JOURNAL OF PURE AND APPLIED MICROBIOLOGY, March 2016. Vol. **10**(1), p. 515-522

Combining Ability Analysis for Fruit Yield and its Component Characters in Brinjal (*Solanum melongena* L.)

A.Y. Makani[1], P.C. Patel[2], A.L. Patel[3], P.B. Dave[2] and M.M. Bhatt[4]

[1]Tribal Research cum Training Centre, Anand Agricultural University, Devgadh Baria, India.
[2]Regional Research Station, Anand Agricultural University, Anand, India.
[3]Aspee College of Horticulture and Forestry, Navsari Agricultural University, Navsari, India.
[4]Department of Botany, B. A. College of Agriculture, Anand Agricultural University, Anand, India.

(Received: 02 December 2015; accepted: 14 January 2016)

A study was carried out in half diallel fashion with eight parents in brinjal. Parents were evaluated for estimation of gca and sca effects and variances for yield and yield contributing characters. The general and specific combining ability variances were significant for all the traits. The σ^2gca and σ^2sca ratio indicated that non-additive gene action was predominant for the inheritance of all the traits except fruit girth for which additive gene action was more important. The estimates of general combining ability effects suggested that parents GBL-1 and KS-331 were good general combiners for fruit yield per plant and its related attributes. The estimates of general combining ability effects suggested that parent GBL-1 was good general combiners for dry matter and total soluble sugars. The estimates of specific combining ability effects indicated that cross combinations *viz.,* Doli-5 x GBL-1, AB-07-08 x GP-180 and AB-07-08 x KS-331 were observed to be most promising for fruit yield and some of its related traits. These crosses need to be exploited and also one can explore the possibility of isolating transgressive segregants from the segregating generations of these crosses.

Keywords: Brinjal, diallel, general combining ability and specific combining ability.

The present investigation had been undertaken to know the type of gene action governing yield and yield contributing traits and to identify the parent and crosses, which could be exploited for future breeding programme. Significant and positive sca effects for fruit yield and its component traits have also been reported by Chaudhary and Pathania (2000); Rao (2003); Singh and Singh (2004); Vadodaria *et al*. (2008) and Shanmugapriya *et al*. (2009). The present investigation had been undertaken to know the type of gene action governing yield and yield contributing traits and to identify the parent and crosses, which could be exploited for future breeding programme.

* To whom all correspondence should be addressed.
Tel.: +91-94265 25204
E-mail: aniketmakani@yahoo.com

MATERIALS AND METHODS

Eight parents of brinjal viz., NDB-18, PPL-1, Pusa Uttam, Doli-5, AB-07-08, GBL-1, GP-180 and KS-331 and their complete set of 36 entries comprising 8 parents and their 28 F_1s were planted for evaluation in a Randomized Block Design (RBD) with three replications. at Research Farm of Main Vegetable Research Station, AAU, Anand, Gujarat (India) during *kharif-rabi* 2011-12. Each plot consisted of a single row of 10 plants. Inter and

intra row spacing was kept 90 and 60 cm, respectively. The observations were recorded on five randomly selected plants from each treatment and replication for twelve characters *viz*; days to 50% flowering, days to first picking, fruit length, fruit girth, average fruit weight, number of fruits per plant, plant height, fruit yield per plant, fruit volume, dry matter, total phenol and total soluble sugar (TSS). The general and specific combining ability effects of the parents were assessed by diallel analysis. To understand the real picture of genetic architecture of the hybrids and their parents, the data obtained for parents and hybrids were analyzed by Model-I, Method-II proposed by Griffing (1956).

RESULTS AND DISCUSSION

The analysis of variance for combining ability indicated that the mean squares due to general combining ability and specific combining ability were significant (Table 1). The variance due to sca was higher than that of due to gca for all the characters indicating the predominant role of non-additive gene action except for fruit girth for which additive gene effect was more important. This is in agreement with the studies of Chaudhary and Pathania (2000), Chaudhary and Malhotra (2000), Rao (2003), Singh and Singh (2004), Vadodaria *et al*. (2008), Shanmugapriya *et al*. (2009).

