Estimation of diversity and combining abilities in *Helianthus annuus* L. under water stress and normal conditions

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**ABSTRACT.** Sunflower cannot produce high yields under water-limiting conditions. The aim of the present study was to prevent the impediments on yield and to develop varieties with high-yield potential under water scarce conditions. For achieving this objective, it is necessary to detect parents with desirable traits that mainly depend on the action of genes controlling the trait under improvement, combining ability, and genetic makeup of the parents. Heterosis can also be used to pool the desirable genes from genetically divergent varieties and these divergent parents could be detected by molecular studies. Ten tolerant and five susceptible tester lines were selected, crossed, and tested for genetic diversity using simple sequence repeat primers. We identified two parents (A-10.8 and G-60) that showed maximum (46.7%) genetic dissimilarity. On an average 3.1 alleles per locus were detected for
twenty pair of primers. Evaluation of mean values revealed that under stress conditions the mean performances of the genotypes were reduced for all traits under study. Parent A-10.8 was consistent as a good general combiner for achene yield per plant under both non-stress and stress conditions. Line A-10.8 in the hybrid A-10.8 x G-60 proved to be a good combiner as it showed negative specific combining ability (SCA) effects for plant height and internodal length and positive SCA effects for head weight, achene yield per plant, and membrane stability index. Valuable information on gene action, combining ability, and heterosis was generated, which could be used in further breeding programs.

**Key words:** Combining ability; Line x tester; SSR; Water stress tolerance