

ASSESSING SOIL PROPERTIES UNDER VARIOUS COVER CROP MANAGEMENT SYSTEMS IN IMMATURE RUBBER PLANTATIONS

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Rubber (*Hevea brasiliensis*) plays a significant role in the economy of Sri Lanka as a cash crop. Nevertheless, the issues of continuous cultivation and soil erosion have emerged as critical factors adversely impacting crop growth and productivity in recent years. Implementing cover crop management (CCM) is the most easily applicable solution to address the above issues. This study was conducted to assess the spatial variability of soil properties within immature rubber plantations under various cover crop management systems. Soil samples were collected from the immature rubber plantations (L1, L2, and L3) in the *Boralu* soil series at *Cylid* Estate under three cover crop conditions: L1-Fully established cover crop (FCC), L2-partially established cover crop (PCC), and L3-natural vegetation cover (NVC). Soils were analysed for certain physical [soil texture, moisture, and bulk density (BD)] and chemical [soil pH, soil organic carbon (SOC), exchangeable potassium (Ex. K), exchangeable magnesium (Ex. Mg), total nitrogen (TN), available phosphorous (Av. P)] parameters. The randomized block design was used, and data were analysed using analysis of variance (ANOVA) followed by mean separation using LSD test. Spatial variability maps for all measured soil parameters were prepared using the Kriging procedure. Results indicated significantly ($p < 0.05$) higher SOC ($1.23 \pm 0.09\%$), AP ($19.17 \pm 0.19 \text{ mg kg}^{-1}$), Ex. K ($59.30 \pm 8.28 \text{ mg kg}^{-1}$) and Ex. Mg ($24.25 \pm 2.93 \text{ mg kg}^{-1}$) in L1 with the FCC. However, the significantly highest ($p < 0.05$) TN ($2.4 \pm 0.19 \text{ mg kg}^{-1}$) was observed in L3 under NVC. No significant difference ($p > 0.05$) was observed for the pH, and moisture among the three lands but the highest BD ($2.22 \text{ g cm}^{-3} \pm 0.096$) was observed in L3 under NVC. Overall, the FCC condition showed a significant positive effect on most tested soil parameters, except for TN and BD. These results suggest that CCM could be an essential management practice to enhance soil fertility levels in immature rubber plantations.

Keywords: *Boralu* soil series, Cover crop management, Fertility, Soil erosion