Effect of Water Stress on Growth and Yield of Selected Spider Plant Accessions

ABSTRACT

Spider plant (Cleome gynandra L.) is one of the most popular underutilized African Indigenous Vegetables due to its known nutritional and health benefits. Currently, little information is available on its adaptability to drought stress. The objective of this study was to evaluate several spider plant accessions grown under drought stress and non-drought stress to identify genotypes for breeding programs. Two greenhouse experiments were conducted at Upper Kabete Field Station of the University of Nairobi, Kenya, in a randomized complete block design using 14 selected Kenyan spider plant accessions, five from the Muguga Genetic Resource Research Institute, eight sourced from farmers in Western, Nyanza, Rift Valley and Coastal parts of Kenya and one commercial seedlot. The plants were grown under drought stress levels of 40%, 60% and 80% field capacity (FC) in comparison to non-drought stress (100% FC) conditions between June 2018 and March 2019. Data was collected on plant growth, physiological and yield attributes. Drought stress reduced leaf number by 25.7%, 55.1%, 74.2% and leaf yield by 25.7%, 55.1%, and 74.2% for the treatments at 80%, 60% and 40% field capacity, respectively. Seed yield was reduced by 43.9%, 77.9% and 90.6% for the treatments at 80%, 60% and 40% FC, respectively. Chlorophyll content was reduced by 11.3%, 26.7%, 38.2%, and leaf relative water content by 9.3%, 26.3% and 36.6% for the treatments at 80%, 60% and 40% FC, respectively. Single leaf area was reduced by 11.8%, 22.4% and 31.0%, while leaf senescence (number of leaves) and dry matter partitioning increased by 2.1, 5.1 and 9.4, and 0.05 g, 0.10 g and 0.18 g for the treatments at 80%, 60% and 40% FC, respectively. Accessions GBK-032210, Baringo, Kuria, Homabay, Kakamega and GBK-040449 performed well with respect to growth and yield, even under increased levels of drought stress. Our results show that accessions GBK-032210, Baringo, Kuria, Homabay, Kakamega and GBK040449 would be promising candidate genotypes to be used in the breeding for drought tolerant genotypes.