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Corn Cob Biochar Improves Aggregate Characteristics of a Tropical Sandy Loam

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Abstract

Most tropical soils are highly weathered and are vulnerable to soil erosion due to their poor aggregate characteristics. This study assessed how corn cob biochar applied at 0 [CTRL], 10 t ha⁻¹ [BC-10] and 20 t ha⁻¹, [BC-20] and 20 t ha⁻¹ with P (P-enriched biochar) [BC-20+P] to a tropical sandy loam affected several aggregate characteristics. Soil aggregate characteristics are critical indicators of soil structural stability, and they have the propensity to influence soil physical behaviour and functioning. In this study, we investigated the effect of corn cob biochar on the aggregate characteristics of a highly weathered tropical sandy loam. Biochar was incorporated at varying rates to study its effects on the stability, strength and friability of aggregates evaluated. Biochar significantly increased soil organic carbon by 35–66 % relative to the untreated soil with a surprising trend of increasing water dispersible clay as biochar rate increased. This was attributed to an increase in pH and a substantial reduction in EC following biochar incorporation. Amount of water stable aggregates was significantly improved by 27–53 % in biochar treatments compared to control. Incorporation of biochar decreased the tensile strength of the large aggregates (4–8 mm and 8–16 mm), but increased same in the smaller aggregates (1–2 mm). Soil friability and workability were significantly improved in the BC-20 and BC-20+P treatments. In perspective, incorporation of biochar offers the potential to arrest the rate of degradation in highly weathered tropical soils and salvage the decline in their physical quality by minimising the effects of soil erosion.

Keywords: Aggregate stability, friability, tensile strength, water dispersible clay, workability