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Comparative Study of Soil Nutrients in Selected Paddy Lands in Wet Zone Treated with Organic and Chemical Fertilizers

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Abstract

In Sri Lanka, paddy consumes the most significant part of chemical fertilizers and accounts for approximately 50 percent of the widespread use of chemical fertilizers. With the immediate banning of inorganic fertilizers, there was a huge argument between the government and the farmers about organic farming. Since the soil fertility change takes a long time, the impact of long-term application of the same fertilizer should be assessed. Field experiments were conducted in six selected paddy fields in wet zone considering fertilizer type and rice variety. Total 30 samples from each site were collected and soil initial nitrogen (N), phosphorus (P) potassium (K), Organic C, and composition of used fertilizers were analyzed. Nutrient status compared using critical, optimum ranges, and general management practices are discussed. This study revealed that the total N level in all the sites varies near the critical level and is inadequate to produce expected yields. Soil organic C (3.8-6.7%) and N (0.06-0.2%) levels in organic sites were higher than the chemical sites (0.09-0.19N%, 1.4-2.1C%). Phosphorus level is below the critical level (0.9-8.4 mg/kg) in organic sites, and varies from medium to high (7.5-27.0 mg/kg) in chemical sites. The sites using chemical fertilizers showed excessive K (395-480 mg/kg), and organic sites were below the optimum range (82-92 mg/kg). According to the fertilizer analysis, organic fertilizers are rich in organic C (40-90 g/kg), while organic C is absent (0%) in chemical fertilizers. All the other nutrient amounts are very low (N:0.7-19.3 g/kg, P:0.06-0.8 g/kg, K:33.2-15.4 mg/kg) in organic fertilizers, and the composition is unstable. Chemical fertilizers have an exact composition of nutrients and can easily be applied at the particular growth stage of the plant which is beneficial. An external supply of essential soil nutrient through organic or chemical fertilizer sources is required to produce expected yields. Regular and continuous monitoring of soil quality, pre-nutrient assessment of organic fertilizers, site-specific fertilization, and proper agronomic practices are highly recommended. These results will be beneficial in selecting or manufacturing suitable fertilizer type/types for paddy cultivation, including bio-fertilizers.

***Keywords**:* Organic fertilizers, Status of soil nutrients, Soil fertility, Rice varieties