

Effect of Land - Use on Particulate Organic Carbon and Carbohydrates Distributions in Dry - and Wet - Sieved Stable Aggregates in an Ultisol

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Abstract

Particulate organic carbon (POC) and carbohydrates (R-CHO) distributions in dry- and wet-sieved aggregates in four land-use types in southern Nigeria were studied. The land-use types were: secondary forest, 5-year fallow plots, cocoa plantation, and 5-year continuous cultivation. The results showed that land types affected soil organic carbon fractions, soil organic carbon density, bulk density, and aggregate stability. Soil aggregation following 5-year continuous cropping increased the soil bulk density. POC and R-CHO in 4.75-2.0 mm dry-sieved aggregates in forested and 5-year fallow soils were 12.7 and 5.3 g kg⁻¹, respectively. This is compared to 8.9 and 4.1 g kg⁻¹ in cocoa plantations and 8.0 and 4.9 g kg⁻¹, respectively, in 5-year cropping. There was a significant positive correlation between R-CHO and K_{sat} ($r = 0.811$), and a non-significant correlation between R-CHO and MWD. ($r = 0.573$). A positive correlation was also established between POC and MWD ($r = 0.764$). The results also indicated that POC, rather than R-CHO, was more responsible for maintaining the macro-aggregate stability in forested and 5-year fallow soils. Wetting of the soil aggregates in water results in significant losses of POC and R-CHO in 5-year continuous cropping.

Keywords: Organic Carbon, Carbohydrates