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NEWSCORNER

A new EU COST action on mycorrhiza: first meeting in Nancy, France

The first scientific meeting of the new COST (European Cooperation on Scientific and Technical Research) Action 838 "Managing Arbuscular Mycorrhizal Fungi for Improving the Quality and Plant Health in Agriculture" was held in Nancy, France, 10–11 December 1999. This is the third COST Action on Mycorrhiza (following COST Action 810 and COST Action 821), which is certainly due to the hard work and the energy of the coordinator but which also emphazises the success of the network and promotes the importance of AM fungi in ecosystem function.

The topic at Nancy was "Arbuscular Mycorrhizas and Plant Health under Abiotic Stress". More than 50 participants from 21 countries attended the meeting. Oral communications and posters were presented within four sessions: AM-mediated uptake of nutritional and/or non nutritional heavy metals and radionuclides, toxicity of inorganic/organic pollutants, AM fungi diversity/dynamics in polluted/disturbed soils, role of AM in bioremediation. Most of the presentations concerned heavy metals but a few dealt with pollutants such as radionuclides, polycyclic aromatic hydrocarbons and pesticides. Only one concentrated on nutritional aspects of trace elements, two others were on AM fungi in salt marshes and one on the effect of soil tillage on AM fungi.

In the session on the effects of AM fungi on plant metal uptake, it was shown that Cs uptake by AM plants was reduced by K and that Cd binding to AM fungal hyphae was reduced by Zn and Ca addition. This clearly shows that interactions and competition between cations should be taken into account in such studies. Interactions between competing cations may be one explanation for contradictory results on the effect of AM fungi on plant metal uptake.

Although the mechanisms of the interactions between AM fungi, plant roots and soil pollutants are not fully understood, new results were presented on the implication of metalloproteins, genes related to the stress response, and the localisation of heavy metals in mycorrhizas. After Cd application, enhanced and new proteins were differentially synthesised in mycorrhizal and non-mycorrhizal *Pisum sativum*. One presentation on ericoid mycorrhizal fungi also reported the presence of stress related genes.

Compartment systems were used to produce AM hyphae and study their capacity to bind heavy metals, which appears to be very high. Interesting results were presented on the localisation of heavy metals in or on the hyphal wall and in mucigel using EDAX, and on the detection of Cd accumulation in AM mycelium and spores using proton microscopy.

Results on the effects of various pollutants, including heavy metals, polluted sewage sludges and fungicides, on AM fungal spore germination and root colonisation were presented. The proposed use of AM fungi as bioassays for soil pollution stimulated discussion on this topic. Since AM fungi (i) are a direct link between roots and soil, (ii) may be more sensitive to pollutants than plants and (iii) are produced commercially, they may be an adequate biotest for assessing soil pollution.

Presentations were made on the diversity of AM fungi in roots in heavy-metal polluted soils, studied using different molecular methods (nested PCR on 25S rDNA, 18S rDNA sequencing and fluorescence assisted mismatch analysis). AM diversity in roots must be considered in studies of the interactions between mycorrhizas, roots and pollutants in soils and more investigations on the topic are needed. It was also pointed out that AM fungi from highly polluted sites associated with metal-accumulating plants may be more efficient in alleviating metal toxicity in plants, suggesting that the search for more efficient AM fungi may be another approach to improve bioremediation.

This meeting confirmed the potentially beneficial role of AM fungi in polluted soils. AM fungi can improve plant establishment, survival and growth, prevent erosion in soils polluted with inorganic (heavy metals) and organic (hydrocarbons, pesticides) agents, and contribute to the immobilisation of heavy metals

(in roots) in polluted soils (phytostabilisation). There is evidence that they can also improve biodegradation processes in the rhizosphere of soils with organic pollutants (phytodegradation). Mycorrhizas may, therefore, be a key component for successful phytoremediation treatments. However, AM fungi are not useful agents for removal of metals from polluted soils (phytoextraction), since they tend to decrease metal translocation to shoots and plants most efficient in metal accumlulation (hyperaccumulators) tend to be non-mycorrhizal species.

Some of the presentations at the meeting will be submitted for publication in Mycorrhiza. Abstracts of the presentations will be available in the COST 838 Action Annual Report which can be requested from S. Gianinazzi (UMR BBCE-IPM, INRA/CMSE, BV 1540, 21034 Dijon cedex, France).

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