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Changes of soil organic matter and microbial activity in irrigated and non irrigated olive groves under Mediterranean soil climatic conditions in Crete

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The implementation of olive cultivation techniques in Greece has not been systematically tested under the prevailing Mediterranean conditions. 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. The soil campaign took place during the period December 2012-February 2013. Twelve soil parcels of olive groves were selected (6 irrigated and 6 rainfed) 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 olive 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 total organic carbon (TOC), soil basal microbial respiration (BR), microbial biomass C (MB-C) from the region of Messinia, are presented. Organic matter was determined by dichromate oxidation. The microbial activity was measured by the amount of CO_2 evolution, while microbial biomass C was determined by substrate-induced respiration, after the addition of glucose. The results showed considerable differences in TOC, BR and MB-C associated with the sampling position and soil depth. The higher TOC, BR and MB-C values, in most cases, were determined in samples taken from points under the canopy, but not close to the tree trunk compared to the sampling points outside the canopy. This indicates the positive effect of rhizosphere and the favorable soil moisture conditions under tree canopy on soil microbial activities. TOC, 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 significantly enhances the soil microbial activity. There were no considerable differences in TOC. For this the TOC and 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.