > guinea pepper > hot pepper. The analysis showed the markets with the highest prominence in sales of these (4) pepper spices within Ibadan metropolis in the ascending order; Bode < Aleshinloye < Oje < Bodija. The regression analysis revealed family size, years of experience and cost price of spices as socio-economic factors affecting revenue generated from spices. However, to fully harness the benefits inherent in the utilization and marketing of these pepper spices, there should be a synergy in cost and selling price of the pepper spices in order to boost their market performance in the study area.

Keywords: *Pepper spices, Market performance, Condiments*

NIGERIAN FARMERS' SOURCES OF INFORMATION ON UTILIZATION OF SPICES: AN EXPLORATORY SURVEY

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Abstract

Spices are horticultural crops used primarily as adjuncts for enhancing taste, flavor and appeal of foods and beverages. Though they are neglected and under-utilized; they can significantly contribute to attaining the targets of sustainable global development considering their potentials in diet diversity, nutrition and health, poverty and hunger alleviation. Agricultural development and extension service delivery which is dependent on availability and usage of information is crucial in improving the utilization of spices and enhancing their status from neglected and under-utilized crops (NUCs) to development-opportunity crops (DOCs) that will significantly contribute to Agricultural; National development and the Sustainable Development Goals (SDGs). The study was conducted to ascertain farmers' sources of information on utilization of spices among farmers in the adopted villages of the National Horticultural Research Institute in Nigeria. Using multi-stage sampling procedure, 153 farmers were selected for the study. Data were collected with the use of structured questionnaires and interview schedules and analyzed using descriptive and inferential statistics. Majority (72.5%) of the farmers were males, majority (81.1%) were married and 99.3% had formal education. *Capsicum annumm* was utilized by the majority (97.4%) of the respondents and was ranked first of the spices considered. The sources of information on utilization of spices included friends and relatives, extension agents from Agricultural Development Programme (ADP). A significant percentage of the respondents obtained information on utilization of spices from their parents and relatives. There was a significant relationship between sources of information and utilization of spices ($r = 0.022$). Modern means of communication should however be utilized to disseminate information on utilization of spices to take advantage of their diverse benefits.

Keywords: *Spices, Information, Sustainable Development Goals, Nigeria.*

IMPACT OF CROSS-SECTORAL STRUCTURAL IMBALANCES ON THE DEVELOPMENT THE HUMAN CAPITAL IN AGRICULTURE

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Abstract

Human capital is an intensive factor of economic and social development, that includes a formed part of human resources, knowledge, tools of intellectual and management labor, life and work environment. In the conditions of globalization the competitiveness of agricultural complex will more and more depend on innovative development of labor resources as an important element of agrarian production resource potential. Successful solution of innovative retooling of agriculture will be determined by the quality of labor force, its level of mobility, motivation and innovations, relevance of supply and demand on the labor market.In the new development paradigm the human capital takes the leading place in national wealth (up to 80% in developed countries) and in collective productive capital. Today in economically developed countries each working place in machine-hand production includes 3-4 and more places of mental labor. In these countries the basic employment surplus is connected with intellectual labor jobs domination: 85% in the USA, 89% - in Great Britain, 90% - in Japan. The modern human capital is an intensive productive and social factor of development, which is closely connected with a person, his or her intellect and mentality. It is formed by the investments in nurture, education, health, knowledge, entrepreneurial ability, data support, safety and economic freedom of population and also in science, culture and art.

Keywords: *Human capital, labour market, urbanization, industrialization, intensification of agriculture, transformation of agricultural employment structure, regional sectorial index of the human capital, Russia.*

AGRICULTURE AND TOURISM IN SERBIA

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Abstract

In Serbia on the area of 4.1 million hectares of arable agricultural land from 15 to 20 million t of agrarian produce has been produced annually in the value of near 5.5 billion dollars. In 2014the food export amounted to 3 billion dollars. Higher food production with the development of rural tourism is possible to be realised if in the rural development of Serbia would be invested 1.5 billion dollars and the region would be made known the territory without the GMOs. It is of extreme importance since 10 percent of the inhabitants in the EU or 50 million of them are for this kind of food. Thus Serbia might double its food production for three years now and its value would be seven billion dollars and in 2030 the export value would be nine billion dollars. The agriculture and tourism in Serbia are not strategic economic branches. If it would have been invested in the agriculture Serbian villages would have stopped disappearing since one fourth of near 4 700 of them is on this path.

Keywords: *Agriculture, healthy food, tourism and spa*

ECONOMIC EFFECTS OF PLUM PRODUCTION ON FAMILY FARMS IN THE REPUBLIC OF SERBIA

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Abstract

Plumsare the most-wide spread fruit and the most important stone-fruit in Serbia. They are used for fresh consumption, dried, and for brandy, marmalade or jam production. It is important for farmers to be introduced to the economic effect of a certain production. Gross margin (GM) is a quick and efficient indicator for comparing production lines in different conditions. Gross margin was used as an indicator of economic effects of production. Data for GM calculations were collected through the questionnaire from the representative plum farms in Jagodina (Pomoravlje region) in the period 2011-2014. For calculating the basic elements of gross margin, the following data were used: data on yield and price, by-product price, quantity and value of fertilizers, pesticides, and fuel, and costs for contracted services. GM does not indicate profits and it does not include the size, and value of fixed costs. It represents the total value of a production line subtracted by the direct costs for the production line in question (purchased inputs). Within the period 2011-2014, GM varies from 175.038 RSD/ha (2011), to 261.288RSD/ha (2014). At the same time, the total variable costs did not change as much, ranging from 132.279 (2012) to 169,963 RSD/ha (2011). With the average yield for the observed sample (28.2 t/ha) and significantly higher price, an outstanding GM for plum was obtained.

Keywords: *Gross margin, plum, variable costs, yield, price.*

GROSS MARGIN OF PEPPER PRODUCTION IN THE POMORAVLJE REGION, SERBIA

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Abstract

Peppers are significant vegetable species produced in Serbia. They are considered to be the economically most effective plant in Serbia. Peppers are mostly produced in Vojvodina province and in the south of Serbia (Leskovac), being a product that is exported to Germany, Belgium, Slovenia, Croatia, but also imported from Macedonia. Gross margin, or the calculation of variable costs, was used as a tool for determination of economic effects of this production. Data analyzed in this paper were collected through the questionnaire from the representative pepper producers in Jagodina (Pomoravlje region, Serbia) for the period 2011-2014. The basic elements of calculation, obtained by this form of gross margin, were: data on yield and price, quantity and price of inputs used, such as fertilizers, pesticides, and fuel, and costs of contracted services. GM is a simple, yet useful tool to indicate the profitability of a single production line. By neglecting the amount of fixed costs, it gives farmers an idea of the amount of money they can earn from a single product, after covering production costs.Within the period 2011-2014, GM for pepper varies from 4.323 EUR/ha (2011), to 18.978 EUR/ha (2014). At the same time, the total variable costs ranged from 5.513 (2011) to 7.041 EUR/ha (2013). With the average yield of 53 tonnes/ha in 2014 and a price of 430 EUR/t, an outstanding GM for pepper was obtained in the last of the analysed years.

Keywords: *Gross margin, pepper, variable costs, yield, price.*

ADVISORY SERVICES: VARIOUS MODELS OF FINANCING

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Abstract

Modern agricultural advisory can be traced back to the late 18th and the early 19th century, being more important in the 20th century. It emerged in the times when rural population had a greater percentage in total population, and when a need for transfer and dissemination of new technologies to farmers went along with the industrial revolution. Advisory first came up as a link between those in power, who were trying to implement certain agrarian policies, and farmers who did not perceive them as something positive. The current situation is characterised by the process of globalisation, which brings along progress and development in the field of communication and transportation. In such circumstances, a room for wider spreading of transnational capital emerges. A "shift of power" from public to private ownership has happened in this period. There were numerous objections against publicly-owned advisory services related to their inefficiency, lack of flexibility and high operational costs. Other reasons for privatisation of advisory were a need for charging costs and having cheaper advisory services. These and other arguments led to a diverse ways of organizing and financing advisory services in different countries, or even in different regions within the same country. Today, there are many ways to finance advisory: state budget, direct payments, voluntary contributions, agricultural chamber fees, etc. This paper presents the examples of financing advisory services in a larger number of the EU countries and in the USA.

Keywords: *Advisory service, public, private, financing.*

PROPOSAL OF A MODEL TO EVALUATE THE QUALITY OF CONSUMER-ORIENTED FOOD CLASSIFICATION SYSTEMS

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Abstract

The main function of food classification systems is to regulate the market and inform it (consumers above all) about the different types of products and their characteristics.However, the reality is that many of these systems give rise to confusion and prevent consumers from obtaining a clear idea of them, making the purchasing process more difficult.The objective of this study was to propose a method that can be used as a basis or reference framework for analysing the quality of any food classification system, based on maximising consumer comprehension and learning, before introducing it into the market.The model proposed establishes the procedure and the necessary indicators for identifying the advantages and drawbacks of each of the different systems, making it possible to compare their quality.The model was tested empirically by comparing the current classification of Ibeian ham with a different proposal, in an experiment conducted with an online consumer panel, and using MANCOVA to analyse the differences between the six indicators related to consumer learning.The results showed that the proposed system is clearly superior to the one currently in force.It was concluded that the model is suitable for assessing the intrinsic quality of the classification systems, as it shows technical viability, ease of introduction in practically any situation and the ability to facilitate and guide the process of drawing up consumer-oriented food classification systems.

Keywords: *Food classification, food categorization, consumer orientation, agricultural policy.*

A COMPARATIVE LIVELIHOOD STUDY OF FARMERS AT DIFFERENT ORGANIC FARMERS MARKETS IN COSTA RICA

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Abstract

Social food movements such as local organic markets contribute to the production of more environmentally sustainable and socially just forms of agriculture. Such markets should be cultivated from the point of view of the farmer, where support is limited and consequently organic production is decreasing in countries like Costa Rica. By comparing the livelihoods of farmers participating at two successful organic farmers markets in Costa Rica this study aims to establish the most successful components of a local, organic market from the farmers interest. The Sustainable Livelihoods Framework and the Livelihood Capital Assets have been used as a tool to determine the differences in farmers' access to capitals for the two markets. Structured interviews were conducted and analysed according to the 5 Livelihood capitals: Financial, Natural, Human, Physical and Social. A comparative Livelihood Pentagon was used to hypothesise the strengths and weaknesses of both markets and a list of the most successful components of an organic market in Costa Rica was formed.Results show that a i) good level of publicity; ii) good communication between producers and consumers; iii) a communication of health aspects; iv) opportunities to improve the status of the farmer within the community; v) continual market growth; vi) a 'farmer led' market; vii) good sense of community; as well as, viii) union between organisers and producers; ix) organic group certification and x) low subscription fees are the 10 optimal components of an organic market in Costa Rica that can increase livelihoods and therefore improve the lives of rural farmers.

Keywords: *Sustainable, Organic, Market, Livelihood, Sovereignty.*

THE ECONOMIC VALUATION OF ECOSYSTEM SERVICES PROVIDED BY GRASSLANDS: A LITERATURE REVIEW

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Abstract

The current challenge for agriculture is to maintain and even to restore agroecosystems in order to ensure not only a sufficient production of food, but also the production of ecosystem services which contribute to human well-being. In this context, the concept of ecosystem services, thanks to its holistic approach, is able to better take into account all the positive and negative impacts produced by agriculture. In Europe, grasslands occupy almost half the usable agricultural area and are one of the most important ecosystems. Grasslands provide production service such as feed but also many regulating services such as erosion regulation, carbon sequestration or pollination services. As most of these services do not have market value, they are mismanaged. Moreover, grasslands are threatened by agricultural intensification and by the conversion into cropland. To deal with this situation, a solution is to assess the economic value of the services provided by grassland. The aim of this article is to present the state of the art on the economic valuation of ecosystem services provided by grassland and to discuss the limit and the opportunity of each method. The case where economic valuation constitutes a tool to contribute to biodiversity conservation and to the environment quality will also be discussed.

Keywords: *Ecosystem services; Externalities; Economic valuation*

DRIVERS OF KNOWLEDGE AND ADOPTION OF RICE FARMING TECHNOLOGIES IN WEST AFRICA

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Abstract

Improving farmers' knowledge and adoption of new technologies can dramatically increase their level of productivity in Sub-Saharan Africa. To explore the determinants of agricultural technologies knowledge and adoption, we used data collected between 2013 and 2014 in five West African countries (Benin, Côte d'Ivoire, Niger, Nigeria and Togo) with 414 household heads. The one-way ANOVA test and the Poisson regression were used for analysis. The level of knowledge is influenced by the household size, the attendance to rice training, the relation of the household head with formal and informal agricultural knowledge sources and the crossing effect of the gender with the country. To adopt rice farming technologies, farmers rely more on personal experiences or otherwise on the experiences of their colleagues. Information and knowledge from farmers' organizations leaders had a negative effect on the adoption. This is probably due to a lack of capacity strengthening and a leadership power issue. To overcome the various biases observed in learning in rural areas, it is important to resort to innovative rural extension and learning approaches using the new technologies of information and communication (NTICs) as tools (Video, mobile phone, radio, social networks…). These extension tools when well used can reach millions of illiterate farmers and provide them with knowledge in agriculture in a language they understand. Policies that promote better access of farmers to both formal and informal agricultural knowledge sources, credit services, rural radio and video, and a satisfactory welfare may help them to enhance their level of knowledge and adoption of new technologies.

Keywords: *Agricultural Knowledge, adoption, determinants, rice, West Africa*

THE ANALYSIS AND PREDICTION OF MAIZE PRODUCTION PARAMETERS

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Abstract

Maize is one of the most important agrarian cultures in the entity of Republic of Srpska (Bosnia and Herzegovina). The subject of this study is the analysis of maize production parameters in the period from 2000 to 2014. In Republic of Srpska, maize was averagely grown on more than 141 000 hectares in the analyzed period of time. Maize areas are relatively stable, which is shown by coefficient of variations values (Cv = 5,73%), but they are also tending to fall according to average annual rate (r = -1,94%). The average annual maize production was 585 000 tons and the average income was 4,2 t/ha. The aim of this work is to predict tendencies in the production of this culture in the period from 2015 to 2020 according to the analysis of the current maize production parameters. The analysis of maize production parameters in the period from 2000 to 2014 was derived on the basis of descriptive statistics, while ARIMA models were used for the prediction. According to previous researches, when it comes to vegetable production, the sowing structure is to a certain extent determined by incomes, i.e. the production from the previous year, so the impact of the total maize production from the previous period on sown maize areas of the current year was also analyzed in this work. The quantification of this impact on the basis of corresponding regressive models could have a practical application in planning maize production in the future.

Keywords: *Maize production, prediction, regressive analysis, ARIMA models.*

THE DEVELOPMENT OF RURAL TOURISM THROUGH ADDITIONAL ACTIVITIES

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Abstract

Rural development measures are mostly aimed to maximize employment opportunities and to create the conditions for economic growth in rural areas. The aim of the measures is to improve the quality of life in rural areas and to achieve diversity in the rural economy. In recent years, rural tourism in Croatia has become an important factor in achieving long-term objectives of rural development because it allows better use of productive and human resources at the family farm. Also, the number of registered accommodation and catering facilities in rural tourism increased, but tourists on family farm stay only one to two days.

For further development of rural tourism, it is necessary to devise a variety of tourist attractions in the form of additional activities tourists want to participate in and thus extend their stay in the rural tourist facilities. Therefore, this paper analyzes the family farms registered in the National Catalogue of rural tourism in Croatia and observe their development through complementary activities offered at farms. For now, 48 different additional activities have been noted and observed in three main categories: participation in agricultural work and tasting products, educational activities and presentations of old crafts and sports activities.

Keywords: *Rural development, Rural tourism, Additional activities in rural tourism.*

THE ECONOMIC IMPACTS OF EXPANDING GREENHOUSE VEGETABLE PRODUCTION IN EGYPT

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Abstract

Water and land resources in Egypt are becoming scarce, while increasing agricultural production is necessary to enhance food supply, improve food security for the rapid growing population and increase agricultural exports that put more pressure on Egypt's resources. In this sense, the Egyptian Sustainable Agricultural Development Strategy towards 2030 (SADS) targets expanding greenhouse (protected agriculture) vegetable production to boost the productivity and enhance farmers' livelihoods. Therefore, the current study aims at investigating the economic impacts of expanding greenhouse vegetable production in Egypt. The study uses data obtained from greenhouse vegetable producers in Egypt to calculate some economic indicators. Our findings showed that vegetables cultivated in open fields contributed to about 14% of the total cropped area in Egypt. However, some vegetables (e.g. tomatoes, cucumbers, peppers, green beans, green peas, cabbage, squash, lettuce, spinach crops and cantaloupe) are produced in greenhouses on an area estimated at about 5.7 thousand feddans (1 feddan=0.42 ha), achieving triple productivity over that gained in the open fields. Moreover, the cultivation of about 277 thousand feddans in a crop rotation of (beet sugar + summer potatoes) achieved the highest returns. Taking the costs of the establishment of the greenhouses into account, our results revealed that cultivating 133 thousand feddans of greenhouse vegetable production allow gaining a net revenue reaching about 6.76% over that gained in the open fields. Besides, shifting to greenhouse vegetable production saves about 400 million cubic meters of water annually.

