LINE × TESTER ANALYSIS FOR COMBINING ABILITY IN BHENDI (*ABELMOSCHUS ESCULENTUS* (L.) MOENCH)

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Abstarct

Seven lines and three testers of bhendi were evaluated for general and specific combining ability through line × tester mating method. The gene action was observed predominantly dominant for days to 50 per cent flowering, plant height, number of branches per plant, internodal length, fruit length, fruit grith, fruit weight, number of fruits per plant, number of seeds per fruit, 100 seed weight, fruit yield per plant.The parent Kallakkurichi local was good general combiner for number of branches per plant, internodal length, fruit length, average fruit weight, number of fruits per plant, number of seeds per fruit, 100 seed weight and fruit yield per plant. Trichy local was found good general combiner for fruit grith. The most promising specific combiner was Kallakkurichi local × Salkeerthi.

Key words: Combining ability, bhendi, gca, sca, L × T analysis.

Introduction

Bhendi (*Abelmoschus esculentus* (L.) Moench) is one of the most important vegetable crops of India. The information about combining ability is immense helping to the plant breeders for hybridization programme and provides valuable information regarding cross combinations to exploited commercially. The nature and magnitude of gene action will enable the breeder in deciding suitable breeding methodology to be adopted in the crop improvement programmes. Therefore, present investigation was undertaken to estimate combining ability for fruit yield and its component traits in bhendi.

Materials and methods

Seven lines (females) *viz.*, Thalaivasal liocal, Kallakurichi local, Bhuvanagiri local, Chinnasalem local, Madurai local, Trichy local and Chidambaram local were crossed with three testers (males) namely; Salkeerthi, Ankur-40, Arka Anamika in a line × tester fashion during January to Apirl 2018. The experimental materials consisting of 31 entries including 10 parents (7 lines and

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3 testers) and their 21 crosses, were raised in a RBD with three replications during July to October 2018 at the Plant Breeding Farm, Department of Genetics and Plant Breeding, Annamalai University, Annamalainagar, Tamilnadu. The experimental plot was ploughed repeatedly and land was brought to fine tilth. Ridges and furrow were formed at a distance of 60 cm apart. Two to three seeds of each genotype per hill were dibbled at a distance of 30 cm in a row. The plants were thinned to one seedling per hill after germination. Recommended cultural practices were followed and the observations were recorded on five randomly selected competitive plants for fruit yield and its component characters. The data were analyzed for combining ability following Kempthorne (1957).

Results and discussion

The analysis of variance for line × tester (table 1) revealed highly significant variances due to lines and testers for all the characters under the study, which indicate the existence of substantial genetic diversity in the parents. The variation due to line × tester interactions, representing specific combining ability were also highly significant for all the traits which suggested manifestation

Table 1: Analysis of variance for combining ability in bhendi (*Abelmoschus esculentus* (L.) Moench)

Source of variation	Df	MSS										
		Days to 50 per cent flowering	Plant height	Number of branches per plant	Internodal length	Fruit Length	Fruit grith	Fruit weight	Number of fruits per plant	Number of seeds per plant	100 seed Weight	Fruit yield
Replication	2	7.1890	4.0599	0.0009	0.0229	0.0392	0.0060	0.0476	0.0207	0.7080	0.0092	35.9461
Hybrid	20	60.6652**	371.3323***	1.2492**	1.7330**	9.8105**	1.2094**	5.4323**	7.6038**	239.3556**	1.4958**	6239.0647**
Line	6	139.107***	271.2355***	2.5581***	2.2254**	10.6306***	2.9842**	7.5810***	7.3371**	345.7635***	2.0138***	7611.8442***
Tester	2	80.5567***	2641.863***	1.8313***	6.1246***	25.9644***	0.9649***	6.4323***	43.580***	755.3129***	7.2336***	19393.469***
L × T	12	18.1287**	42.9589**	0.4977**	0.7549**	6.7081**	0.3628**	4.1910**	1.7411**	100.1587**	0.2804**	3360.2741**
Error	60	0.9543	5.7618	0.0107	0.0125	0.2746	0.0180	0.1937	0.1887	2.2025	55.9645	62.5807

