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Expression of Economic Heterosis for Productive Traits in Brinjal Hybrids (*Solanum melongena* L.) Hybrids

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ABSTRACT

A diallel (8 x 8) analysis excluding reciprocal was made to assess the expression of heterosis using 28 eggplant hybrids along with their 8 parents and 2 checks in a RBD with 3 replications for fourteen productive traits namely, days to 50 % flowering, plant height(cm), primary branches per plant, secondary branches per plant, plant spread(cm2), fruit length(cm), fruit girth(cm), fruit weight(g), fruits per plant, fruit yield per plant(g), Total soluble solids (°Bx), Total phenol (mg g-1), Fruit dry weight (mg/100mg) and Total sugar (%). The analysis of variance for all the characters revealed that parents were found to be highly significant for all the character studied except primary branches per plant and fruit yield per plant, similarly hybrids were also found highly significant for all the characters. Parents vs. hybrids comparison was found highly significant for all the characters studied except plant spread. Hybrids PLR-1 x GBL-1, PLR-1 x Doli-5, KS-224 x Doli-5 and PLR-1 x GJB-2 recorded high per se performance, significant heterosis over local check Surati ravaiya for fruit yield per plant, which may be utilized for further breeding programme.

Key words: *Brinjal, Heterosis, fruit yield, Total phenol (mg g-1), Total sugar (%).*

INTRODUCTION

Brinjal (*Solanum melongena* L.) is very important and popular vegetable crop which is a self-pollinated, annual herbaceous versatile crop adapted to different agro-climatic regions and grown throughout the year. Brinjal originated in India and major brinjal growing states in India are Andhra Pradesh, Karnataka, Maharashtra, Orissa, Bihar, Uttar Pradesh, Gujarat and West Bengal. The fruits of brinjal are widely consumed in various culinary preparations and are rich source of protective nutrients (Hedges and Lister[5]). In the face of increasing population, there is a need for increased production and productivity levels of brinjal. Exploitation of heterosis on a commercial scale in vegetable crops has resulted in the development of the several high yielding hybrid varieties.

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This technique has been proved to be the most important genetic tool for enhancing yield potential. And also information on combining ability is a pre-requisite, which employed to identify the desirable parents, cross combinations and provide information on the type of gene action involved in the inheritance of quantitative traits. This information is helpful in selecting the elite parents and desirable cross combinations to be used in breeding programme aimed at varietal improvement or exploitation of heterosis on a commercial scale.

MATERIALS AND METHODS

The experiment was carried out during rabi 2013-14 and late *kharif* 2014 at college farm, Navsari Agricultural University, Navsari (Gujarat) India. The experimental material consisted of eight parents namely, GJB-3, PLR-1, KS-224, Pant rituraj, GJB-2, GBL-1, Doli-5 and GOB-1 and their 28 hybrids derived from 8 x 8 diallel (excluding reciprocal) mating design **(Table 1).** The hybrids and parents were evaluated along with the two checks namely, surati ravaiya and GBH-2 in a randomized block design with three replications. Each plot consisted of ten plants in a row at 90 x 60 cm^2 inter and intra row spacing. All the recommended package of practices were adopted for raising a healthy crop. Five randomly selected plants, excluding the border ones, from each plot of all the three replications were tagged and used for recording the observations and average values were computed. The data recorded for 14 biometrical traits namely, days to 50 % flowering, plant height(cm), primary branches per plant, secondary branches per plant, plant spread(cm^2), fruit length(cm), fruit girth(cm), fruit weight(g), fruits per plant, fruit yield per plant(g), Total soluble solids (°Bx), Total phenol (mg g-1), Fruit dry weight (mg/100mg) and Total sugar (%).

Days to 50 per cent flowering noted by number of days from transplanting to first flowering in 50 % of plants in a entry. Observations on plant height, primary branches per plant, secondary branches per plant, plant spread were recorded at last picking and Plant spread obtained by multiplying both the directions (point of maximum spread in north - south and east - west) value. In contrast, data on fruit length, fruit girth, fruit weight, fruits per plant and fruit yield per plant was obtained for each picking and the total was computed. The observations on fruit dry matter, total sugars, Total soluble solids and total phenols were recorded on five random fresh fruits, taken from each genotype in each replication and the mean values were calculated. Estimates of total sugars and total phenols were obtained following the procedures outlined by Dubois *et al*[4] and Bray and Thorpe[3], respectively. However Total soluble solids recorded by Brix hand refractrometer (ERMA, Tokyo, Japan, Range 0-32%) and Fruit dry weight was determined by taking 5 g of green fruit sample and heating at 105 ^{0}C for five hours in oven. The magnitude of the heterosis was estimated as per the standard procedure.

