

Heritability of drought resistance in *Solanum aethiopicum* Shum group and combining ability of genotypes for drought tolerance and recovery

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Abstract

Drought tolerance is a complex trait whose inheritance had not been investigated in *Solanum aethiopicum* L. Shum group. This is partly because of perceived cross incompatibilities in the crop. This study relied on 24 successful crosses from an incomplete 9x4 North Carolina II mating design, evaluated under five watering conditions based on plant growth stage and watering level in order to determine the heritability of drought resistance and combining ability. Subsequent data analyses were based on restricted maximum likelihood. Overall, specific combining ability (SCA) effects were significant across and within watering environments for all study traits. The most highly heritable traits (in the narrow-sense) were identified as leaves per plant, chlorophyll content (CHL), leaf fresh yield and leaf dry yield while leaf area (LA), leaf relative water content (LRWC) and leaf mass area (LMA) were least heritable. However, the broad sense heritability (H²) was over 0.80 for seven of the traits, indicating that dominance gene action surpasses additive gene effects for drought resistance in *S. aethiopicum* Shum. Further analysis showed that LA is suited for selection of best combiners under well-watered and drought-stress (DS) treatments. The LRWC served best in separating the SCA effects of crosses under DS. The CHL produced clear separations of SCA effects under both DS and drought recovery while LMA served best under the latter.

Keywords: Specific combining ability; optimum watering; drought tolerance mechanisms; breeding traits; hybridization; African eggplant