Geophysical Research Abstracts
Vol. 14, EGU2012-1274, 2012
EGU General Assembly 2012

The role of ash on soil water repellency changes in a Mediterranean area affected by a forest fire: a field conditions study

P. Jiménez-Pinilla (1), E. Lozano (1), J. Mataix-Solera (1,2), V. Arcenegui (1,2), L.M. Zavala (2), A. Jordán (2), A. Morugán (1), A. Pérez-Bejarano (1,2), and G.M. Bárcenas (2)

(1) GEA- Grupo de Edafología Ambiental. Department of Agrochemistry and Environment. University Miguel Hernández, Elche (Alicante), Spain (pjimenez@umh.es), (2) MED_Soil Research Group, Department of Christallography, Mineralogy and Agricultural Chemistry, University of Sevilla, Sevilla, Spain

Soil water repellency (WR) is one of the properties most affected by combustion during a forest fire (Doerr, *et al.,* 2000). The modifications of soil organic matter by the heating and the condensation of distilled organic compounds over mineral surfaces are the main factors responsible..After a fire, a layer of ash covers the soil surface affecting also its wettability; it has been demonstrated that ash can also be water repellent depending on the degree of combustion, and type of plant burned (Bodí, *et al*., 2011). Ash plays an important role in terms of fertility but also in the hydrology of the affected area. The aim of this study is to assess how ash influences the behaviour of soil WR in the short-term after a forest fire.

In July 2011, a forest fire affected an area of 50 has in Gorga, Alicante Province, SE Spain. Immediately after fire plots for monitoring were installed in burned (B) and adjacent control (unburned; C) area. In the burned area two treatments were established: Burned ash (Ba): plots where ash was kept, and Burned without ash (Bwa): plots where ash was removed simulating an ash exportation that sometimes occurs through wind erosion. The main objective being to study was therefore the effect of the ash factor. All of the plots were installed underneath *Pinus halepensis* specie. The water drop penetration time test (WDPT) was used to measure the persistence of WR over topsoil (surface of A mineral horizon) under field conditions in July (immediately after the fire), and in September, October and December 2011,the last measure being after a very rainy period. Ash samples were collected after fire and WR was also measured in laboratory.

As expected, WR in July was the highest measured during the study period both in burned and control soil, being higher (670 $\pm$ 289) in burned compared to control area (228 $\pm$ 92). The measurements of ash WR in laboratory revealed that 50% of samples were water repellent (mainly in the WDPT classes of 10 and 30 s). In the study area, soil WR decreased during the next months but the observed decrease was faster in Bwa plots. The ash removal had an effect on soil WR facilitating a faster decrease. A possible explanation is that the washing of water repellent compounds through soil profile with infiltration water was easier without ash cover, and the fact that the elimination of ash avoided the input of hydrophobic ash material from surface. We continue monitoring the plots to check whether this "positive" effect of ash elimination on a faster decrease of soil WR is or not beneficial *versus* the expected "negative" effect of elimination of nutrients because of ash removal.

Keywords: Ash, wildfire, water repellency, hydrophobicity, WDPT test

References:

Doerr, S.H., Shakesby, R.A., Walsh, R.P.D. 2000. Soil water repellency: its causes and hydro-geomorphological consequences. Earth-Sciences Reviews 51, 33-65

Bodí, M., Mataix-Solera, J., Doerr, S., Cerdá, A. 2011. The wettability of ash from burned vegetation and its relationship to Mediterranean plant species type, burn severity and total organic carbon content. Geoderma 160, 599-607