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ASSESSING THE DYNAMICS OF ORGANIC CARBON AND NUTRIENTS IN SOIL AGGREGATE SIZE FRACTIONS UNDER TILLAGE AND NO-TILLAGE PRACTICES IN OXISOL OF CAMEROON

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Abstract

This study examines the effects of tillage practices—Conventional Tillage (CT) and No Tillage (NT)—on aggregate size distribution, along with organic carbon and nutrient dynamics in Oxisols from Dschang. Soil samples were collected from two depth horizons (0-10 cm and 10-20 cm) to evaluate variations in soil structure and its implications for carbon retention and nutrient availability.

The aggregate distribution analysis revealed significant differences influenced by tillage practices. NT exhibited a higher percentage of intermediate-sized aggregates, indicating a more favorable aggregate structure for carbon storage. Moreover, NT showed elevated Mean Weight Diameter (MWD) and Geometric Mean Diameter (GMD), demonstrating enhanced aggregate stability and soil structure, crucial for maintaining organic carbon levels.

Organic carbon chemistry assessment highlighted varying contributions of organic carbon fractions between CT and NT, with NT consistently maintaining higher organic carbon levels, particularly in the 0-10 cm layer, reflecting the benefits of reduced soil disturbance. Additionally, total nitrogen content, carbon stock (C-stock), and C/N ratios were generally more favorable under NT, signifying improved soil health and microbial activity.

This study emphasizes the role of tillage management practices in shaping soil organic carbon dynamics, aggregate stability, and overall soil health. The findings suggest that no-tillage practices are superior for enhancing carbon storage and soil fertility, making it a vital approach for sustainable agricultural management, especially in regions like Dschang. Overall, the exploration of organic carbon chemistry provides insights essential for developing effective soil conservation strategies and promoting sustainable agricultural practices.

Keywords: Tillage-Aggregates- Oxisol- Nutrients Availability- Organic Carbon

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