# Particulate, mineral fraction and water extractable organic carbon in the soil and in the sediments transported by runoff

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# BACKGROUND

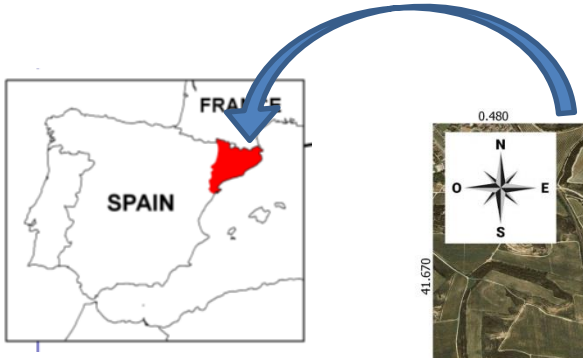
Erosion is the most widespread process that cause land degradation. It produces changes in soil properties and contribute to the depletion of organic matter content as well as to the loss of nutrients. The changes have an additional effect on the infiltration and on water retention capacity, which all together influence crop productivity. Water erosion occurs due to natural forces. But in areas with Mediterranean climate, most of erosion losses occur in a reduced number of events of high intensity.

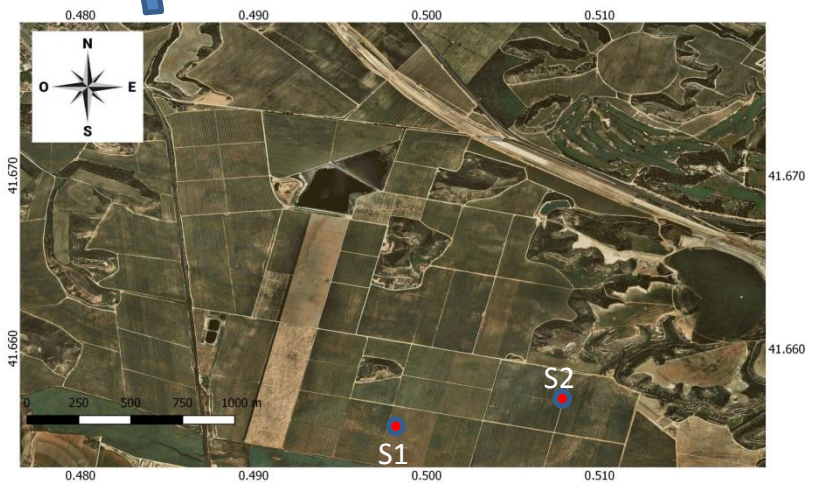
## OBJECTIVE

The objective of this research was to evaluate the effect of high intensity rainfall on soil carbon mobilization and transportation in soils with scarce soil cover, and the form in which carbon is transported by runoff.

# MATERIAL AND METHODS

The research was carried out under simulated rainfall in a commercial vineyard located in Raimat, Costers del Segre Denomination of Origin, Lleida, NE Spain).




Soil samples from 0-20 cm were collected in two locations in the field, before the rainfall simulation for texture characterization and chemical analysis.

# MATERIAL AND METHODS

Plots 1m length * 0.5 m width were delimited in the field at each location and subjected to simulated rainfall using a rainfall simulator, which had a dropper system placed 2.5 m above the ground.

The rainfall intensity was fixed for the experiment in 60 $mmh^{-1}$. The simulations were done in triplicate. Runoff was collected every 10 minutes during 1h and the sediment transported by runoff was separated and weighted after dried.

# MATERIAL AND METHODS

Total organic carbon (TOC) was analysed in the soil before and after the simulation. In addition, in the original soil and in the sediments recorded in each simulation, the particulate organic carbon (POC) and the mineral-associated organic carbon (MOC) (Cambardella and Elliott, 1992), as well as the water extractable organic carbon (WEOC) (Gigliotti et al., 2002) were analysed.

References
Cambardella CA, Elliott ET. 1992. Participate Soil Organic-Matter Changes across a Grassland Cultivation Sequence. Soil Sci. Soc. Am. J. 56,777-783.
Gigliotti G, Kaiser K, Guggenberger G, Haumaier L. 2002. Differences in the chemical composition of dissolved organic matter from waste materials of different sources. Biology and Fertility of Soils, 36,321-329.
Soil Survey Staff, 2006. Keys to Soil Taxonomy, 10th ed. USDA-Natural Resources Conservation Service, Washington, DC, US.