Keywords: *Greenhouses, vegetables, production, Egypt.*

WOMEN PARTICIPATION IN SUSTAINABLE LIVELIHOOD AND DEVELOPMENT THROUGH COMMUNITY FOREST MANAGEMENT: A CASE STUDY OF JIM CORBETTNATIONAL PARK

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Abstract

In many developing countries women are responsible for the collection and management of forest products essential to the daily lives of their household sustainability. Despite they have stronger interests than men in ensuring the availability of these products; women are often neglected from the decision-making process that sets out the rules to access and collect forest products within a Community Forest. The study area is located in Foothills of Nainital district of Uttarakhand, India. This paper analyses the women's Participation in Community Forest Management and examines women's involvement in community forestry management, especially, in implementing programs, making decision, sharing, managing community forest resources and livelihood. The study is based on both the primary and secondary data sources. The primary data were collected through household survey with a set of questionnaires prepared, tested and used for interviewing along with Participatory Rural Appraisal (PRA) approach. Women users from each household selected randomly and treated as a unit of analysis. The paper focuses on the active and interactive participation of women, secures women's rights to control and access over the forest resources and provides many opportunities to lead in the community forest and various activities related to Forest Management, Livelihoods, Drinking Water and Sanitation, Health Care, Women's Development and Education. By adopting JFM (Joint Forest Management) programme, Community Forest management, Social Forestry, Van Panchayat, ensure the socio-economic status of villagers particularly the people of weaker section of the society who are more dependent on it.

Keywords: *Community Forest Management, Livelihood, Women and Decision Making Policy*

EFFECTIVE FACTORS OF ADOPTION DOUBLE CROPPING IN GUILAN PROVINCE, NORTHERN IRAN

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Abstract

Double Cropping in Guilan Province is an essential strategy to enhance the productivity of paddy fields in order to increase crop production, employment, food demand satisfaction, and production sustainability. However, most fertile agriculture fields in Guilan Province undergo only a single harvest yet, and they are abandoned for the rest of the year. The present research studied the factors affecting Double Cropping in the Pirbazzar village center in Rasht Township, Guilan Province. The statistical population composed of rice farmers of the village center. The sample size was estimated by Bartlett et al. (2001)'s least sample size table as 351 people which was increased to 390 to avoid the error caused by non-response questionnaires. Finally, 360 acceptable questionnaires were returned back. After comprehensive review of literature and identification of variables, the questionnaire was designed in six sections. Its validity was confirmed by a panel of university professors and experts of Jahad-e Agriculture Organization, and its reliability was estimated by Cronbach's alpha to be 0.67-0.858 for main variables and 0.831 for whole questionnaire. Data were analyzed by coefficient of correlation, Logit regression and means comparison test using SPSS Statistical Package. The results of Logit regression revealed the positive, significant contribution of the variables of attitude, performance, farming experience and attendance in training courses and the negative, significant impact of farm-to-house distance on the adoption of Double Cropping. The review of chance ratio statistic, Exp(B), also showed that among variables included in regression equation, farmers' attitudes toward Double Cropping had higher role in the prediction of its acceptance, so that as farmers' attitudes were improved, the likelihood of Double Cropping acceptance was increased by 2.69 times. In addition, means comparison showed significant differences between two studied groups of farmers in terms of the level of social participation and cooperation, the use of communication tools, and earnings from rice growing.

Keywords: *Double Cropping, Logit model, adoption, rice, Guilan.*

THE APPARENT PRODUCTIVITY OF AGRICULTURAL EMPLOYMENT IN MOROCCO

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Abstract

The Moroccan agricultural sector creates more than 4 million direct jobs annually, equivalent to 37% of jobs at national level and 80% in rural areas. Consequently, agriculture is the first employer nationally and in rural areas.However, the agricultural employment is determined by the importance and distribution of rainfall. It is very fluctuating and specific compared to other sectors. The horticulture activities provide more permanent and sustainable jobs (35%) compared with those of non-perennial plant sectors, especially cereals (23%) and legumes (2-3%) are dominated by casual and unskilled jobs. While employment in arboriculture and gardening has become more demanding in skilled jobs, especially for fertigation. However, non-agricultural activities in rural areas, which contribute to 20% of rural employment,are concentrated in rural towns (Bourgs). This type of works is concentrated in derivative service agricultural jobs.

In addition, the peculiarities of the apparent productivity of agricultural employment which is defined as the ratio of added value and jobs created in this sector, is negatively impacted by underemployment, unskilled work, unpaid family work, child labor under 15, and casual work.Since the sixties, the rural areas have benefited from investments in sector programs especially in agriculture and infrastructure. Now, with the launch of the Green Morocco Plan, in 2008, agricultural investment is multiplied by ten. Investments brought positive effects to equipment of farms especially in terms of mechanization (tractors and combine harvesters), during the first five years of the program. However, the employment has not evolved at the same pace as investment, including job quality.

This paper makes the point, through comparative and descriptive analysis of employment in agriculture, on the analysis of the employment productivity in the sector compared to non-agricultural sectors and concluding with a benchmark.

Keywords: *Employment productivity, agriculture.*

DETERMINANTS OF CREDIT RATIONING: A STUDY OF FORMAL CREDIT GROUPS IN EKITI STATE FARMERS DEVELOPMENT UNION

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Abstract

Failure of investment, failure of farmers to use borrowed funds for production and the refusal to return borrowed funds are some of the causes for low repayment performance: hence the need for credit rationing. The study was therefore aimed at determining factors affecting credit rationing among groups in Farmers Development Union (FADU) of Ekiti State. The study was carried out in four local government areas (Ikere, Ado-Ekiti, Ayedun and Ijan Ekiti) in Ekiti State in Nigeria. A total sample size of 33 farmer groups within the union comprising of 10 members each were selected via sampling proportionate to size. Secondary data obtained from records of the groups spanning a single year period was used for the study in addition to interview schedule. Findings however revealed that loan beneficiaries of FADU must be registered members of the organization and must have at least 25% loan request as savings before loans could be granted to them. Also, 66.7% of the beneficiaries were in their active working age and 84.8% of the groups consisted mainly of women with trading as their major occupation. All the beneficiaries were married with 36.4% of the women having a mean household size of 6 people. The regression analysis showed that educational level and income were socio-economic characteristics that positively affect repayment performance. Also, the probit model revealed that income, outstanding debt and leverage of beneficiaries were significant determinants of loan rationing. However, to fully harness the benefits inherent in credit rationing by microcredit institutions; proper monitoring of borrowed funds was encouraged as repayment performance and credit rationing are interwoven.

Keywords: *Credit rationing, FADU, Probit model, Repayment performance and Leverage*

NEXUS BETWEEN INTERNAL VALUE CHAIN FINANCE AND COCOA PRODUCTION IN SOUTHWESTERN NIGERIA: IMPETUS TO AGRICULTURAL PRODUCTIVITY AND SUSTAINABILITY

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Abstract

In view of the fact that securing loan for agriculture in financial institutions has become difficult as a result of the inability of small holder farmers to provide collateral securities, the Internal Value Chain Finance(IVCF), which takes place within the value chain, is increasingly becoming the major source of finance in cocoa production. The study was carried out in Southwestern part of Nigeria. The objectives of the study included: description of the socio-economic characteristics of the cocoa farmers and IVCF; identification of thesources of IVCF; examination of the conditions that impact on the borrower and lender; and appraisal ofthe prospects and challenges of IVCF. Data were collected from 120 cocoa farmers through interview schedule. Data analysis was carried out using frequency counts, percentage, mean, standard deviation and probit regression model. Contrary to popular opinions that farmers main source of finance were from other farmers, cooperatives and commercial banks, the major source of financing cocoa production isIVCF, sources such as cocoa merchants or input supplier, which provide credit to known producers and lead firmfunds advances tomarket intermediaries. Furthermore, cocoa farmers claimed that the credit granted to farmers is flexible in terms of ease of repayment; interest free, accessibility and timeliness. The main prospect of the IVCF is that cocoa farmers have access to loan which led to increase in production and sustainable income. The problems include lack of transparency on the part of farmers, cocoa merchantsand input suppliers and high risks related to uncontrollable factors such as global price fluctuations and natural disasters.There is need for extension agency and policymakers to train the farmers on the procedures of obtaining loans from lenders and provide reliable information on IVCF functioning, success factors and results. Lenders should also assess the credit-worthiness of the specificborrowers before giving out loans.

Keywords: *Finance, Cocoa farmers, accessibility nexus, productivity, sustainability, value chain*

COMMUNITY DRIVEN DEVELOPMENT APPROACH (CDD): EFFECTIVE TOOLS FOR FARMERS PARTICIPATION IN WORLD BANK FADAMA III PROJECT IN NIGERIA

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Abstract

The study assessed community driven development approach as effective tools forfarmers' participation in World BankThird National Fadama Development Project (Fadama III) in Osun State, Nigeria. Four LGAs that participated in the Fadama (III) project were purposively selected. In all 80 fadama farmers were interviewed through the use of structured interview schedule and Focus Group Discussions (FGDs). Data analysis was carried out using descriptive and inferential statistics. Majority of the farmers (…%) reported that they were involved in development of their projects from planning to implementation stage. The entire farmers indicated that they have committee for planning, implementation and monitoring and evaluation but most of the members are not always effective in their duty post. Majority of the farmers (…%) reported that executive members and committee members of the group were the signatories to their accounts and have access to their beneficiaries' contribution.Constraints mentioned include elite capture, inability to pay beneficiaries' contribution as at when due by members.Collective action agreements must be backed up by credible enforcement mechanisms, either from within the groups or community or from outside to reduce elite capture. There is need to review the beneficiaries' contributionby the funding agency so as to allow more people to participate in the project in future.

Keywords: *Capacity building, effectiveness, fadama community associations, fadama users group and participation*

ONLINE TRADING OF CHILIES IN PAKISTAN: A STEP TOWARDS MARKET TRANSFORMATION

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Abstract

Pakistan's roughly $4.1 billion horticulture market is estimated to comprise two-thirds for fruits, a quarter for vegetables, and the rest for condiments. Around 90 percent of this produce (by value) passes through the current system of value chain through wholesale markets (*mandi's*) and the remaining 10 percent is estimated to pass directly from farmers to exporters and to processors. Red chilies are most common and important kitchen items in Pakistan which are used as condiments and vegetables. The demand for chilies within the country is almost inelastic whereas it becomes elastic if there is increase in exports or change in amount of production. Pakistan has unique but complex network of up to five or six intermediaries between the primary producer and the end user. The qualitative and quantitative analysis of chilies production and marketing system indicates the level and extent of production inefficiency and market imperfections. Besides, the export market and diversification of product by processing is hindered by presence of Aflatoxins-poisonous and cancer-causing chemicals that are produced by certain molds (Aspergillus flavus and Aspergillus parasiticus) which grow in soil, decaying vegetation, hay and grains. Realizing the importance of structure of this enterprise and its efficiency and with a view to access the complexity of chilies production and marketing for profitable production and efficient distribution system, the idea of better post-harvest management for quality premium to the producers and trading plate form and online trading for chilies was initiated by the Government of Sindh, Pakistan so that chilies are traded across the region and globe in raw shape as well as with the value addition. The harvest and post-harvest management of chilies was done by providing hand gloves to the chilies pickers from plant and green nets for manual drying of chilies so to reduce the contact of chilies with earth and dirt for controlling Aflatoxins**.** This small effort brought positive results, and all those farmers who practiced this method were able to reduce the levels of Aflatoxins much lower than the WHO standards. The trading platform devised a system to give quality premium to the producers in which quality testing at farmers' store, online biding and payments to the farmers through bank were introduced. The system has brought a significant change in the prices, farmers have started receiving quality premium and it has set a direction for transformation of marketing and value chain system of chilies in Pakistan. The paper covers the case study of the new approach of online trading and value chain within the framework of market transformation and value chain.

Keywords: *Chilies, online trading, quality premium, case study, Pakistan.*

FARMERS' ACCEPTANCE OF EFFICIENT IRRIGATION TECHNOLOGIES FOR GROUNDWATER SECURITY IN BALOCHISTAN, PAKISTAN

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Abstract

Concerns over falling groundwater tables in Balochistan tend to recommend efficient irrigation technologies as a potential solution of the problem. However, after decades of their introduction, these technologies have failed to attract the farmers. This study examines farmers' enthusiasm towards efficient irrigation technologies in four districts of Balochistan province of Pakistan. The required information was obtained through a survey questionnaire administered for a sample of 283 groundwater users, and was analyzed descriptively and with the help of multiple regression technique. Results indicate that adoption of efficient irrigation technologies is less likely to take place in the absence of incentive such as subsidy on installation of the system, reliable supplier who can offer service and spare parts warranty, and training to the participating farmers. The results of regression analysis suggest that in case of straightforward promotion of irrigation technologies, the southern region would be a wise choice to start with due to relatively higher level of farmers' enthusiasm. Similarly, more effort would be required in motivating farmers in the northern region. At micro level, household heads of relatively small size families having most of their land under irrigated agriculture may respond more positively. Thus, it is possible to design a technological package keeping in mind the specific needs of any group. Nevertheless, before offering any technological package, it is important to assess its economic impact in form of reducing the existing subsidy account, its technical viability in any particular region, farmers training needs and its probable impacts on the environmental variables.

Keywords: *Groundwater, Irrigation Technologies, Drip Irrigation, Balochistan.*

AGRICULTURE TRAINING ARRANGED BY FARM SERVICES CENTERS AND ITS IMPACT ON FARMER YIELD

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Abstract

Pakistan has fertile lands, ideal agro-environmental conditions and dedicated agriculturists however itsper acre yield is lower as compared to the world averages. Numerous agriculture extension strategies have so far been launched in Pakistan to bridge the gap. A new strategy Farm Services Centre (FSC) was initiated in Khyber Pakhtunkhwa (KPK) in 24 districts for supplying quality farm inputs to the farming community, build farmers' capacity along with its rational utilization at farms. FSC is a form of public-private partnership. The present study was therefore conducted to investigate their performance regarding yield improvement of the farming community. Five districts - viz. Swabi, Mansehra, Dir Lower, Swat and Dera Ismail Khan - were selected after thorough discussion with focal persons from related fields. A sample of 80 respondents was selected from each district thus making a lump sum of 400 respondents. Data was collected through well prepared and pre-tested interview schedule. It was found that trainings arranged on Agronomic Practices, Soil Management, Integrated Pest Management (IPM), Integrated Disease Management (IDM), Water Management Practices, Food Preservation Techniques and weed management trainings were reported satisfactory by the respondents. Paired sample t-test results showed significant improvement in wheat, sugarcane, rice, maize, onion, tomato and gram was observed. Results of linear regression showed highly significant linear trend among year of the registration with Farm Services Centers and yield improvement of wheat, sugarcane, rice, maize, onion, tomato and gram.

Keywords: *Farm Services Center, IPM, IDM, Trainings, Agriculture Extension.*

INNOVATIVE NUTRITION OF BEES IN POLAND

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Abstract

Bees are a very important part of human environment. Working bees and beekeeping agriculture gives a lot of benefits. Thanks to them crops are pollinated.
To be able to manage well beekeeping in Poland; B.freewas created. It is a solution developed by scientists and beekeepers for beekeepers. With B.free beekeepers in Poland and Europe can more effectively manage bees. Bees are healthier, stronger and less aggressive. B.free also allows reception of larger quantities of bees' products.Working scientists-beekeepers honey gave the environment a healthier and easier to work in the apiary.
The paper presents preliminary results of B.free research. B.free shows the composition and evaluation of beekeepers.B.free is the answer to the problems of beekeepers, bee diseases, poisoning, death of bee colonies.

