

Poster

Investigating the hazard of a Pb polluted soil through microanalysis and bio-availability assays using earthworms

Porfido C., Allegretta I., Rascio I., Gattullo C.E., Terzano R., Spagnuolo M.

Department of Soil, Plant and Food Sciences, University of Bari "Aldo Moro", Via Amendola 165/A, 70126 - Bari, Italy

In this study, the potential hazard posed by the presence of huge amounts of lead (Pb) in the soil from a former shooting range area (Acerra, Italy), later used for agriculture, is under investigation. Lead is one of the most hazardous elements; in Pb polluted soils, assessing the element speciation and hence its mobility and availability is crucial to determine the actual risk for both humans and the environment.

With this aim, Pb distribution in the shooting range soil has been investigated by micro X-ray fluorescence spectroscopy (μ XRF) and scanning electron microscopy coupled with energy dispersive spectroscopy (SEM-EDS). Additionally, Pb bioavailability is being evaluated by using earthworms (*Eisenia andrei* Bouché - 1972) as bio-indicator.

μ XRF mapping on petrographic thin sections (30 μ m) of the 2 mm sieved soil showed an abundant presence of Pb slivers, either sub-circular or elongated in shape, ranging from hundreds of microns up to few millimeters. In such slivers, Pb correlated to P, with a P/Pb ratio increasing from the core of the sliver towards its boundaries. Such evidence could be related to an ongoing phosphating process of metal Pb particles: this would also explain the higher P concentration in the external parts. The presence of alteration products at the boundaries of the Pb slivers was further confirmed by SEM-EDS analyses.

Pb phosphates (e.g. Pyromorphite - $Pb_5(PO_4)_3Cl$) are rather stable in soil, so much that the use of phosphate amendments is a common practice for the stabilization of Pb in polluted soils. No information is available about previous amendment and/or fertilizing practices applied to the soil under investigation, therefore we cannot exclude that the observed phosphating of Pb particles has an anthropogenic origin. Anyway, based on these preliminary results, we could hypothesize that Pb is not present in hazardous forms in the examined soil. This hypothesis will be further supported by different bioassays, including acute toxicity test, bioaccumulation in fluids and tissues, and reproduction tests using earthworms as bio-indicators.