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# Impact of elevation and weed management methods on variability of Soil Organic Carbon stocks in an Ultisol

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Soil organic carbon (SOC) stocks play a significant role in regulating global warming.Generation of detailed maps of SOC stocks is necessary to assess its contribution for C sequestration at regional scale. Identifying environmental controllers of SOC stocks is a requirement for designing sampling schemes and detailed mapping of SOC stocks.

This study was conducted in Hapugasthanna Tea Estate in Maskeliya(WU1) to quantify the spatial variability of SOC stocks while investigating impact of elevation, soil properties and weed management on SOC stocksin a slopyUltisol soil-scape. Topsoil (0-30 cm) samples were collected from 44 locations using grid combined random sampling scheme.Three fields where herbicides applied in three months interval and three fields where herbicide free integrated weed management (HFIWM) practiced for three yearswere selected and samples were taken within each field. These samples were analyzed for SOC, bulk density, soil texture, saturated hydraulic conductivity, pH and EC.Organic carbon content and bulk density were used to calculate SOC stocks. Shuttle Radar Topography Mission (SRTM) 90m Digital Elevation Model was used to extract the elevation data.

Average SOC stock within the study area was 64.8 t $ha^{-1}$and coefficient of variation (CV=18.4%) indicated medium variability. Other soil properties(pH, EC, hydraulic conductivity)showed CVs from 9 % to 35 % indicating medium variability. Soil organic carbon stocks showed a positive correlation (r = 0.4) with bulk density and clay content. A negative correlation (r = -0.31) was observed between SOC stocks and elevation. Agreeing with this finding, interpolated map showed higher SOC stocks in low elevation compared to higher elevation. Variogram of SOC indicated moderately structured spatial variability. Average SOC stock in HFIWM fields (80.2 t $ha^{-1}$) was larger than herbicide applied fields (65.6 t $ha^{-1}$) (P = 0.07).

We found a medium level spatial variability of SOC stocks in slopy Ultisol soil-scape. Topography is one of the main controllers of spatial variability of SOC stocks. Thus, elevation and topographic attributes can be used as co-variates for sampling and subsequent mapping of SOC stocks. Weedicide free weed management enhances soil carbon sequestration in tea growing Ultisols.