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ESTIMATION OF COMBINING ABILITY FOR FRUIT YIELD AND ITS ATTRIBUTING TRAITS IN BRINJAL (*SOLANUM MELONGENA* L.)

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ABSTRACT

A study was undertaken to estimate combining ability for fruit yield and yield contributing components in brinjal using twenty-eight brinjal hybrids obtained from half-diallel of eight elite genotypes were evaluated along with their parents and standard check GJBH-4 during Late *kharif* 2022-23 (E_1), *Rabi* 2022-23 (E_2) and Early *Rabi* 2023-24 (E_3) at the Instructional Farm, Jambuvadi, College of Horticulture, J.A.U., Junagadh. The observations were recorded on five randomly selected plants for 12 traits *viz.*, number of primary branches, fruit length, fruit diameter, fruit weight, number of fruits per plant, fruit yield per plant. The pooled analysis of variance for combining ability revealed significant differences of GCA and SCA variances indicated that both additive and non-additive gene effects played an important role in the genetic control of all the traits. Parents JBR-21-14, JBL-21-09 and JBL-21-10 were good general combiners for fruit yield per plant as indicated by significant and positive gca effects. Out of 28 crosses, one, twelve, nine and thirteen crosses exhibited significant and positive sca effects in E_1, E_2, E_3 and in pooled, respectively for fruit yield per plant. The highest, estimates of sca effects in hybrids varied from 0.35 (JBR-20-01 x JBR-20-11); 0.80 (JBR-21-06 x JBL-21-10); 0.84 (JBL-21-09 x JBL-21-10) and 0.60 (JBL-21-09 x JBL-21-10) and in E_1, E_2, E_3 and on pooled, respectively. Cross JBL-21-09 x JBL-21-10 had highest significant and positive sca effect of fruit yield per plant which involves good x good combiner parents. This cross also expressed high sca effect for fruit diameter and fruit weight.

Key words : Brinjal, Combining ability, G x E interaction, GCA, SCA.

Introduction

Brinjal (*Solanum melongena* L.), also known as eggplant, is an important vegetable crop of India grown throughout the year. However, it is widely cultivated in both temperate and tropical regions of the globe mainly for its immature fruits as vegetables (Rai *et al.*, 1995), but in the temperate regions it is cultivated mainly during warm season. India is regarded as the primary centre of origin/diversity of brinjal (Vavilov, 1931 and Bhaduri, 1951). The general combining ability is primarily a measure of additive or fixable genetic variance and specific combining ability is mainly a function of dominance variance or non-fixable genetic variance. The random mating design is a useful tool for preliminary evaluation of genetic stock for use in hybridization programme with a view to identify good combiners, which may be used to build up a population with favourable and fixable genes for effective yield improvement. These studies provide necessary information regarding choice of parents and illustrate the nature and magnitude of gene action involved in expression of desirable traits. The crosses showing significantly desirable and reliable specific combining ability effects over wide range of environments have the potential of being commercially exploited for the production of F_1 hybrids. Studies on genetic divergence and combining ability of parents on one side and magnitude of heterosis on the other side will facilitate identification of heterotic hybrids.

Materials and Methods

The experimental material comprised of eight homozygous lines namely, JBR-20-01, JBR-20-11, JBR-21-06, JBR-21-14, JBR-20-06, JBL-21-12, JBL-21-09 and JBL-21-10. These eight parents were crossed with half-diallel mating design to derive 28 F_1 hybrids. The experiment was conducted in randomized block design with three replication during Late *kharif* 2022-23 (E_1), *Rabi* 2022-23 (E_2) and Early *Rabi* 2023-24 (E_3) at the Instructional Farm, Jambuvadi, College of Horticulture, J.A.U., Junagadh, India. Each entry was sown in a single row plot of 5.4 m length keeping row-to-row and plant-to-plant distance of 90 cm and 60 cm, respectively. The recommended package of practices and necessary plant protection measures were followed timely to raise a healthy crop of brinjal. For late *kharif*-2022-23 season, the nursery was raised during first week of July 2022; For *Rabi*-2022-23, the seeds were sown in nursery during last week of September 2022, while for early *Rabi*- 2023-24 season, the seeds were sown during last week of August 2023. Seedlings were transplanted in the field after 55 days of sowing in the nursery for both *rabi* and late *kharif* planting. Observations were recorded from five randomly selected plants in each replication for fruit length (cm), fruit girth (cm), number of fruits per plant, average fruit weight (g), number of primary branches per plant and fruit yield per plant (kg). The magnitude of heterosis in hybrids was expressed as percentage increase or decrease of a character over better parent and standard check variety (GJBH-4) using standard formula.

Results and Discussion

Analysis of variances for combining ability

The analysis of variance for combining ability, using diallel mating design in respect of eight parents and 28 crosses for all the six characters in individual environment is presented in Table 1. The analysis of variance in each environment (Griffings, 1956a Method II, Model I) revealed that mean square due to general combining ability (GCA) was significant for all the characters in all the three environments. Likewise, mean square due to specific combining ability (SCA) was significant for all the characters in all the three environments (except fruit yield per plant and total fruit yield in E_1). Significant mean squares due GCA and SCA for the concerned characters suggested difference among parents for GCA and among hybrids for SCA. The σ^2sca was considerably higher than their corresponding σ^2gca for all the characters in all the three environments (except fruit yield per plant and total fruit yield in E_1) (Table 1), which indicated preponderance of non-additive gene action in the inheritance of these traits. Significance of general and specific combining ability variances were also reported earlier for fruit yield and yield components by Bhatt (2018), Kaushik *et al.* (2018), Kolekar (2018), Kachouli *et al.* (2019) and Siva *et al.* (2020).

Estimation of general combining ability effects

Estimates of general combining ability for various traits have been presented in Table 2.

Fruit length (cm)

Only two parents in E_1, E_2, E_3 and pooled exhibited significant and positive gca effects. Among the parents, gca effect was significant and positive for JBL-21-12 in E_1 (1.40), E_2 (1.27), E_3 (1.34) and pooled (1.34) and JBL-21-09 in E_1 (0.36), E_2 (0.43), E_3 (0.42) and pooled (0.40). Hence, both parents were registered as good general combiners for fruit length. Further comparison across the environments indicated that the parents *viz.*, JBR-20-01 in E_1 (-1.05), E_2 (-1.03), E_3 (-1.07) and pooled (-1.05); JBR-20-11 in E_1 (-0.52), E_2 (-0.52), E_3 (-0.58) and

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

Source of variation	Env	df	Fruit length (cm)	Fruit diameter (cm)	No. of fruits per plant	Fruit weight (g)	No. of primary branches/plant	Fruit yield per plant (kg)
GCA	E_1		5.14**	1.08**	41.38**	377.84**	2.32**	0.19**
	E_2	7	4.77**	1.34**	109.86**	250.37**	2.15**	0.48**
	E_3		5.34**	0.99**	141.02**	494.33**	2.87**	0.59**
SCA	E_1		1.10**	0.24**	27.18**	114.59**	0.90**	0.02
	E_2	28	0.98**	0.35**	43.43**	157.65**	0.97**	0.23**
	E_3		1.08**	0.35**	46.62**	143.86**	0.90**	0.24**
Error	E_1		0.21	0.11	1.60	18.61	0.04	0.02
	E_2	70	0.26	0.05	1.62	11.45	0.03	0.01
	E_3		0.15	0.07	2.93	10.32	0.04	0.02

Table 2 : Estimates of general combining ability effects for different characters in brinjal.

