



Soil erosion in olive orchards: from historical averages to extreme events

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Olive orchards are known as one of the most erosion-prone land uses in the Mediterranean. Reported erosion rates however are often based on simulations or small-scale plot studies. Field measurements are scarce and therefore urgently needed as input for modeling and conservation efforts.

This study aims at evaluating the range of soil losses by water that can be observed in olive orchards. Field measurements were made of soil erosion at temporal scales ranging from historical or medium-term (<100 years) to individual events and at spatial scales ranging from fields to small basins. The results were compared with literature values and simulations by traditional soil erosion models.

Medium-term average soil loss was assessed by a simple and inexpensive technique. In 7 conventionally tilled orchards, soil surface change was reconstructed from mounds forming around the olive trees. The derived historical soil erosion rates, averaged for periods of 39-100 years, was calculated to range between 95 - 163 Mg.ha⁻¹.yr⁻¹. In one of the analyzed orchards, the historical soil erosion rate was compared with measurements of rills and gullies formed at the end of one hydrological year. Although the observed actual and historical erosion patterns correspond well, the locally reconstructed historical soil loss rate are considerably higher, which indicates the additional

influence of processes like tillage translocation.

Secondly, sediment budgets were established for three catchments, after an intensive rainfall event of approximately 100 mm on 20-11-2007 near Cordoba, Spain. In four catchments with conventionally tilled olive orchards, between 27 – 91 ha, rills, gullies and sediment bodies were surveyed. Preliminary results showed basin-wide erosion rates range of up to 300 Mg.ha⁻¹ and first estimates of deposition volumes show that minimum sediment delivery ratio was about 90 %. These figures are considerably higher than traditionally assumed.

This data demonstrates the severity of soil degradation in some orchards and this data should be used to modify existing soil erosion models, which do not perform well in these adverse conditions.