The presence of predominantly large amount of non-additive gene action observed for various yield attributing characters would necessitate the maintenance of heterozygosity in the population. Breeding methods such as biparental mating followed by reciprocal recurrent selection may increase frequency of genetic recombination and hasten the rate of genetic improvement (Hanson, 1960).

The predominance of non-additive gene action for fruit yield per plant as observed in present study has already been reported by many researchers, *viz.*, Chaudhary and Pathania (2000), Chaudhary and Malhotra (2000), Rao (2003), Singh and Singh (2004), Vadodaria *et al*. (2008), Shanmugapriya *et al*. (2009).

The importance of non-additive genetic variance in the inheritance of days to 50% flowering was also reported by Chaudhary and Pathania (2000), Baig and Patil (2002), Vadodaria *et al*. (2005) and Shanmugapriya *et al*. (2009). The preponderance of non-additive gene effects was also reported for days to first picking (Sawant *et al*., 1991; Chaudhary and Pathania, 2000 and Patel, 2003), fruit length (Chaudhary and Pathania, 2000; Rao, 2003 and Shanmugapriya *et al*. 2009), average fruit weight (Kaur,1998; Rao, 2003 and Shanmugapriya *et al*. 2009), number of fruits per plant (Kaur,1998; Chaudhary and Pathania, 2000; Rao, 2003; Vadodaria *et al*., 2005), plant height (Chaudhary and Pathania, 2000; Patel, 2003; Singh and Singh, 2004 and Shanmugapriya *et al*. 2009) and yield per plant (Chaudhary and Pathania, 2000; Rao, 2003; Singh and Singh, 2004; Vadodaria *et al*. 2008; Shanmugapriya *et al*. 2009). While additive genetic variance in the inheritance of fruit girth was reported by (Das and Barua, 2001; Singh and Singh, 2004; Aswani and Khandelwal 2005 and Bisht *et al*., 2006).

Nature and magnitude of combining ability effects help in identifying superior parents and their utilization in further breeding programme. Looking to the estimates of gca effect for different characters, an overall appraisal of gca effects revealed that the genotype GBL-1 was found to be a good general combiner for all the yield attributing characters except average fruit weight, plant height and total phenols. The parent KS-331 was a good general combiner for days to flowering, days to first picking, fruit girth, average fruit weight, number of fruits per plant, fruit yield per plant and fruit volume. Therefore, above parents can be considered as a good source of favourable genes for increasing fruit yield along with other yield attributes. It is evident from these results that high gca effects for fruit yield per plant in the varieties GBL-1 and KS-331 were mainly due to important yield contributing characters mentioned above (Table 2). Therefore, it would be worthwhile to use the above parental lines (GBL-1 and KS-331) in the hybridization programme for improvement of brinjal.

For quality components, parents GBL-1 and Doli-5 were found to be good general combiners for dry matter and total soluble sugars. AB-07-08 was found to be a good general combiner for dry matter and total phenols. The estimates of gca effects further revealed that the parental lines showing high gca effects for fruit yield also exhibited high to average gca effects for one or

Table 1. Analysis of variance for combining ability of different characters in brinjal

Sources of variation	d.f.	Days to 50% flowering	Days to first picking	Fruit length (cm)	Fruit girth (cm)	Average fruit weight (g)	Number of fruits per plant	Plant height (cm)	Fruit yield per plant (kg)	Fruit volume (cc)	Dry matter (mg/100 mg)	Total phenols (mg/100 mg)	Total soluble sugars (mg/100 mg)
GCA	7	19.36**	82.98**	6.08**	9.62**	2887.77**	764.05**	328.46**	7.76**	31503.81**	0.50**	0.00087**	0.0049**
SCA	28	15.32**	61.40**	1.60**	0.98**	384.58**	364.33**	56.69**	1.77**	15774.44**	0.23**	0.0010**	0.0075**
Error	70	1.48	10.99	0.35	0.15	10.71	23.82	5.19	0.082	1405.41	0.016	0.000035	0.000096
s^2gca	1.79	7.20	0.57	0.95	287.71	74.02	32.33	0.77	3009.84	0.048	0.000084	0.00048	
s^2sca	13.84	50.41	1.25	0.83	373.87	340.76	51.5	1.69	14369.03	0.214	0.00097	0.0074	
s^2gca/s^2sca	0.13	0.14	0.46	1.14	0.77	0.22	0.63	0.45	0.21	0.23	0.087	0.065	

*,** significant at 5% and 1% levels, respectively.