RESULTS AND DISCUSSION

The present investigation was undertaken to elucidate information on heterosis for fruit yield and its related traits in brinjal. The analysis of variance exhibited highly significant differences among the parents for all the characters except primary branches per plant and fruit yield per plant indicating considerable amount of genetic variability present in the selected materials. Highly significant differences observed for days to 50 per cent flowering, plant height, secondary branches per plant, plant spread, fruit length, fruit girth, fruit weight, fruits per plant, total soluble solids , total phenol, fruit dry weight and total sugar, which indicated that genotypes possessed more variability for all these characters. The mean square due to hybrids was also found highly significant for all the characters studied indicating significant genetic differences were present among

hybrids. Highly significant parents *vs.* hybrids comparison for days to 50 per cent flowering, plant height, primary branches per plant, secondary branches per plant, fruit length, fruit girth, fruit weight, fruit yield per plant, total soluble solids, total phenol, fruit dry weight, total sugar indicated that substantial amount of hybrid vigour present for all these characters **(Table 2.)**

The extent of heterosis showed by hybrids over local check, Surati ravaiya and commercial check, GBH-2 is presented in **Table 3.** Among the fourteen attributes studied, highly significant negative heterosis over local check surati ravaiya for days to 50% flowering and phenol contents was -12.90 (GJB-3 x Doli-5) and -21.10 (Pant rituraj X GOB-1) respectively, whereas heterosis over commercial check, GBH-2 for days to 50% flowering and phenol contents was -11.48 (GJB-3 x Doli-5) and -32.02 (Pant rituraj X GOB-1) respectively. Highly significant and positive heterosis for plant height 22.18 (GJB-3 X PLR-1) per cent over Surati ravaiya and 11.63 (GJB-3 X PLR-1) per cent over GBH-2. standard heterosis for primary branches per plant was 43.72 (GJB-2 X GBL-1) per cent over Surati ravaiya and 11.97 (GJB-2 X GBL-1) per cent over GBH-2. Standard heterosis for secondary branches per plant was 91.22 (KS-224 X GBL-1) per cent over Surati ravaiya and 38.57 (KS-224 X GBL-1) per cent over GBH-2. For plant spread, standard heterosis expressed over local check Surati ravaiya was 171.92 (PLR-1 X Doli-5) per cent. Whereas heterosis over GBH-2 was 63.74 (PLR-1 X Doli-5) per cent. Heterosis for fruit length ranged from -41.85 (PLR-1 X Doli-5) to 9.28 per cent (PLR-1 X GOB-1) over Surati Ravaiya and -46.58 (PLR-1 X Doli-5) to 0.39 per cent (PLR-1 X GOB-1) over GBH-2. For fruit girth heterosis ranged from -19.09 (KS-224 x GOB-1) to 68.70 per cent (GJB-3 X GBL-1) over Surati ravaiya and -25.83 (KS-224 X GOB-1) to 54.64 per cent (GJB-3 X GBL-1) over GBH-2. Standard heterosis for fruit weight ranged from -22.53 (Pant rituraj X Doli-5) to 30.33 (GJB-3 X Pant rituraj) per cent over Surati ravaiya and -24.91 (Pant rituraj X Doli-5) and 26.33 (GJB-3 X Pant rituraj) per cent over GBH-2. Twelve hybrids depicted significant positive standard heterosis over both checks. The amount of heterosis for fruits per plant existed between -9.74 (Doli-5 X GOB-1) and 63.41 (PLR-1 X GJB-2) per cent over Surati ravaiya. The heterosis over standard check GBH-2 varied from -30.17 (Doli-5 X GOB-1) to 26.42 (PLR-1 X GJB-2) per cent. The estimates of standard heterosis for total soluble solids was ranged between -10.35 (PLR-1 X GOB-1) and 42.48 (GJB-2 X GBL-1) per cent over Surati ravaiya and -14.76 (PLR-1 X GOB-1) to 35.47 (GJB-2 X GBL-1) per cent over GBH-2. Out of 28 hybrids, total 19 and 17 hybrids depicted significant positive heterosis over Surati ravaiya and GBH-2, respectively. Magnitude of heterosis for fruit dry weight varied from -18.29 (KS-224 X Doli-5) to 24.00 (GJB-2 x GOB-1) per cent over Surati ravaiya and -28.63 (KS-224 x Doli-5) to 8.31 (GJB-2 X GOB-1) per cent over GBH-2. The amount of standard heterosis existed between 7.30 (PLR-1 X GOB-1) to 114.99 (GJB-3 X GOB-1) per cent over Surati ravaiya and -18.81 (PLR-1 X GOB-1) to 62.69 (GJB-3 X GOB-1) per cent over GBH-2 for total sugar. Shafeeq *et al*[12] and Suneetha *et al*[13] also reported highly significant heterosis for fruit yield and its contributing traits in brinjal. The maximum heterosis for fruit yield per plant ranged from -0.27 (Doli-5 X GOB-1) to 72.70 (PLR-1 X GBL-1) per cent over Surati ravaiya and -24.31 (Doli-5 X GOB-1 and Pant rituraj X GBL-1) to 31.07 (PLR-1 X GBL-1) per cent over GBH-2. Total 8 hybrids exhibited significant positive standard heterosis over Surati ravaiya for fruit yield per plant **(Table 4).** Similar trend was also reported by Prabhu *et al*[8], Sao and Mehta[11], Kumar *et al*[6] Pachiyappan *et al*[7]; Singh *et al*[10]; Al-Hubaity and Teli[1]; Biswas *et al*[2] and Reddy and Patel[9].

