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SOIL FERTILITY CONSTRAINTS IDENTIFIED FOR A LOW PRODUCTIVE ALFISOL AT MAHAILLUPPALLAMA

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Low productive soils exist throughout the world and many of these soils are low in organic matter and nutrients. These fertility constraints can be resolved using an appropriate supply of nutrients. This study was conducted to identify soil fertility constraints of a low productive field from the low country dry zone of Sri Lanka.

Soil samples were collected from the Field Crops Research and Development Institute at Mahailuppallama. Two sites were selected representing a low productive field (LPF) and a comparatively high productive field (HPF), based on farm records. From each field 16 soil samples were collected at 0-20cm depth using a grid method to prepare a representative composite sample. Six sub-samples from the composite sample were analyzed for pH, organic-matter (OM), cation exchange capacity (CEC) electrical conductivity (EC) and texture. Available nutrients were determined using three extractions; P, K, Cu, Fe, Mn and Zn were extracted with 0.25 M NaHCO₃ + 0.01M EDTA + 0.01M NH₄F, 0.1M KCl extraction used for NH₄-N, Ca and Mg and 0.08 M CaH₂(H₂PO₄).2H₂O extraction for S. Critical values considered for N, P, K, Ca, Mg, S, Fe, Mn, Cu and Zn were 100, 48, 156, 701, 182, 40, 30, 12, 3 and 4 mg kg⁻¹, accordingly.

There was no significant difference between the two fields for OM%, sand % and EC. The pH, CEC, clay % and silt % were significantly different (p<0.05) between the two fields but pH and CEC were within the favourable range for cropping in both fields. Soil in LPF is sandy clay loam in texture while that of HPF is sandy loam. The higher clay content in LPF (27%) as compared to the HPF (20%) may be linked to poor infiltration rates reported for LPF and may have caused its low productivity. Concentrations of S, K, Mg, Ca, Zn and Mn were significantly different (p<0.05) between the two fields. Further both fields were deficient in N, P, S, Ca and Zn in comparison to the critical values. Hence, nutrient deficiencies could be limiting the productivity of both fields.

Implementing site-specific fertilizer recommendations, addition of silt-sized organic matter pellets or rock powder, and planting in raised beds could be adopted to increase the productivity of LPF.

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