Table 2. Estimates of general combining ability (gca) effects of parents for various characters in brinjal

Parents	Days to 50% flowering	Days to first picking	Fruit length (cm)	Fruit girth (cm)	Average fruit weight (g)	Number of fruits per plant	Plant height (cm)	Fruit yield per plant (kg)	Fruit volume (cc)	Dry matter (mg/100 mg)	Total phenols (mg/100 mg)	Total soluble sugars (mg/100 mg)
NDB-18	0.52	0.18	0.30	-1.79**	-20.21**	1.96	-5.50**	-1.20**	-29.97**	-0.26**	0.00	-0.01**
PPL-1	0.89*	1.84	0.62**	-1.00**	-14.69**	-7.19**	-5.36**	-1.26**	-17.86**	-0.30**	0.01**	-0.01**
Pusa Uttam	0.46	1.88	-0.61**	0.14	-6.16**	1.29	-6.05**	-0.16	-7.04**	-0.02**	0.00	0.02**
Doli-5	0.22	1.34	-0.67**	0.18	-0.21	-2.26	4.30**	-0.10	-2.63**	0.14**	0.00	0.04**
AB-07-08	-0.21	0.48	-0.89**	0.10	-1.53	3.99*	-3.47**	0.37**	-5.06**	0.26**	-0.01**	0.00
GBL-1	-2.61**	-5.12**	0.76**	0.26*	1.14	9.68**	1.99**	1.04**	5.53**	0.24**	0.00	0.01**
GP-180	1.96**	3.08**	1.11**	0.74**	36.45**	-16.68**	6.53**	0.25**	38.36**	0.12**	0.01**	-0.03**
KS-331	-1.24**	-3.66**	-0.62**	1.36**	5.20**	9.20**	7.56**	1.04**	18.68**	-0.18**	-0.01**	-0.02**
S. E. ±	0.359	0.98	0.175	0.113	0.968	1.685	0.674	0.0844	0.765	0.0369	0.00175	0.0029
Range	-2.61 to 1.96	-5.12 to 3.08	-0.89 to 1.11	-1.79 to 1.36	-20.21 to 36.45	-16.68 to 9.68	-6.05 to 7.56	-1.26 to 1.04	-29.97 to 38.36	-0.30 to 0.26	-0.01 to 0.01	-0.03 to 0.04

*,** significant at 5% and 1% levels, respectively.

other yield components (Table 2). These parents can be intensively used in the hybridization programme aimed at amelioration of fruit yield.

The estimates of specific combining ability effects revealed that as many as thirteen cross combinations exhibited significant and positive sca effects for fruit yield per plant (Table 3). The maximum significant positive sca effect was exhibited by hybrid Doli-5 x GBL-1 (1.97) followed by AB-07-08 x GP-180 (1.73) and AB-07-08 x KS-331 (1.55) and thus were good hybrid combinations, contributing towards higher fruit yield per plant. The cross combination Doli-5 x GBL-1 (Average x Good) had highest sca effects for fruit yield (1.97), which also recorded significant sca effects in desired direction for days to flowering, number of fruits per plant, total phenols and total soluble sugars. The cross AB-07-08 x GP-180 (Good x Good) exhibited significant sca effects for fruit yield per plant and average fruit weight. The cross AB-07-08 x KS-331 (Good x Good) manifested significant sca effects for number of fruits per plant and fruit yield per plant in desired direction.