** Significant @ 1 % level

Table 2: General combining ability (gca) effects of line × tester hybrids for eleven characters

Sl no	Characters / Treatments	Days to 50 per cent folowering	Plant height	Number of branches per plant	Internodal length	Fruit length	Fruit grith	Fruit weight	Numb-er of fruits per plant	Number of seeds per fruit	100 seed weight	Fruit yield per plant
1.	Thalaivasal local	5.21**	3.90**	-0.20**	-0.25**	-0.69**	-0.43**	-0.91**	-1.01**	-8.43**	-0.26**	-33.81**
2.	Kallakurichi local	-4.93**	-7.07**	0.83**	0.76**	1.42**	0.53**	1.71**	1.20**	8.60**	0.73**	33.38**
3.	Bhuvanagiri local	4.56**	8.25**	-0.61**	-0.63**	-0.66**	-0.74**	-0.30*	-0.97**	-6.35**	-0.48**	-28.35**
4.	Chinnasalem local	-2.10**	-1.17	0.18**	-0.26**	0.76**	0.18**	-0.98**	0.44**	3.70**	0.25**	15.04**
5.	Madurai local	0.70*	2.11*	-0.24**	-0.03	-1.34**	-0.35**	0.34*	0.01	0.08	-0.32**	16.47**
6.	Trichy local	-3.92**	-6.45**	0.53**	0.59**	1.17**	0.89**	-0.16	0.96**	4.98**	0.46**	26.13**
7.	Chidambaram local	0.46	0.43	-0.49**	-0.18**	-0.65**	-0.08	0.31*	-0.62**	-2.58**	-0.37**	-28.86**
8.	Salkeerthi	1.92**	-12.72**	0.34**	0.62**	0.42**	0.25**	0.59**	1.25**	6.23**	0.62**	25.76**
9.	Ankur-40	0.07	4.24**	-0.22**	-0.39**	-1.26**	-0.10**	-0.50**	-1.58**	-5.74**	-0.54**	-33.51**
10.	ArkaAnamika	-1.99	8.47**	-0.12**	-0.23**	0.84**	-0.15**	-0.90	0.33**	-0.49	-0.08*	7.75

*Significant @ 5% level ** Significant @ 1% level

Table 3: Specific combining ability (sca) effects of line × tester hybrids for eleven characters

