

## EVALUATING SOIL AGGREGATE STABILITY OF ORGANICALLY AND CONVENTIONALLY GROWN TEA PLANTATIONS IN UVA REGION OF SRI LANKA

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Soil erosion is a major environmental problem in tea plantations in the Uva region of Sri Lanka, leading to a decline in soil health and productivity. The objective of this study was to evaluate whether the long-term application of organic amendments can enhance soil resistance to erosion compared to the application of synthetic fertilizers in selected tea plantations. Soil samples were collected from depths of 0–15 cm and 15–30 cm at the upper, middle, and lower slope positions across six plantations. These included three plantations with long-term organic amendment applications and three with synthetic fertilizer applications. Soil samples were analyzed to determine dry aggregate stability (DAS), wet aggregate stability (WAS), and soil organic carbon (SOC) in both bulk soil and various aggregate size fractions using standard methods. The experimental design was a three-stage nested factorial. Data analysis was performed using ANOVA. The mean weight diameter (MWD) in organic amendment applied plots was significantly higher ( $1.99 \pm 0.2$  mm) than in synthetic fertilizer added ( $1.46 \pm 0.5$  mm) plots ( $p < 0.05$ ). Geometric mean diameter (GMD) was also higher in organic ( $1.54 \pm 0.23$  mm) than in conventional ( $1.06 \pm 0.44$  mm) plots ( $p < 0.05$ ). WAS were significantly greater in organic ( $96.4 \pm 1.1\%$ ) compared to conventional ( $86.0 \pm 1.3\%$ ) plots ( $p < 0.05$ ). Organic plots had significantly higher SOC% ( $1.10 \pm 0.36\%$ ) than conventional ( $0.98 \pm 0.36\%$ ) plots ( $p < 0.05$ ). Soil aggregate stability and SOC were not significantly different along slope and depth. SOC% was also significantly higher ( $p < 0.05$ ) in micro-aggregates than in macro-aggregates. The DAS showed strong positive correlations with SOC ( $r > 0.8$ ,  $p < 0.05$ ). However, SOC% did not show a higher correlation with WAS. It could be concluded that long-term organic fertilizer application has significantly improved SOC, WAS and DAS in organic farmer plots reducing tea soil's vulnerability to wind and water erosion.

**Keywords:** Aggregate stability, Organic tea, Organic amendments, Soil erosion, Soil organic carbon