The three best crosses selected each for sca effects, *per se* performance and heterobeltiosis for all the characters are presented in Table 4. The crosses viz., Doli-5 x GBL-1, AB-07-08 x GP-180 and AB-07-08 x KS-331 which recorded high and

Table 3. Estimates of specific combining ability (sca) effects of hybrids for various characters in brinjal

Crosses	Days to 50% flowering	Days to first picking	Fruit length (cm)	Fruit girth (cm)	Average fruit weight (g)	Number of fruits per plant
NDB-18 X PPL-1	7.46**	13.29**	-0.25	1.76**	1.01	-1.39
NDB-18 X Pusa Uttam	3.23**	4.59	1.58**	0.16	10.88**	-12.62**
NDB-18 X Doli-5	1.80	3.12	1.18*	0.56	-9.56**	20.02**
NDB-18 X AB-07-08	-2.10	-2.01	0.79	-1.01	13.97**	8.22
NDB-18 X GBL-1	-0.70	3.26	0.18	-0.92*	-10.44**	9.66*
NDB-18 X GP-180	5.06**	2.72	-3.64**	-1.09**	-49.29**	31.71**
NDB-18 X KS-331	-1.07	1.12	-0.91	0.14	-9.03**	3.43
PPL-1 X Pusa Uttam	-5.47**	-8.08**	-0.24	-0.32	0.60	18.86**
PPL-1 X Doli-5	-1.57	-4.88	0.89	0.85*	4.42	16.27**
PPL-1 X AB-07-08	-3.47**	-3.68	0.00	0.67	-10.09**	15.10**
PPL-1 X GBL-1	0.26	-1.41	0.64	-1.07**	-7.40*	-24.06**
PPL-1 X GP-180	-1.64	-8.94**	1.51**	1.06**	-22.23**	11.09*
PPL-1 X KS-331	2.23*	-0.21	-1.20*	-0.74*	-12.68**	4.50
Pusa Uttam X Doli-5	-1.14	-7.91**	-0.49	0.09	-5.93*	-3.43
Pusa Uttam X AB-07-08	-6.37**	-13.71**	-0.54	-0.50	-6.99*	17.31**
Pusa Uttam X GBL-1	1.36	1.22	-1.38*	-0.39	6.05*	-1.13
Pusa Uttam X GP-180	-0.54	0.02	0.47	1.05**	-11.93**	-3.09
Pusa Uttam X KS-331	2.33*	8.09**	0.26	-0.11	-1.81	11.29*
Doli-5 X AB-07-08	1.53	4.49	-0.01	0.00	-10.34**	-4.85
Doli-5 X GBL-1	-7.40**	-10.91**	0.05	-0.40	4.43	22.12**
Doli-5 X GP-180	0.03	-0.44	0.50	-0.36	28.63**	-12.63**
Doli-5 X KS-331	4.56**	11.29**	-0.41	0.24	6.79*	-0.79
AB-07-08 X GBL-1	7.36**	17.29**	2.26**	0.32	6.08*	15.22**
AB-07-08 X GP-180	-0.54	1.76	-0.55	-0.83*	15.77**	-0.01
AB-07-08 X KS-331	1.66	-0.18	-0.10	0.10	3.62	14.37**
GBL-1 X GP-180	0.20	-3.31	0.34	-0.09	-31.91**	26.11**
GBL-1 X KS-331	-4.60**	-5.91*	-0.51	0.47	3.02	10.88*
GP-180 X KS-331	-1.17	-4.11	3.08**	2.72**	47.36**	-17.79**
S.E. ±	1.10	3.00	0.54	0.35	2.97	4.43
Range	-7.40 to 7.46	-13.71 to 17.29	-3.64 to 3.08	-0.83 to 2.72	-49.29 to 47.36	-24.06 to 31.71

*,** Significant at 5 % and 1 % levels, respectively.

significant sca effects for fruit yield, resulted from average x good, good x good and good x good general combiners, respectively.

