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Marble waste and pig slurry as amendments for stabilization of abandoned tailing ponds in SE Spain: preliminary results

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Past mining activities in Murcia Region, SE Spain, generated large volumes of wastes from the extraction of lead/zinc ores which were permanently stored forming tailings ponds. These tailings remain unvegetated for long periods of time and are subject to eolian dispersion and water erosion, so revegetation is required to reduce their impact on the environment. Therefore, four field-scale plots (∼3500 m2 each one) were conducted in El Lirio tailing pond to carry out different treatments using marble waste (1.4 kg m-2) and pig slurry (170 kg N ha-1 yr-1) as soil amendments to evaluate their effects for the stabilization of Pb/Zn tailings in order to reduce the risk of metal mobility and improving soil quality for a future phytostabilization program.

First results from a sampling carried out some days after application of the amendments showed an increase in pH in plots amended with marble waste, reaching a value of 7.5, while the plot amended with pig slurry remained with a pH of 4.0. Total nitrogen and organic carbon contents slightly increased in plots were pig slurry was added. DTPA-extractable Zn, Pb and Cd were reduced in comparison with initial concentrations. Preliminary observations with regards to the evolution of vegetation cover after 2 months of amendments application showed that, compared with the plot without amendments, application of marble waste alone, pig slurry alone, and the combination of marble waste/pig slurry effectively promoted plants growth, being Zygophyllum fabago the most abundant species with a vegetation cover > 20%.

Periodical monitoring of the evolution of soil properties and vegetation cover and richness by comparing the results before and after applications will permit the evaluation of the effect of the different amendments on soil quality and their effectiveness on risks reduction. Hopefully, this research will help determine the suitable application rates of marble waste and pig slurry for improving physical and chemical properties to promote vegetation cover in mining areas under semiarid conditions, together with the selection of the most appropriate plant species with phytostabilization possibilities capable of growing in this environment.

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