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SOIL PHYSICAL PROPERTIES IN TROPICAL MONTANE AND SUB MONTANE FORESTS IN SRI LANKA ALONG AN ALTITUDINAL GRADIENT

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Tropical Montane Forests (TMFs) and Tropical Sub Montane Forests (TSMFs) play an important role in watershed function, climate change mitigation and conservation of biodiversity. In the past few decades, increased deforestation has reduced their potential ecosystem roles and services. Although to-date, above-ground information on these forests is sufficiently available, below-ground properties are scarce. The present study investigated the soil physical properties of TMFs and TSMF in Sri Lanka. Soil samples were collected according to standard protocols adopted by the RAINFOR in 1 ha sampling plots at Piduruthalagala (PDG) and Horton Plains (HNP) and two plots from the sub-montane forest at Enasalwatta (ENS). Twenty near-surface (up to 25 cm) representative soil samples were collected, and bulk density, porosity, volumetric water content (VWC), field capacity (FC) and permanent wilting point (PWP) were measured using standard methods. Soil aggregate stability was determined by using the Le Bissonnais method following (i) fast wetting (FW), (ii) slow wetting (SW) and (iii) mechanical breakdown (MB). All measured parameters were significantly ($p<0.05$) different among the plots except soil aggregate stability for FW. Bulk density, porosity and VWC ranged between 0.88-1.38 mg m^{-3}, 48.0 - 66.6% and 10.6 - 19.8%, respectively, whereas FC and PWP were between 44.1-46.9% and 10.8-14.7%, respectively. Aggregate stability ranged between 1.25-1.43 in FW, 1.18-1.70 in SW and 1.16-1.58 in MB. The size of the major aggregate fraction was >2 mm for FW and SW treatments of all plots, while MB was >0.25 mm. The most stable and the least stable soil aggregates were found in PDG and HNP, respectively. In conclusion, soil porosity increased, and bulk density decreased with the increase in altitude, but there was no clear relationship between altitude and other physical properties tested. Correlation analysis showed the positive and negative relationships among the above-measured soil physical properties.

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Keywords: Below-ground soil properties, Soil physical properties, Sub Montane Forest, Tropical Montane Forests