Keywords: *Bee food, Environment, Beekeeping*

SUSTAINABLE AGRICULTURE IN THE LOCAL ENVIRONMENTAL, SOCIAL AND ECONOMIC CONTEXT IN WEST STARA PLANINA MUNICIPALITIES (SERBIA)

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Abstract

Since the United Nations made its Rio Declaration in 1992, sustainable development has become a globally accepted approach toward addressing the negative environmental impacts of human activities and ensuring successful coexistence of humans and the environment. Sustainable agriculture is also an issue of major concern in the European context, and is receiving greater attention within the EU's Common Agricultural Policy (CAP). Recent CAP reforms focus more and more on sustainability aspects, and agro-environment has emerged as a key element of EU agricultural policy since 1992. The overall reform process seeks to move away from a purely production-oriented policy in order to implement the structural changes necessary for integrating rural development and environmental aspects.

Paper provde data analysis of situation and important trends concerning agriculture (environmental, social and economic aspects of sustainability) in the local context of West Stara Planina municipalities: Dimitrovgrad, Pirot, Zajechar and Knjazevac. It identifies the main environmental impacts and services of agriculture, key economic challenges and cultural assets as well as specific opportunities and possible development directions.

Conclusions refers to agro-ecological conditions in the region for sustain households and agricultural businesses, and possible solutions that can ensure specific values of the region.

Keywords: *Sustainable agriculture, Environmental impacts, Key economic challenges*

MIGRATION OF WOMEN FROM RURAL TO URBAN AREAS IN TURKEY

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Abstract

Migration from rural to urban areas has been a relatively important issue in Turkey. Since 1950, the industrialization and urbanization process had a negative effect on living conditions of farmers and it has led to internal migration from rural to urban areas. Of course, rapid industrialization is not the only reason for migration. To have better educational opportunities also led rural people to migrate. Marriage and living with children is one of the major triggers on the migration of women. The sharp inferiority seen in marriage age of women in rural areas, and frequent occurrence of male-dominated attitudes in family relationships make women more desperate and render this social problem more complicated. Economic and social factors, better service in health and also willing to leave the villages to cities can be listed for as other reasons. Agriculture and poverty are very closely related. Rural women suffer from poverty far more than rural men. Nowadays, more than 1 billion people in the world are dealing with poverty. Unfortunately, majority of them are women who live in developing countries. The hope of living within better conditions is another reason for women's rural to urban migration. But when they migrate they have no choice but to live in slum places with unhealthy conditions. Migrant rural women are employed generally in labor-intensive and low wage sectors such as textile, in-home cottage industry and house cleaning. In this paper, the migration process is analyzed from women's perspective in Turkey.

Keywords*:* *Migration, women, rural areas, Turkey*

AGRICULTURAL PRODUCTION AND ECONOMIC GROWTH IN BOSNIA-HERZEGOVINA: AN ECONOMETRIC ANALYSIS

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Abstract

The agricultural season in Bosnia-Herzegovina begins earlier than European Union (EU) countries. In this country, agricultural sector has comparative advantage with respect to other countries especially in terms of low prices and low labour cost. However, there are constraints about produce export, low bargaining power, etc. The aim of this study is to indicate the contributions of agriculture in Bosnia-Herzegovina's economic development process. In this paper, the relationship between economic growth and agricultural production has been analyzed with an empirical study. According to the results, agricultural production has significantly positive effect on economic growth.

Keywords: *Agriculture development, economic growth*

THE RELATIONSHIP BETWEEN PER CAPITA INCOME AND ENVIRONMENTAL POLLUTION: THE ENVIRONMENTAL KUZNETS CURVE APPLICATION FOR DEVELOPING COUNTRIES

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Abstract

Agricultural sector is seen is an important sector all over the world. This sector has been maintaining its value in meeting the most basic need of human nutrition. Also, this sector may employ a considerable share of the population and constitutesan important source of national income in developing countries.

The paper analyses the relationship between per capita GDP and environmental pollution for 2000-2011 years in developing countries with econometric models. The results show that, in the early stages of economic development, until it reaches a certain level, the level of the pollution increase and CO_2 emissions may increase with high-income levels.

Keywords: *Environmental pollution, developing countries, economic development*

CONNECTING SUSTAINABLE AGRICULTURAL NETWORKS IN EUROPEAN UNION AND TURKEY

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Abstract

Turkish agriculture has been experiencing a rapid growth of organic agriculture and "good agriculture practices (GAP)" in recent years. The number of organic producers as well as firms working in the production, trade and retail of these products is growing rapidly. Hence, organic agriculture and GAP present a major potential for growth in sustainable agricultural practices in Turkey. The related environmental benefits of the expansion of these practices are also substantial in the form of improved sustainability of resource use and reduced environmental impacts. However, the structure and the institutional organisation of existing producer associations, and stakeholder networks are still centred on conventional agricultural practices. There is only a small number of sustainable agriculture networks, organic farmers associations, sustainable consumer associations, and research institutes. These associations are highly fragmented at the regional, local and product levels. Their local and national network capacities as well as their connections with sustainable agriculture networks in the European Union (EU) are crucially limited. Thus, there is a major gap in the field of improving civil society dialogue both within Turkey and between Turkey and the EU in the context of sustainable agriculture. In this context, in order to help bridging this gap, this project, entitled "Connecting Sustainable Agriculture Networks in Turkey and the EU", aims at establishing links and civic cooperation among related stakeholders in Turkey and the EU Member States through designing a platform that would connect sustainable agriculture networks and enable them to share their intellectual, technical and social capital. Those networks include farmers, producer organizations, sustainable food consumer organizations, traders, certification firms from Turkey alongside of three best practices from EU Member States.

Keywords: *Sustainable agriculture, organic agriculture, good agricultural practices, Turkey, sustainable agriculture networks.*

ANALYSIS ON THE REFLECTIONS OF CLIMATE AND FINANCIAL CRISIS ON TURKEY'S AGRICULTURE MARKET

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Abstract

World's agriculture markets have to deal with problems connected with global climate change, as well as economic crisis side effects. Both population growth and revenue growth on developing economies cause increase in demand on agricultural products. As being basic need of humankind, this demand on agricultural products may not be influenced from financial crisis. However, the reflections of such crisis on producer and drought affect the supply of agricultural products, causing the increase in prices. Between 2000 and 2001, Turkey had come across with a critical financial crisis. Economic crisis, which started towards the end of 2007 and went worldwide on 2009, caused instability and declines on world economy. Reflections of mentioned crisis merged with the negative impact of severe drought in Turkey in 2001, 2007-2008 and 2013-2014. This combined handicap has had a permanent effect on market of agricultural products which should be elaborated. In this concept, reflections of drought and economic crises on Turkey primary agricultural products prices, input prices, foreign trading and funding opportunities will be researched. The influence between global and local prices of main agriculture product and inputs will be examined with Granger causality test. While supervising crisis and drought seasons, dynamics between local and global prices will be analyzed with short-run (VAR) and long-run (Johansen Cointegration Analysis) equilibrium models.

Keywords: *Climate Crisis, Financial Crisis, Agricultural Prices.*

CHILDREN'S ECONOMIC ACTIVITIES IN AGRICULTURE IN TURKEY

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Abstract

Child labor is a serious problem in Turkey, like other developing countries. Working children are engaged in services, industry and agricultural activities. The Turkish government developed a Time-bounded Policy and Program Framework in 2004 just to decrease the child labor by 2015 and it decreased in the services and industrial sectors but not in agriculture. Because there is a weakness on labor law that it does not require a minimum working age for agricultural or household workers. Child labor works in agriculture, including farming, fishing, aquaculture, forestry and livestock. According the TURKSTAT data, in Turkey, 44 % of working children are engaged in seasonal agricultural activities in 2012. Child laborers work either as an unpaid family members or low waged seasonal workers or both. Gender is important in labor distribution, such as girls are responsible for milking while boys are taking pasture at family business. But at seasonal works such as cotton or hazelnut harvesting; they both do the same work. Unfortunately, most of them are deprived of education; and work in unhealthy conditions, like exposure to hazardous chemicals, walking long distances, and carrying heavy loads. Poverty is the main reason behind children's engagement in economic activities in agriculture because they generate at least 5 to 10 percent of family income. People who live in rural areas have more children than urban areas to get help from them in farming and household activities. In this paper, children's economic activities in agriculture are discussed from the Turkish experience.

Keywords: *Childlabor, Agriculture, Turkey*

A CLIENT-CENTERED APPROACH OF AGRICULTURAL EXTENSION:AN EXPERIENCE IN ISRAEL'S INTERNATIONAL AGRICULTURAL COOPERATION PROGRAMME

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Abstract

The need for higher food and fiber production and quality worldwide has been amply described. This is due to an increase in world population, itself a result of progress in medical care and disease prevention on the one hand and climatic change bringing about droughts, water scarcity or floods. Man's overexploitation of natural resources and industrialization also has negatively influenced nature. The State of Israel is located in a semi-arid area and has considerably developed its agriculture and started to share its experience in development since its early days with developing countries. The Centre for International Agricultural Cooperation was established jointly by the Ministry of Foreign Affairs and the Ministry of Agriculture to offer training and development projects to Developing Nations. One of the subjects is Agricultural Extension, Planning and Methods which was designed according to the experience in developing Israeli agriculture by training and advising its farmers.This paper aims at presenting the nature, concepts and contents of one specific training topic, i.e. agricultural extension as a tool to boost development through its client-centered approach.

Keywords: *Advisory services, agricultural extension, client-centered, extension methodology.*

EXPLORING HOUSEHOLD FOOD WASTE ISSUE IN ALGERIA

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Abstract

Food losses and waste (FLW) is a phenomenon that has been underestimated, little studied and poorly documented in the Mediterranean countries. Actually, no policies, laws, strategies and action plans have been implemented to reduce FLW in Algeria. This exploratory study aims to evaluate household FW in Algeria. An online survey with 323 Algerian households was conducted in February-April 2015 to assess the knowledge and relative importance of FW; attitudes towards FW; impacts of behaviors regarding food and food management; FW quantity and value; as well as barriers and willingness to behavioral change. Sample is gender-balanced (54% female and 46% male) and rather young (93% are less than 44 years old) while most of respondents have high education level. Results show that household planning and shopping activities are significant forecasters of FW. Attitudes may change according to periods especially in Ramadan (88% of respondents declare that FW increase during this month) and to the category of food (most wasted product groups are fruits and vegetables, cereals and bakery products). Most of the respondents have a good understanding of "use by" food date label while they still confuse the meaning of "best before". It seems that FW is widespread in Algeria as only 1% of respondents declare that they do not waste any food. About 15% declare that their households throw away at least 250 g of still consumable food each week. Even though Algeria is considered as a developing country, an important part of food wastage occurs at consumer level as in high and middle income countries. In order to reduce food waste, efforts should be directed towards providing consumers with skills and tools to deal with their food-related activities and to better consider the impact of food waste on the environment and economy.

Keywords: *Food waste, Online survey, Household behavior, Algeria*

NATIONAL REPOSITORY FOR AGRICULTURAL EDUCATION NaRA – OER FOR BUILDING NEW KNOWLEDGE IN AGRICULTURE

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Abstract

National Repository for Agricultural Education, NaRA is created under the TEMPUS SMHES project CaSA "Building Capacity of Serbian Agricultural Education to Link with Society"**.** The idea for creating an Open Education Resource (OER) for agricultural education occurred as a result of over 10 year cooperation between teachers in agricultural sciences and educational psychologists. Due to the lack of pedagogical education of agricultural sciences graduates and the need expressed by teachers to introduce modern and effective teaching methods, formulate learning outcomes needed for modern agricultural education and include professional and generic skills required for contemporary agricultural practice, agricultural faculties in Serbia established a consortium in order to create NaRA under an EU funded project – TEMPUS. The call was devoted to LLL, training of non-University teachers, new teaching methodologies, and HE and society. All these priorities were in focus and applicable to agricultural education and its holders: agricultural advisors, agricultural secondary school teachers, and university teachers. Therefore the project started with trainings recognized as necessary for all groups of agricultural educators in active learning teaching, eLearning, academic and communication skills. In-service trainings (courses), compulsory for both secondary school teachers and advisors, were created by university teachers, with assistance of educational psychologists and EU partners; implemented; improved where necessary; and submitted for accreditation. All the courses, created during CaSA realization and future ones will be placed in NaRA and available to all stakeholders of education in agriculture. Besides courses for knowledge refreshment NaRA will contain large databases such as journals and meetings proceedings published by Serbian agricultural faculties, as well as novelties in different aspects of sustainable agricultural production, processing and environmental resources preservation.

Keywords: *CaSA, NaRA, OER, LLL*

7. FORESTRY AND AGRO-FORESTRY

ECOLOGY AND BIODIVERSITY OF ISOPODA (ARTHROPODA, CRUSTACEA) IN DIFFERENT ORCHARDS AT HUNTING RESERVE OF ZERALDA (ALGERIA)

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Abstract

The hunting reserve at Zeralda(suburb of the city of Algiers in northern Algeria) is characterised by different type of habitats. Besides the natural ecosystems, the reserve has several agricultural ecosystems (cereal crops and orchards). This diverse environment is very favourable to different fauna in particular soil fauna.Terrestrial Isopoda (Arthropoda) were collected from 3 different orchards (Fig trees, Medlar trees and Clementine trees) in the hunting reserve. The Isopoda were sampled using the pitfall traps. Ten traps were used per sampling site for a period of 8 months between 2014 and 2015. A total of 903 specimens were collected of which 857 were mature (406 males and 451 females) and 46 were juveniles. Five families, 5 genera and 7 species were determined. *Armadillidium vulgare* and *Philoscia muscorum* were the most abundant species (82.93% and 11.84% respectively).No difference in species richness was found between the 3 different orchards, while the highest diversity was in the fig orchard.According to Kruskal-Wallis test, there is no significant difference between species activity in the 3 orchards. Also the biotopes have no effect on this activity.

Keywords: *Isopoda, Richness, Orchards, Ecology, Zeralda.*

ECOLOGY OF SPIDERS IN DIFFERENT ORCHARDS AT THE HUNTING RESERVE OF ZERALDA (ALGERIA)

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Abstract

Spiders are an important group of invertebrates in all terrestrial ecosystems. They are the most abundant with very high species richness. They are known to lodge various ecological niches.The aim of the present work is to study the ecology of the ground spiders in three different orchards (Medlar tree, Clementine tree and Fig tree) located in the hunting reserve of Zeralda (suburb of the city of Algiers in northern Algeria). The epigean spiders were collected using thirty pitfall traps, filled third with a formaldehyde solution (4%) as fixative. The traps were emptied monthly during 8 months between 2014-2015. A total of 354 individuals were collected belonging to 14 families. The Gnaphosidae were represented by 6 species, the Lycosidae and the Dysderidae with 5 species each. The other families were collected with less species number.Out of all sampled species, none of them was constant (frequency of occurrence). 6 species were considered as accessory, 9 as accidental and 23 were sporadic. The changes in richness and species diversity might be the results of the richness of the litter's flora. From our results we can consider the sampling sites as being organized according 2 abiotic factors: the soil humidity and the recovery rate of the herbaceous layer. However, this dual ordination did not explain the species distribution.

Keywords*:* *Spiders, richness, Ecology, orchards, Zéralda*.

STUDY OF CHESTNUT (CASTANEA SATIVA MILL.) BEHAVIOR FOR THE PURPOSE OF VALORIZATION AND EXTENSION

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Abstract

Sustainable forest developmentreconciles economic development, social demands, ecosystems preservation and their ability to meet multiple needs. However, joint work in collaboration with local residents through participatory management is still needed to develop operational methods and practices that ensure sustainable development. In other words, undertaken actions must be economically viable, environmentally sustainable and socially acceptable.In order to counteract the various degradation factors, safeguard soil fertility and ensure profitable business by generating marketable local products, the use of multiple-use plant species, such as chestnut (*Castanea sativa* Mill.) seems to be a good long-term strategy. Well suited to Algerian climatic conditions it can be installed on mountainous areas including its fruit which is appreciated by humans for its many nutritional qualities.The aim of this work is to valorize this forest resource through the study of expansion possibilities in mountain areas. They necessarily pass through the mastery of its behavior against environmental factors. The aim is to propose future planting areas and obtain productive stands. The temperament of the species is addressed by building relationships that can explain the influence of environmental factors on growth and production, in order to optimize its operation. The inventory and inspection of plantations established in 1890 and 1948 confirm the adaptation and growth potential of this tree in the Kabylia mountains (Algiers east). A significant fruit production is also noted. However, neglect and lack of maintenance have greatly diminished the vitality of these plantations.

