ABSTRACT

Vegetable amaranths are highly valued for being rich in proteins and micronutrients such as iron, calcium, zinc, vitamin C and vitamin A. In spite of the crop’s exceptional nutritional qualities, very little effort has been put in to improve the foliage yield potential in Kenya. Reports on morphological phenotypic variation analysis in *Amaranthus* are rare and detailed agronomic recommendations for leaf and seed yields and quality enhancement are scanty. Research on the extent of the phenotypic variation of amaranths is of great significance in the choice of some of the amaranths accessions as progenitors for useful traits. It was on this background that this study assessed the phenotypic variation in morphology, yields and seed quality in five amaranth accessions commonly grown for leaf consumption in Kenya. The specific objectives of the study were; to evaluate growth and morphological variation, evaluate leaf and seed yields and to assess seed quality in the five accessions vegetable amaranths. The five accessions were planted in randomized complete block design (RCBD) with three replicates. The amaranth accessions were provided with uniform agronomic treatments. Data was collected on growth and morphological traits, leaf and seed yields and seed quality parameters from ten plants per plot. Seed moisture content was determined using the fresh weight basis as per the international seed testing association (ISTA) standards. Seed quality as measured by germination was conducted in four replicate samples of 25 seeds each. The seeds were sown on plain agar held in 90mm sterilin petri-dishes and incubated at temperatures of 24-26°C. Data collected from the study on the quantitative traits were subjected to analysis of variance (ANOVA) at 5% level of significance. Clustering was done using agglomerative hierarchical clustering method. This study revealed that there was significant variation among the accessions in most of the growth and morphological characteristics. This could probably be attributed to lack of selection pressure on amaranths. There was also great diversity in leaf and seed yields, the most outstanding being *Amaranthus hybridus* (AH). An overall multiple regression model indicated significant positive correlation ($R^2=0.7378$) of the growth and morphological characteristics to leaf yield. The model accounted for 73.78% of the variation in leaf yield per plant. This implies that the greater the value of the growth and morphological characteristics the higher the leaf yield. Morphological characteristics thus contributed directly to leaf yield hence selection could be done on these traits to achieve leaf yield improvement. Significant variation was observed in germination tests with accessions AH exhibiting the highest germination percentage. There was also significant differences in the moisture content among the five accessions. Cluster dendogram grouped the accessions into three clusters with agglomerative co-efficient of 0.81. All the landrace variety (LV) were grouped in cluster 1, Evergreen variety (EG), accession from gene bank of Kenya (GBK) and simlaw (SIM) were grouped in cluster 2 and *Amaranthus hybridus* (AH) grouped in cluster 3. Accessions EG, GBK and SIM clustered together because they are of the same species even though they were sourced from different collections. The study concluded that accession AH is the best source of growth and morphological traits for a breeding programme, the best for selection for both vegetable and seed production and the best producer of quality seeds. Accession AH can thus be recommended to Kenyan farmers as the most suitable cultivar for agro-ecologies similar to Mumias sub-county. Accession AH can also serve as a dual purpose cultivar to farmers in Western Kenya. Landrace variety (LV) was found to contain early maturity traits hence suitable for selection for earliness.