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# Effect of soil redistribution on soil aggregate stability and soil organic carbon in Mediterranean cultivated soils

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Soil tillage and erosion promote the break up of soil structure and loss of carbon. Soil structure is one of the main factors controlling the ability of soil to support plant growth, the movement of water and the cycling of carbon and nutrients. Therefore soil aggregation is an important soil property for farmers. Soil aggregation affects soil organic carbon stabilization and the ability of soils to resist erosion. Soil aggregate size distribution and stability represent two indicators of soil physical quality that may change in response to soil redistribution processes.
This study was performed to evaluate soil structural stability and aggregate-associated SOC dynamics in a Mediterranean mountain agroecosystem (NE Spain). The fieldwork was conducted in 2017, and included the collection of topsoil samples (0-20 cm) from croplands after crop harvest at two contrasting slope positions representing eroded and depositional sites. The main crops were winter cereals and soils with a mean value of pH 8.5 and EC 0.11 dS m-1 and a silt loam texture are developed on sedimentary rocks. Aggregate size separation and soil stability assessments were carried out on soil replicates using a wet sieving method from Six et al. (2000). A total of 80 g air-dried soil samples (8 mm sieved) were fractionated through three sieves (2000, 250 and 53 $\mu$m) into four aggregate-size classes: large macroaggregates (2000-8000 $\mu$m), small macroaggregates (250–2000 $\mu$m), microaggregates (53-250 $\mu$m) and silt-plus clay-sized particles (<53 $\mu$m). Sand correction was performed for each aggregate-size class. SOC contents in topsoils and in each aggregate fractions were measured by the dry combustion method and soil aggregate stability was expressed by the mean weight diameter (MWD, mm) and geometric mean diameter (GMD, mm).
Different physical-chemical properties in topsoils were observed from the upper to the lower part of the slope. Large differences in SOC concentration and soil aggregation in topsoils between the eroded (mean SOC 2.4 g kg-1) and depositional (mean SOC 5.0 g kg-1) sites were found. The results showed an increase in the weight proportion (%) of all the aggregate size fractions at the lower part of the slope except for the silt-plus clay-sized particles. MWD and MGD mean values were lower (0.40 mm and 0.39 mm) at the upper part of the slope compared to the lower part (0.98 mm and 0.53 mm). Topsoils at the depositional site had a better aggregate structure and higher aggregate stability than those at the eroded site. This work contributes to evaluate the effect of soil redistribution processes, responsible for the mobilization and deposition of soil aggregates and associated soil organic carbon, on soil structural stability which is crucial for maintaining soil productivity of Mediterranean agroecosystems.

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