If a cross combination exhibited high sca effects as well as *per se* performance having at least one parent as good general combiner for a particular trait, it is expected that such cross combinations would throw desirable transgressive segregants in later generations. Significant sca effects of those combinations involving good x good combiners showed the major role of additive type of gene effects, which is fixable. However, two good general combiners may not necessarily throw good segregants. Similarly, in the case of superior crosses involving both the poor x poor general combiners, very little gain is expected from such crosses because high sca effects may dissipate with the progress towards homozygosity.

Perusal of the data in the Table 4 revealed that the crosses having higher estimates of sca had resulted from good x good, good x average, good x poor, average x poor and poor x poor general combiners. Better performance of hybrids involving average x poor general combiners indicated dominance x dominance (epistasis) type of gene action (Jinks, 1956). Such cross could be utilized in the production of high yielding homozygous lines (Darrah and Hallauer, 1972). In the present study,

Table 3. Continues..

Crosses	Plant height (cm)	Fruit yield per plant (kg)	Fruit volume (cc)	Dry matter (mg/100 mg)	Total phenols (mg/100 mg)	Total soluble sugars (mg/100 mg)
NDB-18 X PPL-1	7.75**	0.05	12.66**	-0.32**	-0.06**	0.07**
NDB-18 X Pusa Uttam	1.03	-0.10	11.98**	0.48**	-0.03**	0.08**
NDB-18 X Doli-5	-2.61	0.23	-8.79**	-0.08	0.03**	-0.04**
NDB-18 X AB-07-08	-1.74	1.43**	3.33	-0.51**	0.02**	0.12**
NDB-18 X GBL-1	1.10	-0.89**	-16.39**	0.07	0.01	-0.08**
NDB-18 X GP-180	-5.01*	-0.58*	-50.49**	0.71**	-0.05**	0.02
NDB-18 X KS-331	-2.03	-0.60*	-12.01**	0.42**	0.05**	0.02
PPL-1 X Pusa Uttam	2.23	0.93**	-9.80**	0.74**	-0.03**	0.11**
PPL-1 X Doli-5	-4.04	1.34**	16.02**	-0.10	0.04**	0.07**
PPL-1 X AB-07-08	0.24	-0.27	10.15**	-0.52**	-0.03**	0.00
PPL-1 X GBL-1	-6.53**	-2.03**	-14.11**	-0.18	0.00	-0.11**
PPL-1 X GP-180	1.48	0.38	-21.90**	-0.08	0.01	-0.06**
PPL-1 X KS-331	-13.23**	-0.74**	-21.99**	0.11	0.01	0.12**
Pusa Uttam X Doli-5	-3.48	-0.54*	-3.66	0.63**	-0.04**	0.02
Pusa Uttam X AB-07-08	2.76	0.31	-17.13**	-1.03**	0.02**	0.08**
Pusa Uttam X GBL-1	-7.65**	0.21	-12.25**	-0.24*	-0.01	-0.08**
Pusa Uttam X GP-180	-6.05**	-0.13	14.68**	-0.03	-0.01	-0.03**
Pusa Uttam X KS-331	-2.56	0.58*	2.86	0.34**	0.03**	0.08**
Doli-5 X AB-07-08	-6.32**	-1.04**	7.12**	-0.06	0.04**	-0.14**
Doli-5 X GBL-1	4.83	1.97**	8.74**	-0.18	0.03**	0.09**
Doli-5 X GP-180	21.06**	0.53*	0.71	-0.07	0.03**	-0.01
Doli-5 X KS-331	2.48	0.70**	-1.21	-0.97**	-0.04**	-0.09**
AB-07-08 X GBL-1	9.32**	1.48**	29.46**	0.11	-0.02**	0.08**
AB-07-08 X GP-180	11.40**	1.73**	-16.87**	-0.03	-0.02**	0.00
AB-07-08 X KS-331	1.10	1.55**	-6.62**	0.17	-0.02**	-0.04**
GBL-1 X GP-180	0.74	0.87**	-8.56**	-0.13	0.01	-0.07**
GBL-1 X KS-331	1.52	1.25**	6.89**	-0.03	-0.01	-0.01
GP-180 X KS-331	1.94	1.34**	82.33**	-0.13	0.01	0.04**
S.E. ±	2.07	0.26	2.35	0.11	0.005	0.0089

Range -13.23 to 21.06 -2.03 to 1.97-50.49 to 82.33-1.03 to 0.74 -0.06 to 0.05 -0.14 to 0.12
*,** Significant at 5 % and 1 % levels, respectively.

