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Study of heterosis for fruit yield and its yield components in Brinjal [*Solanum melongena* L.]

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Abstract

The experimental material consisted of nine parental lines of brinjal and their 36 hybrids generated through a half diallel mating design along with one standard check hybrid (GJBH-4). The trial was conducted in a randomized block design with three replications at Vegetable Research Station, College of Agriculture, Junagadh Agricultural University, Junagadh during *rabi* 2025-26 to evaluate the magnitude and extent of heterosis for fruit yield and its component characters. The analysis of variance indicated highly significant differences among genotypes, parents and hybrids for most of the traits, suggesting the existence of substantial genetic variability and scope for heterosis breeding. The heterobeltiosis for fruit yield per plant varied from -53.15% to 39.69%, whereas the standard heterosis ranged from -61.93% to 18.16%. Among the hybrids, JBR-24-14 × JBR-24-11 recorded the highest standard heterosis (18.16%) in desirable direction, followed by Pant Rituraj × Pusa Kranti (14.95%). These promising crosses also expressed favorable heterotic effects for important yield contributing traits such as days to first picking, number of fruits per plant, fruit girth, plant height, number of pickings, total soluble solids, total anthocyanin pigment and lower fruit and shoot borer infestation. The findings revealed that heterosis for fruit yield per plant was strongly associated with heterosis in its contributing traits and the identified cross combinations possess good potential for further utilization in heterosis breeding programmes aimed at enhancing yield performance in brinjal.

Keywords: Brinjal, Half- diallel analysis, Heterosis

Introduction

Brinjal (*Solanum melongena* L., $2n = 24$) is one of the most important vegetable crops of India, belonging to the family *Solanaceae*. It is commonly known by different vernacular names such as *Ringan* (Gujarati), *Baingan* (Hindi), *Vangi* (Marathi) and *Katharikai* (Tamil). It is believed to have originated in the Indo-Burma region and has been cultivated in India since ancient times. Due to its wide adaptability, brinjal is extensively grown in tropical and subtropical regions and is often referred to as the “poor man’s vegetable” because of its high yield potential and affordability. Brinjal is valued for its nutritional richness, containing vitamins like ascorbic acid, niacin and vitamin B complex along with essential minerals such as calcium, magnesium, phosphorus, potassium and iron. The fruits are rich in moisture, fibre and carbohydrates and also contain antioxidant compounds like anthocyanins, especially in purple varieties. In India, brinjal is cultivated widely in states like West Bengal, Odisha, Bihar, Karnataka, Andhra Pradesh, Maharashtra, Uttar Pradesh and Gujarat and the country ranks second in global production. The crop exhibits wide genetic variability in plant growth and fruit characteristics, which provides ample scope for improvement through breeding. Yield in brinjal is a complex trait governed by several component characters, making it essential to exploit available variability effectively. In this context, heterosis breeding has emerged as an important approach for enhancing yield and quality traits in brinjal. Heterosis, or hybrid vigor, plays a significant role in increasing fruit yield and its contributing characters. The development and evaluation of hybrids help in identifying superior cross combinations with desirable performance over their parents and standard varieties. Therefore, estimation of heterosis for yield and its component traits is essential to identify promising hybrids for commercial cultivation and further crop improvement programmes.

Materials and Methods

The experimental material comprised of parents and their F_1 derived by crossing among nine parents viz., JBR-24-14, JBR-24-13, JBR-24-12, JBR-24-11, GJB-3, GJLB-4, GRB-7, Pant Rituraj and Pusa Kranti in a half-diallel fashion. (Table 1) Row to row and plant to plant spacing was 60 cm $\times$ 30 cm. To produce a better crop, the region's recommended agronomic practices were followed. Nine parental types were selected on the basis of morphological variability for growth, maturity, fruit size, fruit shape, fruit yield and yield contributing trait in brinjal. The experiment was laid out in a randomized block design with three replications during *rabi*-2025-26 at Vegetable Research Station, Junagadh Agricultural University, Junagadh. The observations were recorded on sixteen characters viz., days to first flowering, days to first picking, number of fruits per plant, fruit length (cm), average fruit weight (g), fruit girth (cm), number of branches per plant, plant height (cm), days to last picking, number of pickings, total fruit yield per plant (kg), total soluble solids, fruit borer infestation (%), shoot borer infestation (%), Vitamin-C (100 mg) and total anthocyanin pigment (100 mg) and Mean data were used for statistical analysis. The variance analysis for each character was performed using the method described by [22] Panse and Sukhatme (1995). Heterosis was estimated in term of two parameters, i.e. heterobeltiosis (heterosis over better parental value) as suggested by [11] Fonseca and Patterson (1968) and standard heterosis (heterosis over standard check) as suggested by [18] Meredith and Bridge (1972).

