

ABSTRACT

Finger millet (*Eleusine coracana* L) is one of the most important cereal crops in Kenya. It is an important staple food rich in minerals and vitamins required for good health. Finger millet has the ability to grow in stressful conditions such as water and salinity much better than other cereal crops and it is for this reason that it is currently being popularised in efforts to address food security in Western Kenya. Soil acidity is a serious problem that affects crop productivity in Western Kenya region, whose soils are acidic. The county governments of Kakamega, Bungoma, Vihiga, Busia and Trans-Nzoia are promoting application of NPK blended fertiliser to ameliorate the soil acidity. The MgO and CaO present in NPK blended fertilizer have liming effects. It is however, not known how the fertilizer affects plant growth, physiology and productivity of the crop. The main objective of the study was to determine the effect of NPK fertilizer application on the soil chemical changes, growth and physiology of finger millet in acidic soils. The experiment was conducted at the crop and livestock research field of Kenya Agricultural and Livestock Research Organization (KALRO), Kakamega station. A Randomized Complete Block Design (RCBD), involving application of 0, 25, 50, 75 and 100 kg per acre of NPK blended fertilizer as the treatments was used. Two equal split applications were done. Two finger millet varieties; P-224 and Gulu-E, which are commonly grown in Western Kenya counties, were cultivated in the research plots. Experiments were conducted during the short and long rain seasons of 2015 and 2016, respectively. Data was collected on soil pH, soil Aluminium, Calcium and Magnesium, finger length, finger width, plant height, Days to 50% flowering and maturity, productive tillers, grain yield, chlorophyll content index and plant tissue nitrogen, phosphorus, potassium, magnesium, calcium were collected. Data was subjected to Analysis of variance (ANOVA) using GenStat statistical package version 15.1. Means were separated by Least Significant Difference (LSD) test at 5% probability level where significant differences were observed. Application of NPK blended fertilizer reduced the amount of soil aluminum consistently for both season with the highest reduction under the highest fertilizer rate, the soil pH, soil calcium and soil magnesium significantly increased linearly with increasing fertilizer rates. The application of NPK blended fertilizer significantly increased the plant height, finger length and finger width of both varieties. At the 75 kg/acre rate the leaves showed the highest total chlorophyll content in both varieties with the highest (29.17 umol) under variety P-224. The control showed the lowest physiological activities in terms of chlorophyll content, calcium, magnesium, nitrogen, phosphorus and potassium. Period to 50% flowering were significantly reduced due to application of NPK blended fertilizer where Gulu-E had 80 days at the highest rate while P-224 had 81 days at the same rate. At 50 kg/acre, the number of days to physiological maturity were significantly reduced under both varieties where Gulu-E took 107 days to mature. The number of productive tillers were significantly increased with increasing NPK blended fertilizer application rate especially under Gulu-E variety with a high number of 42 productive tillers per plot. The grain yield was significantly increased by application of NPK blended fertilizer with the peak observed at the 75 kg/acre rate for both varieties but Gulu-E outperformed P-224. The study concludes that application rate of 75 kg/acre of NPK blended fertilizer leads to the highest grain yield potential of finger millet and has great liming effects that ultimately reduces acidity of soils in the western Kenya region.

Comment [A1]: Formulate a research knowledge gap in the manner suggested.

Comment [A2]: Was the reduction statistically significant?

Comment [A3]: Briefly discuss your findings here