



Seasonal variations in rainfall-induced soil erosion from forest roads in a Mediterranean area

Antonio Jordán (1), Lorena M. Zavala (1), and Juan Gil (2)

(1) MED_Soil Research Group. Dpto. de Cristalografía, Mineralogía y Química Agrícola (Universidad de Sevilla), (2) MED_Soil Research Group. Dpto. de Química Agrícola y Edafología (Universidad de Córdoba)

1. INTRODUCTION

Land use change and the development of rural and eco-tourist activities have contributed to a strong development of forest roads in Spain during recent decades. Most of forest roads cause significant hydrological and geomorphological impacts at different scales, altering the runoff-runon patterns, the direction and properties of runoff water, and subsurface water flow. Some of these effects are caused by the removal of native vegetation from backslopes (Martínez-Zavala et al., 2008), which contributes to increased soil erosion and sediment yield in areas where natural soil erosion risk is usually low (Jordán and Martínez-Zavala, 2008; Jordán-López et al., 2009). Rainfall intensity, soil moisture, slope and vegetation cover are key factors for erosion risk in forest roads (Jordán and Martínez-Zavala, 2008; Cao et al., 2013).

2. METHODS

Sixty backslopes with plant cover varying between dense shrubs and bare soil were selected. Rainfall simulations (90 mm/h during 20 minutes) were performed in winter (December 2012 – January 2013) and summer (August – September 2013) to study the effect of rainstorms at the end and beginning of the rainy season. Surface runoff was collected to determine runoff rates and sediment yields. Plant cover, rock fragment cover and the area covered by biological crusts were determined at each plot. Slope was determined with a portable clinometer (all selected plots were in the range 41-76%).

3. RESULTS

Although soil loss was increased in winter, when soil moisture is higher, small differences were observed at vegetation cover above 75%. Plant cover above 40% considerably reduced sediment yield and runoff flow. In contrast, differences triggered between different plots with decreasing vegetation cover. In bare areas, rock fragments and biological crusts (mosses, lichens, liverworts and fungi) caused great differences between bare areas both during summer and winter periods.

REFERENCES

- Cao, L., Zhang, K., Dai, H., Liang, Y. 2013. Modeling interrill erosion on unpaved roads in the Loess Plateau of China, *Land Degradation & Development*. DOI: 10.1002/ldr.2253
- Jordán, A., Martínez-Zavala, L. 2008. Soil loss and runoff rates on unpaved forest roads in southern Spain after simulated rainfall. *Forest Ecology and Management* 255, 913-919. DOI: 10.1016/j.foreco.2007.10.002.
- Jordán-López, A., Martínez-Zavala, L., Bellinfante, N. 2009. Impact of different parts of unpaved forest roads on runoff and sediment yield in a Mediterranean area. *Science of the Total Environment* 407, 937-944. DOI: 10.1016/j.scitotenv.2008.09.047.
- Martínez-Zavala, L., Jordán López, A., Bellinfante, N. 2008. Seasonal variability of runoff and soil loss on forest road backslopes under simulated rainfall. *Catena* 74, 73-79. DOI: 10.1016/j.catena.2008.03.006.