HELLENIC AGRICULTURAL ORGANIZATION-DEMETER
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# Changes of soil organic matter and microbial activity in irrigated and non irrigated olive groves.

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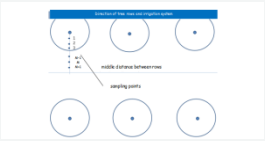
Weed management practices


Soil degradation


Uncontrolled application of olive mill wastes

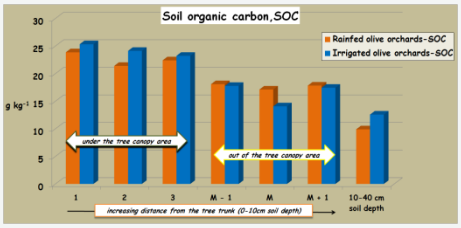

sampling points

**Introduction:** The most important problem of agriculture in Greece is the low percentage of organic matter, which is the most restrictive resource for food production and the sustainability of Greek agriculture. Low levels of organic matter is a result of the mechanization of agriculture, the use of chemical fertilizers, pesticides, monoculture, burning debris, fallow etc. On the other hand, the Mediterranean climate of Greece has strong negative influence on the content of soil organic matter. It is well known that the content of the soil organic matter can be significantly increased by adding compost or crop residues. Incorporation of weeds in the soil had positive influence on soil organic matter content. Materials such as oil mill wastes, leaves and stems of olive, vine, grapes, pig manure and treated municipal waste has been studied in the past as to their suitability for composting with encouraging results. However, the implementation for these techniques has not been systematically tested under the prevailing conditions of the Greek/Mediterranean olive forest. A LIFE+ project was initiated (oLIVE-CLIMA; LIFE 11/ENV/000942) aiming to introduce new management practices in olive tree crops that lead to increased carbon dioxide uptake by plants as well as carbon sequestration from the atmosphere and reverse the trend of soil organic matter decline, erosion and desertification. This paper presents data on soil organic matter and microbial activity from a soil campaign in a pilot region in Greece, and particularly in the area of Chora, prefecture of Messinia, South west Peloponnese.

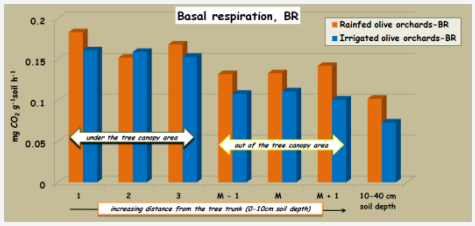
**Materials and Methods:** The soil campaign took place during the period December 2012-February 2013. Twelve soil parcels of olive groves were selected (6 rainfed and 6 irrigated) and in each soil parcel six composite soil samples were taken from 0-10 cm depth at equal intervals along a straight line of the trunk of the tree to the middle of the distance from the nearest tree of the next tree series. The first three samples were under the tree canopy. An additional composite sample was taken at depth of 10-40 cm. Soil samples were analyzed for soil physicochemical and biological properties. In this study results for soil organic carbon (SOC), soil basal microbial respiration (BR), microbial biomass C (MB-C) are presented.

Pilot area with olive orchards (Chora, Messinia)

## Results

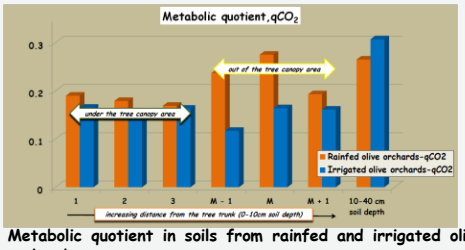


**Soil organic carbon in soils from rainfed and irrigated olive orchards**

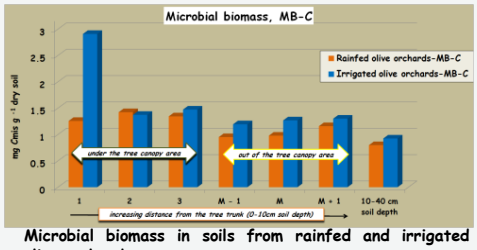


**Basal respiration in soils from rainfed and irrigated olive orchards**


Olive orchard in pilot area



**Metabolic quotient in soils from rainfed and irrigated olive orchards**



**Microbial biomass in soils from rainfed and irrigated olive orchards**



Coverage of slopes of poor soil by a thick carpet of oxalis in winter

The results showed considerable differences in SOC, BR and MB-C associated with the sampling position and soil depth. The higher SOC, BR and MB-C values, in most cases, were determined in samples taken from points under the tree canopy compared to the sampling points out the tree canopy area. This indicates the positive effect of rhizosphere and the favorable soil moisture conditions under tree canopy on soil microbial activity. SOC, BR and MB-C values were considerably lower in soil depth of 10-40cm compared with 0-10 cm in both irrigated and rainfed soil parcels. Moreover BR and MB-C was higher in irrigated soil parcels compared with rainfed ones suggesting that the periodic irrigation enhances the soil microbial activity. There were no considerable differences in SOC. For this the organic carbon and the potential activity of microbial community can contribute in the soil nutrient and irrigation management guidelines in order to exploit the utilization of productive soils in the region under studied.

The study was carried out in the framework of the LIFE 11/ENV/000942 project : "oLIVECLIMA: Introduction of new oLIVE crop management practices focused on CLIMAte change mitigation and adaptation". http://www.oliveclima.eu/