ASSESSING THE POTENTIAL OF SOIL MICROBIAL BIOMASS CARBON AND ITS INTERRELATIONSHIPS WITH SOIL AVAILABLE MACRONUTRIENTS: A CASE STUDY IN KATUPOTHA DRY ZONE FOREST SYSTEMS, MIHINTALE, SRI LANKA

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Dry zone forest systems in Sri Lanka provide essential environmental services, including carbon sequestration, biodiversity conservation, and water cycle regulation, critical for sustaining the region's ecological balance. The Katupotha Forest, with its diverse vegetation and unique ecological dynamics, exemplifies the complex interaction between human activity and natural habitats in the dry zone. Soil Microbial Biomass Carbon (MBC), a vital indicator of soil health and fertility, plays a key role in organic matter decomposition and nutrient cycling. Numerous studies have been conducted on MBC and soil available macronutrients in Sri Lanka's wet zone forests, but research on the dry zone forests remains limited. Therefore, this study has aimed to assess the current status of MBC and soil available macronutrients (available phosphate, nitrate and ammonium) in the soils of the Katupotha tropical dry zone forest systems in Mihintale, Sri Lanka and to investigate the interrelationships among them. Soil samples were obtained from the above ground level (0-15 cm) of the Katupotha forest using the Stratified Random Sampling technique. The Soil MBC and available macronutrients were analysed using standard protocols. Pearson Correlation analysis was used for analysing the results. The results revealed that the MBC varied from 0.045% to 0.283% with a mean value of 0.1695%. Soil available phosphate ranged from 0.244 µg/g soil to 5.166 µg/g soil, having a mean value of 1.791 µg/g soil. While the soil available nitrate varied from 0.781 µg/g soil to 16.629 µg/g soil with a mean value of 7.432 µg/g soil, and the soil available ammonium ranged from 4.122 µg/g soil to 51.047 µg/g soil with a mean of 14.230 µg/g soil. Accordingly, MBC was positively correlated with the soil available ammonium (p= 0.012) and MBC had a negative correlation with soil available phosphate (p= -0.047). According to similar studies done on the Knuckles Forest Range which belongs to the wet zone, the Sub Montane Forests showed MBC of 0.053%, Montane Forests had 0.035% and Open Sparse Forests with an MBC of 0.048%. It is noticeable that even though the minimum MBC recorded in Katupotha dry zone forest is lower than that of the Sub Montane Forests and Open Sparse Forests, the Montane Forests exhibit a comparatively lower MBC than that of the Katupotha tropical dry zone forest systems. The findings of this study underscore the significant role of soil microbial biomass carbon in providing valuable implications for maintaining ecological health and future forest conservation and projects on combating climate change.

Keywords: *Microbial Biomass Carbon, Tropical Dry Zone Forest, Soil available phosphate, Soil available nitrate, Soil available ammonium.*