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Intra-seasonal variability of soil chemical properties in paddy cultivation: A case study from Sri Lanka

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Abstract

Supplementing plant nutrients through fertiliser plays an important role in increasing the soil's capacity to produce greater quantities of high-quality food. Improper use and management of nutrients may lead to adverse impacts on the environment, negative cost-effectiveness of fertiliser applications as well as reduced yield of plants. Assessment of soil chemical properties is important to conserve soil health and fertility. The objective of this study was to investigate differences in the soil's chemical properties in the cropping cycle of paddy cultivation which use different organic fertilisers. So, this study was conducted to explore the variability of agronomically important soil chemical properties of paddy growing areas in Polonnaruwa district (Mahaweli system B) of Sri Lanka. Soil samples were taken from selected blocks prior to ploughing, just after establishment, end of the vegetative stage, just before the booting stage, and at the maturity stage. Soil chemical properties namely, soil organic matter, available Phosphorus, exchangeable Potassium, pH and electrical conductivity were tested in two depth (0–5 cm and 5 – 15 cm) intervals. Results revealed that all tested soil chemical properties varied with the cropping cycle of each block. Soil organic matter, available Phosphorus and exchangeable Potassium also varied along the two-depth interval while pH and electrical conductivity did not vary among the two depths. In all blocks, the highest available Phosphorus, exchangeable Potassium and pH were recorded prior to ploughing while the highest soil organic matter and electrical conductivity were recorded just after establishment. The lowest soil organic matter, available Phosphorus, exchangeable Potassium and pH were recorded at the maturity stage in all blocks. The observed soil property dependencies can be utilised to fine-tune fertiliser application schemes, irrigation, and tillage operations at the field level to enhance rice crop yield while avoiding negative environmental effects.

Keywords: Chemical properties, Cropping cycle, Paddy cultivation, Variability

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