P1.04 Nutrient fluxes in three pure forest stands (*Fagus sylvatica*, *Quercus petraea* and *Picea abies*) on acid soils in the Haute Ardenne

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In the past, wide areas in Wallonia, mainly heathland and degraded forests, were intensively planted with highly productive conifers such as Scots Pine (*Pinus sylvestris* L.) or Norway spruce (*Picea abies* L. Karst). In 1984, Norway spruce covered nearly 200 000 ha in the Walloon Region and became the main planted wood crop in the Ardenne region (south Belgium). However, concerns about possible negative impacts like soil acidification, nitrate contamination of groundwater and susceptibility to windthrow, insect attacks,... have slowed down this expansion. Furthermore these spruce stands appear uniform and have a low biological value. In the Walloon region, only 52 % of the spruce stands are considered as compatible with their site. The non-compatible sites are mainly situated on hydromorphous soils and in low altitude regions. Sustainable forest management on these unsuited areas could involve transformation of Norway spruce monocultures into stands with site adapted species, such as native broadleaf trees. Through increased access to mineral reserves by a higher rooting depth, higher nutrient contents in litter, faster decomposition and the development of ground vegetation, these stands could improve nutrient cycling in former spruce monocultures.

In this poster we present research starting within the FEFOCON project (environmental, social, and economic FEasibility of FOrest CONversion, Politique scientifique fédérale), comparing nutrient cycling in pure Norway spruce, European beech (*Fagus sylvatica* L.) and oak (*Quercus petraea* (Mattuschka) Lieblein) stands. Three adjacent 70 year-old stands on acid brown soil were chosen for intensive measurements. Soil fertility is evaluated through classical measures like pH and exchangeable cations, nitrate and ammonium. The capacity of different tree species to improve soil nutrient conditions is assessed in a litter decomposition experiment. Elements (NO_3^-, NH_4^+, SO_4^{2-}, DOC, Al^{3+}, Ca^{2+}, K^+, Mg^{2+}, Na^+, P and microelements) in throughfall, soil solution and soil percolates are analysed every 2 weeks to characterise input-output budgets and nutrients cycling in these stands. Litter will be collected every month by litterfall collectors in each stand and analysed for nutrients contents. Microbial activities in the soil of each stand will be assessed by measures of decomposition, potential nitrification, respiration and denitrification.

P1.05 Impacts of elevated CO2 on net nitrification and on the community structure of ammonia oxidising bacteria

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It has been shown that the global atmospheric carbon dioxyde (CO_2) concentration is increasing, mainly due to anthropogenic emissions. Elevated concentrations of CO_2 in the atmosphere are expected to have major effects on the carbon (C) cycle in terrestrial ecosystems. As nitrogen

availability influences C sequestration and primary productivity, the processes of N cycling play a key role in the response of the C cycle to elevated atmospheric CO_2. While much is known about above ground plant responses to elevated CO_2, little information is available concerning the effects of elevated CO_2 on below ground processes and on the composition of soil microbiota, despite the essential functions of microorganisms in nutrient cycling.

In this study we investigated the effects of elevated atmospheric CO_2 concentration in open top chambers under Scots Pine (*Pinus sylvestris* L.) seedlings on net nitrification and on the community structure of ammonia oxidizing bacteria (AOB). The diversity of AOBs was investigated by Denaturant Gradient Gel Electrophoresis (DGGE) following genomic DNA extraction and specific PCR amplification targeting the 16S rRNA gene of the AOBs.

When soils from the elevated CO_2 chambers in the field were incubated under elevated CO_2 in the laboratory, the net nitrate production was increased. However, if they were incubated under ambiant CO_2, nitrate production was not increased. These results indicated a direct effect of elevated CO_2 concentration on nitrification, such as selection or adaptation of AOBs. The aim of the molecular analysis in this study was to establish whether some AOBs were selected under elevated atmospheric CO_2 and if the increased nitrate production could be related to the community structure of AOBs. Results of the community structure of AOBs under ambiant and elevated atmospheric CO_2 will be presented and discussed in relation to nitrate production, methodology and sample variability.

P1.06 Identifying and explaining the presence of high ruderalisation areas in a peri-urban deciduous forest

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Ruderals as defined by Grime are plants that are adapted to disturbance (i.e. partial or total destruction of biomass), but not necessarily to stress (i.e. phenomena which restrict photosynthetic production) (Grime et al. 1988). In this study we consider the presence of ruderal plant species as an indication of human disturbance. Although other agents can be responsible for the destruction of plant biomass (e.g. grazers), their influence is small in a peri-urban managed forest.

The research was conducted in the Sonian forest, which lies south of Brussels (50°47' N; 4°26' E). The forest covers an area of 4400 ha, of which 650 ha were studied. For the sampling of the understory herb layer we used a continuous grid of 50 m by 50 m. In each grid cell the abundance of 70 herb species was estimated according to a scale from 0 to 3 (0 absent, 3 dominant). These field data were compiled in a GIS, together with other information layers (road network , tree species, tree age, soil type).

After transforming the C-S-R typification of Grime et al. (1988) to numerical values, we determined for each grid cell the R-value by weighted averaging. With the use of a neighbourhood statistics, spots with a high R-value were selected and compared with spots having a low R-value. This comparison was done with the other available information layers.

We can conclude that high ruderalisation areas are almost always located close to forest roads. Typical road following species are for example *Cardamine flexuosa* (R-value = 10) and *Epipactis helleborine* (R-value not known).