Table 1: Parental materials and its sources

Sr. No.	Genotypes	Source
1	PLR-1	Vegetable Research Station, Palur
2	KS-224	CSAUA&T, Kanpur
3	Pant Rituraj	GBPUAT, Pantnagar
4	Doli-5	AAU,Anand
5	GJB-2	JAU, Junagadh
6	GBL-1	JAU, Junagadh
7	GJB-3	JAU, Junagadh
8	GOB-1	JAU, Junagadh
9	GBH-2 (Check)	JAU, Junagadh
10	Surati Ravaiya (Check)	NAU, Navsari

Table 2: Analysis of variance (mean squares) for various characters in brinjal

Source of variations/ Characters	d.f.	Days to 50 % flowering	Plant height (cm)	Primary branches per plant	Secondary branches per plant	Plant spread (cm^2)	Fruit length (cm)	Fruit girth (cm)
Replication	2	3.66	10.18	0.21	1.93	1383.71	1.73	3.04
Genotypes	35	10.49**	153.36**	1.38**	6.92**	11529.38**	10.68**	30.37**
Parents	7	6.67**	168.84**	0.65	6.93**	22855.16**	10.36**	16.01 **
Hybrids	27	12.10**	134.49**	1.39**	6.64**	8743.20**	10.79**	32.79**
Parents *Vs.* Hybrids	1	7.10**	1641.17**	6.46**	14.35**	7475.99	9.78**	65.66**
Error	70	1.64	5.54	0.31	1.18	3824.62	1.23	5.21
Source of variations/ Characters	**d.f**	**Fruit weight (g)**	**Fruits per plant**	**Fruit yield per plant (g)**	**Total soluble solids (°Bx)**	**Total phenol (mg g^{-1})**	**Fruit dry weight (mg/100mg)**	**Total sugar (%)**
Replication	2	10.98	4.24	460.63	0.07	0.07	0.13	0.02
Genotypes	35	155.49**	52.97**	1823.26**	0.58**	592.12**	2.23**	0.57**
Parents	7	492.84**	50.10**	1005.68	0.80**	0.80**	2.14**	0.49**
Hybrids	27	147.69**	50.42**	1913.57**	0.50**	0.50**	2.13**	0.56**
Parents *Vs.* Hybrids	1	1347.88**	5.38*	15564.65**	1.25**	1.25**	5.70**	1.36**
Error	70	9.87	2.26	434.27	0.03	0.03	0.20	0.02

* Significant at 5 % level, ** Significant at 1 % level

Table 3: magnitude of heterosis over local check and commercial check for various yield and yield parameters in brinjal

