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ABSTRACTS

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SOIL ORGANIC CARBON DYNAMICS & RELATIONSHIPS WITH NUTRIENT AVAILABILITY AND PHYSICO - CHEMICAL PARAMETERS OF PADDY SOIL IN BATTICALOA DISTRICT, SRI LANKA

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Abstract

Rice soils are considered to be one of the significant sites for global carbon cycle due to their preferential rates of soil organic carbon (SOC) accumulation. The low land paddy soils in Batticaloa district was investigated to understand the relationships between SOC and soil nutrient availability/physicochemical parameters. Soil samples were collected from two depths, surface soil layer and sub-surface soil layer, from 30 pre-identified locations by adopting the conditional Latin hypercube sampling (cLHS) design. Thus, a total of 60 soil samples were investigated for soil organic carbon fractions (Microbial Biomass Carbon (MBC), Permanganate Oxidizable Carbon (POXC) and Water Soluble Organic Carbon (WSOC)), available macronutrients ($NO_3^- - N$, $NH_4^+ - N$ and bicarbonate extractable P) and soil physico - chemical parameters (pH, Electrical Conductivity (EC) and moisture) using standard chemical procedures. Two sample t-test was performed to examine the dynamics of SOC fractions in two layers. Pearson's correlation test was conducted to determine the relationships of SOC with the soil nutrients and soil parameters. The results exhibited a statistically significant higher POXC accumulation in the surface soil layer than that of in the sub-surface soil layer. Yet, statistically significant similar WSOC accumulation was observed in both surface and sub-surface soil layers. There were positive correlations of both WSOC and POXC with available Nitrate-Nitrogen ($NO_3^- - N$) content (r = 0.564 and 0.403). Likewise, POXC showed a positive correlation with bicarbonate extractable P (r = 0.495). The MBC and WSOC also showed positive correlation with EC (r = 0.555 and r = 0.643) in a non-saline range. Further, significant correlations were observed between soil moisture contents and all three carbon fractions (MBC, WSOC and POXC). In overall, the study highlights the contribution of paddy soils in Batticaloa district to store organic carbon under the dry zone climatic conditions. Further it can be enhanced by managing identified soil properties (Moisture Content, EC). Moreover, the study confirms the importance of SOC for the soil fertility, as the SOC fractions positively correlated with available soil macronutrients

Keywords: soil carbon sequestration, climate change, nutrient availability, organic carbon, paddy soil