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Ash effects on the thermal conductivity of a mediterranean loam soil

Carles Rubio (1), Paulo Pereira (2), and Xavier Ubeda (3)

(1) Department of Agri-Food Engineering and Biotechnology, Polytechnic University of Catalonia, 08860 Castelldefels, Spain, (2) Environmental Management Center, Mykolas Romeris University, Ateities g. 20, LT-08303 Vilnius, Lithuania.(paulo@mruni.eu), (3) Department of Physical Geography, University of Barcelona, 08001 Barcelona, Spain

The purpose of this work is to explore the variability on the soil thermal conductivity for a burnt soil and assessing the effects of the ashes on the heat transfer when they were incorporated into the soil matrix. A set of 42 soil samples from the Montgrí massif experimental plot between surface and 5 cm depth was collected before and after the soil was burnt. A thermal characterization of the soil was carried out. For that a dry out curve was constructed, which presented the relationship between water content and thermal conductivity for both types of soil samples, burnt and non-burnt soil. The results shown changes in the heat pulse transfer, being more conductive the soil before to be burnt (0.378 W•m-1•C-1) than the soil after to be exposed to the fire (0.337 W•m-1•C-1). Indeed, on the whole of moisture scenarios the values of thermal conductivity decreased after soil was burnt. Another experimental concern was based on to observe the soil thermal behaviour when ash collected after fire was incorporated into the burnt soil matrix. In this case, soil thermal and soil hydrodynamic behaviour presented differences according to the type of ash. Soil mixed with fly ash showed higher thermal conductivity than soil mixed with bottom ash. To sum up; the soil thermal conductivity decreased when soil was burnt. On the other hand, soil thermal conductivity shown differences depending on the type of ash incorporated into the matrix. Fly ash transferred the heat pulse better than bottom ash.