Geophysical Research Abstracts,
Vol. 10, EGU2008-A-00769, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-00769
EGU General Assembly 2008

Edaphic factors related to heavy metals and nutrients behaviour following a single sewage sludge application

J.M. Soriano-Disla, I. Gómez, C. Guerrero, J. Navarro-Pedreño, J. Mataix-Beneyto, M.M. Jordan.

Department of Agrochemistry and Environment, University Miguel Hernández. Avenida de la Universidad S/N, 03202 Elche, España. jsoriano@umh.es.

The aim of this work was to know how some edaphic properties influence the leached quantity of nitrates, phosphates, COD (organic content) and heavy metals following a single sewage sludge application. Another objective was to know the role of these soils properties on the heavy metals bioavailability after the experimentation time.

For this purpose, a column study was carried out applying sewage sludge with a high dose of heavy metals to 40 agricultural soils. The selection of the soils was done with the aim of covering a wide range of several soil properties. The sewage sludge used was obtained by adding metallic salts in solution to one sewage sludge with common levels of heavy metals coming from the wastewater treatment plant of Aspe (SE Spain). Metals in the polluted sludge were added to reach the total heavy metal concentrations that R.D. 1310/1990 (legislation about the issue in Spain) regulates for sewage sludge applications on soils with pH$>$7. Finally, stepwise multiple regression was used to know the role of soil properties on the behaviour of the pollutants studied.

The sewage sludge was applied to each soil with a 50 t/ha doses. The soil/sludge mixtures were done along all the soil thickness (30 cm), simulating an amendment in the arable layer. These mixtures were placed in PVC columns (30 cm length, 12 cm internal diameter). Leachates were taken after 2, 4 and 6 months following 25 l/m^{2}irrigations and the parameters mentioned above (as well as pH and electrical conductivity) were immediately analysed. DTPA extraction was used to estimate the heavy metals bioavailability in the column soil when the experiment was finished.

The highest values of COD, nitrates, phosphates, electrical conductivity, Cu, Ni and Cd were found in the first leachate (after two months), having the opposite situation for pH. Similar values were detected for Zn along the three irrigations. Cr and Pb values were very low, reflecting their reduced mobility. From the point of view of soil, all the metals increased their extractable with DTPA contents as a consequence of the sewage sludge application, except Cr that showed an irregular pattern.

The multiple regression analyses performed confirmed the importance of pH as well as others soil properties such as texture, initial extractable with DTPA heavy metals, electrical conductivity, organic matter or carbonates, on the behaviour of nutrients and heavy metals.

The present work has proved the role of different soil properties on the behaviour of the parameters studied, the necessity of multivariate approaches as well as further studies on new types of soil and sewage sludge.

Acknowledgements The authors gratefully acknowledge the financial support of the research to the Spanish Ministry of Environment (Number of expedient: 021/2006/2-4.2).