

Differences on soil organic carbon stock estimation according to sampling type in Mediterranean areas

Luis Parras-Alcántara and Beatriz Lozano-García

Cordoba, Faculty of Science, Agrifood Campus of International Excellence - ceiA3, Agricultural Chemistry and Soil Science, Cordoba, Spain (qe1paall@uco.es)

Corresponding author: Luis Parras-Alcántara, Tel.: +34957211092; fax: +34957212146; E-mail: luis.parras@uco.es; qe1paall@uco.es

Abstract

Soil organic carbon (SOC) is an important part of the global carbon (C) cycle. In addition, SOC is a soil property subject to changes and highly variable in space and time. Consequently, the scientific community is researching the fate of the organic carbon in the ecosystems. In this line, soil organic matter configuration plays an important role in the Soil System (Parras-Alcántara and Lozano García, 2014). Internationally it is known that soil C sequestration is a strategy to mitigate climate change. In this sense, many soil researchers have studied this parameter (SOC). However, many of these studies were carried out arbitrarily using entire soil profiles (ESP) by pedogenetic horizons or soil control sections (SCS) (edaphic controls to different thickness). As a result, the indiscriminate use of both methodologies implies differences with respect to SOC stock (SOCS) quantification. This scenario has been indicated and warned for different researchers (Parras-Alcántara et al., 2015a; Parras-Alcántara et al., 2015b). This research sought to analyze the SOC stock (SOCS) variability using both methods (ESP and SCS) in the Cardeña and Montoro Natural Park (Spain). This nature reserve is a forested area with 385 km² in southern Spain. Thirty-seven sampling points were selected in the study zone. Each sampling point was analyzed in two different ways, as ESP (by horizons) and as SCS with different depth increments (0-25, 25-50, 50-75 and 75-100 cm). The major goal of this research was to study the SOCS variability at regional scale. The studied soils were classified as Phaeozems, Cambisols, Regosols and Leptosols. The results obtained show an overestimation of SOCS when SCS sampling approach is used compared to ESP. This supports that methodology selection is very important to SOCS quantification. This research is an assessment for modeling SOCS at the regional level in Mediterranean natural areas.

References

- Parras-Alcántara, L., Lozano-García, B., 2014. Conventional tillage versus organic farming in relation to soil organic carbon stock in olive groves in Mediterranean rangelands (southern Spain). *Solid Earth*, 5, 299–311 (2014). <http://dx.doi.org/10.5194/se-5-299-2014>.
- Parras-Alcántara, L., Lozano-García, B., Brevik, E.C., Cerdà, A., 2015a. Soil organic carbon stocks assessment in Mediterranean natural areas: A comparison of entire soil profiles and soil control sections. *Journal of Environmental Management*, 155, 219-228. <http://dx.doi.org/10.1016/j.jenvman.2015.03.039>.
- Parras-Alcántara, L., Lozano-García, B., Brevik, E.C., Cerdà, A., 2015b. Soil organic carbon stocks quantification in Mediterranean natural areas, a trade-off between entire soil profiles and soil control sections. *Geophysical Research Abstracts*. Vol. 17, 986. EGU General Assembly 2015.