S. no.	Genotypes	Number of fruits per plant				Fruit yield per plant (kg)			
		E_1	E_2	E_3	Pooled	E_1	E_2	E_3	Pooled
1	JBR-20-01	-1.98**	0.38	-1.51**	-1.04**	-0.06	0.02	0.002	-0.01
2	JBR-20-11	-2.14**	-4.58**	-4.93**	-3.88**	-0.02	-0.21**	-0.18**	-0.14**
3	JBR-21-06	-1.43**	0.26	1.03*	-0.04	-0.10*	0.01	0.04	-0.02
4	JBR-21-14	3.94**	6.23**	7.65**	5.94**	-0.04	0.24**	0.18**	0.13**
5	JBR-20-06	1.50**	-3.51**	-2.13**	-1.38**	-0.22**	-0.35**	-0.39**	-0.32**
6	JBL-21-12	0.41	-1.21**	-1.76**	-0.86**	0.18**	-0.09**	-0.07	0.01
7	JBL-21-09	0.30	0.89*	-0.50	0.23	0.08	0.07*	-0.01	0.05*
8	JBL-21-10	-0.60	1.52**	2.15**	1.02**	0.18**	0.31**	0.43**	0.31**
	SE.(gi) ±	0.37	0.38	0.51	0.24	0.05	0.03	0.04	0.02
	SE.(gi-gj) ±	0.57	0.57	0.77	0.37	0.07	0.05	0.07	0.04

S. no.	Genotypes	Fruit diameter (cm)				Fruit weight (g)			
		E_1	E_2	E_3	Pooled	E_1	E_2	E_3	Pooled
1	JBR-20-01	0.29**	0.33**	0.31**	0.31**	2.23	0.91	3.55**	2.23**
2	JBR-20-11	0.50**	0.59**	0.48**	0.52**	3.46**	5.66**	5.99**	5.04**
3	JBR-21-06	-0.11	0.12	-0.25**	-0.08	-1.53	-1.21	-1.65	-1.46*
4	JBR-21-14	0.06	-0.09	0.03	0.00	-8.16**	-6.99**	-9.64**	-8.17**
5	JBR-20-06	0.26**	0.18*	0.19*	0.21**	-9.61**	-5.49**	-9.91**	-8.34**
6	JBL-21-12	-0.40**	-0.49**	-0.48**	-0.46**	4.88**	0.28	2.70**	2.62**
7	JBL-21-09	-0.31**	-0.29**	-0.08	-0.23**	0.90	-0.98	-1.32	-0.47
8	JBL-21-10	-0.28**	-0.33**	-0.20*	-0.27**	7.84**	7.81**	10**	8.55**
	SE.(gi) ±	0.10	0.07	0.08	0.05	1.28	1.00	0.95	0.63
	SE.(gi-gj) ±	0.15	0.10	0.12	0.07	1.93	1.51	1.44	0.95

S. no.	Genotypes	Number of primary branches				Number of primary branches			
		E_1	E_2	E_3	Pooled	E_1	E_2	E_3	Pooled
1	JBR-20-01	-0.51**	-0.33**	-0.55**	-0.46**	-1.05**	-1.03**	-1.07**	-1.05**
2	JBR-20-11	0.23**	0.05	0.02	0.10**	-0.52**	-0.52**	-0.58**	-0.54**
3	JBR-21-06	-0.62**	-0.64**	-0.62**	-0.62**	-0.18	-0.07	0.06	-0.06
4	JBR-21-14	0.32**	0.33**	0.40**	0.35**	0.03	0.15	0.11	0.10
5	JBR-20-06	0.35**	0.45**	0.56**	0.45**	-0.23	-0.40**	-0.48**	-0.37**
6	JBL-21-12	0.61**	0.69**	0.68**	0.66**	1.40**	1.27**	1.34**	1.34**
7	JBL-21-09	-0.56**	-0.44**	-0.62**	-0.54**	0.36**	0.43**	0.42**	0.40**
8	JBL-21-10	0.19**	-0.11*	0.13*	0.07*	0.18	0.16	0.21	0.19*
	SE.(gi) ±	0.06	0.05	0.06	0.03	0.13	0.15	0.11	0.08
	SE.(gi-gj) ±	0.09	0.07	0.09	0.05	0.20	0.23	0.17	0.12

pooled (-0.54) and JBR-20-06 in E_2 (-0.40), E_3 (-0.48) and pooled (-0.37) recorded significant and negative gca effects, indicating poor general combiners for fruit length. The findings are in conformity with the reports of Gharghe *et al.* (2016), Makani *et al.* (2016), Bhatt (2018), Siva *et al.* (2020) and Zarna *et al.* (2020).

Fruit diameter (cm)

The gca effects of parents ranged from -0.40 (JBL-21-12) to 0.50 (JBR-20-11); -0.49 (JBL-21-12) to 0.59 (JBR-20-11); -0.48 (JBL-21-12) to 0.48 (JBR-20-11); and -0.46 (JBL-21-12) to 0.52 (JBR-20-11) in E_1, E_2, E_3 and on pooled, respectively. The gca effect was significant and positive for parents *viz.*, JBR-20-01 in (0.29) E_1, (0.33) E_2, (0.31) E_3 and (0.31) pooled; JBR-20-11 in (0.50) E_1, (0.59) E_2, (0.48) E_3 and (0.52) pooled and JBR-20-06 in (0.26) E_1, (0.18) E_2, (0.19) E_3 and (0.21) on pooled basis. Hence, they were registered as good general combiners for fruit diameter. Parents *viz.*, JBL-21-12 (-0.40), JBL-21-09 (-0.31) and JBL-21-10 (-0.28) in E_1; JBL-21-12 (-0.49), JBL-21-09 (-0.29) and JBL-21-10 (-0.33) in E_2; JBR-21-06 (-0.25), JBL-21-12 (-0.48), and JBL-21-10 (-0.20) in E_3 and JBL-21-12 (-0.46), JBL-21-09 (-0.23) and JBL-21-10 (-0.27) on pooled basis recorded significant and negative gca effects, indicating poor general combiners for fruit diameter. The findings are in conformity with the reports of Makani *et al.* (2016), Bhatt (2018), Siva *et al.* (2020) and Zarna *et al.* (2020).

