



Tropentag, September 20-22, 2023, hybrid conference
“Competing pathways for equitable food systems transformation:
Trade-offs and synergies”

Variability and critical values of nutrients in a highland banana farming system in East Africa

JOANPAULA ELLISEUS RUTAZAHA¹, JACOB KAINGO², PETER WILSON MTAKWA³, GODFREY TAULYA⁴

¹*International Institute of Tropical Agriculture (IITA), Tanzania*

²*Sokoine University of Agriculture, FoCoActive Project, Tanzania*

³*Sokoine University of Agriculture, Dept. of Soil and Geological Sciences, Tanzania*

⁴*International Institute of Tropical Agriculture (IITA), Uganda*

Abstract

Poor soil fertility remains a major constraint in East African highland banana systems. Site-specific nutrient management practices promote attainment of sustainable yields. Critical values and their spatial distribution are an essential component for designing a sustainable nutrient management plan. This study was conducted to map the spatial distribution of nutrients and to determine the respective critical values for banana production in Rombo District, Tanzania. It involved a survey of 100 smallholder banana farms. Soil samples were collected at 0–30 cm depth along with plant samples. The samples were analysed for physicochemical properties and nutrient concentrations, respectively. Data on girth at base (Gbase) and at 1-m height from the ground (G1), number of hands per bunch and number of fingers on the bottom row of the second-last hand were collected from three selected mats per farm for allometric estimation of fresh bunch weights. Aboveground biomass (AGB) for the mother plants was also determined. Boundary line analysis was used to determine critical values. Matoke had a significantly ($P < 0.05$) higher Gbase, G1 and AGB than Malindi and Mshare, whereas Malindi had significantly ($P < 0.05$) more hands. Kriging was used to generate the nutrient distribution maps. There was no significant difference ($P < 0.05$) among the cultivars for fingers and bunch weight. Critical values in banana leaves were 2.39, 0.15, 1.5, 0.35 and 0.3% for N, P, K, Ca, and Mg, respectively. Coefficient of variation was observed in the order $P > Cu > K > Zn > Mn > S$. Results provide a basis for nutrient management practices and fertiliser recommendations for enhancement of yields in banana farming systems.

Keywords: Banana farming systems, critical values, kriging, soil fertility