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Effect of soil properties and sample preparation on extractable and soluble Pb and Cd fractions in soils

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ABSTRACT

The effect of soil extraction procedures and/or sample pretreatment (drying, freezing of the soil sample) on the extractability of cadmium and lead was tested in a model experiment, with an employment of optical emission and atomic ab- sorption spectrometry methods. In the first part, 6 extraction procedures were compared: 2 mol l-1 HNO3, 0.43 mol l-1 CH3COOH, 0.05 mol l-1 EDTA, Mehlich III extraction procedure (0.2 mol l-1 CH3COOH + 0.25 mol l-1 NH4NO3 + 0.013 mol.l-1 HNO3 + 0.015 mol.l-1 NH4F + 0.001 mol.l-1 EDTA), 0.01 mol.l-1 CaCl2, and deionised water. Addi-tionally, two methods of soil solution sampling were compared, and the centrifugation of satu-rated soil and the use of suction cups and dif-ferential pulse anodic stripping voltametry was applied to assess free and complexed metals portions. The results showed that different soil sample extraction methods and/or sample pre-treatments including soil solution sampling can lead to different absolute values of mobile cadmium and lead content in soils. However, the interpretation of the data can lead to similar conclusions as are apparent from the compari- son of the soil solution sampling methods where fairly good correlation was observed (for Cd r = 0.76, and for Pb r = 0.74). The ambiguous results were reported for voltammetric determinations of free and complex portions of Cd and Pb where a different behavior was observed for water extracts of soil and soil solution obtained using suction cups. Moreover, a changing extent of lead complexation was determined with prolonged storage of the samples. The results confirmed that soil and/or soil solution sampling under immediate soil conditions and limitations of pre-extraction operations are necessary.

KEYWORDS

Lead; Cadmium; Contaminated Soils; Extractability; Soil Solution; Speciation

Cite this paper

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