Number of fruits per plant

There were three common parents in E_1, E_2, E_3 and pooled exhibited significant and positive gca effects. Among the parents, gca effects was significant and positive for JBR-21-14 in E_1 (0.32), E_2 (0.33), E_3 (0.40) and pooled (0.35); JBR-20-06 in E_1 (0.35), E_2 (0.45), E_3 (0.56) and pooled (0.45) and JBL-21-12 in E_1 (0.61), E_2 (0.69), E_3 (0.68) and pooled (0.66). However, parents namely JBR-20-11 in E_1 (0.23) and pooled basis (0.10) and JBL-21-10 in E_1 (0.19) E_2 (0.13) and pooled basis (0.07) were found significant and positive gca effects. Hence, they were also registered as good general combiners for number of primary branches. On the other hand, parents namely JBR-20-01 in E_1 (-0.51), E_2 (-0.33), E_3 (-0.55) and pooled (-0.46); JBR-21-06 in E_1 (-0.62), E_2 (-0.64), E_3 (-0.62) and pooled (0.62); JBL-21-09 in E_1 (-0.56), E_2 (-0.44), E_3 (-0.62) and pooled (-0.54) and JBL-21-10 in E_2 (-0.11) recorded significant and negative gca effect, indicating poor general combiner for number of primary branches per plant. The findings are in conformity with the reports of Gharghe *et al.* (2016), Bhatt (2018), Siva *et al.* (2020) and Zarna *et al.* (2020).

Fruit weight (g)

The gca effects of parents varied from -9.61 (JBR-20-06) to 7.84 (JBL-21-10); -6.99 (JBR-21-14) to 7.81 (JBL-21-10); -9.91 (JBR-20-06) to 10.00 (JBL-21-10) and -8.34 (JBR-20-06) to 8.55 (JBL-21-10) in E_1, E_2, E_3 and pooled, respectively. The significant and positive gca effects were observed for JBR-20-11 (3.46), JBL-21-12 (4.88) and JBL-21-10 (7.84) in E_1; JBR-20-11 (5.66) and

Table 3 : Estimates of specific combining ability effects for fruit length (cm) in brinjal.

S. no.	Genotypes	Fruit length (cm)			
		E_1	E_2	E_3	Pooled
1	JBR-20-01 x JBR-20-11	0.48	0.31	0.61	0.47
2	JBR-20-01 x JBR-21-06	-0.74	-1.10*	-1.23**	-1.03**
3	JBR-20-01 x JBR-21-14	-0.34	-0.64	-0.54	-0.51*
4	JBR-20-01 x JBR-20-06	0.42	0.13	0.52	0.36
5	JBR-20-01 x JBL-21-12	1.18**	1.47**	1.09**	1.25**
6	JBR-20-01 x JBL-21-09	-0.63	0.06	-0.22	-0.26
7	JBR-20-01 x JBL-21-10	0.32	-0.20	0.12	0.08
8	JBR-20-11 x JBR-21-06	-1.64**	-1.08*	-1.11**	1.28**
9	JBR-20-11 x JBR-21-14	0.29	0.23	0.43	0.31
10	JBR-20-11 x JBR-20-06	-1.30**	-0.88	-1.00**	-1.06**
11	JBR-20-11 x JBL-21-12	1.18**	0.99*	0.96**	1.04**
12	JBR-20-11 x JBL-21-09	0.08	-0.05	0.21	0.08
13	JBR-20-11 x JBL-21-10	1.57**	1.44**	1.14**	1.39**
14	JBR-21-06 x JBR-21-14	0.02	-0.18	-0.23	-0.13
15	JBR-21-06 x JBR-20-06	0.34	0.22	0.28	0.28
16	JBR-21-06 x JBL-21-12	0.58	0.46	0.53	0.52*
17	JBR-21-06 x JBL-21-09	1.57**	1.70**	1.61**	1.63**
18	JBR-21-06 x JBL-21-10	-0.42	-1.05*	-1.06**	-0.84**
19	JBR-21-14 x JBR-20-06	0.20	0.63	0.57	0.47
20	JBR-21-14 x JBL-21-12	0.58	0.04	0.41	0.34
21	JBR-21-14 x JBL-21-09	-1.27**	-1.40**	-1.05**	-1.24**
22	JBR-21-14 x JBL-21-10	-0.01	0.05	0.03	0.02
23	JBR-20-06 x JBL-21-12	-1.79**	-2.15**	-2.22**	-2.05**
24	JBR-20-06 x JBL-21-09	-0.81*	-0.58	-0.91**	-0.76**
25	JBR-20-06 x JBL-21-10	0.48	0.56	0.96**	0.67**
26	JBL-21-12 x JBL-21-09	2.10**	1.41**	1.96**	1.82**
27	JBL-21-12 x JBL-21-10	-1.57**	-1.31**	-1.71**	-1.53**
28	JBL-21-09 x JBL-21-10	-0.60	-0.52	-0.29	-0.47
	SE (S_{ij})	0.41	0.46	0.35	0.24
	SE (S_{ij}-S_{ik})	0.61	0.69	0.52	0.35
	SE (S_{ij}-S_{kl})	0.58	0.65	0.49	0.33
	Number of significant crosses in desirable direction	05	05	06	09

Table 4 : Estimates of specific combining ability effects for fruit diameter (cm) in brinjal.

