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Naveen YKV
M.Sc. Student, Department of Genetics and Plant Breeding, N. M. College of Agriculture, Navsari Agricultural University, Eru, Navsari, Gujarat, India

Patel AI
Assistant Professor, Department of Vegetable Science, ASPEE College of Horticulture and Forestry, NAU, Eru, Navsari, Gujarat, India

Rutvik J Joshi
M.Sc. Student, Department of Genetics and Plant Breeding, N. M. College of Agriculture, Navsari Agricultural University, Eru, Navsari, Gujarat, India

Ruchi J Chhodavadiya
M.Sc. Student, Department of Genetics and Plant Breeding, N. M. College of Agriculture, Navsari Agricultural University, Eru, Navsari, Gujarat, India

Moharana SK
M.Sc. Student, Department of Genetics and Plant Breeding, N. M. College of Agriculture, Navsari Agricultural University, Eru, Navsari, Gujarat, India

Ajay M Sojitra
M.Sc. Student, Department of Forest Biotechnology, College of Forestry, Navsari Agricultural University, Eru, Navsari, Gujarat, India

Corresponding Author:
Naveen YKV
M.Sc. Student, Department of Genetics and Plant Breeding, N. M. College of Agriculture, Navsari Agricultural University, Eru, Navsari, Gujarat, India

Genetic studies on fruit yield and its components in brinjal (*Solanum melongena* L.)

Naveen YKV, Patel AI, Rutvik J Joshi, Ruchi J Chhodavadiya, Moharana SK and Ajay M Sojitra

Abstract
The present investigation was designed in order to estimate heterosis for fruit yield and its component traits in brinjal. The experimental material comprised of 7 parents, their resultant 21 hybrids produced following half diallel mating design and a check "GAOB-2" of brinjal, which were evaluated in randomized block design with three replications. The experiment was conducted at College Farm, N. M. College of Agriculture, Navsari Agricultural University, Navsari during *rabi* 2021. The standard heterosis for all the characters showed that none of the hybrids displayed consistent standard heterosis for all the characters under study. For fruit yield per plant, the range of heterosis varied from -25.17 per cent to 18.23 per cent. Three crosses *viz*., GNRB-1 × CH-215, CH-215 × NBL-5 and GNRB-1 × NBL-5 showed positive standard heterosis for fruit yield per plant (kg). Indirect selection for traits like fruit weight, fruit diameter and number of fruits per plant could be done to obtain higher fruit yield through heterosis. The current investigation reveals good scope for commercial exploitation of heterosis in brinjal.

Keywords: Heterosis, brinjal, half diallel, breeding, yield, vegetable

Introduction
Brinjal [*Solanum melongena* L., 2n = 24], one of the important vegetable crops, belongs to *Solanaceae* family. Internationally, it is referred as egg plant (England) or Aubergine (France). It is a good source of nutrients such as ascorbic acid, vitamin K, niacin, vitamin B_6, pantothenic acid and rich in minerals like Ca, Mg, P, K and Fe (Chaitanya and Reddy 2022) [4]. India is the second major producer of brinjal in the world after China. In India, eggplant occupies an area of 7.49 lakh hectare with an annual production of 128.74 lakh metric tonne (Anon., 2021) [1]. Eggplant occupies an area of 77.55 thousand hectare with an annual production of 1533.67 thousand metric tonne in Gujarat state (Anon., 2021) [1].
Brinjal offers the possibility of improvement through heterosis breeding and continues to be a choice of breeders for exploitation of heterosis as it is a hardy plant with comparatively large sized flowers and large number of seeds can be obtained by a single act of pollination. In order to develop high yielding varieties or hybrids which are location specific and disease resistant the use of hybrid technology for exploitation of heterosis is considered as one of the desirable, sustainable and eco-friendly approach. The estimation of heterosis for yield and its component characters would be useful in determining the best hybrid combination. The proper choice of parents based on their combining ability is a prerequisite in any breeding programme. By keeping above points in consideration, the current study was conducted to estimate the magnitude of heterosis for fruit yield and its component characters.

Material and Methods
Based on their fruit yield as well as other traits, seven diverse lines of brinjal *i. e*., GNRB-1, CH-215, NBL-5, NBL-13, NBL-18, NBL-75 and NBL-117 were selected as parents for hybridization to generate the F_1 hybrids to study heterosis. The parents were crossed in half diallel fashion to get 21 hybrids. The hybrids were evaluated in the second season against the check "GAOB-2" The crossing technique followed was hand emasculation and hand pollination. Flowers of female parents were selected on the previous evening before the day of their opening. The selected flower buds of female parents were emasculated and covered with butter paper bags to avoid out crossing. Pollination was carried out on the next day morning between 7.00 am and 9.30 am by using pollen of desired male parents.

