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Soil Texture and ORGANIC CARBON FRACTIONS in ARID-semiarid soils of Argentina

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The amount of oxidizable organic carbon (OCox) under different oxidation conditions is a sensitive indicator of soil quality; this parameter can change according soil texture and vegetation type. The objective was to determine changes in the amount and quality of the soil organic carbon in sites with different soil textures and vegetation types. Using satellite images, four sites with different type of vegetation cover were selected in the north Patagonia of Argentina (Lat. 41º 58´ S; Long. 62º-50´ O). The area is characterized by a transition from sub-temperate to arid-semiarid climate, and frequent winds, where the natural vegetation is “Monte”, with xerophyte species, and shrub steppes with dominance of *Larrea spp.* (Zygophyllaceae). The mean annual precipitation is 350 mm and the mean annual temperature of 15 ºC. The main soil orders are Aridisols and Entisols. Extensive grazing in natural grasslands is the main production activity in the area. Each site was classified in four conditions: Dispersed vegetation (S1), Low Forest (S2), Low shrubs (S3) and Grassland (S4). In each zone, a composite soil sample was collected at three sampling points at 0.30 m soil depth. The soil samples were air-dried and passed through a 2 mm sieve. Textural composition was determined by Bouyoucos, and the oxidizing conditions for oxidizing C determination were stablish by using different amounts of sulphuric acid: 0.75 mL (fraction 1), 1.5 mL (fraction 2) and 3 mL (fraction 3) specified by Walkley and Black method, resulting in three acid-aqueous solution ratios of 0.5:1,1:1 and 2:1. The four conditions represented a soil-texture gradient, from 8.6% to 54.3% of clay + silt: S4~S1>S3>S2, ($p<0.05$). The amount of oxidizable organic carbon accounted under different oxidizing conditions also showed significant difference. In all cases, S4 site presented the highest values, with 9.19 mg g^{-1} in fraction 1, 14.96 mg gr^{-1} in fraction 2 and 17.30 mg g^{-1} in fraction 3. The average values for the three fractions were 71%, 53% and 24% for S3, S1 and S2, respectively, of the S4 value. The OCox/(clay + silt) ratio was higher in S2 site. Using this ratio for fraction 1 allows to differentiate S4 (higher) from the other sites. The combined use of the textural composition together with different OCox fractions could represent a better indicator to evaluate the soil quality, and to minimize variations associated to texture.

Keywords: Soil texture; Soil quality; Organic matter; Land conservation.

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