Results and Discussion

The results showed that the mean squares due to genotypes were highly significant for every character studied. The genotypic component was further divided into parents, hybrids and parents vs. hybrids. This partitioning revealed that the parents differed significantly among themselves for all traits, except day to first picking and number of primary branches per plant, whereas the hybrids exhibited highly significant differences for all characters. These findings confirm the presence of substantial genetic variability among both parents and hybrids across all traits under studied. (Table 2)

Many crosses depicted significant heterosis over better parent and standard check in favourable direction for days to first flowering (6, 7), days to first picking (13, 4), number of fruits per plant (9, 8), fruit length (cm) (9, 7), average fruit weight (g) (5, 6), fruit girth (cm) (11, 7), number of primary branches per plant (12, 6), plant height (cm) (7, 14), days to last picking (2, 6), number of pickings (9, 15), total fruit yield per plant (g) (6, 2), total soluble solids (%) (4, 10), fruit borer infestation (%) (21, 10), shoot borer infestation (%) (25, 17), vitamin-C (100 mg) (7, 10) and total anthocyanin pigment (100 mg) (5, 18), respectively. (Table 2)

Performance of crosses in respect of heterosis over better parent and standard check (GJBH-4) revealed that the high magnitudes of heterobeltiosis and standard heterosis in desirable direction were found for days to first picking, fruit girth (cm), number of primary branches per plant, plant height (cm), number of pickings, fruit borer infestation (%), shoot borer infestation (%), total anthocyanin pigment (100 mg) and moderate magnitudes of heterobeltiosis and standard heterosis in desirable direction were found days to first flowering, number of fruits per plant, fruit length (cm), total soluble solids, vitamin-c (100 mg) and low magnitudes of heterobeltiosis and standard heterosis in desirable direction were found average fruit weight (g), days to last picking, total fruit yield per plant (kg). Similar observations were also made by [23] Patel *et al.* (2017), [19] Mistry *et al.* (2018), [21] Pandey and Yadav (2018).

In brinjal, as earliness is desirable character in brinjal and days to first flowering is component which effects on earliness. Heterobeltiosis for this trait was ranged from -8.61 (JBR-24-12 $\times$ GJLB-4) to 8.28 per cent (Pant Rituraj $\times$ Pusa Kranti). The standard heterosis varied from -9.21% (JBR-24-12 $\times$ GJLB-4) to 6.58% (JBR-24-11 $\times$ GJB-3). This result matched with finding of [14] Khapte *et al.* (2017), [26] Rani *et al.* (2018), [2] Bagade *et al.* (2020), [35] Timmareddygar *et al.* (2021a).

As earliness in days to first picking is a desirable trait and heterobeltiosis for this trait was varied from -12.70 (JBR-24-13 $\times$ GRB-7) to 7.87 per cent (JBR-24-14 $\times$ Pant Rituraj). the standard heterosis varied from -8.99% (JBR-24-12 $\times$ GJLB-4) to 7.87% (JBR-24-14 $\times$ Pant Rituraj). There findings are akin to [26] Rani *et al.* (2018), [2] Bagade *et al.* (2020), [35] Timmareddygar *et al.* (2021a).

Considering heterosis over better parent, the variation for number of fruits per plant was from -18.10 (GJB-3 $\times$ Pusa Kranti) to 47.31 per cent (Pant Rituraj $\times$ Pusa Kranti). the standard heterosis varied from -27.40 (JBR-24-14 $\times$ Pant Rituraj) to 26.40 per cent (GJB-3 $\times$ GJLB-4). These results are agreed with the result obtained by [14] Khapte *et al.* (2017), [26] Rani *et al.* (2018), [20] Modh *et al.* (2019), [37] Valadares *et al.* (2019), [35] Timmareddygar *et al.* (2021a), [13] Kanchana *et al.* (2024), [33] Sreevandana and Jana (2024a) and [34] Thota and Delvadiya (2025).

