

**Impacts of Organic and Non-Organic Cultivation Practices on Soil Fertility Parameters of Selected Paddy Lands Based on the Duration of Cultivation in Wet and Intermediate Climate Zones of Sri Lanka**

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**Abstract**

Sri Lanka has been practicing the cultivation of rice as its main staple food in two major agricultural techniques; organic and non-organic. The major aim of the present study was to analyze and compare the time duration-based impacts of the above two agricultural practices on paddy soil fertility indicators as the preliminary step of a long-term research project. Organic and non-organic paddy fields that have been cultivated for 2 seasons in Thorapitiya in the Matale district were selected as short-term cultivated lands. Land cultivated for 10 years organically in Homagama and land with a non-organic cultivation history of 20 years in Kottawa was selected as long-term cultivated lands. A total number of 35 samples were collected including the control samples from adjacent uncultivated land during the first phase of the Maha season 2021/2022. The samples were dried, sieved and then analyzed in their physical and chemical properties; color, texture, particle size distribution, pH, electrical conductivity (EC), organic carbon content (OCC), total nitrogen content (TNC), available phosphorus content (APC), exchangeable potassium content (EPC), and exchangeable magnesium content (EMC). The soil samples from Thorapitiya had a reddish-brown nature while most of the samples from Kottawa and Homagama had a grayish-brown color. Higher clay percentages were found in the soil samples from long-term organically cultivated lands in Homagama. The uniformity coefficient ( $C_u$ ) values for soils from study areas except Homagama lie in the range for well-graded soil while the coefficient of gradation ( $C_c$ ) values of all three areas were not in the above range. Short-term cultivation using organic and non-organic fertilizers did not show a significant difference in soil texture, pH, EC, APC, EPC, and EMC values. Most of their cultivated lands had a lower pH (~5.5–6.0) than the corresponding control plots (~5.8–6.4). The TNC levels in non-organically cultivated lands were significantly higher than in organic lands. Practicing agricultural activities for a prolonged period has resulted in significant differences in soil texture, pH, EC, OCC, TNC and APC between organic and non-organic lands. Higher OCC and lower pH, EC and APC values have been obtained for long-term organically cultivated lands than their non-organic counterparts. The TNC, APC and EPC levels were higher in most of the long-term organic and non-organic lands than in their control samples. Several amendments have to be made to bring the fertility parameters to an optimum level in long-term cultivated lands.

**Keywords:** Soil fertility, Paddy soil, Cultivation history, Organic cultivation, Non-organic cultivation