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**Measuring and simulating effect of organic residues on the transport of
cadmium, nickel, and zinc in a calcareous soil**

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Abstract

Knowledge of heavy metal movement from organically-rich soils is important for assessing heavy metal mobility and developing methods for predicting such losses. Laboratory soil column study and sequential extraction analysis were conducted to evaluate the effect of eight organic residues (sewage sludge, municipal solid waste compost (MSWC), poultry manure, sheep manure, mushroom compost, and residues of wheat, potato, and rape) on retention and leaching of cadmium (Cd), nickel (Ni), and zinc (Zn) in a sandy loam soil. Cadmium, Ni, and Zn were monitored in the leachate of soil column by passing a mixture of 50 mg L⁻¹ CdCl₂, 50 mg L⁻¹ NiCl₂, and 50 mg L⁻¹ ZnCl₂ solutions through the soil column. The addition of all amendments to the soil caused to an increase in leachate pH in the initial stage of leaching. Movement of Cd, Ni, and Zn ions in control soil was retarded due to adsorption. The retardation factor (R_f) decreased due to the addition of organic residues, enhancing heavy metal movement. Soil treated with wheat residue, MSWC, and mushroom compost had the highest R_f for heavy metals, followed by sheep manure, rape residue, sewage sludge, potato residue and poultry manure. Potato residues and poultry manure enhanced heavy metals transport to the greatest degree. For most organic residues studied, R_f showed the trend Ni > Zn > Cd, indicating the rate of heavy metals transport in this calcareous soil was: Cd > Zn > Ni. The above

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