Keywords: *Mountain areas, valorization, extension, behavior, chestnut.*

THE IMPORTANCE OF WOODY PLANT INTRODUCTION FOR FOREST TREES IMPROVEMENT

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Abstract

The history of woody plant introduction is closely linked with that of transportation and the European exploration of the planet (16th–19th centuries). Each colonial power established major botanical gardens and experimental stations in various parts of the world. By the 20th century, the purpose of introductions shifted from food plants to timber and other species yielding non-agricultural products. Finally, during the latter part of the 20th century the importance of ornamental species increased dramatically, especially to the more developed and wealthier regions. Over the past two centuries many species have started to spread in their introduced ranges. Until relatively recently the majority of introduced woody species have been highly beneficial, if not essential, to humanity's development, but now ever-increasing numbers of species are becoming detrimental to the maintenance of the earth's biodiversity and to the well-being of human societies. Throughout the 19th and specially in 20th century the large-scale planting of trees for timber production has been one of the main reasons for the introductions of a large number of species, especially conifers e.g. Pinus, Picea. Pseudotsuga and Poplars species as well as Acer, Fraxinus, Quercus, Eucalypts. This paper attempts to unravel the relationships between humans and woody plants by looking at the changes in the introduction of species, the way they are perceived by different human groups and the impact these non native species have on forest trees improvement and other human activities.

Keywords: *Introduction, forest trees, improvement*

THE ANALYSIS OF BROWN BEAR (*URSUS ARCTOS L.*) POPULATION CONDITION IN BOSNIA AND HERZEGOVINA WITH REFERENCE TO THE REGION

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Abstract

The brown bear (*Ursus arctos* L.) is autochthonous and biggest beast in Bosnia and Herzegovina (BiH), and one of the most attractive species of wild animals. Bears living in BiH are part of the Dinaric-Pindos population, which is the second largest population in Central and Southern Europe. The bears in BiH, together with those in Slovenia and Croatia, are genetically similar to the remaining bears from the Alps and as such are suitable for reintroduction of extinct populations in Western Europe. Bears were once numerous and widely distributed in highland areas of BiH, among other things, due to preserved forests and small openness of the areas.More recently (2004), the estimated number of bear population is 438 individuals on the area of about 12 000 km². This type of game to the current number is not threatened in BiH, but it needs improvement of the management planning of its populations and habitats. This paper analyzes the condition and numbers of listed population as well as the main threats and protection measures for bear and its habitats, both in BiH and in the region.

Keywords: *Bear, habitat, population size, analysis of the condition, Bosnia and Herzegovina***.**

IN VITRO VEGETATIVE MULTIPLICATION OF *THYMUS PALLIDUS* COSS., THREATENED MEDICINAL AND AROMATIC PLANT IN MOROCCO

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Abstract

The present study reports an efficient protocol for *in vitro* clonal propagation of *Thymus pallidus* Coss., an aromatic and medicinal plant in Morocco. Initially, seeds collected from wild plants were used for *in vitro* culture establishment on Gautheret basal salts medium without plant growth regulators. Then, aseptic and living explants were transferred to Shah and Dalal medium for culture multiplication. Afterwards, we have selected one stable clone (the longest one) and we have evaluated the effect of six macronutrients. After that, seven cytokinins in different concentrations have been evaluated. Moreover, the effect of three polyamines has been investigated. Thereby, seeds germination started from the fifth day with a survival rate of 25 %. Furthermore, Margara medium has been proved the most favorable for plantlets growing. Higher number of shoots and buds (3.125±0.202 and 26.917±1.444 respectively) was obtained on Maragara medium supplemented with 0.46 µM of Kinetin, it also ensures good root development with an average number of 6.875±0.891 and a length of 1.696±0.079 cm. Also, 5 µM of Spermine gives higher number of shoots and buds (2.583±0.312 and 33.500±2.083 respectively) and a good root development (an average number of 9.250±0.670 and a length of 1.804±0.189 cm). Plantlets with well developed roots were successfully acclimatized to *ex vitro* conditions and an *in vitro* propagation was again established from the acclimatized and well grown plants. The *in vitro* culture system successfully established for *Thymus pallidus* Coss.offers a viable tool for mass micropropagation and conservation of this very threatened species.

Keywords: *Medicinal and Aromatic Plants, Thymus pallidus, In vitro vegetative multiplication, Morocco.*

ENERGETIC AND CHEMICAL PARAMETERS OF PINE BIOMASS EXTRACTED FROM DEGRADED AREAS

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Abstract

The work is based on the results of pine biomass extracted from chemically degraded areas. The study area was targeted by Zakłady Azotowe Puławy PLC- a Polish chemical company, specializing in the production of mono-volumes of nitrogen fertilizer (ammonium nitrate, urea, UAN, ammonium sulfate), one of the world's largest producers of melamine.The analyses included wood biomass and pine needles for their relevance to the energy use of thermochemical processes (firing, co-firing with coal, pyrolysis, gasification). Parameters of the energy, chemical composition and content of heavy metals were studied in the trunks and branches, including the ranges of their thickness.

It was found that, despite the risk of environmental contamination by industrial plant, the content of pollutions in the biomass wood pine was within the ranges reported in the literature for wood. There were no significant non-standard values, which would indicate the impact of the plant production of nitrogen fertilizers. Pine needles have the highest energy value and trunks have the lowest. There were no exceedances of heavy metals, as defined in the European standards for biomass. Wood biomass of pine, obtained from the area subjected to strong human pressure, did not show significant deviations from the average values typical for the genre, so it can be a valuable, renewable source of energy.

Keywords: *Pine, biomass, energy value, heavy metals*

INFLUENCE OF DIFFERENT VARIANT DENSITY SUBSTRATE ON THE BIOMETRIC FEATURES OF SCOTS PINE SEEDLINGS GROWN IN NURSERY CONTAINERS

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Abstract

Breeding seedlings of forest trees in the nursery container requires the use of high-quality substrate. The substrate used in container nurseries is peat, enriched with perlite and vermiculite. The most important influence on the growth of plants by absorption of water and minerals are the conditions of air - water substrate. The change of the physical parameter can be obtained by changing the density of the substrate.In 2015, at the Faculty of Forestry, University of Agriculture in Krakow (Poland),we prepared 9 variants density peat substrate used for container nursery production. Cassettes with the substrate were taken to the nursery container. Cassettes planted with pine seeds on the line technology have been transferred to the field production. Irrigation and fertilization were performed according to the scheme adopted at the nursery container for this species during the growing season. After the growth, the seedlings were taken to the laboratory of the University of Agriculture in Krakow. For each of the variants, density measured parameters were the height of the aboveground part, the length of the root system, the thickness of the root collar, conductivity, and size assimilation apparatus. The results indicate a difference in the growth of plants according to the degree of compaction of peat substrate.

Keywords: *Forestry,Pinus sylvestris, peat,subsoil,plant production.*

THE EFFECT OF DIFFERENT PM AIR POLLUTION ON THE EFFICIENCY OF PHOTOSYNTHETIC APPARATUS OF TREES AND SHURBS

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Abstract

Air pollutants caused by urbanization exert harmful effect on human health. One of the most dangerous inhaled pollutants are particulate matter (PM). They can be suspended in the air even for weeks as aerosols. It is estimated, that PM reduce average life expectancy in European Union (EU) by 1 year and in Poland even by 2 years. The only opportunity to lower/remove PM from atmosphere is *via* environmental biotechnology - phytoremediation in which plants are employed to clean up the environment. There is common opinion that air pollution has negative effects on efficiency of photosynthetic apparatus but still there are no data towards such effects of PM. In this study, we attempt to evaluate (i) efficiency of photosynthetic apparatus and (ii) deposition of PM on leafs of 5 species of trees and shrubs popular in urban forest. Individuals of birch, oak, linden trees and physocarpus and spiraea shrubs were placed in 4 isolated greenhouses, where air was polluted by PM from cement plant, street and from building demolition. For all these species the parameters of photosynthesis and *a* chlorophyll fluorescence were measured 4 times during growing season. Amount of PM deposited on leaf surface were also determined. For all plant species (with the exception of physocarpus) parameters of photosynthesis and chlorophyll *a* fluorescence were reduced in comparison with the control plants. There were differences between species in the size of the response to stress factors of different origin. Results show also that there were differences between species in ability of PM accumulation of different diameter and origin.

Keywords: *Air pollution, PM, Phytoremediation, Photosynthesis, Urban forest*

Acknowledgements

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EVALUATION OF ENVIRONMENTAL SAFETYFUNGICIDE APPLICATION IN FOREST NURSERIES OF SIBERIA

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Abstract

Experimental data of studying the biological indicators of soil AK-efficiency after treatment with fungicides. All studies were conducted in the conditions of forest nurseries for growing seedlings of Siberian pine. It was found that the BIOPRO-formulations do not violate the ecological condition of the soil microbocenosis, which is manifested in high rates of activity of oxidative and hydrolytic enzymes, whereas chemical fungicides leads to a change in microbocenosis structure, size and significant reduction in the enzymatic activity of soil. Analysis of the biological para- meters of soil provides a fairly informative data about ecological state of soil microbocenosis as a whole. This paper presents the results of studied effects of different strains of microorganisms of the genus *Bacillus*, *Pseudomonas* and *Trichoderma* members of the drugs on the performance of the biological activity of the soil. Also, activity levels of different groups of soil enzymes after the use of chemical fungicides have been identified.

Keywords: *Soil, activity, enzymes, processing, microflora.*

APHID FEEDING EFFECTS ON PHYSIOLOGICAL PARAMETERS OF POPLAR CULTIVARS

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Abstract

Aphid feeding effect on poplar leaves has been studied by three physiological characteristics. Different clones of *Populus deltoides* and *Populus alba* have been tested. Investigations were carried out on a fully formed uncolonized and colonized leaves with three aphid species: *Chaitophorus leucomelas* (poplar aphid), *Chaitophorus populialbae* (white poplar leaf aphid) and *Chaitophoruspopulieti* (poplar shoot aphid). The studies of net photosynthesis, dark respiration were carried out using completely developed leaves of one-year-old plants of *Populus deltoides* cl. 101-1 and Populus alba 'L-12'. Net photosynthesis and dark respiration were determined polarographically. Stomatal diffusive resistance was measured by Li-600 in leaves of two Eastern cottonwood clones (*Populus deltoides*) 'S1-8' and '181/82' on adaxial and abaxial leaf surface, in both colonized and uncolonized leaves.In plants colonized with aphids the a decrease of the photosynthesis in the range of 25-75% depending on the aphid species, cultivars and age (leaf) was recorded. Dark respiration was considerably higher, as well as stomatal diffuse resistance in the leaves colonized with aphids. The results indicate that aphid colonization reduced the stomatal conductance and then photosynthesis, probably resulting in negative effect on assimilation, biomass accumulation and other important physiological processes.

Keywords: *Aphids, poplars, net photosynthesis, respiration, stomatal diffusive resistance*

STUDY OF THREE DIFFERENT METHODS FOR SUPPRESSION OF ASH WEEVIL

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Abstract

The ash weevil is the most important insect pest of ash in South East Europe. Mass occurrence of the ash weevil causes defoliation of ash that lead to growth reduction. The feeding of this pest has direct influence to physiological weakening of colonized trees and creates preconditions for the development of secondary pests. This paper presents the examination results of three different methods for control of ash weevil adults. In field trials, we tested the effects of the use of cardboard niches, sticky tree belts and a biological insecticide containing conidia of fungi *Beauveria bassiana*, to the suppression of the ash weevil. As the direct protective measures the application of artificial cardboard niches for the overwintering adults proved to be much more attractive than the moss, that represent the natural shelter of the insect. Burning of the hibernating adults inside the cardboard niches would significantly reduce the population density. Despite the fact that high number of adults was recorded on the sticky bands applied to the stand-leaved ash trees, serious defoliation occurred. Due to the high number of caught beetles it may be presumed that sticky tree bands application could reduce the population densityat certain level when used continuously, and this should be checked by further studies. Control of the ash weevil by applying a bioinsecticide containing conidia of *B. bassiana* gave no positive results in suppression of the population density.

Keywords: *Ash, weevil, Stereonychus fraxini, control*

INJURIES TO LIVING TREES AT THE SAMPLE PLOTS IN CENTRAL SERBIA

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Abstract

Results of the monitoring of injuries at 130 sample plots in the grid 16x16 kilometers, which has been continuously conducted in Serbia since 2003, are presenteds in the paper. The causes of the injuries on the trees can be the consequence of the activity of the series of the adverse agents and owning to it the research of the most significant agents of the injuries was made. All injuries were classified in the paper by species and types of agents. The occurrence of the mass desiccation of oak forests is to a great extent result of the presence of the agents of powdery mildew. As the example of the use of the data from the database, the spatial arrangement of the plots with the pedunculate oak (which is our most sensitive species) was determined, as well as the infection of them by the powdery mildew. The strongest attack was reported during 2005 and 2006, when 79.3 % and 77.6% of the observed trees was infected. The critical month for the occurrence of the intensive infections by the powdery mildew in Serbia is the first half of July, which is important for the creation of the programs aimed at the protection.

Keywords: *Injuries, defoliation, chlorosis.*

CONTROL OF WEEDS IN PRODUCTION OF MAPLE AND BLACK WALNUT SEEDLINGS USING HERBICIDES

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Abstract

The application of herbicides in forestry reduces weed spreading, especially in the initial phases of forest seedling development when the unfavourable impact of weeds on seedlings is the highest. If weeds are not suppressed, the seedlings in nurseries are of poorer quality and their number is lower than expected. During the period 2014 – 2015 experiments were established in order to investigate the possibility of herbicide application in production of one-year-old maple and black walnut seedlings. The experiments were established at the Centre for Nursery Seed-Production Brcko (N44^{0}49'10,70" E18^{0}57'06,96") using randomized block design with three replicates. The investigated pre-emergence herbicides were metolachlor and dimethenamid and post-emergence herbicides clopyralid and imazamox. The efficiency of investigated herbicideswas done 2, 4 and 6 weeks after treatments and selectivity of herbicides were estimated during the vegetation season. The study results showed that investigated herbicides significantly reduced number of weeds compared to control. The better efficacy in weed control in the pre-emergence phase was achieved using herbicide dimethenamid (89.5% - 95.0%). The lower efficacy was achieved by applying the herbicide metolachlor (87.00% - 91.5%). The investigated post-emergence herbicides showed that herbicide clopyralid had better efficacy (88.0% - 93.5%) then herbicide imazamox (82.0% - 87.0%). The pre-emergence herbicides had no phytotoxic effect on maple and black walnut seedlings. But post-emergence herbicide imazamox had phytotoxic effect on maple and black walnut seedlings while herbicide clopyralid was selective to investigated seedlings. The results showed that metolachlor, dimethenamid and clopyralid can be applied for the control of weeds in production of one-year-old maple and black walnut seedlings, while imazamox had phytotoxic effect.

Keywords: *Weeds, herbicides, maple, black walnut*

QUALITATIVE FEATURES OF WOOD AND BARK IN *ROBINIA PSEUDOACACIA* L. TREES WITHIN FOREST STANDS IN THE NORTHERN STEPPE, UKRAINE

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Abstract

Studying of qualitative features of the phytomass components in *Robinia pseudoacacia* L. trees (black locust) is an essential task for survey of biological productivity, phytomass and deposited carbon in the forest stands within Ukrainian Steppe.

We conducted characterization of quality indicators in phytomass components, as an element of comprehensive work on the study of biological productivity, environmental and energy potential for the major forest-forming species under condition of steppe zone of Ukraine. Qualitative indicators of phytomass were determined by the values of local natural and basic density in wood and bark of tree.

Analysis of changes in basic density values in wood and bark from black locust trunk revealed that the maximum values of basic density both wood and bark were observed at the relative height of 0.5 h. Within the interval between the relative heights of 0.1 h and 0.25 h, the values of sample density were equal. The values of natural wood density in black locust trunks have decreased with its height, whereas this index in bark was not observed.

Thus, relationships between natural wood density and height in black locust were found: the value of this index decreases from butt end to the top of tree. This phenomenon may be associated with proportional changes in parenchymal tissues and vessels as xylem structural elements, i.e., natural density is characterized by a descending type.

Keywords: *Robinia pseudoacacia* L.,*biological productivity, wood density.*

THE ANALYSIS OF THE ASSIMILATION COMPONENT PARAMETERS OF THE ABOVEGROUND BIOMASS OF FOREST-FORMING SPECIES IN THE STEPPE OF UKRAINE

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Abstract

The purpose this research is to study the parameters of the leaf (needle) share in the trees greenery fraction and the content of absolutely dry matter in fresh leaves of black locust and Scots pine. The results of the research determined that the leaf share in the structure of tree's greenery fraction has a sufficient range of values: 43,0–72,8 % (for black locust) and 49,1–75,4 % (for Scots pine). For both investigated species it should be noted that there is a consistent pattern indicated by the trend line: with the increase of tree age, height and trunk diameter, there is a decrease of leaf share value in the trees greenery fraction.

