Geophysical Research Abstracts,
Vol. 10, EGU2008-A-03977, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-03977
EGU General Assembly 2008

Preliminary results of soil erosion at different scales in an olive orchard in Southern Spain

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Soil erosion is being measured at different scales in an olive orchard in Southern Spain. The orchard is on a vertic soil, and forms a small basin of 8 ha with an average slope of 9%. Total runoff and sediment loss are measured in a calibrated flume located at the outlet of the basin since August 2006. Gully and rill erosion measurements were made at three times during 2007. Runoff plots (12x6m) experiments were conducted within the orchard from 1999 to 2006 to evaluate soil and runoff losses under different soil management systems.

The objective of this communication is to evaluate soil losses from water erosion at different scales and by different processes in olive orchards using preliminary data from the monitored basin, corresponding to hydrological year 2006-07. Also to compare our experimental results with the predictions of two simple soil erosion models, and discuss the implications of our analysis for current and future studies of soil erosion in olive orchards.

Our results indicate significant differences between the scales measured. Average sediment loss measured at the flume outlet was 4.3 t ha^{-1}. During the same period gully and rill erosion was calculated, based on our field measurements, as 14 0 and 6.7 t ha^{-1} respectively. Average sheet erosion from long term runoff plot data ranged between 0.8 and 2.5 t $ha^{-1}year^{-1}$ on the steepest slopes. From these values we estimated an

annual sediment delivery ratio of 17%. This indicates that important deposition takes place, even in this small basin. This was confirmed during the field surveys. Our results also indicate that most of soil was lost by rill and gully erosion.

These experimental results were compared with simulations using two simple water erosion models (WATEM and USPED). Both models reproduced relatively well the observed patterns of erosion and deposition. However, the simulated eroded and deposited amounts differed considerably with our measurements. Most of the model runs resulted in SDR between 2.5 – 12%, which is significantly smaller than our measurements.

Our results suggest that gully and rill erosion can be the most important soil erosion processes in some olive orchards. To our knowledge, these processes are hardly being monitored in most erosion studies in Southern Spain. The models used in our analysis do not include gully erosion and this might be one of the reasons why the simulations have not been able to reproduce our measurements. In order to obtain a comprehensive view of soil erosion in olive orchards, measurements should be made at different scales in the same experiment, and been analyzed using models that consider the key processes. These three issues should be addressed in further studies in olive orchards to provide a better understanding of soil erosion and designing better soil conservation measurements.