



Soil pollution associated to the El Borracho Pb-Ag mine (Badajoz Province, Spain). Metal transfer to biota: oak-tree and moss.

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El Borracho mine was active since Roman times, but with its higher production period on 19th Century. Mine closure occurred without restoration works and nowadays the mining area is dedicated to deer hunting activities. In order to evaluate heavy metals distribution on mining tailings and surrounding soils of the studied area, 40 samples of dumps, soils and sediments were taken. Samples from the mine tailings were collected with an Eijkelkamp soil core sampler for undisturbed samples, with a vertical constant spacing of 25 cm. With this procedure, a total of 21 samples were taken in two points at main dump. Samples of Oak-tree leaves and moss were taken to evaluate metal transfer to biota.

Analytical determinations have included soil parameters (pH, conductivity, organic matter content), and total metal contents in geological and biological samples by EDXRF.

Analytical determinations shows higher metal contents in dumps, especially in surficial samples, 17,700 mg kg⁻¹ and 470 mg kg⁻¹ in average of Pb and Zn respectively, and lower contents in soils, 5,200 mg kg⁻¹ and 300 mg kg⁻¹, and sediments, 3,500 mg kg⁻¹ and 120 mg kg⁻¹. Metal contents in tailings profiles shows higher levels of Pb, Zn and Cu at 3.5 meters depth, a zone with lower grain size and higher moisture. Differences in efficiency of extraction techniques and metal remobilization inside the dump can be an explanation for this enrichment level. Metal contents in agricultural soils exceeded maximum allowed levels by European Community (300 mg kg⁻¹ for Pb and Zn and 140 mg kg⁻¹ for Cu).

Metal contents in biota evidence that Oak-tree bioaccumulates some metals, especially those with higher mobility in acidic conditions like Zn and Sb, with averages Bioaccumulation factor (BAF = plant concentration/soil concentration) of 0.48 and 0.85 respectively. Moss reaches high concentrations of Pb and Zn (3,000 mg kg⁻¹ and 175 mg kg⁻¹ in average respectively). Uptake pattern of Pb and Zn by plants leaves and mosses seems to be similar and can be characterized by logistic curves, with higher affinity of mosses to uptake metals from soils.