ASSESSMENT OF SOIL MICROBIAL BIOMASS CARBON AND SOIL AVAILABLE NUTRIENTS: A CASE STUDY ON CHENA CULTIVATION LANDS IN MIHINTALE, SRI LANKA

Rammiya M. [1], Premarathna W. D. U.[2], Perera G. A. D.[3] and Ratnayake R. R.[2*]
[1]Department of Agricultural Engineering and Environmental Technology, Faculty of Agriculture, University of Ruhuna, Sri Lanka
[2]National Institute of Fundamental Studies, Hantana Road, Kandy, Sri Lanka
[3]Department of Botany, Faculty of Science, University of Peradeniya, Sri Lanka
[*]renuka.ra@nifs.ac.lk

The productivity of croplands is greatly influenced by Soil Microbial Biomass Carbon (MBC) and soil available nutrients. It is widely reported that MBC plays a vital role in nutrient transformation in terrestrial ecosystems. The fraction of soil organic carbon that exists within living microorganisms is referred to as MBC, which serves as a crucial indicator of microbial activity and overall soil health. Chena cultivation is one of Sri Lanka's oldest agricultural practices, and it contributes significantly to crop production and the rural economy. This study aimed to identify and quantify the present status of soil microbial biomass carbon and soil available nutrients within the Chena cultivation lands in the Wellaragama and Maradankalla Grama Niladhari (GN) divisions in Mihintale Divisional Secretariat of Anuradhapura, Sri Lanka, as an indicator of soil health under different management practices. Soil samples were collected from Chena cultivation systems at a depth of 0-15 cm across 16 predetermined sites, employing a stratified random sampling method. The soil MBC, pH, Electrical conductivity (EC), and available forms of nitrate, phosphate, and ammonium were analysed using standard protocols. Pearson correlation and descriptive analyses were used to analyse the data. Across the study sites, soil available nitrogen exhibited greater variability compared to soil MBC. The soil MBC varied from 0.037% to 0.859% with a mean value of 0.169%, while soil available nitrogen varied from 0.235 µg/g soil to 440.501 µg/g soil with a mean value of 36.5 µg/g. The Pearson correlation analysis showed that there is a negative significant correlation between MBC and soil available nitrogen (Correlation coefficient = -0.013). Further, MBC and soil available ammonium showed a positive significant correlation (Correlation coefficient = 0.043). The negative correlation between MBC and available nitrogen may be due to immobilization or enhanced microbial uptake of nutrients, while the positive correlation between MBC and ammonium indicates that microorganisms may facilitate the conversion of organic matter into ammonium. The results highlight the pivotal role of soil MBC in soil nutrient dynamics which has significant implications for soil fertility management and improvement of chena cultivation systems.

***Keywords**: Chena cultivation lands, Microbial biomass carbon, soil quality, Microbial activity, Nutrient retention.*