Total and Available Phosphorus Concentrations in Major Rice Growing Soils and Their Relationships with Rice Grain Phosphorus Concentration

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Phosphorus (P) is an essential macro nutrient for plant growth and development. Soil P exists in organic and inorganic forms. However, only a fraction of soil P is readily available to plant. Plant available and total P concentrations in soils vary among soil types due to the differences in soil mineralogy, structure, physical & chemical properties, and fertilizer application. Therefore, this research was conducted to estimate the concentrations of plant available and total P in major rice growing soils (i.e. 18 soil types) in Sri Lanka, and to study their relationships with grain P concentration. Total of 200 soil samples and grain samples were collected representing paddy lands across the country using a stratified random sampling approach. Available P (Olsen-P) and total P in soils, and grain P concentrations were measured. Available P concentration in paddy soil samples ranged from 5.4-76.9 mg kg^{-1}. The highest available P concentration was recorded in Reddish Brown Earths & Immature Brown Loams soil (RBE_IBL) (34 mg kg^{-1}) and the lowest in Red-Yellow Latosols soil (RYL) (12 mg kg^{-1}). Soil total P concentration had a wide range of values *i.e.*, 142-5685 mg kg^{-1}. The Red-Yellow Podzolic soils with soft or hard laterite (RYP) had the highest soil total P concentration (2525 mg kg^{-1}). Grumusol soil and RYL soil reported the lowest total P, *i.e.*, < 1000 mg kg^{-1}. Grain P concentration varied among soil types and it ranged between 0.6-1.8 mg g^{-1}. However, there was no correlation between the grain and soil P concentrations. This information would be important for sustainable P-nutrient management in Sri Lankan rice soils.

Keywords: Available phosphorous, Paddy, Soil categories, Total phosphorus