15.22 Project AGRO 689: *In vitro* mycorrhization of *Castanea sativa* and *Pinus pinaster* plants

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The present work concerns results from the Project AGRO 689 "Agronomic, economic and environmental interest of macrofungi associated with pinus (*Pinus pinaster*), chestnut (*Castanea sativa*) and oak (*Quercus pyrenaica*), in the Northeast of Portugal: Production of mycorrhizal pinus, chestnut and oak plants". We intend to contribute to the study of the capacity of two ectomycorrhizal fungi, *Pisolithus tinctorius* / *Boletus edulis* and *Pisolithus tinctorius* / *Lactarius deliciosus* to establish symbiosis with, respectively, *Castanea sativa* and *Pinus pinaster* roots, under *in vitro* conditions, either alone or in co-culture. Evaluation of their effects on plant growth is also being performed. Fungal growth and fungal association with the root system (mantle and Hartig net formation) was monitored at regular time periods. Growth rates of mycorrhizal and nonmycorrhizal plants were determined. This *in vitro* system enables us to compare growth capacity of each fungus, alone and in co-culture, in the presence or absence of the plant, as well as the establishment of mycorrhization. Differences in fungi growth were observed when growing alone or in co-culture. We discuss the preliminary results of mycorrhization with one and two fungi, both in terms of structure and growth of the symbionts.

15.23 Is microbial inoculation a feasible biotechnology for revegetation of spoilbanks?

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The aim of our study was to find out the potential of microbial inoculants – arbuscular mycorrhizal fungi (AMF) and plant growth promoting bacteria (PGPR) – to reduce duration and costs of agricultural reclamation of coal-mine spoilbanks in northwestern Bohemia. Growth effects of mycorrhization were tested for *Medicago sativa* and high biomass crops *Canabis sativa*, *Linum usitatissimum* and *Phalaris arundinacea*. Plants were cultivated in spoilbank substrate with or without organic additives (compost, lignocellulose) commonly used within spoilbank reclamation. High mycorrhizal colonisation potential was determined for spoilbank substrate; however, inoculation significantly increased mycorrhizal colonisation. Addition of compost in commonly used amounts almost eliminated the formation of mycorrhiza, whereas addition of lignocellulose in corresponding dose did not have any inhibitory effect. Therefore, the compost dose was optimised to maintain its nutritional effects on the crop plants without inhibiting the development of AMF. Mycorrhizal growth response was neutral to positive depending on plant species, with the highest benefit for *Linum*. Co-inoculation with PGPR did not influence the effect of mycorrhiza on plant growth, nor changed the level of root colonisation. The results will be tested *in-situ* in a field experiment. The authors are grateful to the Ministry of Education, Youth and Sports of the Czech Republic for financial support within the project IM6798593901.

15.24 The arbuscular mycorrhizal symbiosis as soil quality indicator in forage maize agroecosystems

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Soil quality is one of the main factors affecting agricultural sustainability. Several physical, chemical and biological characteristics of soils have been proposed as environmental indicators of soil quality. Arbuscular mycorrhizal (AM) fungi are usually present in natural soils, but can be negatively affected by agronomic practices when soils are cultivated, thus potentially being key indicators of soil health and agroecosystem sustainability. In this work, forage maize was used as crop plant in three field experiments to study the effect of a conventional mineral fertilization management and the fertilization with dried broiler litter (a by-product of the poultry industry) on the principal physical and chemical properties of the cultivated soils, and on the colonization of maize roots by the indigenous AM fungal population. Soil samples were taken at three soil depths: 0-15 cm, 15-30 cm, and 30-45 cm. Fertilizer treatments mostly affected the upper 30 cm of the soils, resulting in increased levels of P, K, Ca, Mg, and micronutrients respect to the soil layer at >30 cm depth. Maize roots were extensively colonized by AM fungi under both fertilization managements both in the 0-15 cm and the 15-30 cm layers, whereas the percentage of AM colonization in roots taken at >30 cm were significantly lower, suggesting that the AM symbiosis was influenced by factors other than soil nutrient availability.