Abstracts

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"Mycorrhiza for Science and Society"

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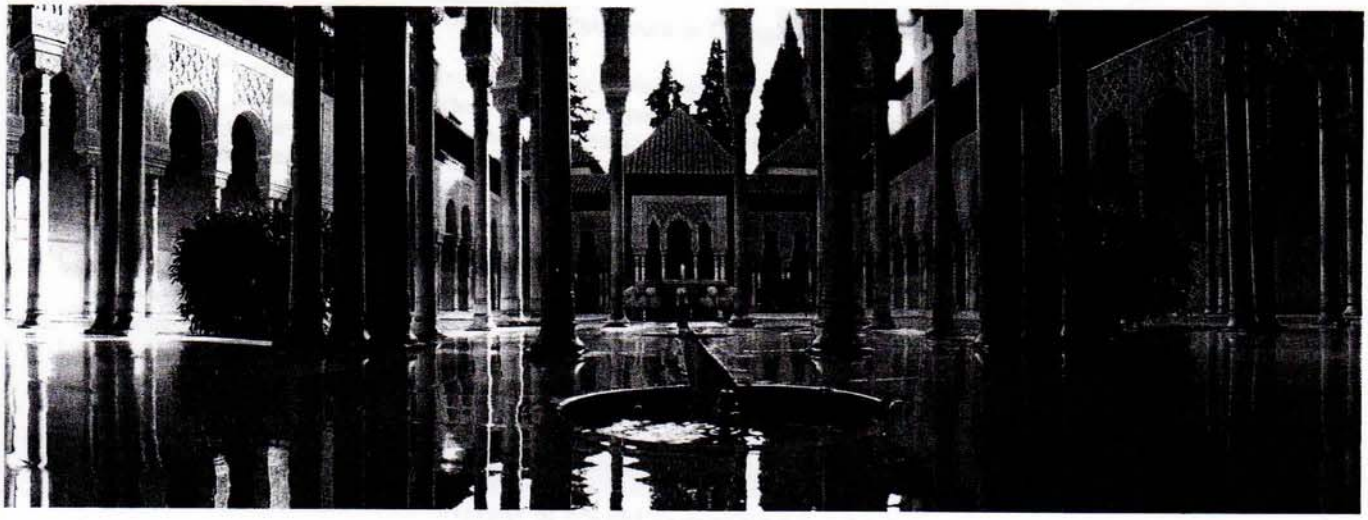

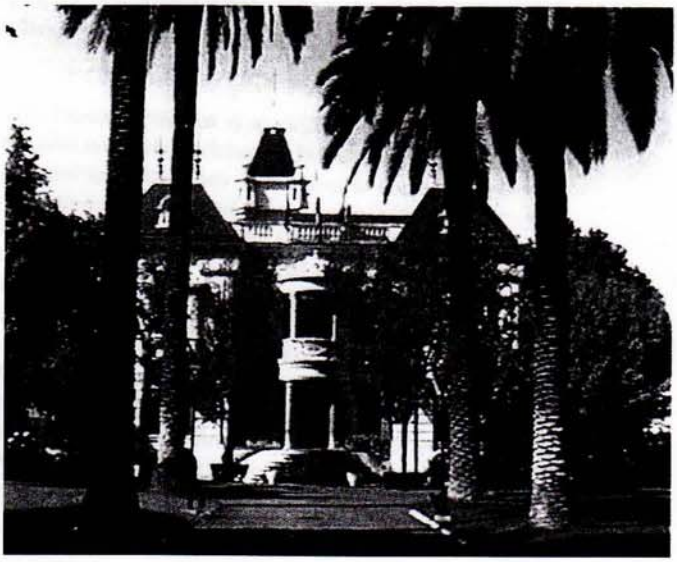

Estación Experimental del Zaidín
CSIC

7.16 Cd-tolerant *Suillus luteus* protects its host against Cd-toxicity

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It has become quite clear that the ecological success of many plant species is – in large extent – established by microbial symbionts that protect them against all kinds of negative influences. The basidiomycete fungus *Suillus luteus* is a common mycobiont in pioneer pine forests. On severely polluted soils in the vicinity of former non-ferro smelters, metal tolerant populations of this fungal species have evolved. It has been established that Cu- and Zn-tolerant *Suillus* species can reduce heavy-metal stress in plants by limiting transfer of the respective metals to above-ground parts of the plant. In a dose-response experiment with mycorrhizal plants we evaluate the importance of Cd-adaptation in *Suillus*. Can the Cd-tolerance of *S. luteus* improve the health of a host plant exposed to toxic Cd-concentrations? Results indicate that isolates sensitive to cadmium do not perform well when the association is exposed to high Cd-levels. The uptake of essential minerals (ammonium, phosphate) from the test solution by Cd-tolerant plant-fungus associations is maintained in the presence of high Cd-concentrations.

7.17 Occurrence of mycorrhizal associations in mining tailings polluted with heavy metals

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Thousands of years of intense mining activity has caused the accumulation of tailings in the hills surrounding the mines in the Southeastern Spain. These tailings are polluted with high concentrations of heavy metals and this determines a scarce and dispersed presence of vegetation on soils. Mycorrhizal fungi are thought to be involved in improving plant tolerance to several stress conditions, including heavy metal stress. So, the establishment of mycorrhizal associations could contribute to achieve the successful restoration of plant-deprived soils. In this work we anlyze the presence of mycorrhizae in plants spontaneously growing in an ancient tailing pond located in Murcia. Microscopical observations of roots from *Zygophyllum fabago*, *Phragmites australis* and *Paronychia suffruticosa* revealed the generalized occurrence of these symbiotic associations. Furthermore, analysis of phosphatase, esterase and dehydrogenase enzymatic activities extracted from rhizospheric soils showed a good correlation with mycorrhizae abundance. Since these enzymatic activities are considered to be sensitive markers of soil quality, results obtained point to an improvement of soil attributes due to the presence of mycorrhizal associations. Acknowledgements: This work was partially supported by MEC and Fundación Séneca (REN2002-02952, PB/23/FS/02).

7.18 Genetic and functional diversity of ericoid mycorrhizal fungi tolerant to heavy metals

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The introduction of heavy metals in terrestrial ecosystems through human activities is one of the main causes of pollution, but soils derived from ultramafic rocks (serpentine) are also naturally enriched in heavy metals. Ericoid mycorrhizal fungi are known to be highly tolerant to heavy metals and to protect their host plants in contaminated sites. Aim of this study was to investigate the functional and genetic diversity of *Oidiodendron maius*, a widespread ericoid fungal species, in *Vaccinium myrtillus* roots collected (i) in a serpentinitic area of the Mont Avic Parc in Italy, (ii) in a heavily polluted industrial site in Poland, (iii) in unpolluted sites in Italy, Poland and Canada. Functional diversity of *O. maius* strains was evaluated by testing their growth in the presence of heavy metals (Cr, Ni, Zn). Some specificity in metal tolerance was found towards the contaminants abundant in the site of origin. Genetic diversity was analysed through AFLP analysis and sequencing of ITS and functional genes (e.g. SOD). For strains isolated in contaminated soils, genetic diversity was found to be higher for the SOD locus than for the ITS locus. Phylogenetic analyses showed different tree topologies for the two loci, indicating their different evolution. Interestingly, strains more tolerant to metals showed higher genetic diversity. One of the most tolerant fungal isolates, when tested in mycorrhizal synthesis experiments, was found to confer to the plant a higher tolerance to Cr.