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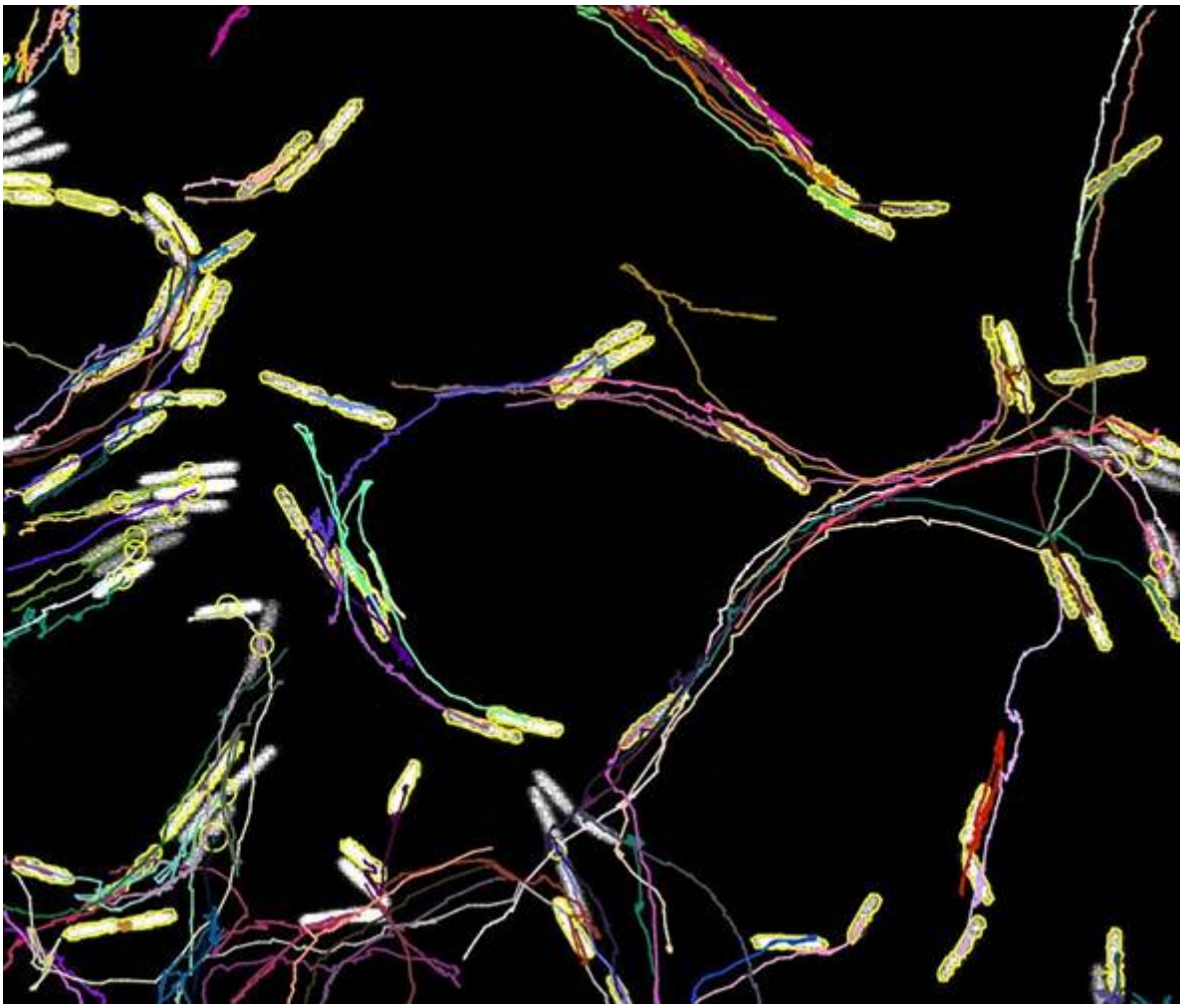

Foto: Se hace camino al andar. Celeste Dea. 1er puesto. Concurso fotográfico SAMIGE 20 años.

POTENTIAL OF GLOMALIN-RELATED SOIL PROTEIN ON METAL SEQUESTRATION IN LEAD-CONTAMINATED SITES

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Heavy metals (HM) accumulation in the soil represents a risk to the environment, food safety, and human health due to their toxic nature and potential to mobilize between environmental compartments. The remediation of contaminated sites is complex, leading to the proposal of phytoremediation as a key tool for restoring affected areas. Therefore, this study aimed to evaluate the amount of glomalin-related soil protein (GRSP), produced by arbuscular mycorrhizal fungi (AMF), and its contribution to Pb sequestration. Twenty soil samples were randomly collected from the vicinity of an abandoned acid battery recycling plant, specifically from the rhizosphere of the predominant plant species (*Sorghum halepense*, *Bidens pilosa*, and *Tagetes minuta*) growing in Pb-contaminated soils, and three soil samples were taken from a nearby uncontaminated site. The Pb concentration in soils was determined in dried soil samples using an X-ray Fluorescence Analyzer. GRSP was extracted using citrate buffer and autoclaving and quantified by the Bradford protein assay. To determine the Pb content in the GRSP extracts by flame atomic absorption spectrometry (AAS), the following steps were performed: protein precipitation at pH 2.5 with HCl, resuspension, dialysis against water, lyophilization, and digestion in HNO_3. The Pb concentration in GRSP was determined in mg g^{-1}, and the percentage of Pb retention in GRSP, defined as the proportion of the total Pb in the soil that is bound to glomalin, was calculated. The Pb concentration in soil from the contaminated sites showed significant variation, with values ranging from 149.28 to 77,588.77 ?g g?¹, forming a concentration gradient. The values found in the uncontaminated sites ranged from 19.95 to 27.87 ?g g?¹. GRSP was found at all evaluated sites (between 1.25 and 3.89 mg g^{-1}), but no increasing or decreasing trend was observed associated with soil Pb content with a weak negative correlation (r = -0.24). The amount of Pb bound to GRSP (ranging from 2.03 to 548.54 mg g?¹) tended to increase with the rise in soil Pb concentration, showing a strong positive correlation between these variables (r = 0.84). This represented a Pb retention percentage in GRSP of up to 23.3 %, which decreased to 1.04 % as the total soil Pb increased, showing a moderate negative correlation (r = -0.56). This study considered very high levels of Pb in the soil, which had not previously been evaluated in this context. As a result, the contribution of GRSP to element stabilization may be reduced in percentage terms at highly contaminated sites. However, similar amounts of GRSP bound 77 times more Pb at the most contaminated site compared to the least contaminated site. Therefore, for AMF-assisted phytoremediation, it would be essential to develop

strategies that lead to an increase in soil glomalin levels to mitigate the adverse effects of soils highly contaminated with heavy metals.

Palabras clave: Heavy metal - Soil pollution - Bioremediation - Arbuscular mycorrhiza - Glomalin