O4.9: NOVEL APPLICATIONS OF LACTOPEROXYDASE SYSTEM AGAINST PATHOGENS OF CULTIVATED PLANTS

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Nowadays, the majority of the agricultural systems in our industrialized countries are characterized by an intensive use of soils, a genetic homogeneity of the cultures, a specialization on a large scale as well as an important mechanization. These cultivation methods worsen the impact and the frequency of the diseases requiring a frequent utilisation of plant protection products which support the development of resistant pathogenic populations to these products. In that context, new strategies of production are in development aiming at ensuring profitability for agriculture and a less damage for the environment and human health. Among these strategies, the development of low impact chemical methods could constitute one of the tools to reach that goal.

Lactoperoxydase is present in a variety of secretions including tears, saliva, and milk and airway surface fluid. Lactoperoxydase is a member of the family of mammalian peroxidases, which utilize hydrogen peroxide (H_2O_2) to oxidize thiocyanate ($OSCN^-$) to hypothiocyanate ($OSCN^-$). Lactoperoxidase is also able to oxidize iodite (I^-) in hypoiodite ion (IO^-). A broad spectrum of antimicrobial activity has been described for the peroxidase system producing hypothiocyanate and hypoiodite with activity against gram-positive and gram-negative bacteria, as well as viruses and fungi. Catallix® is a patented system whereas there is a separation between the localisation of the reaction with substrates and the production of Activated Water containing the active substances (IO^- + $OSCN^-$). That Activated Water is a low impact chemical method due to several toxicological studies and to its use in milk as recommended by the lactoperoxidase system.

The Activated Water has shown a promising inhibitory effect against several fungal pathogens of plants during *in vitro* and *in vivo* trials and the application of that antimicrobial activity has been also patented against pathogens of plants The Activated Water was efficient *in vitro* against *Botrytis cinerea* (fungal agent of the phyllosphere), against *Pythium sp.* (fungal agent of the soil) and *Plasmopora viticola* (downy mildew of grapevine). The level of efficacy was depending on the ratio between hypothiocyanate and hypoiodite ions. The Activated Water was further tested *in vivo* against *P. viticola*. An efficacy between 89 and 96 % was detected on cuttings of grapevines infected with *P. viticola*. That high and reproducible inhibitory activity was detected during preventive and curative treatments. Similar results were also observed against *Phytophtora infestans*. This pathogen is responsible of mildew, the most important disease on potatoes worldwide. The perspective of application of Catallix® as producer of Activated Water thanks to the action of lactoperoxydase system against plant pathogens will be further discussed.