Geophysical Research Abstracts, Vol. 8, 02778, 2006
SRef-ID: 1607-7962/gra/EGU06-A-02778

Biochemical indicators of degradation of soils contaminated with 2,4-diclorophenol

E. Perotti (1), S. Bouzas (1), M.C. Leirós (1), C.Trasar-Cepeda (2), F. Gil-Sotres (1).

(1) Dep. Edafología y Q. Agrícola, Universidad de Santiago de Compostela, Spain, (edgils@usc.es / Phone: +34-981-563100)

(2) Dep. Bioquímica del Suelo, IIAG-CSIC, Spain

The Spanish Ministry of the Environment (*Ministerio de Medio Ambiente*) has recently published a Royal Decree (*Real Decreto* 9/2005: BOE 18 Enero 2005), which outlines potentially contaminating activities and establishes the criteria and standards by which a soil can be declared as contaminated. The *Real Decreto* outlines the regulations for the so-called *generic reference levels* (GRL - a basic parameter used to define soil contamination by the presence of certain substances), describes GRL values for a group of organic pollutants and indicates the methods to be used for assessing whether a soil is contaminated: OECD test 208 (germination and root elongation), test 216 (mineralization of soil N) and test 217 (mineralization of soil C). The aim of the present study was to find methods that are more effective than the OCDE tests for demonstrating soil degradation and to establish if the GRL indicated in the above-mentioned legislation are realistic for contamination of soils by 2,4-diclorophenol.

Samples were collected from the surface horizons of 4 agricultural soils with similar organic matter contents (total C content between 1.5-4.0 %) and of similar pH (pH 5.0-6.0), but of different textures. Soils **V** and **T** are Mollisols from Argentina (silty texture) and soils **M** and **L** are Inceptisols from Spain (sandy loam texture). After mixing the 2,4 diclorophenol (GRL 0.1 mg kg^{-1}) with sand, it was added to the soils to achieve final concentrations of 0 (control), 100, 500 and 1000 mg kg^{-1} (0, 1000, 5000 and 10000 times the GRL). Three days after the artificial contamination was carried out, the control and contaminated soils were analysed for the above-mentioned OCDE tests, as well as for catalase, dehydrogenase and urease activities using the methods described by Leirós *et al.* (2000) and Trasar-Cepeda *et al.* (2000).

In all 4 soils, both respiration and N mineralization increased (in some cases greatly) as a consequence of the addition of the contaminant, and the urease and dehydrogenase activities decreased with increasing dose of contaminant (at doses greater than 100 mg kg^{-1}), although the levels of activities of both enzymes remained fairly high, even at the highest dose of contaminant added. Catalase activity varied greatly at the different doses and in soil **M** the activity of this enzyme disappeared at the highest dose of contaminant. As regards the germination and elongation tests, soils **V** and **T** were not affected, whereas soils **M** and **L** were only affected at doses equal to or higher than 500 mg kg^{-1}.

The results obtained suggest that none of the tests selected under Spanish law are universally valid for demonstrating soil degradation, and that the analysis of dehydrogenase or urease activity is preferable for diagnosis of soil contamination, as these parameters appear to be much more sensitive to the presence and the dose of contaminant. Furthermore, the data obtained suggest that the GRL values for 2,4-diclorophenol are not realistic and that the soils resist degradation at much higher concentrations of this compound than those suggested under the prevailing legislation.