S. no.	Genotypes	Fruit diameter (cm)			
		E_1	E_2	E_3	Pooled
1	JBR-20-01 x JBR-20-11	-0.36	0.27	-0.53*	-0.20
2	JBR-20-01 x JBR-21-06	-0.17	-0.47*	-0.58*	-0.41**
3	JBR-20-01 x JBR-21-14	0.08	0.22	0.43	0.24
4	JBR-20-01 x JBR-20-06	-0.23	-0.05	-0.87**	-0.38**
5	JBR-20-01 x JBL-21-12	0.31	-0.14	0.82**	0.33*
6	JBR-20-01 x JBL-21-09	-0.42	-0.69**	-0.34	-0.48**
7	JBR-20-01 x JBL-21-10	-0.31	0.14	-0.22	-0.13
8	JBR-20-11 x JBR-21-06	0.67*	0.58**	0.58*	0.61**
9	JBR-20-11 x JBR-21-14	-0.06	-0.25	0.16	-0.05
10	JBR-20-11 x JBR-20-06	0.37	-0.08	1.09**	0.46**
11	JBR-20-11 x JBL-21-12	-0.48	-1.25**	-0.46	-0.73**
12	JBR-20-11 x JBL-21-09	-0.30	0.00	-0.68**	-0.33*
13	JBR-20-11 x JBL-21-10	-0.54	-0.17	-0.60*	-0.44**
14	JBR-21-06 x JBR-21-14	-0.35	0.00	0.08	-0.09
15	JBR-21-06 x JBR-20-06	-0.54	-0.66**	0.17	-0.34*
16	JBR-21-06 x JBL-21-12	-0.25	0.04	-0.54*	-0.25
17	JBR-21-06 x JBL-21-09	0.04	0.13	-0.19	-0.01
18	JBR-21-06 x JBL-21-10	-0.19	-0.86**	0.04	-0.33*
19	JBR-21-14 x JBR-20-06	0.93**	1.05**	1.04**	1.01**
20	JBR-21-14 x JBL-21-12	0.48	0.22	0.09	0.26
21	JBR-21-14 x JBL-21-09	-0.48	-0.58**	-0.43	-0.49**
22	JBR-21-14 x JBL-21-10	-0.44	0.11	-0.76**	-0.36*
23	JBR-20-06 x JBL-21-12	0.48	0.92**	0.08	0.49**
24	JBR-20-06 x JBL-21-09	-0.80**	-0.90**	-0.39	-0.70**
25	JBR-20-06 x JBL-21-10	0.07	0.77**	-0.38	0.15
26	JBL-21-12 x JBL-21-09	-0.39	-0.03	-0.28	-0.23
27	JBL-21-12 x JBL-21-10	0.08	-0.04	0.23	0.09
28	JBL-21-09 x JBL-21-10	0.73*	0.39	0.44	0.52**
	SE (S_{ij})	0.30	0.20	0.24	0.14
	SE (S_{ij}-S_{ik})	0.44	0.30	0.36	0.21
	SE (S_{ij}-S_{kl})	0.41	0.28	0.34	0.20
	Number of significant crosses in desirable direction	03	04	04	06

JBL-21-10 (7.81) in E_2; JBR-20-01 (3.55), JBR-20-11 (5.99), JBL-21-12 (2.70) and JBL-21-10 (10.00) in E_3 and JBR-20-01 (2.23), JBR-20-11 (5.04), JBL-21-12 (2.62) and JBL-21-10 (8.55) on pooled basis. Hence, they were registered as good general combiners for average fruit weight. Further comparison across the environments indicated that the parents *viz.*, JBR-21-06 (-1.46) on pooled basis; JBR-21-14 in E_1 (-8.16), E_2 (-6.99), E_3 (-9.64) and pooled (-8.17) and JBR-20-06 in E_1(-9.61), E_2 (-5.49), E_3 (-9.91) and on pooled basis (-8.34) recorded significant and negative gca effects, indicating poor general combiners for average fruit weight. The findings are in conformity with the reports of Gharghe *et al*. (2016), Makani *et al.* (2016), Bhatt (2018), Siva *et al.* (2020) and Zarna *et al.* (2020).

Number of primary branches

There were three common parents in E_1, E_2, E_3 and pooled exhibited significant and positive gca effects. Among the parents, gca effects was significant and positive for JBR-21-14 in E_1 (0.32), E_2 (0.33), E_3 (0.40) and pooled (0.35); JBR-20-06 in E_1 (0.35), E_2 (0.45), E_3 (0.56) and pooled (0.45) and JBL-21-12 in E_1 (0.61), E_2 (0.69), E_3 (0.68) and pooled (0.66). However, parents namely JBR-20-11 in E_1 (0.23) and pooled basis (0.10) and JBL-21-10 in E_1 (0.19) E_2 (0.13) and pooled basis (0.07) were found significant and positive gca effects. Hence, they were also registered as good general combiners for number of primary branches. On the other hand, parents namely, JBR-20-01 in E_1 (-0.51), E_2 (-0.33), E_3 (-0.55) and pooled (-0.46); JBR-21-06 in E_1 (-0.62), E_2 (-0.64), E_3 (-0.62) and pooled (0.62); JBL-21-09 in E_1 (-0.56), E_2 (-0.44), E_3 (-0.62) and pooled (-0.54) and JBL-21-10 in E_2 (-0.11) recorded significant and negative gca effect, indicating poor general combiner for number of primary branches per plant. The findings are in conformity with the reports of Makani *et al.* (2016), Bhatt (2018), Siva *et al.* (2020) and Zarna *et al.* (2020).

Fruit yield per plant (kg)

The gca effects of parents varied from -0.22 (JBR-20-06) to 0.18 (JBL-21-12 and JBL-21-10) in E_1; -0.35 (JBR-20-06) to 0.31 (JBL-21-10) in E_2; -0.39 (JBR-20-06) to 0.43 (JBL-21-10) in E_3 and -0.32 (JBR-20-06) to 0.31 (JBL-21-10) in pooled. Among the parents, gca effect was significant and positive for JBL-21-12 and JBL-21-10 (0.18) in E_1; JBR-21-14 (0.24), JBL-21-09 (0.07) and JBL-21-10 (0.31) in E_2; JBR-21-14 (0.18) and JBL-21-10 (0.43) in E_3 and JBR-21-14 (0.13), JBL-21-09 (0.05) and JBL-21-10 (0.31) on pooled basis. Hence, they were registered as good general combiners for fruit yield per plant. On the other hand, parents *viz.*, JBR-21-06 (-0.10) and JBR-20-06 (-0.22) in E_1; JBR-20-11 (-0.21), JBR-20-06 (-0.35) and JBL-21-12 (-0.09) in E_2; JBR-20-11 (-0.18) and JBR-20-06 (-0.39) in E_3 and JBR-20-11 (-0.14)

Table 5 : Estimates of specific combining ability effects for number of fruits per plant in brinjal.

