

Abstract

There is a decline in crop yields due to climate change. Drought and low-soil-fertility-tolerant crops could enhance food production. The objective of this study was to assess the effects of rainfall patterns and soil properties on yields of sorghum landraces. Rainfall and yield data were obtained from the Ministry of Agriculture and the meteorological department. Soil properties from farmers' farms and experimental sites were determined. Experiments were laid out in a Randomized Complete Block Design. Accessions were grown in selected locations in the Eastern, Nyanza and Coastal regions. Data were subjected to analysis of variance using R statistical software. Reduced rainfall periods recorded low yields. However, on station (2019), yields were higher, though rainfall was very low. Farmers' farms recorded pH (6.3–6.8), OC (0.6–1.2%), phosphorus (36.5–50.0ppm), nitrogen (0.1–0.2%) and potassium (1.1–1.6 Cmol/kg). Sodium was highest in the east (0.8 Cmol/kg), calcium (4.0 Cmol/kg), and magnesium (1.4 Cmol/kg) in Nyanza. Manganese and copper were highest in Nyanza, while high iron and zinc were observed in eastern and coastal regions, respectively. At planting, Taita Taveta farm recorded significantly high nitrogen, whereas phosphorus and calcium were highest in KALRO Katumani. *Kitaakya ivuui* Makueni (b) and Nyakabala Siaya (a) performed best in at least two regions. Though rainfall had an impact on yields, optimum agronomic practices and accession yield potential increased yields under low rainfall. Low on-farm yields could be attributed to low organic carbon and nitrogen. Use of accessions with high yield potential could enhance food security under low moisture and nutrient-depleted soils.