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# Chemical stabilization of metals in contaminated soils using an amorphous Mn oxide

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An amorphous Mn oxide (AMO) was tested as a possible stabilizing amendment for soils contaminated with metals. The AMO was compared with other nano-oxides (maghemite and magnetite) using batch, incubation and column experiments coupled with tests of soil microbial activity. The obtained results showed that the AMO was the most effective treatment for the stabilization of metals (Cd, Cu, Pb) in the studied soil samples at the given w/w ratios (0.1, 1, 2%). Its application resulted into significant decreases of exchangeable metal fractions (up to 92, 92 and 93% decreases of Cd, Cu and Pb concentrations, respectively). The adsorption efficiency of the AMO towards Cd, Cu and Pb was 2-3 orders of magnitude higher than those recorded for the other amendments. It was also the most efficient treatment for reducing Cu concentrations in the soil solution. Metal stabilization was a result of combined specific adsorption onto the AMO surface and increase of soil pH promoting the adsorption of metallic cations. Furthermore, the AMO had a positive influence on the activity soil microorganisms, a crucial point in soil remediation. On the other hand, the strongly oxidizing properties of the AMO has to be taken into account as it is able to promote SOM dissolution associated with the (re)mobilization of adsorbed metals. In conclusion, the AMO at lower w/w ratios (especially 0.1%) seems to be an effective and cheap stabilizing amendment. However, its stability and efficiency in rhizosphere environments and field conditions needs to be evaluated.