Absolutely dry mass has a sufficient range of values from 0,321 to 0,524, with the extreme values for the trees belonging to the young stock groupin the case with black locust. The absolutely dry matter content in needle Scots pine showed a significant variability of values from 0,426 to 0,620.

There is no statistically proved dependency of the parameter indicating leaf share in the trees greenery fraction on the tree age, trunk diameter$_{1,3}$ and height. However, certain regularity has been noticed: there is a decrease in the index showing leaf share in the arborous greenery fraction with the increase of taxation parameters. The regression equations showing the dependence of the changes ofleaf (needle) share of trees greenery fraction and their absolutely dry matter on age, diameter and height also have enough lowcoefficients of determination.

Keywords: *Aboveground biomass, greenery fraction, taxation parameter trees, Scots pine, black locust*

TOTAL BIOACTIVE COMPONENTS AND ANTIOXIDANT PROPERTIES OF AQUEOUS EXTRACT OF WILD-GROWN*Ganoderma lucidum* FROM TURKEY

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Abstract

The genus *Ganoderma* has used to promote human health since the prehistoric ages. The *Ganoderma* species is considered one of the most important medicinal mushrooms and is traditionally used in the treatment of various ailments, including cancer, hypertension, gastric ulcer, tumor, kidney and cardiovascular problems. This work reports the antioxidant effects of water extractofwild-grown *Ganoderma lucidum*(Curtis) P. Karst from Turkey.Total phenolic and flavonoid contents present in the extract were also determined by Folin-Ciocalteu and $AlCl_3$ assays. Antioxidant activities were investigated by using different assays, including free radical scavenging assays(DPPH and ABTS) reducing power(FRAP and CUPRAC), phosphomolybdenum and metal chelating assays. Total phenolic and flavonoid contents were found to be 25.58 mgGAE/g extract and 0.67 mgRE/g extract, respectively. The extract was more effective than ABTS (83.44 mgTE/g extract) as compared to DPPH (17.67 mgTE/g extract). Moreover, the reducing abilities were 78.02 mgTE/g extract for CUPRAC and 46.55 mgTE/g extract for FRAP. Molybdenum reducing power was found to be 0.46 mmolTE/g extract. Ferrous chelating power was 14.45 mgEDTA/g extract. Results indicate that, *G. lucidum* could be considered as a natural source of high-valued functional ingredients for further use in healthful formulations.

Keywords: *Ganoderma, Total phenolic, Free radical scavenging, Turkey.*

A STUDY ON *IN VITRO* ENZYME INHIBITORY PROPERTIES OF AQUEOUS EXTRACT OF WILD-GROWN *Ganoderma lucidum*FROM TURKEY

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Abstract

The key enzyme inhibitory theory is one of the most accepted strategies in the treatment of global health problems including Alzheimer Disease and Diabetes mellitus.This theory based on alleviate the symptoms of these disease with the inhibition of key enzymes. To this end, several drugs are synthetically produced as enzyme inhibitors. However, these components have limited effectiveness and unfavorable health effects. For this reason, the enzyme inhibitory properties of waterextractof wild-grown*Ganoderma lucidum*(Curtis) P. Karst from Turkey were investigated against cholinesterase, tyrosinase, amylase and glucosidase. The *in vitro* enzyme inhibitory potentials were measured with a microplate reader. The extract was found to be effective on these enzymes. The activities were evaluated as standard equivalents. Acetylcholine and butrylcholinesterase inhibitory activities were 1.02 mgGALAE/g and 1.29 mgGALAE/g, respectively. Anti-diabetic activity was evaluated with α-amylase and α-glucosidase inhibition and the results were determined as 0.18 mmolACAE/g and 1.11 mmolACAE/g extract, respectively. Moreover, anti-tyrosinase activity was reported as 9.04 mgKAE/g extract. The results suggested that *G. lucidum* could be considered as a source of natural enzyme inhibitors for the treatment of major health problems.

Keywords: *Ganoderma, Enzyme Inhibition, Natural agents, Turkey.*

EDUCATIONAL PERSPECTIVES IN URBAN FORESTRY - OVERVIEW IN THE FEDERATION OF BOSNIA AND HERZEGOVINA

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Abstract

As relatively new concept in Western Balkan countries (WBC), urban forestry is facing with vast number of challenges that are stemming from both institutional and legislative shortages as well as poor human resource capacities. What is more, current situation of this sector in the Federation of Bosnia and Herzegovina (FBiH) arises an arguable question whether urban forestry can be treated as a separate sector or not. Scattered jurisdictions between public and private sector, lack of legislative framework that is strictly focused to urban forestry, small number of professionals with educational background in urban forestry and even an arguable definition of basic terms this sector operates with (i.e. "urban forest") can justify the fact that urban forestry is in its initial phase in this part of Bosnia and Herzegovina (BiH). On the other side, it is needless to speak about immense positive effects of urban forests to our society, both ecologically and socially.Due to the complex situation in which the employees of enterprises responsible for urban forestry are operating, the goal of this paper is to identify main burning issues they are facing with. Identification of these problems could help in preparation of case-specific educational programs for professionals in urban forestry. Finally, it will lead to the improvement of overall conditions of urban forests and, consequently, it will increase the level of satisfaction of local population as users of urban forests.

Keywords: *Urban forestry, the Federation of Bosnia and Herzegovina, education, professional trainings*

POPULATION DYNAMICS OF DAGGER NEMATODE ATTACKING ALEPPO PINE TREE IN JORDAN

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Abstract

The temporal distribution of an isolate of the dagger nematode attacking Aleppo pine, *Pinus halepensis* grown in AL-Jubiha area in Jordan was investigated. A total of eighteen samples were collected from rhizosphere about 30 cm deep in soil and 50 cm away from the trunk of a Pine tree showing decline and brown needles as one sample per month starting in November 2014 until April 2016. Cobb sieving and gravity methods were used for the nematode isolation from rhizosoil. The soil type is clay with 51 % porosity. The monthly air temperature, precipitation, and relative humidity were monitored and tabulated. The results showed that the number of recovered nematodes ranged from 2 individuals /100 cm^3 to 88 individuals /100cm^3 of rhizosoil. The lowest number was recovered on October whereas the highest numbers were recovered in December. The reason of decline in numbers may be due to a raise in temperature. The highest number may be due to favorable temperature and soil moisture. The difference of nematode in same month in two different years may be due to the temperature and precipitations.

Keywords: *Aleppo pine, dagger nematode, population, temperature, moisture*

COMPARISON ON THE DENDROMETRIC PROPERTIES OF SILVER BIRCH *BETULA PENDULA* ROTH AND DOWNY BIRCH *B. PUBESCENS* EHRH.GROWING IN THE SIMILAR CONDITIONS

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Abstract

Both of these commercial birch species are present in Latvia, growing as mixed forest stands, often without the admixture of other tree species. Birch groves occupy 28% of the Latvian forest area. It is believed that the silver birch is more common in fertile and mesic mineral soils, but downy birch prefers wetlands and nutrient-poorer areas. Often birch groves are characterized by spruce second floor and undergrowth. From dendrological point of view silver birch and downy birch are two separate tree species. But in forestry practice these ideas are ignored. This is evidenced, for example, by the fact that in forest inventory to determine parameters of individual trees and forest stands for both species are used common regulations (tables, formulas, coefficients). Another case shows the round timber market with similar prices for both species timber assortments. Objective of this research is to analyze the dendrometric differences between both birch species growing in the same environmental conditions.The empirical material was collected in the two naturally regenerated forest stands represented by two birch species. For every tree of each plot has been assessed: species belonging, tree height, the first green branch height, trunk diameter at the height of 1.3 m above the root collar, stem sinuosity. To determine tree age and course of tree growth the increment cores were obtained by using Presler's increment borer. The main dendrometric parameters including annual increment dynamics for both birch species are found to be statistically different.

Keywords: *Silver birch, downy birch, dendrometric parameters.*

THE COMPARISION OF GREY ALDER'S *(ALNUS INCANA* (L.) *MOENCH)* VEGETATION ON ABANDONED AGRICULTURAL LANDS AND RIPARIAN FORESTS IN LATVIA

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Abstract

The objective of the research is to compare grey alder's(*Alnus incana* (L.) Moench) vegetation on abandoned agricultural lands and riparian forests. Grey alder occupies 7 % of total forest area in Latvia. It has an essential ecological role in forest: it grades soil and enables succession of forest but the most valuable forest habitats of grey alder develop in riparian forests. Total of 12 sampling plots(each - 0.04 ha)have been conducted in grey alder's stands.The type of forests' growing conditions is rich deciduous forest *Aegopodiosa*. The inventory of growing trees, dead wood and vegetation is carried out in each sampling plot. The average volume of growing trees on abandoned lands is 318.8 m^3 ha^{-1}, and in riparian forests – 399.4 m^3 ha^{-1}. The average volume of dead wood is accordingly 14.4 m^3 ha^{-1} and 85.8 m^3 ha^{-1}. In total, 196 species of vascular plants and bryophytes are listed: 16 species – in the tree layer, 15 – in shrub layer, 116 – in herb layer and 27 – in the moss layer. The average projective cover of vegetation in grey alder's forests on abandoned agriculturallands is bigger than it is in riparian forests. Plant species of nemoral forest group characterize stands of grey alder: the most common species are *Alnus incana*, *Fraxinus excelsior* L., *Padus avium* Mill. and *Corylus avellana* L.

Keywords: *Alnus incana, vegetation, dead wood, abandoned agricultural lands, riparian forests.*

SANITARY CONDITION *OF PICEA ABIES* (L.) KARST. YOUNG FOREST STANDS DEPENDING ON THE SPATIAL SPECIFICITY

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Abstract

As a result of nature resources intensive use, most of ecosystems have been converted. Anthropogenic impact includes changes of forest stands structure and their spatial specificity in the forest area. Accordingly the sanitary state of Norway spruce young forest stands can be affected by different risk impact factors of management. The aim of the research was to analyze the spruce *Picea abies* (L.) Karst. young forest stands sanitary condition depending on forest plots spatial specificity and location in the forest areas. The data were collected in 4 regions of Latvia in spruce young forest stands (1 - 40 years old).The research was conducted in young natural and artificial stands (pure – 44, mixed – 42). In total 502 sample plots with a total area of 28250 m^2were installed.The particular plot size (25, 50, 100 and 200 m^2) were selected depending on the stand average tree height, while their number depended on the forest stand area.A total area of investigated forest stands were 127.5 hectares. Results showed that the expression of spatial specifics depended on risk factors and their intensity, as well as the environmental characteristics. Damages caused by abiotic risk factors at different forest stands were not the same regarding intensity, nature and volume, but more or less closely were related to all site conditions. Spatial specificity of forest stands area (regular and irregular), as well as their location in the forest massif significantly affects the spruce young forests sanitary status (respectively p=0.027 and p=0.002). Different risk factors damage to forests, bordering with spruce or pine young growths, cutovers and various types of infrastructure, were identified as much more important.

Keywords: *Forest stand, risk factor, sanitary condition.*

THE REGROWTH CONSERVATION AFTER SELECTION CUTTING OF FOREST STANDS GROWING IN *HYLOCOMIOSA* SITE TYPE

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Abstract

Clear cutting and selection cutting are final felling methods. Clear cutting are often used in Latvian forest. The disturbance of biological rhythm in clear cutting areas occurred for several years. Whereas selection cutting is more environmentally friendly, efforts should be made to apply it more in practice. Objectives of this research are to analyze the regrowth conservation after gradual felling in *Hylocomiosa* forest stands with a different species composition and determine tree health. For dendrometric indicators and gradual selective felling intensity characterization, twelve sample plots with an area of 500 m^2 were established in both forest stands. Plots were surveyed before and after the gradual selective felling. In order to perform an analysis of regrowth, 92 small inventory plots with a radius of 2.82 m were evaluated. Regrowth trees were counted (conifers from 0.1 m height and deciduous - 0.2 m) and their height was measured, as well as root rot infection was verified. In the Norway spruce mixed stand ($7S3P_{145}$) felling intensity was 52% but in the Scots pine mixed stand ($5P5S_{105}$) respectively – 49%. After felling trees regrowth number of losses account are 53 and 68%. The average height of spruce regrowth trees in both stands after felling was fallen but average height of birch and Scots pine regrowth increased. The differences of regrowth preservation between tree species during selection cutting were significant ($p=0.016<\alpha=0.05$). Root rot was not detected in the mixed Scots pine stand, but in spruce stand it was found in 33% of cases.

Keywords: *Mixed stand, clear cutting, height, root rot*.

THE EFFECTS OF ENVIRONMENTAL IMPACT ON CONIFEROUS FORESTS OF THE WESTERN PART OF LATVIA

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Abstract

The quality of Latvia's environment is influenced by many natural and anthropogenic factors whose proportions and intensity depends on local and global processes. Effective and quick evaluation of environment's quality with bioindication methods allows obtaining a concept of the real situation that derives from a sum of factors affecting the environment. Therefore nowadays not only felling of trees and recreation are affecting forest ecosystems, but also changes of environmental conditions, including chemical and physical factors. It must be emphasised that environmental factor impact on forest ecosystems is accumulating gradually and visually it is difficult to be discovered. The territory of the research covers Kurzeme region, which is located in the west part of Latvia or in the east of the European Union. Previous researches in this field in Kurzeme have fragmental features – they include impact evaluation of separate factors in separate stands. The analysis of environmental impact on forest ecosystems has theoretical and practical characteristics. Additional increment has been used to evaluate how stand has formed in a specific period of time. To demonstrate the accumulation course of environmental impact (or impact trend) the additional cumulative volume increment m^3m^{-2} per year has been used, which allows comparing different component and stand densities, or their parts. Total impact of environmental factors were evaluated in two categories: in the first category are those impact parts that can be explained with a common parameters for all sample plot stands. Second category is represented by only specific (local) factor impacts of each sample plot stands. A pronounced both category fluctuation of environmental impact in the territory of Kurzeme has been observed. The economic losses that results from the wood losses estimates 198 EUR ha^{-1} per year on average.

Keywords: *Environmental impact, Norway spruce, dendrochronology, volume increment.*

HIGH DENSITIES OF *CERVIDAE* EFFECT TO FOREST REGENERATION IN MIXED BROADLEAF FOREST IN SOUTH PART OF LITHUANIA

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Abstract

The abundance of *Cervidae* species is increasing in Lithuania as well as in the whole Baltic region. High densities of forest ruminants: Moose (*Alces alces*), Red deer (*Cervus elaphus*), Roe deer (*Capreolus capreolus*), Fallow deer (*Dama dama*) and European bison (*Bison bonasus*) cause a significant damage both to natural forest regeneration and afforestation. Strong negative impact on forest regeneration lead to increased costs of forest regeneration, formation and maintenance. Thus, the balance among intensive silviculture and big game management must be found for sustainable use of environment recourses. In our study, we observed the influence of cervids density increment to natural forest regeneration in mixed broadleaf forest, which is located near the Zuvintas strict reserve, and in landscape point of view connected with other forest arrays by natural migration corridors. We found that natural regenerated forest understory is hardly damaged as well as cultural forest plantations. Thus, hunting pressure in our research area is obviously too low and the current abundance of wild ruminants will not allow the economically effective intensive silviculture. After investigation we found a steady *Cervidae* abundance, not exceeding the highest optimal densities. Cervid winter pasture quality is relatively good – economically and browsing very intensively did not effect ecologically important tree species regeneration in forest understory. However, damage degree to forest regeneration in our observed stands was very high. Natural as well as artificial forest regeneration is rather difficult, thus cervid densities should be reduced of expensive protection tools should be implemented in forest regeneration stands.

Keywords: *Cervids, afforestation, damage to forest regeneration, hunting pressure.*

THE EFFECT OF MEDIUM pH ON WHITE POPLAR SHOOTS' GROWTH *IN VITRO*

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Abstract

The effect of initial medium pH on shoot growth and development of five white poplar (*Populus alba* L.) genotypes was tested. After 35 days of culture *in vitro* following characters were measured: shoot height, number of new shoots, percentage of survival and percentage of multiplication, fresh mass of shoots, dry mass of shoots, and shoot moisture content. The effect of four media buffered with sodium citrate buffer with following initial pH: 3.0, 4.0, 5.5 and 7.0, as well as of standard multiplication medium with pH 5.5 with no citric acid added were tested. In order to achieve agar solidification in medium with pH 3.0 media were sterilized in microwave oven. Results of analysis of variance indicated that there is significant effect of the media pH on the most of examined characters. There was no significant effect of interaction clone x medium pH, but according to LSD test, clones significantly differed in their reaction on medium with pH3 in relation to medium with pH5.5, especially by shoot height and fresh shoot mass. Generally, significantly lower values of the shoot height, number of new shoots, percentage of multiplication, fresh and dry shoot mass were recorded on a medium with initial pH 3.0 and pH 4 compared to the medium with pH 5.5. Most of the examined white poplar genotypes had a significantly lower percentage of the multiplication on low pH medium than on the control medium and medium with a higher pH values. Medium with initial pH 7.0 achieved inhibitory effect on fresh shoot mass and shoot moisture content.