Sl no	Characters / Treatments	Days to 50 per cent folowering	Plant height	Number of branches per plant	Internodal length	Fruit length	Fruit grith	Fruit weight	Number of fruits per plant	Number of seeds per fruit	100 seed weight	Fruit yield per plant
1.	Thalaivasal local × Salkeerthi	1.19	4.70**	-0.57**	-0.27**	0.59	-0.21*	-1.28**	-0.24	-5.96**	-0.21*	-9.93*
2.	Thalaivasal local × Ankur40	-3.36**	-5.21**	-0.22**	0.30**	0.06	0.02	-0.88**	0.38	3.14**	0.53**	14.26*
3.	Thalaivasal local×ArkaAnamika	2.18**	0.51	0.78**	-0.03	-0.65*	0.19*	2.16***	-0.14	2.82**	-0.31**	-4.33
4.	Kallakkurichi local ×Salkeerthi	-0.75	-3.27*	0.31**	-0.17*	1.42**	-0.07	0.70**	1.19**	8.68**	0.26*	11.94*
5.	Kallakkurichi local×Ankur40	1.32*	3.58*	0.36**	-0.31**	-0.97**	-0.21*	-0.03	-0.75**	-4.00**	-0.47**	-33.34**
6.	Kallakkurichi local×ArkaAnamika	-0.57	-0.31	-0.67**	0.48**	-0.45	0.28**	-0.67**	-0.44	-4.68**	0.21*	21.40**
7.	Bhuvanagiri local ×Salkeerthi	-2.89**	4.19**	-0.25**	-0.13*	0.94**	-0.02	0.16	0.11	-8.18**	-0.04	2.29
8.	Bhuvanagiri local×Ankur40	-0.45	-3.49*	0.23**	0.71**	-0.12	-0.10	0.79**	0.19	7.53**	0.18	2.78
9.	Bhuvanagiri local×ArkaAnamika	3.34**	-0.71	0.03	-0.58**	-0.82*	0.12	-0.95**	-0.30	0.65	-0.14	-5.07
10.	Chinnasalem local ×Salkeerthi	-0.23	-1.23	0.15*	0.57**	0.07	-0.22**	1.17**	-0.75**	-0.09	0.10	-9.71
11.	Chinnasalem local × Ankur40	0.95	2.79	-0.27**	-0.69**	-0.38	0.07	-0.10	-0.07	-6.54**	-0.34**	-21.39**
12.	Chinnasalem local×ArkaAnamika	-0.72	-1.57	0.12	0.12	0.31	0.15	-1.70**	0.82**	6.63**	0.25*	31.10**
13.	Madurai local×Salkeerthi	3.30**	-2.99	0.15*	0.27**	-3.07**	-0.24**	-0.95**	-0.56*	1.10	-0.06	-39.23**
14.	Madurai local×Ankur40	-1.31*	4.37**	0.03	0.17*	1.60**	0.18*	0.27	0.25	1.09	0.13	68.27**
15.	Madurai local×ArkaAnamika	-1.99**	-1.38	-0.17**	-0.44**	1.46**	0.06	0.67**	0.31	-2.20*	-0.07	-29.04**
16.	Trichy local×Salkeerthi	-1.81**	-2.29	0.13*	-0.05	1.53**	0.74**	0.78**	0.91**	2.46**	0.01	15.53**
17.	Trichy local×Ankur40	2.71**	1.36	-0.01	-0.43**	-1.06**	0.32**	0.31	-0.84**	-0.96	0.17	-28.53**
18.	Trichy local×ArkaAnamika	-0.90	0.93	-0.12	0.47**	-0.47	-0.34**	-1.09**	-0.06	-1.50	0.17	13.00*
19.	Chidambaram local×Salkeerthi	1.20*	0.88	0.09	-0.22**	-1.48**	0.02	-0.59*	-0.06*	1.99*	-0.06	29.11**
20.	Chidambaram local×Ankur40	0.14	-3.41*	-0.12	0.25**	0.87**	-0.28**	-0.35	0.84**	-0.26	0.16	-2.05
21.	Chidambaram local×ArkaAnamika	-1.35*	2.53	0.03	-0.03	0.61	-0.46**	0.94**	-0.18	-1.73	-0.10	-27.06**

*Significant @ 5% level ** Significant @ 1% level

of parental genetic variability in their crosses. The variance due to replication was non- significant for all the characters studied. It indicated the less influence of environment on the expression of the characters studied.

Nature and magnitude of combining ability effects provide guide line in identifying the better parents and their utilization. The summary of the gca effects of the parents (table 2) revealed that none of the parents found to be good general combiner for all the characters. Negative gca and sca effects are desirable for the traits of days to 50 per cent flowering and plant height. An over all appraisal of gca effects revealed that, among the parents Kallakkurichi local emerged out as good general combiner for number of branches per plant, internodal length, fruit length, average fruit weight, number of fruits per plant, number of seeds per fruit, 100 seed weight and fruit yield per plant. Whereas, line Thalaivasal local traced out as good general combiner for days to 50 per cent flowering and plant height. Male parents Salkeerthi for number of branches per plant, days to 50 per cent flowering, fruit grith, average fruit weight, number of fruits per plant, number of seeds per fruit, 100 seed weight and fruit yield per plant.

The specific combining ability is the deviation from the performance predicted on the basis of sca effect (Allard, 1960). According to Sprague and Tatum (1942), the specific combining ability is controlled by non additive gene action. The sca effect is an important criterion for the evaluation of hybrids. Among the hybrids, Kallakkurichi local × Salkeerthi retained its top ranking position for traits like number of fruits per plant, number of seeds per fruit and Fruit yield per plant. This is in confirmity with the findings of Murali (2008). The other promising hybrid *viz.*, Trichy local × Salkeerthi performed creditably well for fruit length, average fruit weight, number of fruits per plant and fruit yield per plant.Similar results were given by Sashidhar Reddy(2004). The combining ability analysis reveled that parent Kallakkurichi performs better for some traits and cross Kallakurrichi local × Salkeerthi performs better for yield and its contributing traits in an overall view.

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