# RESULTS AND CONCLUSIONS

## Soil type

***Haploxeralf fluventic***

*Table 1. Soil properties of the analysed soils*

| Soil | Slope (%) | Clay (%) | Silt (%) | Sand (%) |
|---|---|---|---|---|
| **Soil S1** | 5 | 25.5 | 50.2 | 24.3 |
| **Soil S2** | 5 | 23.2 | 49.5 | 27.3 |

## RESULTS AND CONCLUSIONS

# Runoff rates and sediment concentration in runoff

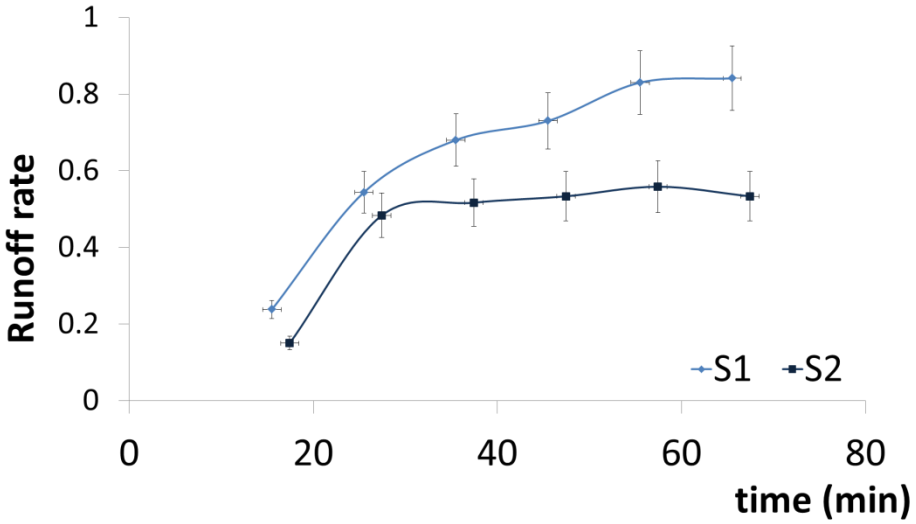



*Fig. 1. Runoff rate along the rainfall simulation in each analysed soil*

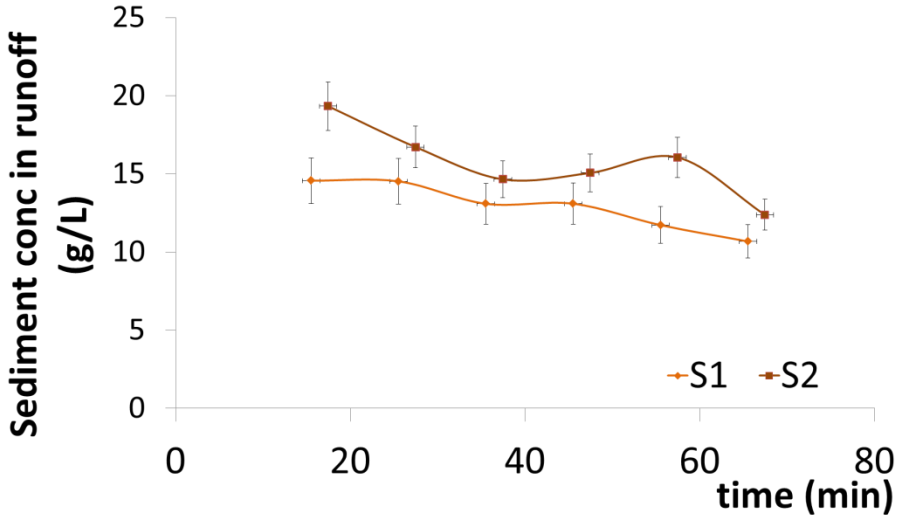



*Fig. 2. Sediment concentration in runoff along the rainfall simulation in each analysed soil*

## RESULTS AND CONCLUSIONS

*Table 2. Organic carbon fractions in the original soils and in the sdiments recorded after rainfall*

| TOC Sediments | TOC $gkg^{-1}$ | POC $gkg^{-1}$ | MOC $gkg^{-1}$ | WEOC $gkg^{-1}$ |
|---|---|---|---|---|
| **Soil S1** | 14.09±0.67 | 3.55±0.45 | 10.56±0.55 | 0.74±0.11 |
| **Soil S2** | 13.56±0.8 | 3.38±0.45 | 10.18±0.85 | 0.73±0.09 |
| | | | | |
| **Sediment S1** | 12.29±1.13 | 3.18±0.27 | 8.90±0.85 | 0.95±0.11 |
| **Sediment S2** | 12.84±1.19 | 3.66±0.24 | 9.53±0.89 | 0.96±0.12 |

## RESULTS AND CONCLUSIONS

The POC and the MOC represented 24.7% and 75.3% of TOC in the original soil, and no significant changes were observed in the sediment transported by runoff (values ranging between 25.90 to 28.47 % for POC and between 71.5 and 74.1% for MOC). However, the WEOC fractions were higher in the sediment (7.7 and 7.5%) than in the original soil (5.26%).

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