Keywords: *Populus alba, micropropagation, acidity, microwave sterilization*

SPATIAL GENETIC PROFILE OF MARGINAL POPULATION OF SILVER FIR (*Abies alba* (var. *´Pyramidalis´*))FROM SERBIA USING SSR MARKERS

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Abstract

Considering that the pyramidal fir is of high conservation importance for Serbia forest diversity, the aim of this study was to determine, using SSR marker analysis, spatial genetic profile of the endemic and marginalised *Abies alba* population from Ogorijevac, Serbia. Leaf samples from nineteen *Abies alba* individuals from Ogorijevac site were collected, where nine of them were determined by morphological traits as *Abies alba* f. *´Pyramidalis´* and ten as a typical, silver fir, (*Abies alba* Mill.). PCR amplification was done with the 19 SSR primers in three multiplex mixes (16 EST-SSRs divided in 2 multiplexes and three genomic SSRs as a separate multiplex mix). Successful amplification was obtained for 17 out of 19 markers. Fragment analysis of PCR products was done on capillary electrophoresis automatic sequencer where, afterwards, scoring of resulted peaks was obtained using the GeneMarker V2.4.0 and MicroChecker software. Spatial genetic profile analysis was evaluated via BAPS software. The results of spatial BAPS showed the presence of two clusters (7/12) among 19 sampled individuals, indicating significant difference in genetic profile between selected silver fir (taxa) samples. Cluster differentiation within marginalised population of silver fir showed the results of such genetic profile which will be used as a platform for further molecular genetic research and conservation strategies of this endemic species. This research was done on STSM project within COST Action FP 1202 (MaP-FGR).

Keywords: *Abies, SSRs, genetic profile, spatial analysis*

ECTOMYCORRHIZAL FUNGI ON BEECH IN SERBIA

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Abstract

Knowing mycorrhizal community structure can provide valuable information about functioning of forest ecosystems. Beech forests make almost one half of forestry fond in Serbia and have important influence on environmental status.The aim of this study was to identify types of ectomycorrhizae in natural managed beech (*Fagus sylvatica* L.) stands from four different sites in Serbia: Homolje Mountains, Čemernik-Ostrozub, East Boranja and Fruška gora in two seasons: early winter and spring. Identification of fungal partner in ectomycorrhiza was obtained with morphological and anatomical characterization according to published descriptions and with molecular identification based on PCR amplification and sequencing of the ITS regions within nuclear ribosomal DNA. In all soil samples from investigated sites in two seasons total number of analysed fine roots was 54636 while total number of vital ectomycorrhizal roots was 8373. In examined beech stands 36 ectomycorrhizal types were recorded. Twenty seven types of ectomycorrhizae were identified with molecular methods from which 14 types to the species level, 4 types to the genus, 6 types to the family and 3 types to the ordo level. Genera *Russula* and *Lactarius* were the most species-rich genera, while type *Cenococcumgeophilum* was the most frequently found. Most of recorded ectomycorrhizal fungi are commonly found on beech.

Keywords: *ECM, Fagus sylvatica L., morphological-anatomical characterization, ITS rDNK, Serbia*

ANALYZE OF RATIONALITY OF SETTINGS WATCHTOWERS BY GEOGRAPHIC INFORMATION SYSTEM TOOLS

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Abstract

Forest fires destroy forests worldwide. Anthropogenic factors are the most frequent causes of forest fire. Negative consequences of forest fires in environmental and economic aspects are immeasurable and incalculable. Various preventive measures could be effectively used only if forest fires occurrence were discovered in the early stages (spatial and temporal). The use of modern technology can help in the forecast, detection, localization and fire extinguishing. Analysis of the vulnerability to forest fires is possible using Geographic Information System tools. Which provide thorough, time and spatial related analysis of parts of forest endangered by forest fire. Space surveillance and fire detection at an early stage might be carried with a watchtower or equipped by video surveillance. GIS tools provide the ability to set up an observation post simulation or camera system for identifying fire. Their use is obtained by covering the surface of each observation point, where it can be determined whether more observation posts or camera covering the same surface (location). The aim of this work is to analyse a rationality of settings of watchtowers by GIS tools.

Key words: *Forest fires, GIS tools, watchtowers.*

COENOLOGICAL ADAPTABILITYAND VITALITY OF ARTIFICIALLY ESTABLISHED BROADLEAFSTANDS IN HUNGARIAN OAK AND TURKISH OAK FOREST TYPE IN LIPOVICA NEAR BELGRADE, SERBIA

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Abstract

The paper presents the results of a research of coenological adaptability and vitality, and in those terms the planning of sustainability of species in artificially established stands on the forest type of Hungarian oak and Turkish oak (*Quercetumfarnetto-cerris* Rud.1949), on brown forest soil in the forest complex of Lipovica near Belgrade. The research results clearly confirm that it is justified to introduce some individual species into this site, because they show marked coenological flexibility and vitality, and accordingly apply the regular planning process. These are primarily pedunculate oak, largeleaf linden and white ash. The coenological inadaptability and unsustainability under the site conditions of the Hungarian oak and Turkish oak (*Quercetumfarnetto-cerris* Rud.1949) forest type on brown forest soil is primarily shown by green ash, which is ecologically and coenologically unsustainable in this site, as well as maple and black locust. Guided by the priority objectives of forest management in the complex "Lipovica" and in order to ensure biological stability and multifunctional contents, these species should primarily be substituted either by the species of the primary typological composition (Hungarian oak, Turkish oak) or the ones which have shown coenological stability and vitality (largeleaf linden, white ash and oak).

Key words: *Artificially established broadleaf stands, vitality, Hungarian oak and Turkish oak forest type, Serbia*

ECOLOGICAL-COENOLOGICAL RELATIONS OF BLACK PINE IN SITE CONDITIONS OF DIFFERENT FOREST TYPES IN THE VICINITY OF BELGRADE, SERBIA

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Abstract

The distribution and share of black pine in the growing stock of Serbia is related to its primary and secondary sites. According to the typological classification of forest sites in Serbia, black pine sites are natural finds of black pine in which black pine is at its coenological optimum, i.e. biological black pine characteristics are adaptable to specific extreme site conditions. However, considerable areas in artificially established stands in sites of different forest typesare occupied by black pine. Most commonly those are areaswhose primary ecological and stand structure is endangeredor areas of priority purpose and planned zoning (protective forest belts and various other purpose units).Depending on the typology of black pine sites black pine shows different ecological and coenological flexibility and vitality in artificially established stands under the site conditions of different forest types. This is further reflected in its functional sustainability and overall multi-functional effects.In the vicinity of Belgrade, black pine covers significant areas in the sites of various forest types of different multifunctional purposes.Therefore, the analysis and study of vitality and ecological and coenological stability gives full importance to the management, i.e. realistic assessment of planning procedures, when this species under specific site and typological conditions is at issue.In the Hungarian oak and Turkish oak forest type (*Quercetumfrainetto-cerris*)on brown forest soil, black pine achieves significantly higher production effects at the age of 50 years, compared to site conditions of the forest ofpedunculateoak and white linden (*Tilio-Quercetumcrassiusculaetypicum*Slavnić 1952) on medium deep to deep carbonate chernozem, also being morecoenologicallystable. Actually, even in artificially established stands biological characteristics of black pine have been manifested under the specific site conditionsof different forest types.

Keywords: *Black pine, typology of sites, ecological and coenological stability, forest types, Serbia.*

HYDROLOGICAL PROPERTIES OF EUGLEY SOIL IN THE MIDDLEDANUBE BASIN

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Abstract

The paper presents hydrological characteristics of eugley soilin the middle basin of the Danube river. Eugley soilwas analyzedat three sites within the part of the alluvial plain, which is protected from flood waters and wetting of this soil is under the influence of groundwater. The level of groundwater in the first profile ranged from 130 to 230 cm below the soil surface, in the second profile movement of groundwater amounted from 90 to 240 cm, while the third profile had amplitude varying from 95 to 185 cm below the soil surface. During the measurement of soil moisture at the depth of 10 cm it was noted that moisture values ranged from 8.96 to 72.65% vol., at the measurement depth of 40 cm soil moisture ranged from 12.24 to 47.74% vol., while at a depth of 70 cm soil moisture was in the range from 13.83 to 54.80% vol.. The measurement results show that the highest value of soil moisture is in the surface horizon at 10 cm depth, while soil moisture values at 40 and 70 cm are periodically increased due to the influence of groundwater capillary rising,especially in dry summer months.

Key words: *Soil moisture, Ground water, Eugley, Soil*

AREA POTENTIALLY AVAILABLE AND ITS CORRELATION WITH GROWTH OF TREES IN THE PLANTATION OF POPLAR CLONE B-229

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Abstract

Defining growing space is one of the basic elements of the plantations of fast growing tree species, such as poplars, because of it depends on the length of the production cycle, the dimensions of the trees and the economic profitability of plantations. The paper shows possibility of using the area potentially available (APA), as an expression of growing space of trees, in the poplar plantation of clone B-229 which has been established in planting space of 5 x 5 m and where in a part of plantation after 8 years thinning has been performed. The experiment was established in a block design with three replications with the control and the experimental sample plots each of 0.1225 ha, or total of 0,735 ha, where diameters at breast height of all trees were measured after 8 and 11 years, as well as the elements of the spatial position of the trees. Area potentially available is defined as a polygon that is determined by the position and diameter of the tree and its neighbors by the method of Moore et al (1973). The results showed that area potentially available was an average of 26.6 m^2 in the part of plantation where thinning operation has not been implemented and 52.1 m^2 in the part where thinning was conducted. Correlation of diameter and basal area increment with area potentially available on the control plot is positive and highly significant, ie. 0.7 and 0.76, respectively. However, the correlation is very low (0.2 and 0.35) and not significant in the experimental plot.

Keywords: *Area potentially available, increment, correlation, poplar, thinning.*

CONTRIBUTION TO KNOWLEDGE OF STRUCTURE OF MIXED BLACK LOCUST AND COMMON HACKBERRY STANDS IN THE AREA OF SUBOTICA-HORGOS SANDS (SERBIA)

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Abstract

The paper shows elements of growth and structure of mixed black locust and common hackberry stands, 28 years old and mixed origin in the area of Subotica-Horgos sands (Serbia) by measuring of all trees on three experimental plots, each of 0.0625 ha (25 x 25 m). Black locust trees in the stand are predominantly of coppice origin, and common hackberry trees are predominantly of seed origin. On the experimental plots 5000-6380 trees per hectare were determined, with the dominant share of black locust with 3100-4200 trees per hectare, or 62-71%. Basal area is 32.2 m^2ha^{-1} and wood volume is 200 m^3ha^{-1} on average, where black locust account for 73-80%. The dominant height of the black locust is 13.4-16.0 m and common hackberry is 14.8-15.9 m, while the mean height of black locust and common hackberry are approximately identical in all experimental plots and amount 11.4-12.8 m, indicating that stands belong to the V site class by Redei et al, (2014). The mean diameter of black locust trees ranged from 8.6 to 9.9 cm and the dominant from 16.8 to 19.3 cm, while the mean diameter of the common hackberry trees ranged from 70 to 94%, and dominant 92-122% of the black locust trees.Having in mind achieved heights of common hackberry trees, its abundance in the stand and representation in all crown classes, as well as its biological properties to a greater extent tolerated shading compared to black locust, it is estimated its dominance in the future of mixed black locust and common hackberry stands in the area of Subotica-Horgos Sands. Accordingly, it is necessary to adjust silvicultural and management measures in these stands, having in mind the natural succession of species and different planned orientations with them in the management plans in this area.

Keywords: *Black locust, common hackberry, mixed stands, growth elements, stand structure.*

FOREST AREAS AS KEY INDICATOR FORSUSTAINABLE FOREST MANAGEMENT IN SERBIA

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Abstract

Forests and forest land belong to the most important natural resources in Serbia. The area under forest represents one of the key indicators of sustainable forest management. Forests in Serbia are spread over a surface area of 2,252,400 ha. One of the main problems related to the state of forests and forest land and their sustainable management in Serbia is the inadequacy of its forest coverage (29.1%) in relation to the optimum level of 41%. From the global point of view, it is close to the world's average forest cover of 30%, but drastically lower than the 46% in Europe (TBFRA 2000). The forest cover in Serbia needs to be raised to its optimum level by year 2050. Sustainable forest management has its own requirements that can be fulfilled only if we provide certain preconditions. As regards the forest cover, the goal is to increase it by afforestation. According to the provisions of the Spatial Plan, the operational objective of the Republic of Serbia implies that, with respect to global space regionalization and categorization, 450 km^2 of new forests were to be established in the period 2010 - 2014. Operational objectives are by nature specific, measurable, time-framed, "real" and susceptible to analysis. In this context, two main objectives are contained in this paper. Based on the data available, the first objective is to do an analysis on the area size of new forests in Serbia that were established through afforestation of barren land in the period 2010 - 2014. In this regard, an assessment will be made of whether the afforestation level and trend represent a sufficiently secure framework to ensure sustainable forest management in Serbia. The second objective of this paper is to analyze the resources of the Budgetary Fund for Forests of the Republic of Serbia allocated for the purpose of afforestation on barren lands for the period 2010 - 2014. For this purpose, an analysis will be carried out (growth / decline trend) of allocated funds and the by-laws related to the conditions for their granting, allocation and justification. The paper shall give specific recommendations on how to improve the current situation in this field, given the conditions in Serbia.

Keywords: *Afforestation, sustainable forest management, Serbia*

SEASONAL VARIABILITY OF THE CHEMICAL COMPOSITION OF BIRCH SAP OBTAINED THROUGH TAPPING*(Betulae sucus recens)*

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Abstract

This work analyzes the variability of the chemical composition of birch sap, which is obtained through a traditional tapping method in discontinuous time intervals in seasons: 2000, 2010 and 2016. The subject of research are two stands of silver birch (*Betula pendula* Roth, Syn. *B. verrucosa* Ehrh,). The firstone on the Eocene flysch, in the belt of forests where sessile oak (*Quercus petraea*) alternates with European beech (*Fagus sylvatica*). Another one on silicate substrata, where birch trees form patches between spruce forest belt (*Picetum montanum*) and pastures. Samples of fresh birch sap (*Betulae sucus recens*) were measured in the following parameters: total solids, total sugars, total acids, tannin compounds, organic nitrogen, specific weight, refractive index, ash, Na, K, Ca, Mg, P, Fe, Cu, Zn, Mn, As, Cd, Co, Pb, Hg, Ni, Se. Also analyzed but not proven, were the presence of fat, flavonoidsand vitamin C. Sugars were analyzed in qualitative and quantitative terms. Presence od individual sugars were determined applying thin layer chromatography, while the impact of terrain and stand conditions on total sugar concentration in birch sap was evaluated using the Kruskal-Wallis test.Having in mind that birch sap is consumed by people as a refreshing and healing beverage, standard microbiological analysis has also been carried out.

Key words: *Birch sap, chemical composition, tapping*

GROUND COVER VEGETATION DEVELOPMENT IN *HYLOCOMIOSA* FOREST SITE TYPE AFTER THE CLEARCUT

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Abstract

Most of the ground cover vegetation descriptions given for characteristic of certain forest site types are made for mature forest stands. However the site type estimation for the practical forest inventory needs knowledge about the vegetation in every age class of forest. The clearcut as an artificial forest disturbance causes dramatically changes in plant community. Especially fast changes proceed during the first years after the clearcut. Due to increase of temperature and nutrient availability there proceeds several processes causing significant changes in ground cover vegetation.In 2015 a research was started to clarify the changes in ground cover vegetation in *Hylocomiosa* forest site type. This forest site type is most abundant in Latvian forests taking around 22%. The dominant tree species in *Hylocomiosa* is Scots pine (*Pinus sylvestris* L.) although the silver birch (*Betula pendula* Roth), Norway spruce (Picea abies (L.) Karsten) and aspen (*Populus tremula* L.) can form a tree stand there. The chronosequence method was used by providing the inventory at 5 tree stands dominated by pine. Six sample plots at each forest stand with size of 10 m^2 were established. The point-square method by using of 1mm thick and 1m high metallic needle was used for registration of plants at each square of sample plot.The inventory showed significant changes of species composition and projective cover of moss species and caulescent plants. The results of calculation of the Ellenberg's ecological values and Tschekanovsky coefficient suggest of appearance of plants with another attitude to the ecological factors.

