

Heterosis in long duration pigeonpea [*Cajanus cajan* (L.) Millsp.]

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SUMMARY

The estimates of heterosis for yield and yield traits was done in long duration pigeonpea using five lines (MA 98 PTH 1, MAL 8, Pusa 9, MA 98 SD 74 and DA 11) and three testers (Bahar, ICPL 7035 and ICPL 84023). The fifteen crosses were made in line x tester fashion. The maximum standard heterosis was recorded in the cross Pusa 9 X Bahar (52.11%) followed by Pusa 9 X ICPL 84023 (44.17%) and DA 11 X Bahar (42.03%) for number of pods per plant. Pusa 9 x Bahar also revealed significantly positive heterotic effect for most of the yield components such as 100 seed weight, number of seeds per pod, pods per plant and number of primary and secondary branches.

Key words : Pigeonpea, Heterosis, Line x tester, Branches

Pulses, being a rich source of protein, form an integral part of the vegetarian diet in our country. In addition, they also have the unique ability to fix atmospheric nitrogen and thus, play a vital role in sustainable agriculture. In India, pigeonpea is the second most important pulse crop after chickpea and is being widely grown in the country. The per capita availability of the pulses has declined from 64 g/capita/day (1951-56) to about 34 g/capita/day (1998-99) as against the FAO/WHO's recommendation of 80g/capita/day (Asthana and Chaturvedi, 1999). It is estimated that country's population will touch nearly 1350 million by 2020 AD and country would then need a minimum of 30.3 million tonnes of pulses (Asthana and Chaturvedi, 1999). To meet the requirement of pulses for growing population, the development of hybrids is inevitable. Pigeonpea is an often cross pollinated crop and out-crossing has been observed upto 70 per cent (Saxena, *et al.*, 1990) which may be useful for the production of hybrid seed. Commercial exploitation of hybrid vigour utilizing genetic male sterility in pigeonpea have been realized and few hybrids namely, ICPH 8 by ICRISAT, Hyderabad, PPH 4 by Punjab Agricultural University, Ludhiana, COH 1 and COH 2 by TNAU, Coimbatore and recently AKPH 4104 and AKPH 2022 by Dr. P.D.K.V.Akola have been released. Now the new CGMS lines open up new avenue for the production of hybrid seed on commercial scale. In the present investigation, the main objective is to work out the extent of heterosis in long duration genotypes.

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MATERIALS AND METHODS

The experimental materials comprised of five lines (MA 98 PTH 1, MAL 8, Pusa 9, MA 98 SD 74 and DA 11) and three testers (Bahar, ICPL 7035 and ICPL 84023) were obtained from the All India Co-ordinated Pulse Improvement Project, Department of Genetics and Plant Breeding, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi. Fifteen crosses were made in a line x tester fashion in *kharif*, 2002-03 and corresponding 15 F₁'s along with 8 parents were grown in randomized block design with three replications during *kharif*, 2003-04. Each of the parents and F₁'s were grown in single row of 4m length and row to row and plant to plant distances being 75 and 25 cm, respectively. All recommended agronomic practices were followed to raise a good crop. Mid parent and useful heterosis was calculated as per the standard procedure and was expressed as percentage increase over it. In the present investigation, heterosis was estimated over mid parent and best variety of the area *i.e.* Bahar (economic heterosis).

RESULTS AND DISCUSSION

Heterosis may be expressed as superiority or inferiority of the F₁ over the mid parents, better parents or best commercial/standard variety. The improvement in grain yield in pigeonpea is mainly attempted through traditional breeding methods based on exploitation of additive genetic variance. Since sufficient degree of non-allelic genetic variance for yield and other components has been reported (Ocmmen, *et al.*, 1994 and Srinivas *et al.*, 1998), an alternative breeding method like heterosis breeding may be useful to further boost up the pigeonpea productivity in our country. For utilization of heterosis breeding on commercial scale, it is pre-requisite to firstly spot out desirable cross combinations which could give more than 20% economic heterosis. In the past, though