More fruit length generally directly responsible for high yield and hence, their positive values found beneficial in brinjal. The estimates of heterobeltiosis was noted from -30.61 (JBR-24-11 $\times$ Pant Rituraj) to 43.81 per cent (JBR-24-14 $\times$ Pant Rituraj). Similarly, for spectrum range of standard heterosis was noted from -40.24 (JBR-24-14 $\times$ GJLB-4) to 16.33 per cent (GJB-3 $\times$ Pusa Kranti). These results are agreed with the result obtained by [16] Kumar *et al.* (2017), [19] Mistry *et al.* (2018), [20] Modh *et al.* (2019), [37] Valadares *et al.* (2019), [2] Bagade *et al.* (2020), [17] Makasare *et al.* (2020), [5] Datta *et al.* (2021a), [15] Kumar *et al.* (2022), [13] Kanchana *et al.* (2024), [33] Sreevandana and Jana (2024a) and [34] Thota and Delvadiya (2025).

The heterobeltiosis ranged was found from -30.72 (JBR-24-11 $\times$ Pusa Kranti) to 18.21 per cent (JBR-24-14 $\times$ Pant Rituraj) for average fruit weight. The standard heterosis varied from -32.31 (JBR-24-14 $\times$ GJB-3) to 14.29 per cent (JBR-24-13 $\times$ Pusa Kranti). Positive estimation of heterosis in this trait was reported by [7] Deshmukh *et al.* (2015), Ansari and Singh (2016) [11], [3] Balwani *et al.* (2017), [14] Khapte *et al.* (2017), [16] Kumar *et al.* (2017), [26] Rani *et al.* (2018), [20] Modh *et al.* (2019), [37] Valadares *et al.* (2019), [2] Bagade *et al.* (2020), [17] Makasare *et al.* (2020), [35] Timmareddygar *et al.* (2021a), [15] Kumar *et al.* (2022), [36] Tripathy *et al.* (2025a).

In case of brinjal, positive heterosis is desirable for fruit girth. The heterobeltiosis ranged from -10.70 (JBR-24-14 $\times$ GRB-7) to 31.61 per cent (JBR-24-13 $\times$ Pant Rituraj). The spectrum range of standard heterosis was noted from -10.00 (JBR-24-14 $\times$ GJLB-4) to 12.38 per cent (JBR-24-14 $\times$ JBR-24-11 and GJB-3 $\times$ GJLB-4). There finding confined the result of those reported by [16] Kumar *et al.* (2017), [20] Modh *et al.* (2019), [15] Kumar *et al.* (2022) and [34] Thota and Delvadiya (2025).

For number of primary branches per plant, the estimates of heterobeltiosis ranged from -21.67 (JBR-24-11 $\times$ GJB-3) to 68.85 per cent (Pant Rituraj $\times$ Pusa Kranti). The range of standard heterosis was noted from -33.33 (JBR-24-11 $\times$ GJB-3) to 47.52 per cent (JBR-24-13 $\times$ GRB-7). Similar results were observed by [14] Khapte *et al.* (2017), [16] Kumar *et al.* (2017), [33] Sreevandana and Jana (2024a), [36] Tripathy *et al.* (2025a).

The values of heterobeltiosis ranged for plant height from -32.25 (JBR-24-12 $\times$ GRB-7) to 49.43 per cent (Pant Rituraj $\times$ Pusa

Kranti). The minimum and the maximum values of heterosis over standard check were -19.81 (JBR-24-12 × GRB-7) and 42.31 per cent (JBR-24-14 × GJLB-4). These results are agreed with the result obtained by ^[14] Khapte *et al.* (2017), ^[16] Kumar *et al.* (2017), ^[2] Bagade *et al.* (2020), ^[17] Makasare *et al.* (2020), ^[13] Kanchana *et al.* (2024).

The values of heterobeltiosis for days to last picking ranged from -11.81 (GJB-3 × Pusa Kranti) to 9.50 per cent (JBR-24-12 × JBR-24-11). The standard heterosis varied from -6.44 (GJB-3 × GRB-7) to 8.42 per cent (JBR-24-12 × JBR-24-11). These results also resemble to finding reported by ^[21] Pandey and Yadav (2018), ^[30] Siva *et al.* (2020), ^[25] Rahul *et al.* (2023), ^[28] Sharma *et al.* (2016) and ^[8] Dhaka and Kaushik (2022).

The estimated heterosis over better parent varied from -8.33 (JBR-24-12 × JBR-24-11) to 16.28 per cent (GJB-3 × GJLB-4 and JBR-24-11 × GJB-3) for number of picking. The standard heterosis varied from 0.00 (JBR-24-14 × Pant Rituraj) to 18.60 per cent (GRB-7 × Pant Rituraj and JBR-24-13 × Pusa Kranti). These findings are akin to those of results reported by ^[12] Gadhiya *et al.* (2015) and ^[28] Sharma *et al.* (2016).

