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**HEAVY METAL AVAILABILITY AND MOBILITY IN SEWAGE SLUDGE-
TREATED SOILS**

by

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Thesis submitted for the degree of Doctor of Philosophy

December 1998

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ABSTRACT

Sewage sludge is a useful fertiliser for soils, but it also contains heavy metals which may have some potentially harmful effects on crops, animals and possibly humans. Sludge-borne organic matter influences metal mobility and its behaviour may depend on temperature and rainfall.

In a pot experiment, sludge-soil mixtures were incubated at 15 °C and 25 °C for two years. The availability of Cd, Ni, Pb and Zn was assessed by ryegrass uptake and soil extractions with DTPA and CaCl₂ and was found to increase in the higher sludge application. Metal availability at 25 °C was greater than that at 15 °C. Over time, availability increased in the plants (except Zn which did not change) and CaCl₂ extractions, while DTPA did not follow this trend precisely. The more rapid decomposition of organic matter may have caused the increased availability at 25 °C.

Field experiments at sites in England and in Greece provided the different temperature conditions simulated in the above pot trial. Metal availability, in the sludge-treated plots, increased with the sludge application. After the first cutting, ryegrass uptake and DTPA extractions did not change. This was probably due to the organic matter content not being changed over time.

The mobility of heavy metals was also assessed by a leaching experiment, where sludge had been put on the top of soil columns. Cadmium, Ni and Zn (but not Pb) moved down to 10 cm depth in the high sludge treatments. In the leachate, metals increased with the sludge as well as with the simulated rainfall rate (450 and 900 mm a⁻¹). DOC from the sludge may have facilitated this movement.

In the last pot experiment soil-sludge mixtures were irrigated with solutions containing DOC. The availability of metals increased with the DOC additions, and this was further enhanced in the higher sludge additions.