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Heterosis and inbreeding depression for yield and its components in Indian mustard

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Heterosis and inbreeding depression were studied in 45 hybrids developed through 10 X 10 diallel set of Indian mustard [*Brassica juncea* (L.) Czern & Coss.]. Heterobilities varied from - 21.4 to 19.6 per cent and standard heterosis from - 23.6 to 29.6 per cent for seed yield. Significant desirable heterosis over best parent (Rohini) was observed for all the characters studied. Maximum significant standard heterosis was observed for main shoot length (56.6%) followed by secondary branches (35.8%), seed yield (29.6%), siliquae on main shoot (28.6%), seeds per siliqua (23.4%) and primary branches (22.4%) while heterobeltosis for main shoot length (68.7%), secondary branches (49.8%), siliquae on main shoot (41.6%), seeds per siliqua (39.1%), primary branches (33.4%) and seed yield (19.6%). The inbreeding depression for seed yield ranged from - 35.2 to 12.8 per cent. The highest significant positive heterobeltosis and standard heterosis and high inbreeding depression was recorded in hybrids Rohini X Varuna followed by RK 9870 X Vardan and Rohini X Vardan for seed yield. These crosses may be utilized for developing hybrids.

Key words : Heterosis, Inbreeding depression, GCA effects, SCA effects, Mustard.

INTRODUCTION

Mustard is predominantly a self - pollinated crop and the exploitation of hybrid vigour will depend upon the direction and magnitude of heterosis, biological feasibility, and nature of gene action involved. 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 from parent 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 and inbreeding depression in F_2 jointly in combination signifies the nature of gene action involved for the expression of the vigour in F_1 and depression in F_2. As the high heterosis with least inbreeding depression depicts involvement of largely additive gene action, high heterosis coupled with high inbreeding depression refers 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. With the availability of perfect restoration for moricandia CMS (Prakash *et al.*, 1998), heterosis breeding is being looked as a promising tool to over come the yield barriers in Indian mustard (Pandey *et al.*, 1999), which is a predominant oil seed crop of Indian subcontinent. The present investigation was undertaken to estimate the level of heterosis and inbreeding depression from crosses of diverse genotypes of Indian mustard.

MATERIAL AND METHODS

The experimental material comprising of ten diverse genotypes of Indian mustard viz., RK 8605, RK 9803, RK 9807, RK 9808, Mathura Rai, NDR-8501, Rohini, Vardan, Basanti and Varuna. These parents have been maintained by self - pollination for several generations and therefore, may be considered as homozygous. An experiment comprising 100 treatments (45 F_{1S}, 45 F_{2S} and 10 parents) was conducted in Randomised Block Design with three replications during *Rabi* 2002-2003 at Oilseeds Research farm, Kalyanpur, Kanpur of C.S. Azad University of Agriculture and Technology, Kanpur. Each parent and F_{1S}'s were grown in single row and each F_{2S}'s in two rows of five metre length spaced at 45 cm apart. All recommended agronomic practices were adopted. Ten plants in F_{1S}'s and twenty plants from each F_{2S}'s were randomly selected for recording the observations on eleven characters (Table 1). The F_1 hybrid performance was computed as the estimates of heterosis over Rohini (heterobeltosis) and over Varuna (standard heterosis). Heterosis and inbreeding depression were calculated in percentage, using the standard procedures.

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