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ABSTRACTS

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by mycorrhiza although frequently AM under field conditions. In the grass *Deschampsia flexuosa*, generally considered facultatively mycorrhizal, AM colonization intensity correlated with increasingly negative 15N values indicating increasing N transfer from the AM symbiont with increasing AM frequency in plant roots. This study shows that in the low Arctic, some AM host plants may be fully functional without AM symbiosis under field conditions.

Quantification of carbon fluxes in boreal forest ecosystem

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Boreal forest trees allocate a considerable part of their assimilated carbon to ectomycorrhizal (ECM) fungi, suggesting that ECM fungi may have a large potential to influence soil carbon fluxes and mediate belowground carbon sequestration. This is highly relevant in the context of predicting and mitigating environmental change and modelling carbon budgets. To assess carbon fluxes in boreal forest ecosystems more accurately, it is critical to investigate how specific components of the plant-ECM-soil interaction regulate belowground carbon flow. Within my PhD project I aim to fill in knowledge gaps of how microorganisms regulate carbon sequestration in forest soils. This will be achieved by coupling measurements of soil carbon dynamics (i.e. ECM biomass production, turnover and respiration) with fungal communities and forest stand properties. The project is part of the strong research environment IMPRESS (Integrating microorganisms in predictive models of carbon sequestration in forest soils), which aims to improve the capacity of ecosystem models to predict future national carbon budgets.

Antioxidant potential of fungi and seedlings during mycorrhizal induction

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Mycorrhizal associations implicate a chemical recognizing process being the establishment of the symbiosis triggered by signals produced by both partners. We evaluated the establishment of mycorrhizal symbiosis between two ectomycorrhizal (ECM) fungi species, *Paxillus involutus* and *Pisolithus arhizus*, and two different symbionts, *Pinus pinaster* and *Castanea sativa*. In a first step, we monitored the growth

of the two ECM species in the presence and absence of the symbiont *P. pinaster*. Then we evaluated the antioxidant properties of fungi and seedlings, in response to the symbiotic process, under different contact periods. After, we tested the mycorrhization process between the two fungi species and *C. sativa* seedlings, assessing the production of tocopherols and sugars produced by both partners during the earlier steps of symbiosis. The antioxidant properties were assessed through four *in vitro* assays: Folin-Ciocalteu assay (total phenolics), Ferricyanide/Prussian blue assay, 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity and β-carotene/linoleate system assay. Tocopherols and sugars were analysed by HPLC-fluorescence and HPLC-RI, respectively. ECM fungi grew less in the presence of *P. pinaster*, with *P. arhizus* being less affected (in growth) and thus being more adapted to this association. Regarding the mechanisms of oxidative stress in ectomycorrhizal associations, the response of the fungi and plants to the contact with the host is somehow specific, revealing different forms of mutual recognition. Considering bioactive compounds production, *P. involutus* revealed a maximal value of phenolics after 6h in co-culture with *P. pinaster* and *P. arhizus* revealed increased contents of sugars and tocopherols when in contact with *C. sativa*.

Effect of AM fungi on antioxidant enzymes activity in tomato (*Solanum lycopersicum* L.)

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Arbuscular mycorrhizal fungi (AMF) have been used to enhance the plant growth and yield to maintain good health and fertility that contributes great extents to a sustainable product. The study was undertaken to identify the responses of antioxidant enzymes activities in tomato (*Solanum lycopersicum* L.) inoculated with AM fungi. Oxygen free radicals induce damage due to peroxidation of biomembranes, which lead to tissue damage, thus cause occurrence of a number of diseases. Antioxidants neutralize the effect of free radicals through different ways and prevent the body from various diseases. The Arbuscular mycorrhizal fungi (AMF) increased the antioxidant enzyme activities such as superoxide dismutase (SOD) and catalase (CAT) activity in roots of inoculated plants, indicating lower oxidative damage in the colonized plants. It can be concluded that the mycorrhiza helps tomato plants by enhancing the antioxidant activity compared to non-mycorrhizal plants. Therefore, inoculation of indigenous AM fungi is recommended at seedling stage.