

**SPATIAL DISTRIBUTION OF SOIL MICROBIAL BIOMASS CARBON AND
SOIL AVAILABLE MACRONUTRIENTS IN KATUPOTHA DRY ZONE
FOREST SYSTEMS, MIHINTALE, SRI LANKA**

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Abstract

Tropical dry forests provide critical ecosystem services, including biodiversity conservation, carbon sequestration, and nutrient cycling. The Katupotha Forest, characterised by its diverse vegetation and distinct ecological dynamics, illustrates the intricate interactions between anthropogenic activities and natural ecosystems within the dry zone of Sri Lanka. Soil Microbial Biomass Carbon (MBC) is a key indicator of soil health, reflecting microbial activity in organic matter decomposition and nutrient availability. Soil available macronutrients play a vital role in plant metabolic processes throughout the lifecycle of plants. Several researches have been done on MBC and soil available macronutrients in the wet zone forests and other ecosystems of Sri Lanka, but research on the dry zone forests remains relatively limited. Therefore, this study aimed to assess the current status of soil MBC and soil available macronutrients (phosphate, nitrate, and ammonium) in the Katupotha tropical dry zone forest, Mihintale, Sri Lanka, and to study the spatial variation of these soil parameters throughout the forest. Soil samples were collected from 30 random locations at a depth of 0-15 cm and analysed using standard protocols. The 0-15 cm soil layer was selected for measurement due to its high microbial activity compared to the sub soil layer. GIS-based digital maps illustrating the spatial distribution of soil microbial biomass carbon, pH, and EC were generated using Arc GIS 10.8 software. The results showed that MBC varied from 0.045% to 0.283%, with a mean of 0.1695%. Soil available phosphate varied from 0.244 to 5.166 µg/g soil, with a mean of 1.791 µg/g soil, the nitrate varied from 0.781 to 16.629 µg/g, with a mean of 7.432 µg/g, while the ammonium ranged from 4.122 to 51.047 µg/g soil, with a mean of 14.230 µg/g soil. Spatial analysis indicated that higher concentrations of MBC and macronutrients were found in the northern part of the forest, particularly around the peak of the Katupotha mountainous forest. In similar studies done on the Knuckles Forest range, of wet zone, Sub Montane Forests showed an MBC of 0.053%, Montane Forests had 0.035%, and Open Sparse Forests with MBC of 0.048%. These findings of the study underscore the importance of MBC and available macronutrients as key indicators of soil health and functioning, particularly in dry zone where such levels may be lower compared to other regions. Hence, further research on dry zone forests is crucial to guiding conservation and strengthening ecosystem resilience.

Keywords: Ecosystem services, Katupotha, Microbial Biomass Carbon, Soil health, Spatial variations, Tropical dry zone forest system

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