Table 4. The three top ranking parents with respect to per se performance and gca effects; the three top ranking hybrids with respect to per se performance and sca effects and heterosis over better parent and check variety (GBL-1)

Characters	Best performing parents	Best general combiners	Best performing hybrids		Hybrids with high sca effects		sca effects	MP	Heterosis over BP	SC
Days to 50 % flowering	NDB-18	GBL-1	Doli-5 x GBL-1	A x G	Doli-5 x GBL-1	A x G	-7.40**	-12.59**	-9.36**	-9.36**
	KS-331	KS-331	GBL-1 x KS-331	G x G	Pusa Uttam x AB-07-08	A x A	-6.37**	-11.56**	-9.30**	-3.95*
	GBL-1	AB-07-08	Pusa Uttam x AB-07-08	A x A	PPL-1 x Pusa Uttam	P x A	-5.47**	-10.27**	-9.46**	-0.99
Days to first picking	NDB-18	GBL-1	Doli-5 x GBL-1	A x G	Pusa Uttam x AB-07-08	A x A	-13.71**	-14.71**	-9.66**	-1.03
	KS-331	KS-331	GBL-1 x KS-331	G x G	Doli-5 x GBL-1	A x G	-10.91**	-11.53**	-4.44**	-4.44*
	GBL-1	NDB-18	Pusa Uttam x AB-07-08	A x A	PPL-1 x GP-180	A x P	-8.94**	-12.97**	-12.36**	6.48**
Fruit length (cm)	GBL-1	GP-180	GP-180 x KS-331	G x P	GP-180 x KS-331	G x P	3.08**	21.11**	12.11**	12.09**
	GP-180	GBL-1	PPL-1 x GP-180	G x G	AB-07-08 x GBL-1	P x G	2.26**	17.36**	4.22**	4.20
	PPL-1	PPL-1	GBL-1 x GP-180	G x G	NDB-18 x Pusa Uttam	A x P	1.58**	7.22**	0.74	-0.57
Fruit girth (cm)	GBL-1	KS-331	GP-180 x KS-331	G x G	GP-180 x KS-331	G x G	2.72**	34.58**	28.83**	26.05**
	KS-331	GP-180	GBL-1 x KS-331	G x G	NDB-18 x PPL-1	P x P	1.76**	28.82**	26.59**	-20.84**
	AB-07-08	GBL-1	Pusa Uttam x GP-180	A x G	PPL-1 x GP-180	P x G	1.06**	23.42**	4.83**	-6.19
Average fruit weight (g)	GP-180	KS-331	GP-180 x KS-331	G x G	GP-180 x KS-331	G x G	47.36**	46.79**	2.79**	81.73**
	GBL-1	GP-180	Doli-5 x GP-180	A x G	Doli-5 x GP-180	A x G	28.63**	25.36**	-12.79**	54.19**
	PPL-1	GBL-1	AB-07-08 x GP-180	A x G	AB-07-08 x GP-180	A x G	15.77**	11.91**	-21.94**	38.01**
Number of fruits per plant	KS-331	GBL-1	GBL-1 x KS-331	G x G	NDB-18 x GP-180	A x P	31.71**	168.45**	93.47**	44.20**
	GBL-1	KS-331	Doli-5 x GBL-1	A x G	GBL-1 x GP-180	G x P	26.11**	122.26**	47.69**	47.68**
	Pusa Uttam	AB-07-08	AB-07-08 x GBL-1	G x G	Doli-5 x GBL-1	A x G	22.12**	84.07**	64.76**	64.75**

Table 4. Continues...

