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Soil and Water Research

Heavy metals phytoextraction from heavily and moderately contaminated soil by field crops grown in monoculture and crop rotation

čechmánková J., Vácha R., Skála J., Havelková M.:

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The uptake of Pb, Cd, Zn and biomass production of the plants *Brassica juncea* v. Opaleska, *Triticale hexaploides* var. Gabo and *Helianthus annuus* v. Maritza were observed in a field (trial) and a pot experiments during four years. The plants were grown in monoculture variants and also in crop rotation. The field experiment (plots about 1 × 1 m) was set up in heavily contaminated Haplic Fluvisol in the Litavka River alluvium. Pb, Cd, and Zn phytoextraction from the identical Haplic Fluvisol and Haplic Cambisol less contaminated mainly by atmospheric deposition was observed in the pot experiment. The application of 0.2 g EDTA (ethylenediaminetetraacetic acid)/kg and 1 g citric acid/kg into the soils of field (250 kg of soil/m² plot) and pot (6 kg of soil/pot) experiments was realized. The comparison was accomplished between natural phytoextraction efficiency of *B. juncea*, *H. annuus*, and *T. hexaploides*. Crop rotation with and without chemical

induction was tested. EDTA application had an immediate strong mobilization effect on the elements tested in both experiments and both soils. In the pot experiment, Pb, Cd, and Zn were more mobilized in Cambisol with initial lower mobile contents of elements in comparison with Fluvisol. The highest mobilization by EDTA was achieved for Pb. Strong Pb mobilization in Cambisol after EDTA addition resulted in a high Pb uptake and translocation from the roots of *B. juncea* into the shoots. EDTA application increased Pb phytoextraction by harvested *B. juncea*. Naturally grown *H. annuus* proved the high phytoextraction efficiency for Cd and Zn in the experiment. The assumed effect of the cultivation method, i.e. crop rotation vs. Monoculture, was not statistically proved in our experiments.

Keywords:

Brassica juncea; Cd; heavy metals contamination; *Helianthus annuus*; mobilization; Pb; phytoextraction; *Triticale hexaploides*; Zn

[[fulltext](#)]

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