



Assessing the use of treated waste water for irrigation agricultural lands by using soil quality indices

V. Arcenegui, A. Morugán, F. García-Orenes, R. Zornoza, J. Mataix-Solera, M.A. Navarro, C. Guerrero, and J. Mataix-Beneyto

University Miguel Hernández, Agrochemistry and Environment, Elche-Alicante, Spain (fuensanta.garcia@umh.es, +34966658532)

The use of treated wastewater for the irrigation of agricultural soils is an alternative to utilizing better-quality water, especially in semiarid regions where water shortage is a very serious problem. However, this practise can modify the soil equilibrium and affect its quality. In this work two soil quality indices (models) are used to evaluate the effects of long-term irrigation with treated wastewater in soil. The models were developed studying different soil properties in undisturbed forest soils in SE Spain, and the relationships between soil parameters were established using multiple linear regressions. Model 1, that explained 92% of the variance in soil organic carbon (SOC) showed that the SOC can be calculated by the linear combination of 6 physical, chemical and biochemical properties (acid phosphatase, water holding capacity (WHC), electrical conductivity (EC), available phosphorus (P), cation exchange capacity (CEC) and aggregate stability (AS)). Model 2 explains 89% of the SOC variance, which can be calculated by means of 7 chemical and biochemical properties (urease, phosphatase, and β -glucosidase activities, pH, EC, P and CEC). We use the residual (difference between calculated SOC by models and real SOC) as soil quality indices. The soil will be equilibrated if residuals are near 0 or inside confidence intervals of the models (95%). The study was carried out in two areas irrigated with wastewater for more than 30 years, and in the same areas there were control plots irrigated with fresh water. Six soil samples were taken from both waste-water and fresh-water irrigated plots of the two areas chosen. The results show a slight increase of EC in the soils irrigated with wastewater, but the levels obtained are not limiting for agricultural soils. As a consequence of the irrigation with wastewater, an important increment of organic matter content in the soil was observed. The application of the models indicates that all the scenarios are out of the confidence intervals for the models because these soils are submitted to a perturbation as it is the agricultural use. However, there are not big differences in the deviation for the models between soils irrigated with either waste or fresh water, even in one of the chosen areas; the residual value obtained is less for the soil irrigated with wastewater than the soil irrigated with fresh water.