Characters	Best performing parents	Best general combiners	Best performing hybrids		Hybrids with high sca effects		sca effects	MP	Heterosis over BP	SC
Plant	AB-07-08	Pusa Uttam	Pusa Uttam x GBL-1	G x P	PPL-1 x KS-331	G x P	-13.23**	-24.11**	-9.64**	-18.27**
height (cm)	NDB-18	NDB-18	PPL-1 x KS-331	G x P	Pusa Uttam-1 x GBL-1	G x P	-7.65**	-14.80**	-9.89**	-19.21**
	Pusa Uttam	PPL-1	NDB-18 x AB-07-08	G x G	PPL-1 x GBL-1	G x P	-6.53**	-12.55**	-7.93**	-16.72**
Fruit yield	GBL-1	GBL-1	GBL-1 x KS-331	G x G	Doli-5 x GBL-1	A x G	1.97**	84.76**	42.50**	42.59**
per plant (kg)	KS-331	KS-331	AB-07-08 x KS-331	G x G	AB-07-08 x GP-180	G x G	1.73**	136.39**	125.78**	32.02**
	Pusa Uttam	AB-07-08	Doli-5 x GBL-1	A x G	AB-07-08 x KS-331	G x G	1.55**	102.20**	61.73**	43.53**
Fruit volume (cc)	GP-180	GP-180	GP-180 x KS-331	G x G	GP-180 x KS-331	G x G	82.33**	78.40**	40.84**	138.08**
	GBL-1	KS-331	Doli-5 x GP-180	P x G	AB-07-08 x GBL-1	P x G	29.46**	39.74**	17.39**	17.39**
	KS-331	GBL-1	GBL-1 x GP-180	G x G	PPL-1 x Doli-5	P x P	16.02**	23.10**	16.62**	-20.55**
Dry matter	AB-07-08	AB-07-08	Pusa Uttam x Doli-5	P x G	PPL-1 x Pusa Uttam	P x P	0.74**	11.43**	11.01**	-3.91
(mg/100 mg)	GBL-1	GBL-1	AB-07-08 x GBL-1	G x G	NDB-18 x GP-180	P x G	0.71**	12.56**	5.63**	-2.14
	DOLI-5	Doli-5	NDB-18 x GP-180	P x G	Pusa Uttam x Doli-5	P x G	0.63**	7.89**	0.68	-0.15
Total phenols	Doli-5	AB-07-08	NDB-18 x GP-180	A x P	NDB-18 x PPL-1	A x P	-0.06**	-19.38**	-24.09**	-10.49**
(mg/100 mg)	AB-07-08	KS-331	Doli-5 x KS-331	A x G	NDB-18 x GP-180	A x P	-0.05**	-16.00**	-18.60*	-10.96**
	KS-331	GBL-1	AB-07-08 x KS-331	G x G	Doli-5 x KS-331	A x G	-0.04**	-2.75**	-3.64**	-9.20**
Total soluble	Doli-5	Doli-5	Doli-5 x GBL-1	G x G	NDB-18 x AB-07-08	P x A	0.12**	18.78**	15.08**	-0.08
sugars	GBL-1	Pusa Uttam	NDB-18 x AB-07-08	P x A	PPL-1 x KS-331	P x P	0.12**	21.69**	21.05**	-1.71
(mg/100 mg)	GP-180	GBL-1	Pusa Uttam x AB-07-08	G x A	PPL-1 x Pusa Uttam	P x G	0.11**	23.48**	21.16**	1.14

* and ** significant at P = 0.05 and P = 0.01 levels, respectively; G = Good, A = Average; P = Poor

top three crosses which exhibited high sca effects for yield per plant involved at least one good general combiner, indicating additive x dominance type of gene interaction, which could produce desirable transgressive segregants in subsequent generations.

