Geophysical Research Abstracts
Vol. 12, EGU2010-7953, 2010
EGU General Assembly 2010

Dynamics of soil organic carbon and microbial activity in treated wastewater irrigated agricultural soils along soil profiles

Elisabeth Jüschke (1), Bernd Marschner (1), Yona Chen (2), and Jorge Tarchitzky (2)

(1) Department of Soil Science/Soil Ecology, Ruhr-University Bochum, Universitaetsstr. 150, 44780 Bochum, Germany (E-mail: Elisabeth.Jueschke@rub.de) , (2) Faculty of Agricultural, Food and Environmental Quality Science, The Hebrew University of Jerusalem, POB 12, Rehovot, 76100 Israel

Treated wastewater (TWW) is an important source for irrigation water in arid and semiarid regions and already serves as an important water source in Jordan, the Palestinian Territories and Israel. Reclaimed water still contains organic matter (OM) and various compounds that may effect microbial activity and soil quality (Feigin et al. 1991). Natural soil organic carbon (SOC) may be altered by interactions between these compounds and the soil microorganisms. This study evaluates the effects of TWW irrigation on the quality, dynamics and microbial transformations of natural SOC. Priming effects (PE) and SOC mineralization were determined to estimate the influence of TWW irrigation on SOC along soil profiles of agricultural soils in Israel and the Westbank.
The used soil material derived from three different sampling sites allocated in Israel and The Palestinian Authority. Soil samples were taken always from TWW irrigated sites and control fields from 6 different depths (0-10, 10-20, 20-30, 30-50, 50-70, 70-100 cm).
Soil carbon content and microbiological parameters (microbial biomass, microbial activities and enzyme activities) were investigated. In several sites, subsoils (50-160 cm) from TWW irrigated plots were depleted in soil organic matter with the largest differences occurring in sites with the longest TWW irrigation history. Laboratory incubation experiments with additions of 14C-labelled compounds to the soils showed that microbial activity in freshwater irrigated soils was much more stimulated by sugars or amino acids than in TWW irrigated soils. The lack of such "priming effects" (Hamer & Marschner 2005) in the TWW irrigated soils indicates that here the microorganisms are already operating at their optimal metabolic activity due to the continuous substrate inputs with soluble organic compounds from the TWW. The fact that PE are triggered continuously due to TWW irrigation may result in a decrease of SOC over long term irrigation. Already now this could be detected at some agricultural fields by SOC measurements (Jüschke 2009). Therefore attention has to be drawn especially on the carbon content and quality of the used TWW for irrigation purposes.