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SOIL ORGANIC CARBON CONTENT AND ITS' EFFECT ON AVAILABLE SOIL NUTRIENTS IN KNUCKLES CONSERVATION FOREST OF SRI LANKA

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ABSTRACT

Estimation of soil organic carbon (SOC) contents and soil available nutrients in tropical forest ecosystems is important to understand the function of soil in the conservation of ecosystems. This study aimed at estimating the soil organic carbon (SOC) contents among major vegetation types in the Knuckles Conservation Forest (KCF) and correlating SOC contents with soil available nutrients. KCF is located in the north-west to south-east alignment in the central massif of Sri Lanka. Sampling was carried out (0-15 and 15-30 cm) in each vegetation type; montane forest (MF), sub-montane forest (SMF), moist monsoon forest (MMF), open and sparse forest (OSF), grassland (GL) and forest plantation (FP). The estimated total organic C (TOC), microbial biomass C (MBC), $KMnO_4$ oxidizable C (POC) and water soluble C (WSC), soil available macro (N, P, K, Ca, Mg) and micro (Fe, Mn, Cu, Zn) nutrients were analyzed using ANOVA-GLM in Minitab 16. Correlation between carbon fractions and soil available macro nutrients were also done using Minitab 16. MF recorded the highest TOC content of 4.52% with the lowest MBC of 0.035%. The highest POC and WSC were also estimated in MF soils (0.071%, 0.047%, respectively), while the lowest were recorded in FP (0.062%, 0.014% respectively) within the 0-15 cm layer. FP contained the lowest TOC content of 2.70% and relatively higher MBC content of 0.049%. Available N showed a significant and positively correlated relationship with TOC content and similarly available Mg was also positively correlated with WSC content. Results concluded that MF contained higher carbon fractions compared to other vegetation types in KFR, indicating its importance to a better function of the forest ecosystem. Available nutrients of N and Ca showed positive correlations with organic compounds due to the consumption of organic C as energy source. This information will address the dearth of data on soil carbon sequestration potentials and its' contribution to the available nutrients in forest ecosystems of the tropics, hence useful in tropical forest ecosystem conservation programs.

Keywords: Soil Organic Carbon, Soil Available Nutrients, Tropical Forest Ecosystems