The heterobeltiosis for this trait was ranged from -53.15 (JBR-24-11 × Pusa Kranti) to 39.69 per cent (GJLB-4 × GRB-7) for total fruit yield per plant. The highest desirable heterobeltiosis was found in cross GJLB-4 × GRB-7 (39.69%) followed by GJB-3 × GJLB-4 (37.71%), JBR-24-12 × GJLB-4 (37.11%) and Pant Rituraj × Pusa Kranti (35.63%). The standard heterosis varied from -61.93 (JBR-24-14 × GJLB-4) to 18.16 per cent (JBR-24-14 × JBR-24-11). The cross, JBR-24-14 × JBR-24-11 found the highest magnitude of standard heterosis (18.16%) in desirable direction followed by Pant Rituraj × Pusa Kranti (14.95%), GJLB-4 × GRB-7 (6.27%). These results were also agreed with the result obtained by ^[6] Desai *et al.* (2016), ^[29] Shende *et al.* (2016), ^[3] Balwani *et al.* (2017), ^[14] Khapte *et al.* (2017), ^[16] Kumar *et al.* (2017), ^[23] Patel *et al.* (2017), ^[27] Santhosha *et al.* (2017), ^[9] Dishri *et al.* (2018), ^[19] Mistry *et al.* (2018), ^[26] Rani *et al.* (2018), ^[10] Dutta *et al.* (2019), ^[20] Modh *et al.* (2019), ^[5] Datta *et al.* (2021a), ^[35] Timmareddygar *et al.* (2021a), ^[32] Solanki *et al.* (2022), ^[13] Kanchana *et al.* (2024), ^[33] Sreevandana and Jana (2024a), ^[24] Patel *et al.* (2025).

The estimated heterosis over better parent varied from -34.49 (GJLB-4 × GRB-7) to 16.10 per cent (JBR-24-13 × Pant Rituraj) for total soluble solids. The standard heterosis varied from -16.20 (JBR-24-12 × JBR-24-11) to 40.26 per cent (GRB-7 × Pant Rituraj). These finding are akin to ^[4] Bhushan *et al.* (2016), ^[28] Sharma *et al.* (2016), ^[29] Shende *et al.* (2016), ^[3] Balwani *et al.* (2017), ^[26] Rani *et al.* (2018).

In brinjal, negative heterosis is desirable for fruit borer infestation. The heterobeltiosis for this trait was varied from -34.81 (JBR-24-13 × Pusa Kranti) to 32.38 per cent (JBR-24-11 × Pusa Kranti). The estimated heterosis over standard check (GJBH-4) varied from -21.31 (Pant Rituraj × Pusa Kranti) to 30.71 per cent (JBR-24-12 × GJB-3). Similar findings were also reported by ^[7] Deshmukh *et al.* (2015), ^[29] Shende *et al.* (2016), ^[31] Sivasankarreddy *et al.* (2025), ^[34] Thota and Delvadiya (2025).

The negative heterosis is desirable for shoot borer infestation. The heterobeltiosis for this trait was varied -39.81 (JBR-24-13 × Pusa Kranti) to 13.81 per cent (GRB-7 × Pant Rituraj). The estimated heterosis over standard check (GJBH-4) varied from -37.37 (JBR-24-11 × Pusa Kranti) to 17.37 per cent (JBR-24-14 × GJB-3). These finding are akin to ^[7] Deshmukh *et al.* (2015), ^[31] Sivasankarreddy *et al.* (2025), ^[34] Thota and Delvadiya (2025).

The values of heterobeltiosis for Vitamin-C ranged from -18.55 (JBR-24-12 × Pant Rituraj) to 35.83 per cent (JBR-24-13 × GJLB-4). The standard heterosis ranged from -6.33 (JBR-24-12 × Pant Rituraj) to 30.67 per cent (JBR-24-14 × GJLB-4, JBR-24-14 × Pant Rituraj and JBR-24-13 × GJLB-4). These results also resemble to finding reported by ^[4] Bhushan *et al.* (2016), ^[28] Sharma *et al.* (2016), ^[26] Rani *et al.* (2018), ^[35] Timmareddygar *et al.* (2021a).