After pollination, the female flower buds were again covered with butter paper bags to avoid contamination and tagged with the details of parent and date of pollination. Simultaneously, the male and female parents were also selfed by bagging the flower buds with butter paper bags before the day of flower opening. Crossed and selfed fruits were harvested separately at full maturity stage. The seeds were hand extracted and preserved in butter paper bags labelled with the details of the cross.

Data was recorded on five randomly selected plants in each treatment over the replications for all the characters *viz*., days to 50 % flowering, flowers per plant, branches per plant, plant height (cm), fruit weight (g), fruit length (cm), fruit diameter (cm), fruits per plant, fruit yield per plant (kg) and quality parameters of fruits like total soluble solids (%), ascorbic acid (mg/100 g) and total phenol content (mg/100 g).

Results and Discussion

The analysis of variance (ANOVA) revealed that highly significant differences among genotypes were observed for all the characters under study indicating higher genetic diversity exhibited in the genotypes. Similar results were also obtained by among parents, highly significant differences were observed for all the traits except fruit length (cm). Among hybrids, highly significant differences were observed for all the traits except ascorbic acid (mg/100 g). Similar results were reported by Siva *et al.* (2020) [22], Rameshkumar and Vethamonai (2020) [16], Singh *et al.* (2021) [21] and Nikhila *et al.* (2022) [13].

Days to 50 % flowering

Earliness is required in crops for realizing the potential economic yield in less time as possible, which is an important consideration for vegetable growers (Patel, 2017) [14, 15] so, considering negative heterosis for this trait. The standard heterosis ranged from -8.91 per cent (GNRB-1 × CH-215) to 18.32 per cent (NBL-75 × NBL-117) for this trait. The hybrid GNRB-1 × CH-215 (-8.91 per cent) exhibited significant and negative standard heterosis, followed by GNRB-1 × NBL-13 (-7.43 per cent) and GNRB-1 × NBL-5 (-6.93 per cent). Significant and negative standard heterosis for days to 50% flowering were reported by Chaudhari *et al.* (2020) [5], Makasare *et al.* (2020) [11], Singh *et al.* (2021) [21] and Nikhila *et al.* (2022) [13].

Flowers per plant

The hybrids exhibited a wide range of standard heterosis from -41.66 per cent (NBL-13 × NBL-117) to 8.80 per cent (GNRB-1 × CH-215) for this trait. Out of 21 hybrids, top three hybrids *viz*., GNRB-1 × CH-215 (8.80 per cent), GNRB-1 × NBL-13 (7.72 per cent) and GNRB-1 × NBL-5 (6.39 per cent) exhibited non-significant and positive standard heterosis for this trait. Similar kind of results were reported by Sujin *et al.* (2018) [23].

Branches per plant

The number of branches per plant is one of the major parameter contributing for total fruit yield per plant (Rani *et al.*, 2018) [17]. The plant height and primary branches which ultimately contribute to yield by increasing number of flowering clusters (Khapte *et al.*, 2017) [10]. For the trait branches per plant, the hybrids exhibited a range of standard heterosis from -20.19 per cent (NBL-75 × NBL-117) to 6.73 per cent (GNRB-1 × NBL-5). The top three hybrids are GNRB-1 × NBL-5 (6.73 per cent), GNRB-1 × CH-215 (5.77 per cent) and CH-215 × NBL-5 (2.88 per cent), which exhibited non-significant and positive standard heterosis for this trait as reported by Chaudari *et al.* (2020) [5], Rameshkumar and Vethamonai (2020) [16], Singh *et al.* (2021) [21] and Nikhila *et al.* (2022) [13].

