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Effects of different soil types in natural Mediterranean areas on soil organic carbon (SOC)

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The carbon content of the atmosphere can be influenced by soils, since they can store carbon or emit large quantities of CO_2. C sequestration into soils is one of the most important ecosystems services because of its role in climate regulation (IPPC, 2007). Thereof, agriculture and forestry are the only activities that can contribute to C sequestration through photosynthesis and its carbon incorporation into carbohydrates (Parras Alcántara et al., 2013).
Dehesa is a multifunctional agro-sylvo-pastoral system and typical landscape of southern and central Spain and southern Portugal. It is an anthropogenic system dedicated to the combined production of black iberian pigs, a variety of foods, fuel, coal, and cork. Besides, it acts as well in the production of endangered species as wildlife habitat and as sustainable hunting areas. These dehesa areas are defined by a relationship between productivity and conservation of forest oaks, providing environmental benefits such as carbon capture and storage.
The area focused in this study is the Cardeña-Montoro Nature Reserve, located within the Sierra Morena (Córdoba, South Spain). The most representative soils in Cardeña-Montoro Nature Reserve are Cambisols, Regosols, Leptosols and Fluvisols according to IUSS Working Group WRB (2006). They are characterized by a low fertility, poor physical conditions and marginal capacity for agricultural use, along with low organic matter content due to climate conditions (semiarid Mediterranean climate) and soil texture (sandy).

Several studies have shown that land use affects the SOC concentration (Lozano-García et al., 2016; Khaledian et al., 2016). Based on this statement, the main goal of this work consists in establishing the vertical distribution in the profile of SOC and N concentrations and to quantify the SOC and N stocks affected by different soil types in a natural Mediterranean area, under the same land use (agroforestry system) and management (conventional tillage). This will allow to evaluate the soil quality.

It was verified that SOC concentrations significantly decreased with depth in the majority of soil profiles for all soil groups under consideration. Leptosols are characterized by the highest concentration of soil organic carbon in the subsurface horizons as opposed to Cambisols which are defined by the lowest SOC concentration in depth.

The SOC stock determined in the studied soil groups are 110. Mg. ha-1 for Fluvisols and 78.35 Mg.ha-1 for Regosols that can be caused by soil thickness.
According to McLauchlan (2006), it cannot be found a strong relationship between clay content and organic carbon in the soil groups under study.

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