

SOIL AGGREGATE STABILITY OF ORGANICALLY AND CONVENTIONALLY MANAGED TEA LANDS IN UVA REGION OF SRI LANKA

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Soil health of tea lands in Uva region of Sri Lanka has repeatedly deteriorated under conventional tea cultivation, particularly due to soil erosion. This study investigated whether transitioning from a conventional to organic cultivation system improves soil aggregate stability, potentially reducing susceptibility to erosion. Soil samples were collected randomly from six tea lands, three organic fields which were converted to organic in 2018, and three conventional fields. Dry and wet aggregate stability were determined by dry sieving and wet sieving methods, respectively. The Soil organic carbon percentage (SOC %) in bulk and different aggregate size fractions were determined using loss on ignition method. Data were analysed using three staged nested factorial design using SPSS statistical software. Results indicated that dry aggregate stability was significantly higher ($p < 0.05$) in organic system ($2.6 \pm 0.3\%$) compared to conventional system (1.7 ± 0.3). Similarly, wet aggregate stability was significantly higher ($p < 0.05$) in the organic systems ($92.3 \pm 7.1\%$) than the conventional systems ($84.0 \pm 12.2\%$). Higher dry aggregate stability leads to lesser susceptibility to erosion and runoff. The aggregate stability had shown considerable fluctuations. Significantly higher ($p < 0.05$) SOC% was recorded in the organic system ($8.6 \pm 1.8\%$) than the conventional system ($5.0 \pm 1.9\%$). The SOC% had decreased along the slopes, where upper slope had higher SOC% than lower slope in both cultivation systems. The SOC% was significantly higher ($p < 0.05$) in micro-aggregates than the macro-aggregates. Thus, SOC% negatively correlated with the aggregate size. The findings suggest that transitioning conventional tea lands into organic can substantially decrease the susceptibility of soil to erosion by enhancing soil aggregate stability. Further research is recommended to explore the long-term effects of organic tea cultivation on soil properties.

Keywords: Aggregate stability, Organic system, Conventional system, Soil organic carbon