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# Combining ability analysis for yield and its components in Indian mustard [*Brassica juncea* (L.) Czern and Coss]

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## SUMMARY

The combining ability analysis of 10 parents and their-45$F_1$'s and 45$F_2$'s generated through diallel system of mating revealed that significant differences existed for general and specific combining ability for all the characters GCA and SCA variances were important for all the characters indicating the presence of both additive and non-additive gene effects in controlling the expression of various characters RK-8701 and RK-8601 were found to be good general combines for seed yield and some of its component traits. Sixteen crosses exhibited good combining ability for seed yield was found to be controlled predominantly by non-additive gene action. The crosses with high SCA effects did not always had parents with good gca effects. Such a relationship between gca and sca indicates the importance of epistasis and crosses are expected to produce desirable transgressive segregants.


**Key words :** *Brassica juncea*, Mustard combining ability, Yield components.

Identification of superior parents are the important pre-requisites for the development of high yielding genotypes. Combining ability is one of the most powerful analytical tools to decipher the genetic architecture of quantitative traits.

The information regarding the gene effects involved in expression of the traits in question not only helps in suitable choice of breeding technique but also helps in identification of desirable parents and specific crosses for further exploitation. The present investigation was undertaken to know the genetic architecture of genotypes having high *per se* performance and to make use of these materials to generate new recombinants for selecting high yielding genotypes.

## MATERIALS AND METHODS

The plant material comprised of ten diverse genotypes namely, CSR-1017, RL-18, LAHA-101, T-6342, RK-8901, RK-8601, RK-8608, RK-8701, A-11 and B-85. These parents were crossed in a dialled fashion resulting ninety crosses (45$F_1$'s and 45$F_2$'s) along with ten parents evaluated in a Complete Randomised Block Design with three replications at research form of C.S.A. University of Agriculture and Technology, Kanpur. All the treatments were grown in 5 m long three row plots. Row to row and plant to plant distance was maintained at 45cm and 20 cm, respectively. At maturity, data for yield and other contributing characters were taken on 20 randomly selected plants from each plot. Combining ability analysis was carried out as per model I and method II of Griffing (1956).

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## RESULTS AND DISCUSSION

The analysis of variance for various characters revealed highly significant differences amongst the entries (Table 1). The combining ability analysis of variance also revealed significant differences for all the characters under study.

Analysis of variance for combining ability revealed significant mean squares due to gca for all the attributes in both the generations except seed yield per plant and dry matter per plant in $F_1$ generation. Significant differences due to specific combining ability for all the traits in $F_1$ generation except relative water content in leaf where as in $F_2$ generation significant differences were observed for days to flowering, harvest index, test weight, oil content, erucic acid content and protein content in seed. It reflects the involvement of additive as well as non-additive genetic variance in the expression of these attributes (Table 1) Thakral and Singh (1995) also reported greater importance of additive gene action for days to maturity and non additive type of gene action for oil content.

The estimates of gca effects revealed that parents RK-8701 and RK-8601 were the best general combiners for seed yield and also showed high gca effects for yield components like days to flowering, no. of secondary branches, length of main fruiting branch, harvest index and test weight. The parent RL-18 showed good gca for erucic acid and protein content associated with negative combining ability for seed yield. A close relationship was