Geophysical Research Abstracts
Vol. 13, EGU2011-2726, 2011
EGU General Assembly 2011


# Medium term changes in the structure and organic matter content of a Mediterranean Rendzic Leptosol affected by repeated fires of different severities

Julian Campo, Vicente Andreu, Eugenia Gimeno-García, Oscar Gonzalez-Pelayo, and Jose Luis Rubio

Centro de Investigaciones sobre Desertificación-CIDE, Soil Degradation and Conservation Dept., Albal, Spain (vicente.andreu-perez@uv.es, 00 34 961270967)

To study the variations in soil structure and organic matter content of a Mediterranean soil burned repeatedly, a set of two experimental fires with different severities were conducted in the Experimental Station of La Concordia (Valencia, Spain). In June of 1995, three plots (20 x 4 m) were burned with high severity fire (T1), three with moderate severity (T2) and three plots were left unburned to be used as control (T3). In July of 2003, plots corresponding to the fire treatments were burned again, giving low fire severities. In the eight-year interval between fires, plots remained undisturbed. A period of four years after the repeated fires (July 2003 - July 2007) was considered to study the changes and the relationships among the aggregates size (mean weight diameter: MWD), their stability (SMS) and organic matter content (SOM) in a Rendzic Leptosol differentiating two environments: soil under canopy (UC) and soil between plants or bare soil (BS).

A General Linear Model uni-variate procedure (95% significance level) was performed to ascertain possible differences in each soil characteristic with regard to the fire treatment, environment, time and double and triple interactions between them. Statistical correlation analyses were applied to determine the possible relations among variables.

The treatment factor was no significant for the three characteristics studied, which imply that the repeated fires did not produce any change in these properties, probably because of its low severity. The environment factor was significant for SMS and SOM but for the MWD. However, the double interaction (treatment x environment) revealed differences between the SMS and the MWD of UC and BS soils on T3, and between the SOM content of UC and BS soils on T1 and T2. In all these characteristics, the UC presented higher values than the BS. The treatment x environment x time interaction was also no significant for the SMS, SOM and MWD. Therefore, in addition to confirming that low fire temperatures did not provoke variations in these soil characteristics at medium term, depending on the environment, it is possible to state that the temporal evolution of the different soils did not cause them either. Accordingly, no degradation or improvement sign can be noted in the studied characteristics of UC and BS, burned or not, during the four years following the repeated fires. The MWD of all studied soils hardly changed during this time although some temporal trends could also be identified in their evolution.

According to the observed correlations, SOM content was a key factor stabilizing the aggregates of all soils but had little importance in increasing its diameter. Such correlations suggest that the contributions of organic material partially charred after fires could increase the SOM content in the burned soils increasing the stability of their aggregates, for at least one year. As time passed, the carbonized material would have been exported off-site and the contribution of fresh organic material in the UC could have became more important. In the soil studied, incorporation of organic matter seems to be very slow regardless of the fire treatment, but particularly in the bare soils. This fact would explain the scarce differences found in the medium term evolution of the aggregates stability in all soils (both characteristics were strongly correlated). Despite that aggregates size was independent of the organic matter content; significant variations were not either registered during this time. In addition to these results, the differences observed among T1 soil characteristics, with regard to those of the other soils, suggest that the soils firstly burned with high severity were still seriously degraded meanwhile those firstly burned with moderate severity showed some recovery.