The estimated heterosis over better parent varied from -85.42 (GJB-3 × GJLB-4) to 19.28 per cent (JBR-24-13 × GJB-3) for total anthocyanin pigment. The standard heterosis varied from -83.14 (GJB-3 × GJLB-4) to 72.29 per cent (JBR-24-14 × JBR-24-12). These findings are akin to those of results reported by ^[38] Yadav *et al.* (2017).

The highest, significant and positive standard heterosis was recorded in the hybrid JBR-24-14 × JBR-24-11 and Pant Rituraj × Pusa Kranti. High heterotic effect for fruit yield per plant in above crosses due to high heterotic response of one or more component traits. It is interesting to note that the high heterotic crosses for fruit yield per plant did not show high heterosis for all the yield component traits (Table 4). However, the current study found that significant and positive heterosis for fruit yield was associated with significantly desirable heterosis for two or more yield-contributetraits. A similar cumulative heterotic effect of two or more yield components on fruit yield per plant was previously reported by ^[9] Dishri *et al.* (2018), ^[26] Rani *et al.* (2018), ^[10] Dutta *et al.* (2019), ^[20] Modh *et al.* (2019), ^[5] Datta *et al.* (2021a), ^[33] Sreevandana and Jana (2024a), ^[24] Patel *et al.* (2025).

Table 1: Detailed description of parental lines used in crossing programme

Sr. No.	Parents	Salient features
1	JBR-24-14	Plant is erect in nature. Fruits are purple, big, round fruit and good shiny appearance.
2	JBR-24-13	Fruit size is round and fruits are castor colour. Plants have erect type habit and have a lower incidence of shoot and fruit borer.
3	JBR-24-12	Fruit size is medium long with round shape with long calyx. Fruits are purple in colour. Plant has semi- spreading type habit and resistant to Phomopsis blight.
4	JBR-24-11	Fruits are light purple to pink in colour with good shining. Fruit size is medium long. It is resistant to Phomopsis blight.
5	GJB-3	Fruit is medium to big in size with oval shape and green in colour. Fruit pulp is creamy white with less seeds and fruit surface is smooth.
6	GJLB-4	Plants are non-spiny and spreading type. Fruits are long in shape, dark purple with pink tinge and glossy and medium resistance to fruit and shoot borer.
7	GRB-7	Purple colored fruits with grooves and round in shape. Semi Spreading type of habit.
8	Pant Rituraj	Plants are medium in size and spreading. Fruits are medium to big in size with oval shape. Fruits are purple in color with good shine. The resistance again fruit and shoot borer.
9	Pusa Kranti	The fruits are oblong and stocky, with attractive dark purple colour and shining green calyx and fruits contain fewer seed and less damage of fruit and shoot borer.
Standard check		
1	GJBH-4	Fruit is medium in size with an oblong shape and pink purple in colour with good shining. The fruit pulp is white with less seeds and the fruit surface is smooth.

Table 2: Analysis of variance showing mean square for experimental design for different characters in brinjal

Source	d. f.	Days to First flowering	Days to first picking	Number of fruits per plant	Fruit length (cm)	Average fruit weight (g)	Fruit girth (cm)	Number of primary branches per plant	Plant height (cm)
Replications	2	4.12	11.09	7.16	0.54	33.25	0.01	0.05	12.71
Genotypes	44	8.80**	15.01**	80.33**	5.11**	416.91**	0.87**	3.07**	595.23**
Parents(P)	8	4.95**	8.70	9.63*	2.24**	324.29**	1.12**	0.18	325.36**
Hybrids (H)	35	9.93**	15.67**	94.95**	5.91**	449.65**	0.60**	3.56**	673.69**
P. vs H.	1	0.01	42.22**	134.10**	0.19	11.72	8.35**	8.92**	8.14
Error	88	1.76	4.29	4.27	0.23	27.09	0.09	0.15	21.36

Table 2: Cont...

Source	d. f.	Days to last picking	Number of pickings	Total fruit yield per plant (kg)	Total Soluble Solids % (TSS)	Fruit borer infestation (%)	Shoot borer infestation (%)	Vitamin-C (100 mg)	Total anthocyanin pigment (100 mg)
Replications	2	51.29	0.83	0.27	0.01	0.89	0.24	0.25	9.64
Genotypes	44	99.57**	1.99**	2.70**	1.30**	10.55**	2.61**	3.15**	440.81**
Parents(P)	8	157.18**	2.15**	2.29**	1.53**	8.72**	1.71**	2.31**	446.06**
Hybrids (H)	35	88.96**	1.49**	2.74**	1.25**	11.08**	2.49**	3.23**	440.59**
P. vs H.	1	10.14	18.15**	4.64**	1.35**	6.76**	14.05**	6.93**	406.48**
Error	88	18.28	0.73	0.11	0.04	0.73	0.21	0.33	3.79

