SOIL SCIENCE COLLOQUIUM

Guest speaker

Tuesday 3rd May 2022, 16.30 am – 18.15 am

Phytostabilization strategies to ameliorate arsenic toxicity in soils.

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ABSTRACT. Soil contamination, a global-scale problem, has attracted increasing attention in the last decades. The remediation of contaminated soils is a challenge to protect ecosystems and human health, but the remediation needs to be economically feasible. Conventional remediation technologies, such as excavation or vitrification, present multiple limitations, such as high cost and disturbance of soil properties and functioning. To overcome these limitations, gentle remediation strategies are attracting more attention from researchers.

Phytoremediation or phytotechnologies use green plants to remove or stabilise metal(oid)s in soil and offer a low-cost and sustainable alternative. In combination to plant-based technologies, the addition of soil amendments often decreases metal(loid)s availability and reduce their phytotoxicity, creating a suitable environment for the establishment of a plant cover. Inorganic amendments are in general effective at immobilising metals in soil. However, their application rarely improves soil physicochemical properties. Iron amendments have been often studied for the remediation of soils contaminated with arsenic (As), since iron oxides are known to be major scavengers of As in soils and to mainly control its mobility. Organic amendments lead often to metals immobilisation but may occasionally provoke As mobilization. The main advantage of using organic materials as soil amendments is the improvement of soil functions.

In multi-contaminated soils, each amendment will have different, sometimes contrasting, effects on each contaminant. When negative effects appear (i.e. organic matter on As mobility), the combination of different amendments may be necessary to counteract the drawbacks with another amendment (iron amendments to prevent As mobilisation).

This seminar will show the main results obtained from several experiments combining the addition of iron and organic amendments, focusing not only on chemical parameters to evaluate the success of the remediation strategy, but also on soil and plant health aspects.

BIO. Teresa Fresno is a PhD in Agricultural Chemistry (2017), issued by the Universidad Autónoma de Madrid (Spain). Her research has mainly focused on the assessment of aided phytostabilisation strategies based on the application of inorganic and organic amendments to alleviate toxicity in contaminated and degraded soils and improve soil health and fertility, with a special focus on rhizosphere processes affecting As dynamics in highly polluted soils using advanced techniques such as the use of DGT (diffusive gradients in thin films) to evaluate the 2-D distribution of elements on the plant rhizosphere or the use of the high resolution technique LA-ICP-MS for Fe and As localization in roots. During her PhD and post-doctoral stage, she spent one year at the University of Natural Resources and Life Sciences Vienna (BOKU) collaborating with the Rhizosphere ecology and biogeochemistry group. From 2018 to 2020 she worked as project manager and coordinator for several programs funded by EIT Food (H2020) at the Universidad Autónoma de Madrid at the Department of Food Sciences. Since November 2020, Teresa is working as Assistant Professor at the Department of Agricultural Chemistry and Food Sciences of the Universidad Autónoma de Madrid. Her current research interests are still related with the improvement of degraded or contaminated soils through the addition of organic wastes/by-products. Specifically, she is now leading a project on the dynamics of pharmaceuticals on amended soils and its impact on plant uptake in agricultural soils.

You are welcome to attend virtually in the Zoom seminar room (Meeting ID: 661 2561 8101, psw: 123456).

The presentation will be followed by a talk by Hang Guan, PhD candidate from the Soil Science Group, on the topic:

"The effects of soil disturbance and plant growth on arsenic concentration and speciation in soil-maize system."