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Identification of Potato (*Solanum tuberosum*) Yield Limiting Nutrients in Kenya

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Abstract

Due to continuous cultivation with limited application of nutrient fertiliser and manure by Kenyan potato farmers, the ability of the soils to supply adequate nutrient for potato yield potential is not known. The aim of the study was to identify limiting nutrients to potato productivity in selected sites. A total of 198 soil samples were collected from farmers' fields in Meru and Nyandarua and chemical properties determined Samples of recently mature leaves (4^{th} leaf) of potato crop at flowering stage were taken from same points where soils were sampled and analysed for their nutrient contents. Nutrient sufficiency for soil (nitrogen (N) (25–80 ppm), phosphorous (P) (30–80 ppm), potassium (K) (70–250 ppm), sulphur (S) (4.5 ppm), calcium (Ca) (175–300 ppm), magnesium (Mg) (30–60 ppm),copper (Cu) (0.2–1 ppm), zinc (Zn) (0.6–2 ppm), boron (B) (>1 ppm) and pH (5.5–6.5)) and leaf nutrient (P (0.25–0.5 %), K (3.9–5.5 %), S (0.3–0.5 %), Ca (0.9–2.5 %), Mg (0.25–0.5 %), Cu (5–30 ppm), Zn (20–50 ppm) and B (25–60 ppm)) levels were used to cluster farms into low, optimum or high. In soil chemical results, 46 and 85 % of the farms in Meru and Nyandarua were found to be low in P, 66 and 20 % in N, 67 and 31 % in S and 87 and 80 % in B, respectively. For soils from Nyandarua, 18 and 51 % were low in K and Cu respectively. Results from potato leaf samples showed that 22 and 15 % of farms in both Meru and Nyandarua had low K content while 17 and 55 % were low in B content. Soil pH was found to be below 5.5 in 54 % and 86 % of the farms in Meru and Nyandarua, respectively. In both regions pH had significant ($p < 0.05$) positive correlation with soil P, K, B, Ca and Mg and negative correlation with Cu. There was significant positive correlations between soil and plant P, K, Ca and Cu. In conclusion, N, P, K, S and B were limiting in a number of farms thus a new fertiliser recommendation is required. Liming should be considered for soils with low pH.

Keywords: Chemical characteristics, limiting nutrients, pH, potato, soil fertility

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