

Stabilization of Soil Organic Carbon within Silt+Clay Fraction in Shrub-Encroached Rangeland Shallow Soil at the University of Limpopo Syferkuil Experimental Farm

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Abstract : Shrub-encroachment leads to a gain or loss of soil organic carbon (SOC) in previously open rangelands. The stabilization mechanisms controlling the storage of soil organic carbon (SOC) within aggregates of shrub-encroached grassland soils are poorly understood, especially in shallow plinthic soils. In this study, physical fractionation of surface soils (0- 10 cm) collected from open and shrub-encroached grasslands was conducted to determine the distribution of SOC within macro-and-microaggregates. Soil aggregates were classified into four fractions by a wet-sieving procedure, namely >2000 (large macro-aggregates), 212-2000 (small macro-aggregates), 50-212 (microaggregates) and < 50µm (silt+clay). In both shrub-encroached and open grassland soils, SOC was greater in the silt+clay fraction. In this fraction, SOC was on average 133% greater in shrub-encroached compared to open grassland. The greater SOC within the silt+clay fraction is due to the greater surface area and thus more exchange sites for carbon absorption. This implies that the SOC physically protected within the silt+clay is stored long-term.

Keywords : aggregate fractions, shrub-encroachment, soil organic carbon, stabilization

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