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Effect of Cinnamon Leaf Compost on Selected Soil Properties in Cinnamon (*Cinnamomum zeylanicum* Blume) Growing Soils

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Abstract

Integrated nutrient-management programs incorporating organic and inorganic fertilizers have been suggested to increase crop yields and reduce adverse environmental impacts in intensive agriculture. This study was conducted to investigate the effect of long-term cinnamon leaf compost (CLC) application on some selected physical, biological and chemical soil properties and the horizontal and vertical distribution of some selected soil properties in cinnamon-growing soils. The study was conducted in the National Cinnamon Research and Training Center, Palolpitiya, from January to April 2022. The experimental design was Randomized Complete Block Design (RCBD) with six treatments (T1-Control, T2-Current recommendation (CR), T3-3/4 CR with 5 t/ha/yr CLC, T4-1/2 CR with 10 t/ha/yr CLC, T5-1/4 CR with 15 t/ha/yr CLC, T6-20 t/ha/yr CLC) and three replicates. Soil samples were collected considering three horizontal distances (15, 30 and 45 cm) and with three depths (10, 20 and 30 cm). Soil physical properties (aggregate stability, bulk density, soil moisture), chemical properties (soil organic carbon (SOC), pH, electrical conductivity (EC)), and biological properties (arbuscular mycorrhizal root colonization) were determined. Water stable aggregate (WSA), SOC, and soil pH were significantly affected by the treatments, and all the variables except EC were significantly affected by the soil depth ($p<0.05$). Soil pH was the only variable that was significantly affected by the horizontal distance ($p<0.05$). Only SOC and pH have shown a significant interaction effect among treatments and depth. The application of CLC (20 t/ha/yr) significantly increases the WSA and SOC. Arbuscular mycorrhizal fungi root colonization was increased with the incorporation of CLC. Continuous application of inorganic fertilizers (T2) caused soil compaction and acidification. WSA, soil pH, and SOC were significantly improved within the 0-10 cm soil depth. The best performances of WSA, pH, and EC were shown in 30-45 cm and SOC in 15–30 cm horizontal distance from the plant base and 0-10 cm soil depth with the application of 1/2 CR and 10 t/ha/yr CLC comparison to other fertilizer combinations.

Keywords: Aggregates, Mycorrhizae, pH, Soil organic carbon