PO-19. Restoration of soils contaminated by heavy metals: a strategy based on waste recycling and bioremediation by symbiotic and saprobic microorganisms

Mario Paniagua-López[1,2], Gloria Andrea Silva-Castro[1], Francisco José Martín-Peinado[2], Manuel Sierra-Aragón[2], Inmaculada García-Romera[1]

[1]Dpto. de Microbiología del Suelo y la Planta, Estación Experimental del Zaidín, CSIC, Granada
[2]Dpto. de Edafología y Química Agrícola, Facultad de Ciencias, Universidad de Granada, Granada

Soil contamination represents a major concern worldwide due to the high occurrence of contamination generated by anthropogenic causes. The revalorization of harmless waste materials through their use as soil amendments can represent an effective and ecological solution to remediate contaminated soils [1]. The application of soil microorganisms to improve plant nutrition through the bioprotective effect of arbuscular mycorrhizal fungi (AMF) is another strategy for the remediation of soils contaminated by heavy metals, as they can provide a significant resistance to these adverse elements by their immobilization, extraction, and concentration in their tissues [2].

The present study evaluates the effectiveness of remediation treatments based on inorganic (marble sludge) and organic amendments (vermicompost, and dry olive residue (DOR) biotransformed by saprobic fungi *Coprinellus radians* and *Coriolopsis rigida*) combined with the inoculation of AMF *Rhizoglomus custos* and *Rhizophagus intraradices*, which were applied to residual polluted soils affected by the Aznalcóllar mining spill occurred in 1998 (SW Spain) [3]. For this purpose, the influence of the treatments on the main soil properties and on the toxicity and bioaccumulation of heavy metals in wheat plants grown on the polluted soil was studied.

The results showed that amendments application improved the main soil properties and reduced soil toxicity by reducing potentially toxic element (PTEs) concentrations such as Pb and As. This led to an increase in wheat plant biomass under certain treatments, being that consisting of the combination of marble with biotransformed DOR by *C. rigida* + *R. custos* inoculation the one that most significantly increased plant weight and percentage of mycorrhization in roots. Also, treatments consisting of biotransformed DOR by *C. rigida* inoculated by both AMF showed the greatest reduction in PTEs bioaccumulation in shoots and roots of plants. This suggests that the application of arbuscular mycorrhizal fungi in combination with inorganic and organic amendments may enhance their remediation potential of contaminated soils.

[1] González-Núñez, R. et al. (2015). Viability of adding gypsum and calcite for remediation of metal-contaminated soil: laboratory and pilot plant scales. Int. J. Environ. Sci. Te. 12, 2697-2710.
[2] Arriagada, C. et al. (2009). Contribution of the saprobic fungi *Trametes versicolor* and *Trichoderma harzianum* and the arbuscular mcorrhizal fungi *Glomus deserticola* and *G. claroideum* to arsenic tolerance of *Eucalyptus globulus*. Bioresource Technol. 100, 6250-6257.
[3] Martín-Peinado, F.J. et al. (2015). Long-term contamination in a recovered area affected by a mining spill. Sci. Total Environ. 514, 219-223.

[This work was supported by the Research Project RTI 2018-094327-B-I00 (Ministry of Science, Innovation and Universities)].

I JORNADA DE LA JUVENTUD INVESTIGADORA

30 DE NOVIEMBRE 2022
ESTACIÓN EXPERIMENTAL DEL ZAIDÍN

PÓSTERS || CONFERENCIAS || COMUNICACIONES ORALES

eez Estación Experimental del Zaidín

CSIC Consejo Superior de Investigaciones Científicas