Keywords: *Forest typology, Ground cover vegetation, Hylocomiosa forest site type, Clearcut.*

SPECIAL NATURE RESERVE "KOVILJ-PETROVARADIN MARSHES" – REVIEW AND ANALYSIS OF THE PROCLAMATION PROCESS, OBJECTIVES AND INTEGRATED MANAGEMENT MEASURES

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Abstract

Forest management in protected areas requires multidisciplinary approach of both forestry and nature protection planning. The complexity of protected area management requires investigation of the issue from various aspects, including evolutionary analysis, program analysis (review of proclamation documents, plans for protection realization) and result analysis (that has been achieved by). When forests are managed in protected areas, one of the most important aspects is the harmonization of the goals set in forest management plans and in nature protection documents. To be able to cope with such a challenging situation, it is necessary to take a broader perspective, i.e. to look in detail at the bio ecological condition of the respective protected area, to analyse previous management regimes and to identify main problems to be worked on in the future in order to achieve the goals of sustainability and integral management. The aim of this paper is to analyse key aspects of the proclamation, the proclamation process, the participation and cooperation of stakeholders in that process, the legal base and other relevant documents about the proclamation and management by taking the case of the Special Nature Reserve "Kovilj-Petrovaradin Marshes" as a prominent protected area with significant share of forests. The paper also presents the main characteristics of the marshy wetland ecosystems, and analyse the primary objectives of protection, together with the measures already taken for their achievement. The analyses should serve as a base for later deeper investigation and analysing of potentials for integrated resource management.

Keywords: *Special nature reserve, Protection, Forests, Integrated management.*

THE STUDY OF THE FOREST FORMATIONS DYNAMIC IN THE DAIA-SAIDA MONTAINS (SAIDA, ALGERIA) BY AEROSPACE REMOTE SENSING

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Abstract

Our contribution is the use of aerospace remote sensing techniques to study the forest formations dynamic in the Daïa-Saïda Mountains through processing and interpretation of two satellite images (LandSat images of 1987 and 2015) with the development of the forest vegetation map of these two periods and the change map. With their 23500 ha, Daïa-Saïda Mountains are a highland mountains with rugged terrain, located about 25 km in the west of the city of Saïda (the province main town). The forest vegetation is very representative of thermophilic groups of western Algeria, dominated by the Aleppo pine and Barbary cedar but with remarkable bushy undergrowth. The main results are as follow:

For the year 1987 : we preceded to an unsupervised classification verified with the forest stand map established by the BNEF in 1990, where the dense forest occupied 6203.98 ha , clear forest 6902.3 ha, scrub 5145.6 ha and bare soil and deforestation 5255.5 ha.

For the year 2015 (Image of 13/08/2015) we conducted a supervised classification with the following results: dense forest occupies 5974.94 ha, clear forest 6366.73 ha, scrub 5638.2 ha and the bare soil and deforestation occupies 5527.7 ha.

These results allow us to affirm the regressive dynamic of forest in this area with the increase of scrub, deforestation and a remarkable regression of the dense forest and the clear forest. The northern part of the massif is the most affected by this phenomenon with a very large bare area due to repeated fires that has affected it.

Keywords: *Diagnostic, Forest dynamic, Daïa-Saïda Mountains, LandSat images.*

FLORISTIC STUDY OF THE BOUATROUSS RIPARIAN FOREST (AIN EL HADJAR, PROVINCE OF SAIDA, ALGERIA)

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Abstract

Bouatrous zone, is located about 20 Km west of the city of Saida, this zone encompasses an area subjected to a permanent water surplus due to Bouatrouss river that runs through this forest. In this investigation we have established a floristic inventory of this region using phytoecological method and then we performed a classification of species according to their families, life forms and biogeographical type. With 22 bearings (1 Relevé for each homogenous zone), we have identified 51 species belonging to 29 families. The biological type classification is as follows; Phanerophytes (23.52%), chamaephytes (11.76%), hemicryptophytes (23.52 %), Geophytes (9.8 %) and finally the Therophytes with 31.37%.The species of the Mediterranean territory represent 45.09 %. This floristic study allowed us to confirm that there is high biodiversity in this very small area to be preserved and protected.

Keywords: *Riparian forest, Bouatrouss, Flora, Vegetation, Saida.*

VARIABILITY OF MORPHOLOGICAL CHARACTERISTICS OF FRUITS AND SEEDS OF WILD CHERRY (*PRUNUS AVIUM* L.) IN NATURAL POPULATIONS IN THE REPUBLIC OF SRPSKA (BOSNIA AND HERZEGOVINA)

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Abstract

The paper presents the results of the research into the intra and inter-population variation in the morphological characteristics of the fruits and seeds of five populations of wild cherry (*Prunus avium* L.) in the Entity of the Republic of Srpska. The fruits and seeds were collected from 10 trees of five wild cherry populations: Kalinovik, Višegrad, Milici, Ribnik and Prnjavor in the summer of 2015. The studied morphological properties were: fruit length, fruit width, seed length, seed width and petiole length. The population "Ribnik" was characterized by the highest coefficient of variation regarding petiole length (10.6%). On the other hand, the lowest variation coefficient was observed in the population "Milici" for seed width (3.9%). The ANOVA showed that the variation between populations as well as the variation between the genotypes within the populations were highly significant ($p<0.001$) for all of the analysed traits. Statistically significant correlation was observed between fruit and seed traits studied, as well as between petiole length and fruit length. The conducted research can serve as a starting point for further researches when it comes to breeding wild cherry in the Republic of Srpska and beyond.

Key words: *Wild cherry, population, half-sib lines, morphology, the Republic of Srpska*

USING PINE (*Pinus*) AND SPRUCE (*Picea*) STUMP SURFACE PATTERNS FOR THE DETERMINATION OF FELLING TIME

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Abstract

To determine of the timeline of tree felling is one of a number of investigative leads of illegal logging and superfelling of the forest. The study of literature and electronic sources showed a lack of methodology for the study of these problems along with results of such research. From June through September 2015 an exploration of diagnostic capability for determining the timeline of tree felling using the pine and spruce stumps. For the study cutover areas of spruce shamrock forest were selected. The age of felled forests is upwards of 80 years. The felling was carried out in September (2014), December (2014), February (2015), May (2015) and June (2015). Stumps on permanent plots were selected from every cut over area. There are 40-47 stumps in each cut over plot. Research stumps have a diameter range from 20 to 60 cm. Every stump was photographed in July, August and September. Stumps were grouped by species, degree of decay, diameter and stump surface condition. The change of stump surface condition was determined by climactic factors during summer. There are resin, water-dissolved available nutrients and metabolites on a stump surface after pine and spruce felling. They form a characteristic pattern on the stump surface. As for the pine felled in June (2015) the stumps are characterized by a heavy resin discharge (70 % of the total number of stumps). The May (2015) felling promotes a discharge pattern of water-dissolved nutrients and metabolites along with pine resin. The spruce stump surface has a more complicated pattern depending on the felling time.

Keywords: *Illegal logging, stump analysis, common pine, spruce, shamrock spruce forest.*

ASSESSMENT OF FINANCIAL EFFECTS OF REALIZED WOOD PRODUCTS IN FOREST ESTATES OF ROMANIJA REGION (BOSNIA AND HERZEGOVINA)

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Abstract

The basic assumption of economic progress and prosperity of a country is the sustainable management and use of its natural resources, especially of forests. The forestry sector, for years was not market-oriented and strategic planning at the enterprise level is still not developed in Republic of Srpska. In the previous period, more attention was focused on the income from wood products, pricing policies, as well as the use of comparative advantages and potential of domestic and international markets. Accordingly, within the framework of this study were analyzed gross incomes from realization of wood products from three forest estates (FE "Sokolac", FE "Han Pijesak" and FE "Pale") in the region of Romanija, as well as the growth rates of certain wood products. The survey was conducted with the aim of learning potential and market opportunities for the improvement of the forestry sector in region of Romanija. The subjects of research were companies in forestry sector, generated a gross income and growth rates of certain types of wood products. The main research method was the comparison. In the present study was used a questionnaire which was consisted of seven questions, which included basic information about companies, the amounts o disbursed products and prices at which these products are realized for the period 2005-2014 year. Through conducted research were observed moderate to significant differences between the forest estates in terms of generated gross income and the growth rate of certain product categories.

Keywords: *Region of Romanija, Wood products, Growth rates, Gross income, Forests estates.*

ECOLOGICAL AND PRODUCTION CHARACTERISTICS OF BEECH IN THE MOST PREVALENT MONODOMINANT MONTANE BEECH FOREST TYPES IN SERBIA

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Abstract

Montane beech forests in Serbia are a clearly differentiated and bounded spatial and ecological whole – climate-regional belt - in all mountain ranges. They have been formed under the synergetic impact of a complex of factors. Therefore, they are characterized by a marked ecological diversity expressed through petrographic-edaphic, orographic, microclimate and coenological characteristics. This belt is characterized by a specific microclimate which has a favorable effect on the ecological and coenoecological optimum of beech in most of the forest types: more precipitation, higher relative humidity, lower temperatures (which is very important at the time of summer drought) and lower temperature fluctuations. The largest share in this climate-regional belt belongs to monodominant montane beech forests. The most common forest identified through the typological definition of these forests are:1. The type of montane beech forest (*Fagetum moesiacae montanum - typicum*) on deep and very deep acid brown soils;2. The type of montane beech forest with fescue (*Fagetum moesiacae montanum drymetosum*) on medium deep and sometimes skeletal acid brown soils.In forest type 1, beech is under more mesophile ecological conditions and achieves high production effects, i.e. significantly higher productivity compared to forest type 2, which is influenced by orographic-edaphic conditions of the mountainous region. The stands of forest type 1 are the most productive beech forests in Serbia. In addition, the production dynamics of stands of these two forest types differs substantially.

Key words: *Beech, ecological and production characteristics, forest types, Serbia*

ECOLOGICAL AND PRODUCTIVE CHARACTERISTICS OF THE MOST TYPICAL ACIDOPHILOUS BEECH FOREST TYPES IN SERBIA

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Abstract

The largest areas of acidophilus beech forests in Serbia in the form of fragments are distributed in the montane beech forest belt at altitudes of 600 - 800 and 1000 – 1100m, which is primarily conditioned by the edaphic factor. These forests are also present outside of this belt, on the border between the montane and submontane belts, or most often in the very submontane belt in very small areas, usually formed due to anthropogenic impacts. Therefore, in particular stand situations, we do not actually speak of types.Within the basic typological coordinate system of forests, and in relation to site conditions and the complex interplay of factors, acidophilous beech forests are classified in the complex (belt) of mesophilic beech and beech-conifer forest types. They form a separate group within this complex -the coenoecological group of acidophilous beech forest type (*Luzulo – Fagenionmoesiacae*) on very acid soils (extremely acidic brown soils, podzolizedacid brown soils, brown podzolic soils and dystric humus-silicate soils).The most typical types from this coenoecological group of forest types in terms ofedaphotops differentiationand their overall characteristicsare:1.The type of acidophilous montane beech forest with oakforest woodrush (*Luzulo –Fagetum moesiacaemontanum*) on podzolized acid brown and dystric humus-silicate soils. 2. The type of acidophilous beech forests (*Musco - Fagetum*) on extremely acid brown, podzolized and eroded acid brown soils. The characteristics of edaphotops and marked influence in that sense was reflected in the ecological-vegetation structure and overall production potential effects of stands of these forest types.In forest type 1 site conditions are more favourable and production effects are significantly higher compared toforest type 2.

Keywords: *Acidophilous beech forests, forest types, ecology, productivity, Serbia.*

BIOCLIMATIC MAPPING OF RURAL AREAS IN BOZKURT, TURKEY, FOR RECREATION

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Abstract

Human beings tend to feel healthy and active in regions that have environmental conditions such as overall nominal temperature, precipitation, humidity, and wind within a range called the biocomfort threshold. Beyond the biocomfort threshold,people start to feel uncomfortable and want to move from the area. Hence, bioclimatic mapping of rural areas can help people find the best possible place for recreation. In this study, bioclimatic mapping of Bozkurt's rural areas was conducted with the aim of building upon similar studies in the rural areas of similar structures. To this end, Bozkurt's climatic data was collected from meteorological stations and used to produce biocomfort maps showing temperatures equivalent to the physiological index. The RayMan 1.2 program was used to evaluate the climatic data to determine a field's biocomfort structure, and the geographic information system (GIS) was used to produce thermal perception maps. Based on the psychological equivalent temperature, the most appropriate time and area for outdoor recreation activities were identified on the thermal perception maps.

Keywords: *Rural area, Bozkurt, biocomfort.*

QUALITY INDICATORS OF THE DECIDUOUS FRACTION OF *PINUS SYLVESTRIS* AND *ROBINIA PSEUDOACACIA* PHYTOMASS IN NORTHERN STEPPE OF UKRAINE

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Abstract

The purpose this research is to study the parameters of the leaf (needle) share in the trees greenery fraction and the content of absolutely dry matter in fresh leaves of black locust and Scots pine. The leaf (needle) share in the trees greenery fraction and the content of absolutely dry matter determine for their quantitative measures (weight and volume). The results of the research determine that the leaf share in the structure of tree's greenery fraction has a sufficient range of values: 43,0–72,8 % (for black locust) and 49,1–75,4 % (for Scots pine). The minimum value of this parameter is recorded for an overmature Robinia sample of 41 years of age, while the maximum is for a 3-year-old tree. For the sample pine trees the lowest values of the given parameter are registered for the samples aged 38, 49 and 84 years old, the maximum – for 30–31-year-old trees.For both investigated species it should be noted that there is a consistent pattern indicated by the trend line: with the increase of tree age, height and trunk diameter, there is a decrease of leaf share value in the trees greenery fraction.Such characteristic parameter as absolutely dry mass has a sufficient range of values from 0,321 to 0,524, with the extreme values for the trees belonging to the young stock groupin the case with black locust. The absolutely dry matter content in needle Scots pine showed a significant variability of values from 0,426 to 0,620. The trend line shows a tendency of increase in the value of absolutely dry matter mass in the leaves of the both investigated species with the increase in the values of the tree taxation parameters.There is no statistically proved dependency of the parameter indicating leaf share in the trees greenery fraction on the tree age, trunk diameter$_{1,3}$ and height. However, certain regularity has been noticed: there is a decrease in the index showing leaf share in the arborous greenery fraction with the increase of taxation parameters. For Scots pine the regression equations showing the dependence of the changes ofleaf (needle) share of trees greenery fraction and their absolutely dry matter on age, diameter and height also have enough low the coefficients of determination. The value of leaf (needle) share of trees greenery fraction decreases with the increasing age, height and diameter values, which is quite natural. Correlation indices of absolutely dry matter according to age, height and diameter of sample trees have negative values, while the index of leaf (needle) share of trees greenery fraction has a direct correlation with all the studied factors of influence.

Key words: *Aboveground biomass, greenery fraction, taxation parameter trees, Scots pine, black locust*

THE IMPACT OF HEALTH STATUS OF CORK OAK TREES ON THE CORK'S GROWTH: THE CASE OF TWO REGIONS IN ALGERIA

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Abstract

Cork oak forests are at risk of deterioration due to many factors that directly or indirectly cause deteoriation in the health status of cork oak trees.

In our study, we examined a range of cork trees of different health conditions in two forests in western Algeria - Zarieffet forest in the mountain area and M'Sila in the coastal area. These forests have been registered in the health surveillance system of cork oak forests since 1999. A visual assessment was made by estimating the proportion of leaves lost from trees over the last 10 years. In summer 2008, we selected 60 trees of different sanitary status (healthy trees and degraded trees) to obtain a 20X20 cm^2sample . In laboratory, the samples were prepared (boiling, drying and sanding) for the tree ring measurement with a Lintab 05 machine.

The results show that the health status of the trees has varied from year to year. In 2001, the proportion of degraded trees was 80% in Zarieffet and 93% in M'Sila. The period of 1999 to 2002 had negative effects on the health of cork trees. This had a great effect on the growth of the cork, in fact, the growth rate of the unhealthy trees decreased from 20-34% in the coastal forest (M'Sila) to 13-25% in the mountain forest (Zarieffet). This decrease in growth of cork led to an increase in the production cycle of 2 to 3 years, causing economic damage and risk to kill the weak and decaying trees if their cork will be harvested.

