Geophysical Research Abstracts
Vol. 15, EGU2013-7720, 2013
EGU General Assembly 2013

Effect of biosolid waste compost on soil respiration in salt-affected soils

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A great part of mediterranean soils are affected by salinization. This is an important problem in semiarid areas increased by the use of low quality waters, the induced salinization due to high phreatic levels and adverse climatology. Salinization affects 25% of irrigated agriculture, producing important losses on the crops. In this situation, the application of organic matter to the soil is one of the possible solutions to improve their quality. The main objective of this research was to asses the relation between the salinity level (electrical conductivity, EC) in the soil and the response of microbial activity (soil respiration rate) after compost addition.

The study was conducted for a year. Soil samples were collected near to an agricultural area in Crevillente and Elche, "El Hondo" Natural Park (Comunidad de Regantes from San Felipe Neri). The experiment was developed to determine and quantify the soil respiration rate in 8 different soils differing in salinity. The assay was done in close pots –in greenhouse conditions- containing soil mixed with different doses of sewage sludge compost (2, 4 and 6%) besides the control. They were maintained at 60% of water holding capacity (WHC). Soil samples were analyzed every four months for a year. The equipment used to estimate the soil respiration was a Bac-Trac and CO_2 emitted by the soil biota was measured and quantified by electrical impedance changes.

It was observed that the respiration rate increases as the proportion of compost added to each sample increases as well. The EC was incremented in each sampling period from the beginning of the experiment, probably due to the fact that soils were in pots and lixiviation was prevented, so the salts couldn′t be lost from soil. Over time the compost has been degraded and, it was more susceptible to be mineralized. Salts were accumulated in the soil. Also it was observed a decrease of microbial activity with the increase of salinity in the soil.

Keywords: soil respiration, compost, electrical conductivity, salinization, Bac-Trac

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(Acknowledgements: This work was supported by the Spanish MICINN. Project Ref.: CGL2009-11194)