

# The fate of organic matter brought into soil by olive mill wastewater application at different seasons

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## Abstract

### Purpose

Application of olive mill wastewater (OMW) to soil may cause positive or negative effects. The present study aims at a better understanding of the fate of organic matter brought into soil by OMW application under different environmental conditions.

### Materials and methods

Single OMW application to soil was conducted in spring, dry summer, summer with irrigation, and in winter. Two days and 18–24 months after the application, soil samples from two depths were analyzed for thermal soil organic matter (SOM) properties, total organic carbon, water-extractable dissolved soil organic carbon, and its specific ultraviolet absorbance at 254 nm.

### Results and discussion

After winter and irrigated summer treatments, OMW was largely leached from the upper horizon within 2 days. Application in spring and summer dry initially increased the thermolabile fraction and the calorific value of SOM, however, in a different degree due to different transport, transformation, and immobilization mechanisms. At the long term, SOM content was still elevated after summer dry treatment. The reduction of the thermostable fraction in spring treatment indicates a priming effect of the labile OMW constituents.

## Conclusions

Application in winter or with irrigation cannot be recommended for the investigated site. Under hot and dry conditions, SOM content increased most persistently due to stronger mineral-organic interactions. Favorable conditions for biodegradation during OMW application in spring reduced the effects on SOM quantity in the long term. However, a possible priming effect and the persistence of changes in thermal properties need to be further investigated for repeated applications.

## Keywords

Differential scanning calorimetry Olive mill wastewater Soil organic carbon Soil organic matter Thermal stability Thermogravimetry