SPATIAL DISTRIBUTION OF SOIL MICROBIAL BIOMASS CARBON IN *CHENA* CULTIVATION SYSTEMS IN MIHINTALE, SRI LANKA

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Abstract

Soil microbial biomass carbon (MBC) plays a crucial role in maintaining soil health and productivity by influencing nutrient cycling and organic matter decomposition. Chena cultivation, one of the oldest agricultural practices in Sri Lanka, is a traditional shifting cultivation method commonly found in the dry zone. It involves clearing natural vegetation for farming, which often contributes to the degradation of native plant species. This study aims to assess the MBC in soils from Chena cultivation systems and develop a GIS-based digital map to illustrate the spatial distribution of soil MBC within the Mihintale division in Anuradhapura, Sri Lanka. A total of 16 composited soil samples were collected from predetermined sites, employing a stratified random sampling technique, with samples taken from a depth of 0–15 cm across the 16 Chena cultivation lands. Soil samples were analysed for soil MBC, soil pH, and electrical conductivity (EC) using standard protocols. Derived data were used to create GIS-based digital maps illustrating the spatial distribution of soil microbial biomass carbon, pH, and EC using Arc GIS 10.8 software and for further analyzed using descriptive statistical methods in Minitab software to evaluate MBC and associated soil properties. MBC values varied from 0.037% to 0.859%, with a mean value of 0.1699%, EC ranged between 10.68 µS/cm and 47.90 µS/cm, with a mean of 32.1 µS/cm, and pH varied from 5.59 to 8.76, with a mean of 6.851, reflecting notable differences in microbial activity across sampling sites. Variability in MBC across different chena cultivation sites could be due to the crop type and land use practices. Descriptive analysis showed that the coefficient of variation for MBC was 111.92, while EC and pH were 127.43 and 9.86, indicating a higher variability in MBC and EC among the sites. Similarly, previous studies reported that MBC in paddy soil ranged between 0.001% and 0.17%, while in forest soil, it ranged from 0.045% to 0.823%. This spatial distribution can provide valuable insights for effective land management practices by underscoring the importance of understanding spatial patterns of soil MBC to enhance sustainable land management in Chena cultivation systems.

Keywords: *Chena* lands, GIS, Microbial biomass carbon, Soil health, Spatial mapping

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