



Soil Organic Carbon distribution in three contrasting olive orchards in Southern Spain

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Soil organic carbon (SOC) shows a considerable spatial variability at the field, farm or catchment scales. This complicates its use as an indicator for soil quality, and is an important drawback for the efficient evaluation of carbon sequestration schemes, or for the certification of carbon sequestration potential of agricultural soils at these scales. This is especially significant for olive orchards in Mediterranean environments. We hypothesize that the typical row crop configuration of olive orchards, with cover crops or bare soil in the inter-row areas, can explain a vast proportion of this variability. In addition agricultural activities and topography-driven erosion processes at different scales contribute to SOC variability. Given the complexity of this problem and the important experimental effort required to address it, there are to our knowledge few studies that have addressed this issue, specifically in agricultural soils under Mediterranean conditions.

We present an analysis of SOC data obtained during 2011 and 2012 at three small (6-8 ha) catchments in Southern Spain, with contrasting soils (Vertisol, Luvisol and Cambisol) and covered by olive groves with different managements (conventional tillage, minimum tillage with mulch and non tillage with spontaneous grass cover). Soil organic carbon is analysed across tree rows, inter-row areas, and for different depths. The spatial SOC distribution is evaluated against the topography of the catchments and the intensity of the water erosion processes.

The differences among the catchments are discussed and guidelines are provided for further exploring the sources of SOC variability and to improve SOC estimation at the field scale.