*RESEARCH PAPER*

# Estimation of gene effects and combining ability study in sunflower (*Helianthus annuus* L.) for yield and yield attributing traits

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**Abstract :** The present study was aimed to study the combining ability in sunflower, study the gene action *GCA* and *SCA effect* and GCA and SCA variance in sunflower by evaluating the sunflower hybrids to identify the superior cross combination/ sunflower hybrids in respect to yield and yield components. The crossing was affected in the line x tester fashion and the resultant hybrids were subjected to combining ability studies. The results of this study may be used for the development of new high yielding and stable sunflower hybrids based on the hybridization between the best combiner. The estimates of SCA and GCA variances were highly influenced by highly significant mean square due lines x environments, tester x environments and lines x testers x environments variances in seed filling percentage, while for head diameter, significant interaction between lines x environments and lines x testers x environments variances revealed that testers and hybrids were influenced by environments. The magnitude of estimated component of GCA and SCA variances revealed greater importance of GCA for head diameter, while of SCA for seed filling percentage. Six parents, CMS-853A and CMS-852A and EC-623027(M), EC-601751, EC-623023 and EC-601725 had significant positive GCA effect for seed yield and some other yield components like head diameter, 100 seed weight and volume weight (g/100cc) depicted that these genotypes appeared to possess high concentration of additive genes for seed yield and component traits. Seed yield, the final expression of above component traits, was found to record high significant mean square for lines, testers and line x tester interaction indicating significant contribution of lines and testers towards general combining ability variance component for the trait. Whereas significant mean square for line x tester indicates the significant contribution of crosses for specific combining ability variance component. Significant L x T proved that variation among hybrid combination was considerably higher. Significant interaction between lines x environments and lines x testers x environments suggested that lines and hybrids were highly influenced by environments. On the basis of pooled analysis, SCA: GCA ratio variances indicated that the most of the total genetic variation for seed yield was resulted in by the non-additive gene effects. The studies revealed that the best cross combination for semi-dwarf plant height coupled with good seed yield per plant and high oil content are CMS-10A X EC-601725, P-89-1A X EC-601751 and P-2-7-1A X EC-601725, respectively. Among the hybrids, CMS-853 A X EC-623027, CMS-853 A X EC-623023, CMS-852 AX EC-623016 possessed superior SCA effects for seed yield as well as high 100 seed weight and high volume weight. These crosses involved at least one parent with high GCA effects and had high seed yield at *per se* performance.

**Key Words :** Sunflower, Combining ability, Gene action, Seed yield, Yield components