Effect of arbuscular mycorrhizal fungi on plant biomass and the rhizosphere microbial community structure of mesquite grown in acidic lead/zinc mine tailings. [1]

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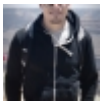 [2]

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Abstract	Mine tailings in arid and semi-arid environments are barren of vegetation and subject to eolian dispersion and water erosion. Revegetation is a cost-effective strategy to reduce erosion processes and has wide public acceptance. A major cost of revegetation is the addition of amendments, such as compost, to allow plant establishment. In this paper we explore whether arbuscular mycorrhizal fungi (AMF) can help support plant growth in tailings at a reduced compost concentration. A greenhouse experiment was performed to determine the effects of three AMF inocula on biomass, shoot accumulation of heavy metals, and changes in the rhizosphere microbial community structure of the native plant Prosopis juliflora (mesquite). Plants were grown in an acidic lead/zinc mine tailings amended with 10% (w/w) compost amendment, which is slightly sub-optimal for plant growth in these tailings. After two months, AMF-inoculated plants showed increased dry biomass and root length ($p<0.05$) and effective AMF colonization compared to controls grown in uninoculated compost-amended tailings. Mesquite shoot tissue lead and zinc concentrations did not exceed domestic animal toxicity limits regardless of whether AMF inoculation was used. The rhizosphere microbial community structure was assessed using denaturing gradient gel electrophoresis (DGGE) profiles of the small subunit RNA gene for bacteria and fungi. Canonical correspondence analysis (CCA) of DGGE profiles showed that the rhizosphere fungal community structure at the end of the experiment was significantly different from the community structure in the tailings, compost, and AMF inocula prior to planting. Further, CCA showed that AMF inoculation significantly influenced the development of both the fungal and bacterial rhizosphere community structures after two months. The changes observed in the rhizosphere microbial community structure may be either a direct effect of the AMF inocula, caused by changes in plant physiology induced by AMF, or a combination of both mechanisms.
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Links
[1] https://www.cienciapr.org/es/effect-arbuscular-mycorrhizal-fungi-plant-biomass-and-rhizosphere-microbial-community-structure?language=en [2] https://www.cienciapr.org/es/user/alexis?language=en [3] https://www.cienciapr.org/es/biblio?language=en&f%5Bauthor%5D=399 [4]

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