

IMPACT OF SLOPE POSITIONS ON SOIL FERTILITY IN IMMATURE RUBBER PLANTATIONS

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Rubber *Hevea brasiliensis* stands as a significant economically valuable plantation crop in Sri Lanka yet faces a critical issue of topsoil erosion. This problem results in fertility issues, ultimately leading to a severe decline in production. The study aimed to evaluate the soil fertility across different slopes in rubber growing lands. Soil samples were collected (0–25cm) from immature rubber growing lands in the *Boralu* soil series at *Dartonfield* estate under three slope positions: upper (US), middle (MS), and lower (LS) slopes, categorized based on their lengths. The sampling was done for each of the three lands (L1, L2, and L3), all under similar conditions. Soils were analysed for certain physical (soil texture, moisture, and bulk density) and chemical (soil pH, soil organic carbon (SOC), exchangeable potassium (Ex. K), exchangeable magnesium (Ex. Mg), total nitrogen (TN), available phosphorous (Av. P) parameters. Randomized complete block design was used, and data were analysed using analysis of variance followed by mean separation using the LSD test. Spatial variability maps for all measured soil parameters were prepared using the Kriging procedure. Results indicated significantly ($p < 0.05$) higher SOC ($2.02\% \pm 0.03$) in MS of L1. The Av. P was higher ($p < 0.05$) both in US of L1 ($19.73 \text{ mg kg}^{-1} \pm 2.35$) and L3 ($10.4 \text{ mg kg}^{-1} \pm 0.9$). The highest ($p < 0.05$) TN ($0.14 \text{ mg kg}^{-1} \pm 0.003$) was observed in the LS of L2. No significant difference ($p < 0.05$) was observed for the pH, Ex. K, Ex. Mg, moisture, and bulk density across the three lands within the gradients. In summary, the slope demonstrated some influence on specific soil properties, although its impact on overall soil fertility was not substantial. However, further studies are necessary to gain a clearer understanding of the gradient effect on soil fertility in immature rubber plantations.

Keywords: *Boralu* soil series, Soil chemical parameters, Soil physical parameters