Hybrids/ Characters	Days to 50 % flowering		Plant height (cm)		Primary branches per plant		Secondary branches per plant		Plant spread (cm^2)		Fruit length (cm)		Fruit girth (cm)	
	LC(%)	CC(%)	LC(%)	CC(%)	LC(%)	CC(%)	LC(%)	CC(%)	LC(%)	CC(%)	LC(%)	CC(%)	LC(%)	CC(%)
GJB-3 x PLR-1	-8.06**	-6.56**	22.18**	11.63**	-2.80	-24.27**	30.95*	-5.11	59.54*	-3.93	15.45	5.83	-18.80*	-25.41**
GJB-3 x KS-224	-8.06**	-6.56**	21.51**	11.01**	12.49	-12.36	51.38**	9.70	63.20*	-1.73	49.09*	36.67	-0.89	-8.96
GJB-3 x Pant rituraj	-4.84**	-3.28*	17.79**	7.61**	1.36	-21.03**	36.48*	-1.10	75.90**	5.92	0.78	-7.62	0.47	-7.71
GJB-3 x GJB-2	-2.42	-0.82	13.29**	3.50*	12.20	-12.58	72.20**	24.78*	103.93**	22.80	7.14	-1.79	-14.19	-21.17*
GJB-3 x GBL-1	-2.42	-0.82	6.87**	-2.37	24.91*	-2.68	68.13**	21.84*	44.42	-13.04	68.70**	54.64*	0.56	-7.62
GJB-3 x Doli -5	-12.90**	-11.48**	12.61**	2.88	6.17	-17.28*	43.09**	3.69	78.40**	7.43	29.48	18.69	-13.04	-20.12*
GJB-3 x GOB-1	-1.61	0.00	9.80**	0.31	36.83**	6.60	51.54**	9.82	56.65*	-5.67	18.31	8.45	0.19	-7.97
PLR-1 x KS-224	0.81	2.46	7.32**	-1.95	2.66	-20.02*	38.32**	0.24	55.26*	-6.51	21.95	11.79	5.71	-2.89
PLR-1 x Pant rituraj	-2.42	-0.82	2.14	-6.69**	7.68	-16.11*	61.41**	16.97	138.10**	43.37**	-12.60	-19.88	-31.44**	-37.02**
PLR-1 x GJB-2	-4.84**	-3.28*	-3.15	-11.52**	21.39*	-5.43	83.36**	32.88**	115.43**	29.73	7.40	-1.55	-31.06**	-36.67**
PLR-1 x GBL-1	-4.03**	-2.46	7.88**	-1.44	0.50	-21.70**	35.39*	-1.89	43.42	-13.64	37.79	26.31	-17.94	-12.99
PLR-1 x Doli-5	-3.23*	-1.64	-5.97**	-14.09**	14.00	-11.19	53.55**	11.27	171.92**	63.74**	50.91*	38.33	-41.85**	-46.58**
PLR-1 x GOB-1	-0.81	0.82	6.08**	-3.09	14.57	-10.74	54.36**	11.86	46.23	-11.94	34.42	23.21	9.28	0.39
KS-224 x Pant rituraj	0.81	2.46	-1.91	-10.39**	-8.18	-28.47**	56.31**	13.28	93.27**	16.38	44.29	32.26	4.90	-3.64
KS-224 x GJB-2	-0.81	0.82	-5.41**	-13.58**	18.52	-7.66	2.44	25.77*	31.74	-20.67	47.79	35.48	8.60	-0.24
KS-224 x GBL-1	-1.61	0.00	-11.60**	-19.24**	34.67**	4.92	91.22**	38.57**	125.51**	35.79*	40.39	28.69	-8.96	-16.37*
KS-224 x Doli-5	-0.81	0.82	-3.83*	-12.14**	38.12**	7.61	86.12**	34.88**	92.49**	15.91	10.91	1.67	-10.26	-17.56*
KS-224 x GOB-1	-1.61	0.00	-15.20**	-22.53**	3.95	-19.02*	-9.00	-34.05**	32.16	-20.42	-19.09	-25.83	-18.33*	-24.98**
Pant rituraj x GJB-2	-8.06**	-6.56**	-2.03	-10.49**	5.53	-17.79*	60.22**	16.10	97.72**	19.06	-7.27	-15.00	-32.36**	-37.87**
Pant rituraj x GBL-1	-4.03**	-2.46	1.24	-7.51**	-3.23	-24.61**	30.46*	-5.46	67.54*	0.89	-10.65	-18.10	-4.52	-12.30
Pant rituraj x Doli-5	-5.65**	-4.10**	-7.55**	-15.53**	10.70	-13.76	65.47**	19.91	153.76**	52.80**	35.45	24.17	-0.52	-8.61
Pant rituraj x GOB-1	-8.87**	-7.38**	-3.27	-11.63**	3.73	-19.18*	23.41	-10.57	71.52*	3.28	-13.51	-20.71	4.71	-3.81
GJB-2 x GBL-1	-5.65**	-4.10**	6.87**	-2.37	43.72**	11.97	84.12**	33.42**	84.00**	10.80	59.87*	46.55*	-28.09**	-33.94**
GJB-2 x Doli-5	-5.65**	-4.10**	5.07**	-4.01*	43.50**	11.80	80.38**	30.71**	117.26**	30.82	23.51	13.21	-26.57**	-32.55**
GJB-2 x GOB-1	-4.84**	-3.28*	8.67**	-0.72	7.39	-16.33*	44.72**	4.87	65.20*	-0.52	3.51	-5.12	-24.55**	-30.69**
GBL-1 x Doli -5	-1.61	0.00	9.35**	-0.10	8.54	-15.44*	46.18**	5.93	83.62**	10.57	19.22	9.29	-28.09**	-33.94**
GBL-1 x GOB-1	-2.42	-0.82	5.18**	-3.91*	-2.37	-23.94**	31.65*	-4.60	45.21	-12.56	10.26	1.07	-30.11**	-35.80**
Doli-5 x GOB-1	2.42	4.10**	5.29**	-3.81*	4.38	-18.68*	40.65**	1.92	61.34*	-2.85	40.65	28.93	-17.10	-23.85**