S. no.	Genotypes	Number of fruits per plant			
		E_1	E_2	E_3	Pooled
1	JBR-20-01 x JBR-20-11	-1.74	1.78	3.38*	1.14
2	JBR-20-01 x JBR-21-06	-3.11**	2.46*	3.69*	1.01
3	JBR-20-01 x JBR-21-14	1.71	9.04**	4.66**	5.14**
4	JBR-20-01 x JBR-20-06	-6.92**	-5.29**	-7.69**	-6.63**
5	JBR-20-01 x JBL-21-12	3.65**	1.28	1.21	2.05**
6	JBR-20-01 x JBL-21-09	2.09	-2.42*	-1.25	-0.53
7	JBR-20-01 x JBL-21-10	-8.55**	-10.38**	-10.57**	-9.83**
8	JBR-20-11 x JBR-21-06	-5.22**	-9.31**	-10.02**	-8.18**
9	JBR-20-11 x JBR-21-14	-1.46	6.6**	0.95	2.03**
10	JBR-20-11 x JBR-20-06	-0.76	1.54	2.14	0.97
11	JBR-20-11 x JBL-21-12	-0.93	-0.76	-1.10	-0.93
12	JBR-20-11 x JBL-21-09	4.78**	-5.52**	-5.29**	-2.01**
13	JBR-20-11 x JBL-21-10	9.68**	1.64	13.93**	8.42**
14	JBR-21-06 x JBR-21-14	-5.10**	2.35*	1.59	-0.39
15	JBR-21-06 x JBR-20-06	-0.53	-3.18**	-5.23**	-2.98**
16	JBR-21-06 x JBL-21-12	5.97**	6.19**	5.67**	5.94**
17	JBR-21-06 x JBL-21-09	1.21	-7.84**	-9.25**	-5.30**
18	JBR-21-06 x JBL-21-10	6.51**	10.86**	8.97**	8.78**
19	JBR-21-14 x JBR-20-06	9.09**	-11.47**	0.15	-0.74
20	JBR-21-14 x JBL-21-12	3.19**	-0.96	3.25*	1.83*
21	JBR-21-14 x JBL-21-09	-4.9**	8.00**	-0.95	0.72
22	JBR-21-14 x JBL-21-10	1.20	0.97	-0.53	0.55
23	JBR-20-06 x JBL-21-12	4.23**	7.24**	7.50**	6.32**
24	JBR-20-06 x JBL-21-09	-1.47	9.34**	8.64**	5.50**
25	JBR-20-06 x JBL-21-10	5.17**	5.97**	2.78	4.64**
26	JBL-21-12 x JBL-21-09	2.43*	6.51**	11.27**	6.74**
27	JBL-21-12 x JBL-21-10	-3.60**	-5.12**	-7.78**	-5.50**
28	JBL-21-09 x JBL-21-10	-6.29**	0.58	2.16	-1.19
	SE (S_{ij})	1.15	1.15	1.55	0.75
	SE (S_{ij}-S_{ik})	1.70	1.71	2.30	1.11
	SE (S_{ij}-S_{kl})	1.60	1.61	2.17	1.05
	Number of significant crosses in desirable direction	10	11	10	11

and JBR-20-06 (-0.32) on pooled basis recorded significant and negative gca effects, indicating poor general combiners for fruit yield per plant. The findings are in conformity with the reports of Gharghe *et al.* (2016), Makani *et al.* (2016), Bhatt (2018), Siva *et al.* (2020) and Zarna *et al.* (2020).

The gca effects of parents are presented in Table 1. The perusal of general combining ability effects of parents revealed that parents JBR-21-14, JBL-21-09 and JBL-21-10 were good general combiners for fruit yield per plant having concentration of favourable genes as indicated by significant and positive gca effects for these parents. Besides having good combining ability effects for fruit yield per plant, parent JBR-21-14 was also observed good combiner for number of primary branches, number of fruits per plant and fruit yield per plant; parent JBL-21-09 was also observed good combiner for fruit length and fruit yield per plant and parent JBL-21-10 was also observed good combiner for number of primary branches, fruit length, fruit weight, number of fruits per plant and fruit yield per plant. The high gca effects for fruit yield and its different components traits were also reported by Gharghe *et al.* (2016), Makani *et al.* (2016), Bhatt (2018), Siva *et al.* (2020) and Zarna *et al.* (2020).

Estimation of specific combining ability

The estimate of specific combining ability (sca) effects of the crosses for different characters for individual and pooled over environments are presented in Tables 3 to 8. The salient features of the results of specific combining ability effects for different characters are given below:

Fruit length (cm) : The estimates of sca effects in crosses varied from -1.79 (JBR-20-06 x JBL-21-12) to 2.10 (JBL-21-12 x JBL-21-09); -2.15 (JBR-20-06 x JBL-21-12) to 1.70 (JBR-21-06 x JBL-21-09); -2.22 (JBR-20-06 x JBL-21-12) to 1.96 (JBL-21-12 x JBL-21-09) and -2.05 (JBR-20-06 x JBL-21-12) to 1.82 (JBL-21-12 x JBL-21-09) in E_1, E_2, E_3 and on pooled, respectively. Out of 28 crosses, five, six and nine crosses exhibited significant and positive (desirable) sca effects in E_1, E_2 and E_3 pooled, respectively for fruit length. The highest, significant and positive sca effect was observed for JBR-21-06 x JBL-21-09 (1.70) in E_2 and JBL-21-12 x JBL-21-09 (2.10, 1.96 and 1.82) in E_1, E_3 and pooled, respectively for fruit length (Table 3). The significant sca effects for fruit yield and different component traits were also recorded by Makani *et al.* (2016), Kumar *et al.* (2017), Bhatt (2018) and Zarna *et al.* (2020).

Fruit diameter (cm) : The estimates of sca effects in crosses varied from -0.80 (JBR-20-06 x JBL-21-09) to 0.93 (JBR-21-14 x JBR-20-06); -1.25 (JBR-20-11 x JBL-21-12) to 1.05 (JBR-21-14 x JBR-20-06); -0.87

Table 6 : Estimates of specific combining ability effects for fruit weight (g) in brinjal.

