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Heterosis and inbreeding depression in relation to other genetic parameters in Indian mustard

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SUMMARY
Experiment comprising 100 treatments (10 parents + 45 F_1s + 45 F_2s) generated from 10 parent diallel mating design in Indian mustard indicated considerable amount of significant heterosis over superior and economic parent for all the characters studied. The estimated value of inbreeding depression in F_2 were also significant for almost all the characters. High estimates of significant heterosis over superior and economic parents alongwith significant inbreeding depression in F_2 population were observed in the crosses, RK 02-3 x SEJ-2, RK 02-3 x RK 01-3, Varuna x Rohini, Rohini x RK 02-5 and Rohini x RK 02-3. High estimates of heterosis and inbreeding depression for yield and most of the other traits thus funnel out non-additive gene action in the inheritance of traits.

Key words : Diallel, Heterosis, Inbreeding depression.

Indian mustard [*Brassica juncea* (L.) Czern & Coss.] is an important *rabi* oilseed crop. Heterosis denotes the increased desired vigour in F_1 arising due to recombination, inter and intra-allelic interactions, complementation and accumulation of desired gene complexes in F_1 whereas, the inbreeding depression reflects the change in vigour of F_1 into F_2, which is largely due to segregation, linkage, etc. and ultimately the vigour obtained in F_1 is diversified. However, the manifestation of heterosis in F_1, over superior parent or economic parent and inbreeding depression jointly in combination signifies the nature of gene action involved for the expression of the traits. High heterosis with low inbreeding depression depicts involvement of largely additive gene action whereas, high heterosis coupled with high inbreeding depression focused the involvement of non-additive gene action. Thus, the heterosis and inbreeding depression are good indicator for the understanding of gene action without any complicated analysis.

MATERIALS AND METHODS

Ten diverse genotypes of Indian mustard, viz., Varuna, Rohini, RK 02-3, RK 02-4, RK 02-5, RK 02-6, RK 03-1, RK 03-2, RK 01-3 and SEJ-2 were crossed in diallel fashion (excluding reciprocals) to develop the hybrid seeds of 45 crosses. All the 100 treatment (10 parent + 45 F_1s + 45 F_2s) were grown in a Randomized Block Design with three replications at Oilseed Research Farm of C. S. Azad University of Agriculture and Technology, Kanpur. The parents and F_1s were grown in single row and the F_2s in two rows of five- meter length spaced 45 cm apart. The distance of 20 cm between the plants within a row was maintained by thinning.

The observations were recorded on ten randomly selected plants in each genotype of all replications for days to 50 per cent flower, plant height, number of primary branches per plant, number of secondary branches per plant, days to maturity, length of main raceme, number of siliquae on main raceme, number of seeds per siliqua, 1000-seed weight, seed yield per plant and oil content. The data were analysed according to the method suggested by Griffing (1956), Model II of Method II. Heterosis over superior and economic parent and inbreeding depression were calculated by usual procedures.

RESULTS AND DISCUSSION

Highly significant variances among treatments, parents, F_1s and F_2s for all the characters except number of primary branches per plant in F_2 indicated much variability among them. The variances among parents *vs* F_1s were also significant for all the traits except 1000-seed weight. Significant differences were also noted among parents *vs* F_2s for all the traits except number of seeds per siliqua, 1000-seed weight and oil content. F_1s *vs* F_2s revealed significant differences for all the characters except number of primary branches per plant.

The computed value of heterosis over superior parent and over economic parent (Table 1) revealed that the degree and direction of heterotic response varied not

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