

EFFECT OF DIFFERENT ORGANIC FERTILIZER PRACTICES ON CARBON AND NITROGEN DYNAMICS IN COCONUT GROWING SOILS IN SRI LANKA

K.G.D. Harshani¹, D.M.P.D. Dissanayake² and D.M.S. Duminda¹

¹*Department of Agricultural Engineering and Soil Science, Faculty of Agriculture, Rajarata University of Sri Lanka, Anuradhapura, Sri Lanka.*

²*Soils and Plant Nutrition Division, Coconut Research Institute, Lunuwila, Sri Lanka.*

Organic coconut farming has been boosted recently in Sri Lanka due to the exorbitant prices of inorganic fertilizers and attractive prices for organic coconut products. However, limited studies explored the impact of different organic fertilizer practices on soil carbon and nitrogen dynamics in coconut-growing soils. This study assessed the effect of the long-term application of different organic fertilizer types on nitrogen and carbon dynamics in coconut-growing soils in Sri Lanka. Three coconut estates (>1 ha) belong to the moderately suitable (S4) land suitability class, with a history of more than 10 years of fertilizer application using common organic fertilizer types; poultry manure, goat manure, and compost were selected for this study. Representative soil samples at 0–25 cm depth was collected from the manure circle and the centre of the square. Soil samples were analysed for pH, electrical conductivity, total nitrogen, nitrate and ammonium contents, organic carbon content, carbon mineralization rates, and nitrifier population using standard methods. Statistical analysis (ANOVA) was performed using SPSS 16.0 software. All organic fertilizer types resulted in a neutral soil pH and accepted range of electrical conductivity in coconut lands. Significant improvement in pH, EC, and organic carbon was found in all three treatments. The highest organic carbon content was found in compost-applied coconut lands, while the lowest was in goat manure-applied coconut lands. Even though goat manure-applied soil had the highest ammonium concentrations, the lower availability of nitrite oxidizers might have affected the nitrification process, resulting in the lowest nitrate concentration. Compost manure applied estates showed the highest value of carbon and nitrogen mineralization. Results imply that different organic fertilizers affect carbon and nitrogen dynamics in soil. The study concludes that the application of all organic fertilizers significantly improved the soil carbon and nitrogen dynamics.

Keywords: Ammonium content, Manure, Nitrate content, Organic farming, Soil organic carbon