S. no.	Genotypes	Fruit weight (g)			
		E_1	E_2	E_3	Pooled
1	JBR-20-01 x JBR-20-11	16.80**	15.40**	12.61**	14.94**
2	JBR-20-01 x JBR-21-06	7.07	9.16**	8.55**	8.26**
3	JBR-20-01 x JBR-21-14	-7.38	-7.74*	-0.21	-5.11**
4	JBR-20-01 x JBR-20-06	10.67**	6.19*	7.63**	8.16**
5	JBR-20-01 x JBL-21-12	-5.02	-4.87	-4.88	-4.92*
6	JBR-20-01 x JBL-21-09	-5.16	-4.59	-3.71	-4.49*
7	JBR-20-01 x JBL-21-10	17.17**	22.76**	19.37**	19.77**
8	JBR-20-11 x JBR-21-06	10.08*	18.83**	6.26*	11.72**
9	JBR-20-11 x JBR-21-14	0.93	-4.10	-1.59	-1.59
10	JBR-20-11 x JBR-20-06	-0.87	-5.72	-5.53	-4.04*
11	JBR-20-11 x JBL-21-12	3.90	2.38	-2.09	1.40
12	JBR-20-11 x JBL-21-09	-10.45**	-9.47**	-22.09**	-14.00**
13	JBR-20-11 x JBL-21-10	-21.32**	-30.55**	-21.93**	-24.60**
14	JBR-21-06 x JBR-21-14	9.42*	12.67**	16.12**	12.74**
15	JBR-21-06 x JBR-20-06	-2.19	-8.30**	-1.42	-3.97*
16	JBR-21-06 x JBL-21-12	-6.37	-6.05*	-9.14**	-7.19**
17	JBR-21-06 x JBL-21-09	1.65	-1.95	4.55	1.42
18	JBR-21-06 x JBL-21-10	-11.17**	-1.29	-1.34	-4.60*
19	JBR-21-14 x JBR-20-06	-11.43**	7.42*	-14.08**	-6.03**
20	JBR-21-14 x JBL-21-12	-3.62	-0.13	1.67	-0.69
21	JBR-21-14 x JBL-21-09	7.25	3.12	4.30	4.89*
22	JBR-21-14 x JBL-21-10	0.62	-1.39	-2.56	-1.11
23	JBR-20-06 x JBL-21-12	-9.11*	-8.22**	-6.97*	-8.10**
24	JBR-20-06 x JBL-21-09	4.02	-0.12	10.34**	4.75*
25	JBR-20-06 x JBL-21-10	-3.42	-9.28**	-2.65	-5.12**
26	JBL-21-12 x JBL-21-09	-7.52	-2.10	-3.26	-4.29*
27	JBL-21-12 x JBL-21-10	9.40*	9.83**	6.65*	8.63**
28	JBL-21-09 x JBL-21-10	21.40**	26.05**	20.36**	22.60**
	SE (S_{ij})	3.91	3.07	2.91	1.92
	SE (S_{ij}-S_{ik})	5.79	4.54	4.31	2.84
	SE (S_{ij}-S_{kl})	5.46	4.28	4.06	2.68
	Number of significant crosses in desirable direction	07	09	09	10

(JBR-20-01 x JBR-20-06) to 1.09 (JBR-20-11 x JBR-20-06) and -0.73 (JBR-20-11 x JBL-21-12) to 1.01 (JBR-21-14 x JBR-20-06) in E_1, E_2, E_3 and on pooled, respectively. Out of 28 crosses, three, four, four and six crosses exhibited significant and positive (desirable) sca effects in E_1, E_2, E_3 and pooled, respectively for fruit diameter. The highest, positive sca effect was observed for JBR-20-11 x JBR-20-06 (1.09) in E_3 and JBR-21-14 x JBR-20-06 (0.93, 1.05 and 1.01) in E_1, E_2 and pooled, respectively for fruit diameter (Table 4). The significant sca effects for fruit yield and different component traits were also recorded by Akpan *et al.* (2016), Gharge *et al.* (2016), Makani *et al.* (2016), Bhatt (2018) and Zarna *et al.* (2020).

Number of fruits per plant

The estimates of sca effects in crosses varied from -8.55 (JBR-20-01 x JBL-21-10) to 9.68 (JBR-20-11 x JBL-21-10); -11.47 (JBR-21-14 x JBR-20-06) to 10.86 (JBR-21-06 x JBL-21-10); -10.57 (JBR-20-01 x JBL-21-10) to 13.93 (JBR-20-11 x JBL-21-10) and -9.83 (JBR-20-01 x JBL-21-10) to 8.78 (JBR-21-06 x JBL-21-10) in E_1, E_2, E_3 and on pooled, respectively. Out of 28 crosses, 10, 11, 10 and 11 crosses exhibited significant and positive (desirable) sca effects in E_1, E_2, E_3 and on pooled, respectively for number of fruits per plant. The highest, significant and positive sca effect was observed by JBR-20-11 x JBL-21-10 (9.68 and 13.93) in E_1 and E_3, respectively and JBR-21-06 x JBL-21-10 (10.86) in E_2 and (8.78) on pooled basis for number of fruits per plant **(Table 5)**. The significant sca effects for fruit yield and different component traits were also recorded by Gharge *et al.* (2016), Makani *et al.* (2016), Kumar *et al.* (2017), Bhatt (2018) and Zarna *et al.* (2020).

Fruit weight (g)

The spectrum of variation for sca effects in crosses ranged from -21.32 (JBR-20-11 x JBL-21-10) to 21.40 (JBL-21-09 x JBL-21-10); -30.55 (JBR-20-11 x JBL-21-10) to 26.05 (JBL-21-09 x JBL-21-10); -22.09 (JBR-20-11 x JBL-21-09) to 20.36 (JBL-21-09 x JBL-21-10) and -24.60 (JBR-20-11 x JBL-21-10) to 22.60 (JBL-21-09 x JBL-21-10) in E_1, E_2, E_3 and on pooled, respectively. Out of 28 crosses, seven, nine, nine and 10 crosses exhibited significant and positive sca effects in E_1, E_2, E_3 and on pooled, respectively for fruit weight. The highest, significant and positive sca effect was observed by JBL-21-09 x JBL-21-10 with a value of 21.40, 26.05, 20.36 and 22.60 in E_1, E_2, E_3 and on pooled, respectively for fruit weight (Table 6). The significant sca effects for fruit yield and different component traits were also recorded by Gharge *et al.* (2016), Makani *et al.* (2016), Kumar *et al.* (2017), Bhatt (2018) and Zarna *et al.* (2020).

Number of primary branches

Crosses of genotypes varied in their sca effects from

Table 7 : Estimates of specific combining ability effects for number of primary branches in brinjal.

