Geophysical Research Abstracts,
Vol. 10, EGU2008-A-02496, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-02496
EGU General Assembly 2008

Wildfire effects on soil erodibility of woodlands in NW Spain

M.E. Varela (1, 2), E. Benito (1) and J. Keizer (2)

(1) Departamento de Biología Vegetal y Ciencia del Suelo, Universidad de Vigo, Spain, (2) Now at CESAM, Department of Environment and Planning, University of Aveiro (eteijeiro@uvigo.es / Fax: +351234429290 / Phone: +351234370200)

Soil erodibility basically reflects the combined effect of the processes that regulate rainfall acceptance by the soil and that determine the soil's resistance to particle detachment and subsequent transport. Assessment of soil erodibility following wildfire is of crucial importance for prioritization of post-fire restoration practices aiming at reduction of soil erosion hazard.

The aim of the present work was to determine the effect of wildfire on soil erodibility for a range of typical woodlands in Galicia, NW Spain, by comparing selected soil properties of wildfire-affected sites with those of neighbouring, (long) unburned sites. In total, 31 burned and 31 unburned sites were selected in various forest and shrubland types, with a special emphasis on Maritime Pine stands, on three geologic substrates (granite, schist and slate). The soil properties analysed in this study, using standard laboratory methods, are those that are generally considered to play a key role in soil erodibility. They are particle size distribution, aggregate size distribution and stability, total porosity, organic carbon content and soil water repellency. The soil samples were collected about one month after the wildfires, and concerned the uppermost mineral soil layer (0-5 cm depth).

Comparison of the adjacent pairs of burnt and unburned sites suggested that wildfire has a noticeable effect on aggregate size distribution but not on particle size distribution. The tendency for wildfire to cause fragmentation of macro-aggregates into micro-aggregates appears to be positively associated with its impact of reducing or-

ganic carbon content.

The immediate effect of wildfire on aggregate stability and total porosity was found to be highly variable. In about one third of the cases aggregate stability was clearly lower at the recently burnt site than the neighbouring site, whereas in the other cases it was either very similar at both sites or higher at the unburned site. The observed differences in aggregate stability and total porosity, like those in aggregate size distribution, appear to be associated with the changes in organic carbon content.

The present results suggest that the impact of wildfire on soil erodibility operates through its effect on soil organic matter and thus depends strongly on the wildfire's severity. Soil erodibility is apparently little affected by wildfires of low severity but is markedly diminished following a high-severity fire.

All burnt soil samples were strongly to very strongly water repellent, so that fire-induced/-enhaced soil hydrophobicty is viewed as a determining factor in the post-fire runoff and erosion processes repeatedly observed in recently burnt areas in north-western Spain.