

LEACHING OF Cd, Ni AND Zn DOWN THE PROFILE OF A SEWAGE SLUDGE-TREATED SOIL

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ABSTRACT

The leachability of Cd, Ni and Zn was studied in repacked 40 cm-soil columns. The hypotheses tested were that DOC (Dissolved Organic Carbon) will influence the metal movement, and that this will be increased with the water application rates. Sludge was placed on the top of the columns at rates of 0, 10 and 50 t ha⁻¹ and two water regimes were applied, equivalent to 450 mm and 900 mm per year. It was found that at 50 t ha⁻¹, the total concentrations of Cd and Zn were significantly higher than the control down to a depth of 8 cm, while Ni moved to 10 cm. In the leachates collected underneath the columns, soluble forms of Ni and Zn were found in significantly higher concentrations at 50 t ha⁻¹ than in the control. DOC was also found in the leachates at elevated concentrations in the high sludge treatment. This indicated that sludge-evolved DOC might have played a significant role in facilitating soluble Ni and Zn transport down the soil profile. Calculations of the budget of metals (metals entering the soil columns compared to the amounts lost from columns) indicated that the elution of Ni, Zn and DOC was enhanced at 900 mm, compared to 450 mm. The results suggest the adverse environmental implications that may exist in conditions that include high precipitation, sandy soils and elevated sewage sludge application rates.