S. no.	Genotypes	Number of primary branches			
		E_1	E_2	E_3	Pooled
1	JBR-20-01 x JBR-20-11	0.39*	-0.07	-0.26	0.02
2	JBR-20-01 x JBR-21-06	0.57**	0.89**	0.58**	0.68**
3	JBR-20-01 x JBR-21-14	-0.49**	-0.07	-0.37	-0.31**
4	JBR-20-01 x JBR-20-06	-0.32	-0.39**	-0.53**	-0.41**
5	JBR-20-01 x JBL-21-12	-0.58**	-0.91**	-0.45*	-0.65**
6	JBR-20-01 x JBL-21-09	-0.08	-0.24	-0.36	-0.23*
7	JBR-20-01 x JBL-21-10	-0.03	0.03	-0.04	-0.01
8	JBR-20-11 x JBR-21-06	-1.37**	-0.36*	-0.80**	0.84**
9	JBR-20-11 x JBR-21-14	-0.10	0.41**	-0.08	0.08
10	JBR-20-11 x JBR-20-06	-1.79**	-1.77**	-1.77**	-1.78**
11	JBR-20-11 x JBL-21-12	-1.05**	-1.29**	-0.96**	-1.10**
12	JBR-20-11 x JBL-21-09	0.05	-0.09	0.27	0.08
13	JBR-20-11 x JBL-21-10	0.70**	0.58**	0.32	0.54**
14	JBR-21-06 x JBR-21-14	-0.92**	-1.17**	-1.10**	1.06**
15	JBR-21-06 x JBR-20-06	-0.88**	-1.42**	-1.26**	-1.19**
16	JBR-21-06 x JBL-21-12	-0.81**	-0.40**	-0.25	-0.49**
17	JBR-21-06 x JBL-21-09	0.83**	0.93**	0.64**	0.80**
18	JBR-21-06 x JBL-21-10	-0.25	0.07	0.50**	0.10
19	JBR-21-14 x JBR-20-06	0.25	-0.51**	-0.08	0.11
20	JBR-21-14 x JBL-21-12	0.26	-0.49**	-0.86**	-0.37**
21	JBR-21-14 x JBL-21-09	-0.31	-0.23	-0.04	-0.19
22	JBR-21-14 x JBL-21-10	0.21	0.31*	0.08	0.20*
23	JBR-20-06 x JBL-21-12	-0.83**	-0.48**	-0.42*	0.58**
24	JBR-20-06 x JBL-21-09	-0.53**	-0.21	-0.33	-0.36**
25	JBR-20-06 x JBL-21-10	1.12**	0.99**	1.26**	1.12**
26	JBL-21-12 x JBL-21-09	1.27**	0.07	0.42*	0.59**
27	JBL-21-12 x JBL-21-10	-0.87**	-1.06**	-1.20**	-1.04**
28	JBL-21-09 x JBL-21-10	0.03	0.27	-0.04	0.09
	SE (S_{ij})	0.18	0.15	0.19	0.10
	SE (S_{ij}-S_{ik})	0.27	0.22	0.28	0.15
	SE (S_{ij}-S_{kl})	0.25	0.21	0.26	0.14
	Number of significant crosses in desirable direction	06	06	05	09

-1.79 (JBR-20-11 x JBR-20-06) to 1.27 (JBL-21-12 x JBL-21-09); -1.77 (JBR-20-11 x JBR-20-06) to 0.99 (JBR-20-06 x JBL-21-10); -1.77 (JBR-20-11 x JBR-20-06) to 1.26 (JBR-20-06 x JBL-21-10) and -1.78 (JBR-20-11 x JBR-20-06) to 1.12 (JBR-20-06 x JBL-21-10) in E_1, E_2, E_3 and on pooled, respectively. Out of 28 crosses, six, six, five and nine crosses exhibited significant and positive sca effects in E_1, E_2, E_3 and on pooled, respectively for number of primary branches per plant. The highest, significant and positive sca effect was recorded by hybrid JBL-21-12 x JBL-21-09 (1.27) in E_1; and JBR-20-06 x JBL-21-10 (0.99, 1.26 and 1.12) in E_2, E_3 and on pooled, respectively for number of primary branches per plant (Table 7). The significant sca effects for fruit yield and different component traits were also recorded by Akpan *et al*. (2016), Gharge *et al.* (2016), Bhatt (2018) and Zarna *et al.* (2020).

Fruit yield per plant (kg)

The estimates of sca effects in crosses varied from -0.18 (JBR-20-01 x JBL-21-10) to 0.35 (JBR-20-01 x JBR-20-11); -0.60 (JBR-21-06 x JBL-21-09) to 0.80 (JBR-21-06 x JBL-21-10); -0.80 (JBR-20-11 x JBL-21-09) to 0.84 (JBL-21-09 x JBL-21-10) and -0.47 (JBR-20-11 x JBL-21-09) to 0.60 (JBL-21-09 x JBL-21-10) and in E_1, E_2, E_3 and on pooled, respectively.

Out of 28 crosses, one, twelve, nine and thirteen crosses exhibited significant and positive sca effects in E_1, E_2, E_3 and in pooled, respectively for fruit yield per plant. The highest, significant and positive sca effect was observed 0.35 (JBR-20-01 x JBR-20-11) in E_1; 0.80 (JBR-21-06 x JBL-21-10) in E_2; 0.84 (JBL-21-09 x JBL-21-10) in E_3 and 0.60 (JBL-21-09 x JBL-21-10) pooled, respectively for high fruit yield per plant (Table 8). The significant sca effects for fruit yield and different component traits were also recorded by Akpan *et al*. (2016), Gharge *et al.* (2016), Makani *et al*. (2016), Kumar *et al*. (2017), Bhatt (2018) and Zarna *et al.* (2020).

The best three hybrids for fruit yield per plant on the basis of *per se* performance, *viz*., JBL-21-09 x JBL-21-10 (good x good), JBR-21-06 x JBL-21-10 (average x good) and JBR-21-06 x JBR-21-14 (average x good) had significant desired sca effects. This indicated that generally one or both parents with good gca effects are desirable for producing high yielding hybrids. However, there is one different cross exhibited higher sca effects and ranking of remaining two crosses was also differed. Similar findings were by Suneetha *et al*. (2006) and Bhatt (2018). Thus, on the basis of these results it is expected that these three crosses may give desirable segregates in subsequent generations and hence, it would be worthwhile to use them for genetic improvement of fruit yield *per se*. A summarized account of the best performing parents, best general combiners, best performing hybrids

Table 8 : Estimates of specific combining ability effects for fruit yield per plant (kg) in brinjal.

