Combining ability analysis in long duration Pigeonpea [*Cajanus cajan* (L.) Millsp.]

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ABSTRACT

The combining ability analysis 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. Among females, Pusa 9 and MA 98 PTH 1 and among males, ICPL 7035, ICPL 84023 and Bahar were identified as good general combiners for yield traits. The two crosses (MAL 8 x Bahar and Pusa 9 x ICPL 7035) for number of pods per plant and three crosses (MA 98 SD 74 x ICPL 84023, MAL 8 x ICPL 7035 and MA 98 PTH 1 x ICPL 7035) for seed yield per plant were found to be superior on the basis of *per se* performance and desirable specific combining ability.

Key words : Pigeonpea, Combining ability analysis, Line x tester.

INTRODUCTION

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. In a hybrid breeding programme, the objective is to identify a new line that when crossed with other parents, may produce hybrids with superior performance. Combining ability analysis is frequently employed to identify the desirable parents and crosses. Therefore, it is urgently required to identify the best combiners and desirable crosses. Line x tester analysis is an extension of   top cross method in which several testers are used (Kempthorne, 1957) which provides information about general and specific combining ability of parents and at the same time, it is helpful in estimating various types of gene effects, besides identifying best heterotic crosses.

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 F_1's along with 8 parents were grown in Randomized Block Design with three replications during *kharif*, 2003-04. Each of the parents and F_1'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. The general combining ability (gca) and specific combining ability (sca) variances were worked out as per the method given by Kempthorne (1957).

RESULTS AND DISCUSSION

Analysis of variance for combining ability showed that variances among females and males genotypes in respect of general combining ability were found to be highly significant for different traits except for number of primary and secondary branches and seed yield per plant (Table 1).

Table 1: Analysis of variance for combining ability for nine characters in line x tester analysis in pigeonpea

Source of variation	d.f.	Days to 50 % flowering	Days to maturity	Plant height	Number of primary branches/plant	Number of secondary branches/plant	Number of pods / plant	Number of seeds /pod	100 seed weight	Seed yield / plant
		Mean sum of squares								
Replication	2	0.60	0.86	761.26	0.28	2.18	19.28	0.03	0.03	5.48
Female (Lines)	4	248.75**	352.70**	917.83*	5.64**	6.18**	3155.72**	0.44**	1.61**	251.50**
Males (Testers)	2	510.47**	171.80**	3199.26**	0.94	0.18	3864.68**	0.53**	7.90**	213.91**
Females x males	8	52.35**	18.80**	656.93*	2.07	3.08*	997.52**	0.04**	0.22	227.71**
Error	28	0.17	1.44	239.50	0.97	1.29	41.45	0.007	0.12	30.00

* and ** indicates significance of values at P =0.05 and 0.01, respectively

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