Hybrids/ Characters	Fruit weight (g)		Fruits per plant		Fruit yield per plant (g)		Total soluble solids (°Bx)		Total phenol (mg g^{-1})		Fruit dry weight (mg/100mg)		Total sugar (%)	
	LC(%)	CC(%)	LC(%)	CC(%)	LC(%)	CC(%)	LC(%)	CC(%)	LC(%)	CC(%)	LC(%)	CC(%)	LC(%)	CC(%)
GJB-3 x PLR-1	20.43**	16.73**	6.99	-17.23*	31.83	0.05	4.98	-0.19	24.77**	7.51	13.76**	-0.64	30.37**	-1.34
GJB-3 x KS-224	10.57**	7.17**	-5.11	-26.59**	12.18	-14.86	-3.61	-8.36*	-4.59	-17.79**	-8.16	-19.79**	17.95*	-10.75*
GJB-3 x Pant rituraj	30.33**	26.33**	5.15	-18.65*	39.97	6.23	13.38**	7.80*	-7.34	-20.16**	-3.39	-15.61**	45.36**	10.00
GJB-3 x GJB-2	23.82**	20.02**	1.53	-21.45**	28.53	-2.45	0.59	-4.36	6.88	-7.91	14.12**	-0.32	24.46**	-5.82
GJB-3 x GBL-1	9.48**	6.11*	-0.44	-22.97**	27.57	-3.18	3.42	-1.67	15.14**	-0.79	18.20**	3.24	29.19**	-2.24
GJB-3 x Doli -5	27.85**	23.92**	-6.11	-27.36**	22.58	-6.97	18.16**	12.35**	1.38	-12.65**	13.39**	-0.96	53.06**	15.82**
GJB-3 x GOB-1	12.83**	9.36**	0.66	-22.13**	16.19	-11.81	19.92**	14.02**	-7.80	-20.55**	-0.78	-13.33**	114.99**	62.69**
PLR-1 x KS-224	-12.36**	-15.05**	39.21**	7.70	24.88	-5.22	-2.44	-7.24	20.18**	3.56	18.45**	3.46	19.72**	-9.40
PLR-1 x Pant rituraj	3.39	0.21	38.65**	7.26	46.17*	10.94	12.30**	6.78	1.38	-12.65**	8.86*	-4.92	43.59**	8.66
PLR-1 x GJB-2	-8.80**	-11.61**	63.41**	26.42**	52.24**	15.54	-3.61	-8.36*	18.81**	2.37	14.12**	-0.32	17.95*	-10.75*
PLR-1 x GBL-1	4.39	1.18	61.22**	24.73**	72.70**	31.07	15.23**	9.56*	15.14**	-0.79	10.94*	-3.10	48.32**	12.24*
PLR-1 x Doli-5	14.33**	10.81**	37.77**	6.59	60.81**	22.05	17.87**	12.07**	54.13**	32.81**	14.24**	-0.21	52.47**	15.37**
PLR-1 x GOB-1	5.85*	2.60	50.66**	16.55*	32.11	0.27	-10.35*	-14.76**	70.18**	46.64**	-3.59	-15.79**	7.30	-18.81**
KS-224 x Pant rituraj	-8.44**	-11.25**	9.17	-15.54*	7.05	-18.75	-9.77*	-14.21**	39.91**	20.55**	23.27**	7.66	8.48	-17.91**
KS-224 x GJB-2	-3.21	-6.18*	19.00	-7.94	20.94	-8.21	19.34**	13.46**	12.39*	-3.16	11.55*	-2.57	77.51**	34.33**
KS-224 x GBL-1	2.08	-1.06	26.64**	-2.03	51.64**	15.09	19.34**	13.46**	4.13	-10.28*	-0.65	-13.23**	54.83**	17.16**
KS-224 x Doli-5	7.04*	3.75	40.26**	8.51	60.55**	21.85	15.23**	9.56*	15.14**	-0.79	-18.29**	-28.63**	48.32**	12.24*
KS-224 x GOB-1	3.90	0.71	57.21**	21.62**	47.75*	12.13	18.16**	12.35**	8.26	-6.72	8.86*	-4.92	53.06**	15.82**
Pant rituraj x GJB-2	1.48	-1.64	31.00**	1.35	42.36	8.04	18.75**	12.91**	-12.84*	-24.90**	6.00	-7.42	53.65**	16.27**
Pant rituraj x GBL-1	8.57**	5.23*	13.54	-12.16	-0.27	-24.31	24.02**	17.92**	37.16**	18.18**	-0.53	-13.12**	62.13**	22.69**
Pant rituraj x Doli-5	-22.53**	-24.91**	16.24	-10.07	22.25	-7.21	-3.03	-7.80*	16.06**	0.00	8.61	-5.13	19.13**	-9.85
Pant rituraj x GOB-1	-0.93	-3.98	38.30**	6.99	18.32	-10.20	15.82**	10.12**	-21.10**	-32.02**	-13.71**	-24.63**	56.61**	18.51**
GJB-2 x GBL-1	11.99**	8.55**	-0.66	-23.14**	27.29	-3.39	42.48**	35.47**	2.75	-11.46*	-1.02	-13.55**	109.66**	58.66**
GJB-2 x Doli-5	16.28**	12.70**	26.64**	-2.03	22.33	-7.15	12.30**	6.78	17.43**	1.19	8.61	-5.13	43.59**	8.66
GJB-2 x GOB-1	-4.19	-7.14**	0.00	-22.64**	22.05	-7.37	19.34**	13.46**	15.14**	-0.79	24.00**	8.31*	54.83**	17.16**
GBL-1 x Doli -5	28.64**	24.68**	0.44	-22.30**	47.75*	12.13	19.04**	13.18**	12.39*	-3.16	3.31	-9.77*	54.24**	16.72**
GBL-1 x GOB-1	2.68	-0.48	20.09*	-7.09	42.36	8.04	25.78**	19.59**	45.41**	25.30**	3.55	-9.55*	65.09**	24.93**
Doli-5 x GOB-1	-5.81*	-8.71**	-9.74	-30.17**	-0.27	-24.31	14.06**	8.45*	-4.59	-17.79**	8.24	-5.45	46.55**	10.90*

