

Finger millet is one of the most important cereal crops in Kenya. It is staple food rich in minerals and vitamins required for good health. Finger millet is a hardy crop compared to other cereals and it is for this reason that its currently being promoted in efforts to address food security. Western Kenya soils are acidic and soil acidity is a serious problem that affects crop productivity in the region. County governments of Kakamega, Bungoma, Vihiga, Busia and Trans-Nzoia are promoting soil application of NPK blended fertilizer (10%N, 26%P, 10%K<sub>2</sub>O, 4%S, 8%CaO, 4%MgO and traces of B, Zn, Mo, Cu and Mn) to ameliorate the soil acidity. However, it is not known how the fertilizer affects soil, plant growth, physiology and crop yield. The main objective of the study was to investigate the effect of NPK blended fertilizer application on the soil physio-chemical properties, growth, physiology and yield of finger millet in acidic soils of Kakamega. Experiments were conducted at the crop and livestock research field of Kenya Agricultural and Livestock Research Organization(KALRO) Kakamega station. Experiments were conducted during the short (October-January) and long (March-August) rain seasons of 2015 and 2016 respectively. A Randomized Complete Block Design, involving application of 0,25,50,75 and 100 kg per acre of NPK blended fertilizer as the treatments. Two equal split application were done. Selected finger millet varieties; P-224 and Gulu-E which were sourced from KALRO. The varieties are commonly grown in Western Kenya and are known to be early maturing and drought resistant.. Data was collected on soil pH, soil Aluminium, Calcium and Magnesium, finger length, finger width, plant height, days to 50% flowering, productive tillers, grain yield, chlorophyll content index and plant tissue nitrogen, phosphorus, potassium, magnesium, calcium were collected. Data was subjected to Analysis of Variance using GenStat statistical package version 15.1 and means separated at 5% probability level where significant differences ( $P \leq 0.05$ ) were observed using the LSD test. Application of NPK blended fertilizer significantly reduced the amount of soil aluminium for both season with the highest reduction recorded under the highest rate. The soil pH, soil calcium and soil magnesium significantly ( $P \leq 0.05$ ) 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 significantly highest total chlorophyll content in both varieties with the highest (29.17  $\mu\text{mol}$ ) 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 on the same rate. At 50 kg/acre, the number of days to physiological maturity were significantly ( $P \leq 0.05$ ) 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, therefore Gulu-E may be recommended to farmers due to its increased yield of 1.55 ton/ha. Farmers may also improve finger millet yield and enhance their incomes while sustaining their soil fertility by using NPK blended fertilizer. The study concluded that application rate of 75 kg/acre of NPK fertilizer leads to the highest grain yield potential of finger millet varieties and positive liming effects that may ultimately reduce acidity of soils in the western Kenya region.