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

Table 3: Range of heterobeltiosis (H₁) and standard heterosis (H₂) as well as number of crosses with specific heterotic effects for various traits in brinjal

Sr. No.	Characters	Range of heterosis (%)						Number of crosses with significant heterosis			
		Heterobeltiosis (H ₁)			Standard heterosis (H ₂)			H ₁		H ₂	
								+Ve	-Ve	+Ve	-Ve
1	Days to First flowering	-8.61	to	8.28	-9.21	to	6.58	4	6	3	7
2	Days to first picking	-12.70	to	7.87	-8.99	to	7.87	2	13	3	4
3	Number of fruits per plant	-18.10	to	47.31	-27.40	to	26.40	9	6	8	24
4	Fruit length (cm)	-30.61	to	43.81	-40.24	to	16.33	9	15	7	27
5	Average fruit weight	-30.72	to	18.21	-31.31	to	14.29	5	15	6	19
6	Fruit girth (cm)	-10.70	to	31.61	-10.00	to	12.38	11	2	7	6
7	Number of primary branches per plant	-21.67	to	68.85	-33.33	to	47.52	12	1	6	14
8	Plant height (cm)	-32.25	to	49.43	-19.81	to	42.31	7	17	14	8
9	Days to last picking	-11.81	to	9.50	-6.44	to	8.42	2	17	6	5
10	Number of pickings	-8.33	to	16.28	0.00	to	18.60	9	0	15	0
11	Total fruit yield per plant (kg)	-53.15	to	39.69	-61.93	to	18.16	6	25	2	30
12	Total Soluble Solids % (TSS)	-34.49	to	16.10	-16.20	to	40.26	4	22	10	13
13	Fruit borer infestation (%)	-34.81	to	32.38	-21.31	to	30.70	2	21	14	10
14	Shoot borer infestation (%)	-39.81	to	13.81	-37.37	to	17.37	1	25	1	17
15	Vitamin-C (100 mg)	-18.55	to	35.83	-6.33	to	30.67	7	8	10	0
16	Total anthocyanin pigment (100 mg)	-85.42	to	19.28	-83.14	to	72.29	5	15	18	12

Table 4: Comparative study of three most heterotic crosses for fruit yield per plant and their heterotic effect for component characters in brinjal

Heterotic crosses	Fruit yield per plant (kg)	Per cent heterosis for fruit yield per plant over		sca effect for fruit yield per plant	Significant and desirable heterosis for component traits over	
		Better parent	Standard check (GJBH-4)		Better parent	Standard check (GJBH-4)
JBR-24-14 × JBR-24-11	5.40	17.31**	18.16**	2.53**	2,3,4,5,6,7,8,9,10,11	3,4,5,6,7,8,9,10,11,16
Pant Rituraj × Pusa Kranti	5.25	35.63**	14.95*	2.14**	2,3,4,6,7,8,10,11,12,13,14	2,3,5,7,8,10,11,12,13,14
JBR-24-12 × GJLB-4	4.59	37.11**	0.51	1.53**	1,2,3,6,7,11,13,14,16	1,2,3,6,7,8,10,16

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

1	=	Days to first flowering	2	=	Days first picking	3	=	Number of fruits per plant
4	=	Fruit length (cm)	5	=	Average fruit weight (g)	6	=	Fruit girth (cm)
7	=	Number of primary branches per plant	8	=	Plant height (cm)	9	=	Days to last picking
10	=	Number of pickings	11	=	Total fruit yield per plant (kg)	12	=	Total soluble solids (%)
13	=	Fruit borer infestation (%)	14	=	Shoot borer infestation (%)	15	=	Vitamin-C (100 mg)
16	=	Total anthocyanin pigment (100 mg)						

Conclusion

From ongoing discussion, it could be concluded that sufficient amount of variation and diversity was present in the material for

fruit yield and its components trait. The crosses GJLB-4 × GRB-7, GJB-3 × GJLB-4 and JBR-24-12 × GJLB-4 manifested maximum heterobeltiosis and other crosses viz., JBR-24-14 ×

JBR-24-11 and Pant Rituraj × Pusa Kranti displayed high magnitude of standard heterosis along with high *per se* performance for fruit yield per plant and some of its components. So, these crosses can be used for exploitation of the heterosis breeding.

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