Keywords: *Cork oak, tree health, growth, ring*

REFLECTION ON DEVELOPMENT PROSPECTS OF SPATIO-TEMPORAL FOREST AND AGRICULTURAL LAND IN THE REGION OF BENI SAF (ALGERIA)

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Abstract

This study highlights and develops a management plan of spatio-temporal forests and agricultural land in the region of Beni Saf, Oran (Algeria). The pressure of the human activities has caused an imbalance in the land use. The methodology applied to superpose the map of potential land and the land use map, using the Geographical Information System (GIS), in partnership with the observations of the ground and the consultation of the forestry and agricultural history of the zone of study. The results obtained revealed a progression in forest space with a surface of 3332 ha (54%) instead of 2843 ha (46%), a regression of the space occupied by cereals with a surface of 690 ha or a rate of 11% and an extension of vines up to 600ha (10%) instead of 5 ha (0,1%), the citrus 275 ha (4,5%) instead of 46 ha (1%) and rustic plantations with a surface of 336 ha (5%) instead of 104 ha (2%). With this planning which rests primarily on the aptitude of the grounds, we can achieve a harmonious balance of the space use.

Key words: *Cartography, TM land sat, potentiality, management, Beni Saf.*

COMPARISON OF GROWTH BETWEEN DRY AND VITAL EUROPEAN BEECH STANDS IN BOSNIA AND HERZEGOVINA

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Abstract

Forest mortality is a great problem today for forestry in Bosnia and Herzegovina and in Europe. Damage caused by the mortality of forests has wide economic and environmental consequences. Average global surface temperatures have risen by approximately 0.8°C in the period between 1861 and 2005 and are expected to continue to increase until the end of this century by 1.5–5.8°C above the referent values. In contrast, the annual precipitation will most likely remain constant over the same time period, but will experience significant changes in seasonal patterns. In European beech forests in Bosnia and Herzegovina, it has not been observed mass mortality up to now, as is the case with other species (e.g. oaks, conifers). Aim of this research was to explain how extreme climate factors (high temperatures and fluctuating precipitation) affect the growth and increment of healthy and dry beech stand in Bosnia and Herzegovina, on the locality near Vlasenica. Vlasenica is the place where beech is in its optimum (*Fagetum montanum*) 800-1200 meters above sea level. Samples were taken from trees that grow in uniform habitat conditions. We took 15 dominant dry trees and 15 dominant healthy trees of beech. These two sampling sites were about 5 km away. Twists were taken by Presler's bore with two cross side by trees at breast height. Samples were fixed, sanded, diameter and statistically analyzed. Standard dendrochronology and statistical analyses were applied. Relation between growth and climate conditions was found.

Keywords: *European beech, forest mortality, dendrochronology, growth and increment.*

IDENTIFICATION OF FACTORS INFLUENCING CONIFEROUS STAND DAMAGE FROM SKYLINE YARDING

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Abstract

Damage to the residual stand is unavoidable if economically feasible levels of production are to be maintained.Regression analysis was used to develop a model, using scar area per turn as the dependent variable. The following variables were found to have most significant influence residual stand damage: number of carriage repositions, log angle, carriage clearance, narrow treatment, rigging slinger, and cutter.The ultimate success in a thinning operation depends on the logging crew; however, results can be influenced by the forest engineer and sale administrator.Further research is necessary regarding the relationship between the percent of the residual stand damaged and the resulting merchantable volume loss at the time of harvest. If volume loss is significant, then control measures must be introduced now in order to minimize stand damage during yarding. Data is needed to perform a benefit/cost analysis to determine whether future benefits, in the form of increased merchantable volume, outweigh any increased logging costs are associated with the implementation of these control measures.

Key words: Skyline yarding

INVESTIGATION OF THE POTENTIAL OF DIFFERENT POPLAR AND WILLOW CLONES FOR PHYTOREMEDIATION OF HERBICIDE-CONTAMINATED SOIL

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Abstract

Production of organic and safe food excludes the use of different pesticides and other artificially produced chemicals. Moreover, soil used for growing organic crops should be free from such compounds and their residues. Most effective green technology for contaminated soil clean-up is phytoremediation, especially if there are fat growing trees, like poplars and willows, on such soil.

In this study, we tested potential of different poplar and willow clones for phytoremediation of soil using two persistent herbicides: flurochloridone and oxyfluofen. In a pot experiment we tested the effect of herbicides on two poplar clones: *Populus x euramericana* cl. I-214 and *Populus deltoides* cl PE 19/66 and two white willow clones (*Salix alba*) B-44 and 378. The investigation included testing of the effect of herbicides on growth, physiological and biochemical processes in plants, together with abundance and enzymatic activity of microorganisms in the rhizosphere of the tested clones.

The results showed different effect on growth parameters of the investigated clones and their assimilation. A stress-induced increase in antioxidant activity was also recorded in the tested clones, although some differences between the clones were evident. On the other hand, transpiration was not affected by the herbicides. The herbicides also affected microorganisms in the rhizosphere of the investigated clones, with a decrease in the number of bacteria and a small increase in the number of fungi, actinomycetes and azotobacter. These preliminary results indicate there are some differences between the clones in almost all investigated parameters, which presents a basis for further selection of clones for phytoremediation of herbicides.

Keywords: *Phytoremediation, herbicides, poplars, willows*

GREENERY AND VEGETATION CONDITION AT THE PETROVARADIN FORTRESS IN CITY OF NOVI SAD (SERBIA)

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Abstract

One of the important components of any urban space are plants, which besides reliefs and constructed buildings or areas are structural elements of it. The functions of plants in urban environment can be: architectural, technical, aesthetic and microclimate. In addition, these plants provide contact of urban environment with nature, so staying in it is enjoyable. Petrovaradin fortress can be characterized as a public space of historical significance, which besides facilities and other structural elements has a large number of plants. Therefore, it is important to monitor the development and condition of greenery on it in order to avoid distortions of primarily aesthetic and other functions of a given space. This paper presents the results of research regarding greenery and conditions of vegetation in representative part of the Petrovaradin fortress in city of Novi Sad. Based on these results it can be said that green areas are dominated by lawns while trees and shrub species are less present. In percentages, there are more trees than shrub species, but also broadleaves are more present than conifers. The total number of trees and shrubs is 259, of which 179 are broadleaves and 81 are conifers. Number of broadleaves trees is 134, while number of coniferous trees is 58. On a scale of 1 to 5, the average score of vitality of plants is 4.30 and score of decorativeness is 4.53.

Keywords: *Urban space, Petrovaradin fortress, Greenery, Trees and shrubs*

ESTIMATION OF PHYTOEXTRACTION POTENTIAL AND ANTIOXIDANT CAPACITY OF POPLAR CLONE "PANNONIA" (*P.* x *euramericana*) UNDER INDUCED HEAVY METAL STRESS *IN VITRO*

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Abstract

Phytoremediation represents an environment friendly way of reclaiming heavy metal polluted soils and fast-growing trees as poplars, and it has been indicated as good candidate for this purpose. Special efforts were invested in selection of poplar clones that are more tolerant to heavy metal induced stress as well as into understanding of underlying biochemical mechanisms that provide higher tolerance to those specific clones. Biochemical properties, as a consequence of genetic predispositions, especially antioxidant capacity as well as phytoextraction potential could be crucial criteria for selection of more tolerant poplar genotypes.

Therefore, the main aim of the study was to characterize the tolerance of poplar clone "Panonia" to three different concentration (10, 50 and 100 mg/L) of Ni and Cu ions (separately) *in vitro* and to estimate and compare plant responses and clone's susceptibility to different metals in different concentration by using biochemical tools. Maximal concentration of Cu ions in shoots (69.50 mg/kg DW) was accumulated under the treatment of 50 ppm Cu, while 98, 83 mg/kg of nickel ions were taken up by shoots under the treatment with 100 ppm of Ni. No significant differences in uptake of K, Mg and Ca ions were noticed. Under the top treatment with Cu ions (100 ppm), ferric reducing ability of extracts (FRAP), total phenolic as well as flavonoid contents were increased for 16%, 24% and even 128%, respectively comparing to untreated controls, while radical scavenging capacities (RSC) of extract against NO and DPPH (2,2-diphenyl-1-picrylhydrazyl radical) were not affected significantly. On the other hand, top treatment with nickel ions caused increase of FRAP values (expressed by trolox equivalents, TE) for 52%, but decrease of total phenolic and flavonoid contents for 147 and 91%, respectively comparing to control. Under elevated Ni amounts in the medium, RSC of clone M1 against NO radical was increased for 39%, while RSC against DPPH remained unchanged. According to data obtained by biochemical assays it could be indicate that inspected clone "Pannonia" showed higher tolerance to elevated amounts of copper than nickel ions *in vitro*.

Keywords: *Heavy metals, poplar clone, phytoremediation, antioxidants.*

PRODUCTION CHARACTERISTICS OF BEECH AND FIR IN THE MOST PREVALENT TYPES OF BEECH AND FIR FORESTS IN SERBIA

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Abstract

The forests of beech and fir in the Republic of Serbia are very modestly represented. They spread over an area of cca11000 ha, which makes 3% of the total growing stock in the Republic of Serbia. They are mostly fragmentarily represented in the localities of Mt. Zlatibor, Mt.Kopaonik, Mt.Stara Planina, Mt. Prokletije, Mt.Željin and others. Only at the location of Mt.Goč, they cover a larger area and constitute a differentiated and homogeneous spatial and ecological whole in terms of a developed climate-regional belt. In the basic typological coordinate system of forests in Serbia, beech and fir forests are classified as complex mesophilic beech and beech and conifer forest types, forming a special coenoecological group of forest types, occurring in different orographic, edaphic-petrographic and microclimate conditions Beech and fir forests are typologically significantly more homogeneous in terms of ecological characteristics and ecological classification. The largest areas of these forests are covered by:

1. The type of beech and fir forest (*Abieti - Fagetum moesiacae montanum typicum*) on deep acid brown soils and delluviums on granodiorites, quartz diorites and schists.

2. The type of beech and fir forest with fescue (*Abieti - Fagetum moesiacae montanum drymetosum*) on medium deep acid brown and humus-silicate soils on granodiorites and schists.

Beech and fir show a different ratio in these forest types in terms of vitality, coenological stability and realistically achievable potential productivity and its development trends.

In forest type, fir achieves significantly higher production effects and is coenologically more stable. In type 2, beech achieves higher production effects compared to fir and is coenologically more stable. That has an impact on a different forest management and planning approach, starting from the optimum mixture ratio to the final functional and purpose objectives.

Key words: *Beech, fir, productivity, beech and fir forest types, Serbia.*

THE INTEGRATED PROTECTION AND SUSTAINABLE FOREST ROLE

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Abstract

In such a quickly changing world, can anything be sustainable? What do we want to sustain? How can we implement such a nebulous goal? Is it too late? With the contradictions and questions have come a hard look at our present forest production system and thoughtful evaluations of its future. The term "sustainable forest" has provided "talking points," a sense of direction, and an urgency, that has sparked much excitement and innovative thinking in the world. Keep the following in mind: a) interactions between farming systems and soil, water, biota, and atmosphere are complex--we have much to learn about their dynamics and long term impacts; b) most environmental problems are intertwined with economic, social, and political forces external to forestry; c) some problems are global in scope while others are experienced only locally; d) many of these problems are being addressed through conventional, as well as alternative, agricultural channels; e) the list is not complete; and f) no order of importance is intended. Role of forestry in producing sustainable raw material - timber - clear. Wide range of additional benefits: local employment and rural development; habitat creation and biodiversity; environmental protection, e.g. riparian woodland; recreation and amenity; landscape enhancement; carbon sequestration; environmental education, culture, folklore, heritage. Forestry is a multi-benefit landuse - environmental, social and economic benefits. So, how best do we manage our forests to maximise all of these benefits without reducing their capacity to provide them to future generations? Solution in **Sustainable Forest Management** (SFM).

Keyword: *Integrated protection, sustainable, forest, management*

QUALITY INDICATORS OF TWO-YEAR-OLD SEEDLINGS OFTHE SYCAMORE MAPLE (*Acer pseudoplatanus* L.)

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Abstract

This paper presents the analysis of morphological characteristics of two-year-old seedlings od the sycamore maple (*Acer pseudoplatanus* L.) and their mutual relations, in order to determine which of these morphological characteristics gives the best quality estimation without having a destructive effect on seedlings and requiring an increased range of work.

The seedlings were produced from the seeds of known origin, in homogenous environments at the seedling nursery of the Institute of Forestry in Belgrade (Serbia). The measurements were carried out on a random sample of 50 seedlings in four replications. The following morphological characteristics were measured: root collar diameter, height of a seedling, weight of aboveground and underground part of a seedling in dry condition, number of buds, length and volume of root. Based on the measured values, the following ratios were calculated: height : root collar diameter, weight of aboveground part of a seedling : weight of underground part of a seedling and a quality index.

The root collar diameterhad the strongest correlation with other measured morphological characteristics and henceit could be recommended as a good quality indicator of the two-year-old seedlings. The best quality indicator of the two-year-old seedlings of the sycamore maple is the quality index, but its determination requires time and resources and causes the destruction of the seedlings.

Key words: Sycamore maple, two-year-old seedlings, quality, morphological characteristics.

MOLECULAR TAXONOMY AND GENETIC DIVERSITY OF *Stereonychus fraxini* IN SERBIA

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Abstract

Ash weevil (*Stereonychus fraxini* Deg.) is the most important insect defoliator of ash trees in Serbia. This insect is found on several ash species in our country like the narrow-leafed ash (*Fraxinus angustifolia* Vahl.), common ash (*Fraxinus excelsior* L.) and water ash (*Fraxinus pennsylvanica* Marsh.). As narrow-leafed and common ash tree species have great economic importance for forest industry in Serbia, our research was focused on this two species where strong or complete defoliation due to ash weevil leads to a serious decrease in yield and affects a physiological weakening of ash trees as well. Adult and larvae stages of insect were collected from 17 localities that covered Northern and Central part of Serbia. In order of taxonomy research and evaluation of genetic diversity of the population ash weevil, molecular approach is applied. After isolation of gDNA, mitochondrial primers for 16S rRNA gene were used and resulted amplicons were sequenced. BLAST and alignment tools confirm that all specimens belong to *Stereonychus fraxini*. Evolutionary analyses were conducted in MEGA7 software where a total of 492 positions were in the final dataset. Neighbour-joining tree generated from the sequences distinguished three clades where one grouped the genetically narrow populations derived from 15 locations, the other representative of the second population (location-Krusevac) was genetically close to the first clade and the third clade represents one population genetically distinct from all others (location-Sremska Mitrovica). Distinctnes proved mutations in their sequences on several positions, mostly in the begining and on the 448 position from the start codon.

Key words: *Fraxinus species, Curculionidae, Molecular taxonomy, Genetic diversity*

SOIL TYPES IN THE MANAGEMENT UNIT INMUZLJANSKI RIT IN PE "VOJVODINASUME", SERBIA

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Abstract

This paper analyses soil properties in MU Muzljanski rit in PE"Vojvodinasume", Serbia. The most common soil unit in MU Muzljanski rit is humogley.

Humogley is mostly soil type for forestry production. Deforestation in the past is occurred mostly on humogley. This soil type is now used by agriculture or they are abandoned. .This type of soils situated in lowest position.

Productivity on meadow black soils mainly depends on texture, wateravailability and $CaCO_3$ content. This paper analyses soil properties of humogley in MU Muzljanski rit.

The content of silt+clay was from 53.2 to 74.4%, and the content of clay was from 25.6 to 48.4%. The texture class was mostly loamy clay, silty loam and clayed loam. The content of humus in A horizon was up to 4.57%.

Key words: *Soil types, Muzljanski rit, humogley*

ADDITIONAL ABSTRACTS

THE CHEMICAL COMPOSITION OF FIVE KINDS OF BASIL (OCIMUM BASILICUM L.)

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Abstract

Basil chemical composition is different depending on the types of basil and development phases of the plant. They were taken five kinds of basil to the field studies. The leaf samples were taken and they were made the analysis of the chemical composition of their essence. The content of essence is different among species and ranges from 2.8 to 4.4%. The essence content varies depending on the technology of cultivation. To specify change of the chemical composition between species it is used the same technology of cultivation for all kinds of basil included in the study. The experiment was set up according to the randomized block scheme in Toshkëz - Lushnje, Albania. Before planting, the soils were been performed the analysis in the laboratory of the Institute of Agronomic Studies in Fushe -Krujë, Albania. The seedlings were produced in greenhouses with central heating. The analysis of plant samples are carried out at the Laboratory of the Faculty of Pharmacy in Skopje – Macedonia.

Key words: *essence, cultivation, composition, technology*

AUTHORS INDEX