Geophysical Research Abstracts
Vol. 19, EGU2017-6805, 2017
EGU General Assembly 2017

Enzymatic activities in a semiarid soil amended with different soil treatment: Soil quality improvement

Paloma Hueso González (1), Jakub Elbl (2), Helena Dvořáčková (2), Juan Francisco Martinez Murillo (1), and Jose Damian Ruiz Sinoga (1)

(1) Department of Geography, University of Málaga, Spain (phueso@uma.es), (2) Department of Geology and Pedology, Mendel University, Brno, Czech Republic

The use of soil quality indicators may be an effective approach to assess the positive effect of the organic amendment as good restoration methods. Relying on the natural fertility of the soil, the most commonly chemical and physical parameters used to evaluate soil quality are depend to the soil biological parameters. The measurement of soil basal respiration and the mineralization of organic matter are commonly accepted as a key indicator for measuring changes to soil quality. Thus, the simultaneous measurement of various enzymes seems to be useful to evaluate soil biochemical activity and related processes. In this line, Dehydrogenase activity is widely used in evaluating the metabolic activity of soil microorganisms and to evaluate the effects caused by the addition of organic amendments. Variations in phosphatase activity, apart from indicating changes in the quantity and quality of soil phosphorated substrates, are also good indicators of soil biological status.

This study assesses the effect of five soil amendments as restoration techniques for semiarid Mediterrenean ecosystems. The goal is to interpret the status of biological and chemical parameters in each treatment as soil quality indicators in degraded forests. The main objectives were to: i) analyze the effect of various organic amendments on the enzimatic activity of soil; ii) analyze the effect of the amendments on soil respiration; iii) assess the effect of these parameters on the soil chemical properties which are indicative of soil healthy; and iv) evaluated form the land management point of view which amendment could result a effective method to restore Mediterranean degraded areas.

An experimental paired-plot layout was established in southern of Spain (homogeneous slope gradient: 7.5%; aspect: N170[U+F0B0]). Five amendments were applied in an experimental set of plots: straw mulching; mulch with chipped branches of Aleppo Pine (Pinus halepensis Mill.); TerraCotten hydroabsobent polymers; sewage sludge; sheep manure and; control (without amendment). Five years after the amendment addition, soil from the 12 plots was sampled. Three samples were collected from each plot (36 soil samples in total) from the soil surface, e.g. 0-10 cm, in which most soil transformations occur. Soil indicators analyzed were: i) EC; ii) pH; iii) soil organic C (SOC); iv)total Nitrogen (N); v) Carbon of microbial biomass; vi) Dehydrogenase activity; Phosphatase activity and; vii) basal respiration.

According to our results, the straw mulch, pinus mulch and sewage sludge treatments helped to maintain the SOC and N at high levels, five years after the amendment addition and comparing to the control. A similar trend has been registered for the dehydrogenase activity, phosphatase activity and basal respiration. Conversely, regarding to control, when the soils were amended with polymers or manure, no significant differences in soil chemical and biological properties were found. In conclusion, from a land management standpoint, the use of pinus mulch, straw mulch and sewage sludge have been proved as a significant method to increase soil quality on Mediterranean semiarid degraded forests.