S. no.	Genotypes	Fruit yield per plant (kg)			
		E_1	E_2	E_3	Pooled
1	JBR-20-01 x JBR-20-11	0.35*	0.56**	0.62**	0.51**
2	JBR-20-01 x JBR-21-06	0.02	0.49**	0.55**	0.35**
3	JBR-20-01 x JBR-21-14	-0.08	0.3**	0.32*	0.18*
4	JBR-20-01 x JBR-20-06	-0.04	-0.20*	-0.27	-0.17*
5	JBR-20-01 x JBL-21-12	0.14	0.03	0.02	0.06
6	JBR-20-01 x JBL-21-09	0.01	-0.25*	-0.20	-0.15*
7	JBR-20-01 x JBL-21-10	-0.18	-0.37**	-0.38**	-0.31**
8	JBR-20-11 x JBR-21-06	-0.09	-0.45**	-0.55**	-0.36**
9	JBR-20-11 x JBR-21-14	0.01	0.41**	0.11	0.18*
10	JBR-20-11 x JBR-20-06	-0.01	0.03	0.07	0.03
11	JBR-20-11 x JBL-21-12	0.08	0.03	-0.06	0.02
12	JBR-20-11 x JBL-21-09	-0.03	-0.57**	-0.80**	-0.47**
13	JBR-20-11 x JBL-21-10	-0.09	-0.59**	0.27	-0.14*
14	JBR-21-06 x JBR-21-14	0.02	0.57**	0.71**	0.43**
15	JBR-21-06 x JBR-20-06	-0.08	-0.37**	-0.33*	-0.26**
16	JBR-21-06 x JBL-21-12	0.17	0.27**	0.09	0.18*
17	JBR-21-06 x JBL-21-09	0.13	-0.60**	-0.55**	-0.34**
18	JBR-21-06 x JBL-21-10	0.08	0.80**	0.64**	0.50**
19	JBR-21-14 x JBR-20-06	-0.17	-0.56**	-0.57**	-0.43**
20	JBR-21-14 x JBL-21-12	0.11	-0.03	0.32*	0.13
21	JBR-21-14 x JBL-21-09	-0.04	0.59**	0.04	0.20**
22	JBR-21-14 x JBL-21-10	0.20	0.07	-0.05	0.07
23	JBR-20-06 x JBL-21-12	-0.05	0.27**	0.26	0.16*
24	JBR-20-06 x JBL-21-09	0.08	0.57**	0.80**	0.48**
25	JBR-20-06 x JBL-21-10	0.26	0.15	0.08	0.16*
26	JBL-21-12 x JBL-21-09	-0.07	0.40**	0.64**	0.33**
27	JBL-21-12 x JBL-21-10	0.09	-0.16	-0.37**	-0.15*
28	JBL-21-09 x JBL-21-10	0.17	0.79**	0.84**	0.60**
	SE (S_{ij})	0.14	0.10	0.14	0.07
	SE (S_{ij}-S_{ik})	0.21	0.15	0.20	0.11
	SE (S_{ij}-S_{kl})	0.19	0.14	0.19	0.10
	Number of significantcrosses in desirable direction	01	12	09	13

and specific cross combinations revealed that for majority of the characters, the best performing parents were also found to be best general combiners though their relative ranking were different (Table 9).

The correlation studies revealed that per se performance of parents has correlated with gca effects for fruit length, fruit diameter, number of fruits per plant and average fruit weight. Likewise, a comparison of mean performance of crosses and their sca effects presented in Table 10 revealed that *per se* performance of crosses was highly correlated with their sca effects for all the characters indicating strong association of *per se* performance and sca effect of the 28 hybrids.

Table 9 : Three best crosses selected on the basis of best performing parents, good general combiners, best performing crosses with SCA effects for different characters in brinjal.

S. no.	Characters	Best performing parent	Best general combiners	Best performing F_1	sca effect	Best specific F_1 cross combination	sca effect
1	2	3	4	5	6	7	8
1	Fruit length (cm)	JBL-21-12	JBL-21-12	JBL-21-12 x JBL-21-09	1.82**	JBL-21-12 x JBL-21-09	1.82**
		JBL-21-10	JBL-21-09	JBR-21-06 x JBL-21-09	1.63**	JBR-21-06 x JBL-21-09	1.63**
		JBR-21-14	JBL-21-10	JBR-20-11 x JBL-21-12	1.04**	JBR-20-11 x JBL-21-10	1.39**
2	Fruit diameter (cm)	JBR-20-11	JBR-20-11	JBR-21-14 x JBR-20-06	1.01**	JBR-21-14 x JBR-20-06	1.01**
		JBR-20-01	JBR-20-01	JBR-20-11 x JBR-20-06	0.46**	JBR-20-11 x JBR-21-06	0.61**
		JBL-21-09	JBR-20-06	JBR-20-11 x JBR-21-06	0.61**	JBL-21-09 x JBL-21-10	0.52**
3	Number of fruits per plant	JBR-21-14	JBR-21-14	JBR-20-01 x JBR-21-14	8.78**	JBR-21-06 x JBL-21-10	8.78**
		JBR-20-01	JBL-21-10	JBR-21-06 x JBL-21-10	5.14**	JBR-20-11 x JBL-21-10	8.42**
		JBR-21-06	JBL-21-09	JBR-21-14 x JBL-21-10	0.55	JBL-21-12 x JBL-21-09	6.74**
4	Fruit weight (g)	JBR-20-11	JBL-21-10	JBL-21-09 x JBL-21-10	22.60**	JBL-21-09 x JBL-21-10	22.60**
		JBL-21-12	JBR-20-11	JBR-20-01 x JBL-21-10	19.77**	JBR-20-01 x JBL-21-10	19.77**
		JBL-21-10	JBL-21-12	JBR-20-01 x JBR-20-11	14.94**	JBR-20-01 x JBR-20-11	14.94**
5	No. of primary branches	JBL-21-12	JBL-21-12	JBR-20-06 x JBL-21-10	1.12**	JBR-20-06 x JBL-21-10	1.12**
		JBR-20-06	JBR-20-06	JBR-20-11 x JBL-21-10	0.54**	JBR-21-06 x JBR-21-14	1.06**
		JBR-20-11	JBR-21-14	JBL-21-12 x JBL-21-09	0.59**	JBR-20-11 x JBR-21-06	0.84**
6	Fruit yield per plant (kg)	JBL-21-10	JBL-21-10	JBL-21-09 x JBL-21-10	0.60**	JBL-21-09 x JBL-21-10	0.60**
		JBR-21-14	JBR-21-14	JBR-21-06 x JBL-21-10	0.50**	JBR-20-01 x JBR-20-11	0.51**
		JBR-20-11	JBL-21-09	JBR-21-06 x JBR-21-14	0.43**	JBR-21-06 x JBL-21-10	0.50**

Table 10 : Correlation coefficient between *per se* performance and gca effects as well as *per se* performance and sca effects in brinjal on pooled basis.

S. no.	Characters	*Per se* performance and gca effects	*Per se* performance and sca effect
1	Fruit length (cm)	0.91**	0.64**
2	Fruit diameter (cm)	0.84**	0.73**
3	Number of fruits per plant	0.80*	0.83**
4	Fruit weight (g)	0.73*	0.82**
5	Number of primary branches	1.00**	0.37
6	Fruit yield per plant (kg)	0.88**	0.84**

Conclusion

General combining ability effects of parents revealed that parents JBR-21-14, JBL-21-09 and JBL-21-10 were good general combiners for fruit yield per plant as indicated by significant and positive gca effects and good *per se* performance. Therefore, these parents could be preferred in breeding programme as these are expected to give desirable transgressive segregants in the succeeding generations. Two crosses *viz.*, JBR-21-14 x JBL-21-10 and JBL-21-12 x JBL-21-09 displayed high *per se* performance, high sca effects and exhibited stability for fruit yield per plant. Such crosses have potential to throw desirable transgressive segregants in the segregating generations, which the plant breeders can handle by pedigree method for developing high yielding and stable varieties in brinjal.

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