The crosses where poor x poor and poor x good general combiners producing high sca effects may be attributed due to presence of genetic diversity in the form of heterozygous loci for specific traits. Thus, the ideal crosses would be the one, which have good *per se* performance, high heterosis or heterobeltiosis, at least one good general combiner parent and high sca effects. On the basis of combining ability, the parent GBL-1 was good general combiner for quantitative traits and GBL-1, Doli-5 and GP-180 were found to be a good general combiner for qualitative traits. Considering mean performance, heterosis and combining ability, the hybrid GBL-1 x KS-331 was found promising for commercial exploitation

REFERENCES

1. Aswani, R. C. and Khandelwal, R. C. Combining ability studies in brinjal. *Indian J. Hort*., 2005; **62**(1): 37-40.
2. Baig, K. S. and Patil, V. D. Combining ability over environments for shoot and fruit borer resistance and other traits in brinjal (*Solanum melongena* L.). *Indian J. Genet*., 2002; **62**(1): 42-45.
3. Bisht, G. S., Singh, M.C., Singh, M., Singh, S.K. and Rai, M. Combining ability analysis in brinjal (*Solanum melongena* L.). *Veg. Sci.* 2006; **33**(1): 68-70.
4. Chaudhary, D. R. and Malhotra, S. K. Combining ability of physiological growth parameters in brinjal (*Solanum melongena* L.). *Indian J. Agric. Res*., 2000; **34**: 55-58.
5. Chaudhary, D. R. and Pathania, N. K. Inheritance of agronomical and physiological growth parameters in brinjal (*Solanum melongena* L.). *Him. J. Agric. Res.*, 2000; **26**: 62-66.
6. Darrah, L. L. and Hallauer, A. R. Genetic effects estimated from generation means in four diallel sets of maize inbreds. *Crop Sci*., 1972; **12**: 615-621.
7. Das, G. and Barua, S. N. 2001. Heterosis and combining ability for yield and its components in brinjal. *Ann. Agric. Res. New Series.* 22: 399-403.
8. Griffing, B. Concept of general and specific combining ability in relation to diallel crossing systems. *Austr. J. Biol. Sci*, 1956; **9**: 463-493.
9. Hanson, J. B., Bageman, R. H. and Fisher, M. E. The association of carbohydrates with the mitochondria of corn seedling. *Agron. J.*, 1960; **52**: 49-52.
10. Jinks, J. L. The F_2 and backcross generations from set of diallel crosses. *Heredity*. 1956; **10**: 1-30.
11. Kaur, J. Genetic architecture of fruit yield and quality characters in brinjal (*Solanum melongena* L.). M. Sc. Thesis, Gujarat Agricultural University, S. K. Nagar 1998.
12. Patel, N. B., Diallel analysis for yield, its components and quality traits in round fruited brinjal (*Solanum melongena* L.). M. Sc. Thesis. Gujarat Agricultural University. Anand Campus, Anand 2003.
13. Rao, Y.S.A. Diallel analysis over environments and stability parameters in brinjal (*Solanum melongena* L.). Ph.D. thesis submitted to Gujarat Agricultural University, S. K. Nagar 2003.
14. Sawant, S. V., Desai, U. T., Kale, P. N. and Joi, M. B. Combining ability studies in eggplant for wilt resistance and yield characters. *J. Maharashtra Agric. Univ.*, 1991; **16**: 343-346.
15. Shanmugapriya, P., Ramya, K. and Senthilkumar, N. Studies on combining ability and heterosis for yield and growth parameters in brinjal *(Solanum melongena L.) crop science* 2009; **36**(1): 68-72.
16. Singh, B. and Singh, A. K. Gene effects for various quantitative traits in brinjal (*Solanum melongena* L.). *Crop Res.*, 2004; **27**: 109-110.
17. Vadodaria, M. A., Mehta, D. R., Bhatiya V. J. and Dobariya, K. L. Combining ability for earliness and plant stature in brinjal (*Solanum melongena* L.). *Gujarat J. Applied Hort*., 2005; **5**(2): 71-77.
18. Vadodaria, M. A., Dobariya, K. L., Chovatiya, V. P. and Mehta, D. R. Combining ability studies for fruit yield and fruit borer resistance in brinjal (*Solanum melongena* L.) *Crop Improvement*, 2008; **35**(2): 195-199