Potassium Status of Sugarcane Soils in Sri Lanka

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Potassium is the most abundant cation in the sugarcane plant, and its application increases cane and sugar yields. On the other hand, potassium deficiency causes poor root development and reduces disease resistance, photosynthesis and carbohydrate transportation in sugarcane.

Sugarcane cultivation for vacuum-pan sugar manufacture in Sri Lanka has been carried out since the early 1960s in Trincomalee and Ampara districts for the factories in Kantale and Hingurana respectively. Sugarcane has been cultivated in Badulla and Moneragala districts for the production of jaggery and syrup at cottage-level. With the establishment of Pelwatte and Sevanagala sugar mills during the mid 1980s, sugarcane cultivation in Moneragala district has been expanded. Presently, nearly 11,500 ha of lands in these districts are under sugarcane.

The main sugarcane-cultivating areas come under five major Great Soil Groups found in the dry zone of Sri Lanka, namely, the Reddish Brown Earths (RBE), Non-Calcic Brown (NCB), Immature Brown Loam (IBL), Alluvial and Low Humic Gley (LHG) soils. The critical level of soil exchangeable potassium for sugarcane is 120 µg/g. The RBE soils are fairly rich in potassium compared to the NCB soils which do not have rich potassium reserves. Recent studies revealed that NCB soils are comparatively rich in potassium than Alluvial soils in Hingurana area where sugarcane has been grown in Ampara district.

It has been estimated that mature sugarcane stalks remove 2.13 kg of potassium per tonne of cane. Under Sri Lankan conditions, about 2.4 kg of potassium in soil is required to produce one tonne of stalks. Potassium uptake in both fertilised and unfertilised conditions increases during the first 8 months of the crop, and then, it becomes stable. The uptake of potassium is higher under fertilised conditions than unfertilised conditions.

The present status of mean soil potassium shows that both Pelwatte and Sevanagala areas in Moneragala district have high concentrations of potassium (90 µg/g) than Hingurana (43 µg/g), where sugarcane cultivation was replaced with paddy for nearly 15 years. However both values are below the critical level of soil exchangeable potassium for sugarcane.

Continuous cultivation of sugarcane in the absence of rotation or fallow periods removes substantial amounts of nutrients, including potassium from the soils. Therefore the optimum amount of nutrients determined on the basis of yield goals, nutrient removal and soil nutrient availability are added as fertiliser. In the fertiliser recommendations given for Pelwatte and Sevanagala, only a small quantity for the former and none for the latter were recommended due to the high level of potassium availability recorded in the past soil survey. On the other hand, the potassium fertiliser requirement for Hingurana was higher than that for Pelwatte and Sevanagala.

Continuous sugarcane cropping depletes the soil reserves of potassium far below the critical level, and hence, it is necessary to incorporate sufficient amount of potassium fertilisers by regular monitoring of the potassium status of the soil to maintain soil potassium levels for sustainable sugarcane production.

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