Table 4: Best heterotic crosses and their performance for fruit yield and related parameters

Promising hybrids	Fruit yield per plant (g)	Standard heterosis (surati ravaiya)	Significant heterosis for other traits over	
			Mid parents	Standard check (surati ravaiya)
PLR-1 x GBL-1	3184.70	72.70	PH, TSS, TS	DFF, SBPP, FPP, TSS, FDW, TS
PLR-1 x Doli-5	2965.56	60.81	PS, FW, FDW	DFF, SBPP, PS, FL, FW, FPP, TSS, FDW, TS
KS-224 x Doli-5	2960.64	60.55	PBPP, PS, FG, FW, TSS, TS	PBPP, SBPP, FW, FPP, TSS, TS
PLR-1 x GJB-2	2807.43	52.24	PBPP, SBPP, PS	DFF, PBPP, SBPP, PS, FPP

DFF = Days to 50 % flowering
PH = Plant height (cm)
PBPP= Primary branches per plant
SBPP= Secondary branches per plant
PS = Plant spread (cm^2)
FL = Fruit length (cm)
FG = Fruit girth (cm)
FW = Fruit weight (g)
FPP = Fruits per plant
TSS = Total soluble solids (°Bx)
TS = Total sugar (%)
FDW= Fruit dry weight (mg/100mg)
TP = Total phenol (mg g^{-1})

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