Plant height (cm)

Plant height is an important growth trait in brinjal which provides seat for number of primary branches. As the number of primary branches gives out secondary and tertiary branches, they determine the ideotype and it is related to the crop duration and productivity also (Santhosha *et al.*, 2017) [18]. An ideal plant should have longer plant height and hence heterosis in positive direction is desired for plant height (Patel, 2017) [14, 15]. Standard heterosis for the hybrids ranged from -12.38 per cent (NBL-75 × NBL-117) to 8.42 per cent (CH-215 × NBL-5) for this trait. The hybrids *viz.*, CH-215 × NBL-5 (8.42 per cent), GNRB-1 × CH-215 (8.2 per cent) and GNRB- 1 × NBL-75 (7.0 per cent) were top performers in terms of higher standard heterosis. Among top three hybrids, CH-215 × NBL-5 exhibited positive and significant standard heterosis for this trait. These results were in line with Chaudhari *et al.* (2020) [5], Makasare *et al.* (2020) [11], Rameshkumar and Vethamonai (2020) [16], Singh *et al.* (2021) [21] and Nikhila *et al.* (2022) [13] in brinjal.

Fruit length (cm)

Fruit length is an important character which decides consumer preference (Rani *et al.*, 2018) [17]. The maximum and minimum standard heterosis ranged from -18.29 per cent (NBL-75 × NBL-117) to 13.57 per cent (GNRB-1 × CH-215) for this trait. Out of 21 hybrids, top three hybrids *viz*.., GNRB-1 × CH-215 (13.57 per cent), GNRB-1 × NBL-5 (12.13 per cent) and CH- 215 × NBL-5 (11.63 per cent) which exhibited non-significant standard heterosis in positive direction. These results were in line with Chaudhari *et al.* (2020) [5], Makasare *et al.* (2020) [11], Rameshkumar and Vethamonai (2020) [16], Singh *et al.* (2021) [21] and Nikhila *et al.* (2022) [13].

Fruit diameter (cm)

Fruit diameter is also one of the parameter that contributes to fruit yield of eggplant and also commercially important traits to gain high market value through high productivity (Desai *et al.*, 2016). Standard heterosis for the hybrids ranged from -27.88 per cent (NBL-75 × NBL- 117) to 17.29 per cent (CH-215 × NBL-5) for this trait. Out of 21 hybrids, top three hybrids *viz*., CH-215 × NBL-5 (17.29 per cent), GNRB-1 × NBL-117 (16.49 per cent) and GNRB-1 × CH-215 (16.40 per cent) exhibited significant and positive standard heterosis. These results are in line with Chaudhari *et al.* (2020) [5], Makasare *et al.* (2020) [11], Rameshkumar and Vethamonai (2020) [16], Singh *et al.* (2021) [21] and Nikhila *et al.* (2022) [13].

Fruit weight (g)

Fruit weight contributes to fruit yield of eggplant and also commercially important traits to gain high market value through high productivity (Desai *et al.*, 2016). The standard heterosis ranged from -28.46 per cent (NBL-75 × NBL-117) to 10.44 per cent (GNRB-1 × CH-215) for this trait. Top performed hybrids were GNRB-1 × CH-215 (10.44 per cent), CH-215 × NBL-5 (10.16 per cent) and GNRB-1 × NBL-5 (9.97 per cent) exhibited significant and positive standard heterosis. Similar results were reported by Chaudhari *et al.* (2020) [5], Makasare *et al*. (2020) [11], Rameshkumar and Vethamonai (2020) [16], Singh *et al.* (2021) [21] and Nikhila *et al.* (2022) [13].

Fruits per plant

Number of fruits per plant is economically important character to get more yield (Rani *et al*., 2018) [17]. The standard heterosis ranged from -43.92 per cent (NBL-75 × NBL-117) to 27.62 per cent (GNRB-1 × CH-215) for this trait. Out of 21 hybrids, top three hybrids *viz*., GNRB-1 × CH-215 (27.62 per cent), GNRB-1 × NBL-117 (27.07 per cent) and GNRB-1 × NBL-13 (24.59 per cent) exhibited significant and positive heterosis for this trait. Similar results were reported Rameshkumar and Vethamonai (2020) [16], Singh *et al.* (2021) [21] and Nikhila *et al.* (2022) [13].

Fruit yield per plant (kg)

Yield in any crop is the final product of different yield components (Das *et al.*, 2009) [6] and one of the most important characters, which deserves maximum consideration in any crop improvement programme (Rani *et al*., 2018) [17]. For this trait significant and positive standard heterosis is desirable. The range of standard heterosis varied from -25.17 per cent (NBL-5 × NBL-117) to 18.23 per cent (GNRB-1 × CH-215). Out of 21 hybrids, top three hybrids *viz*., GNRB-1 × CH-215 (18.23 per cent), CH-215 × NBL-5 (16.61 per cent) and GNRB-1 × NBL-5 (15.04 per cent) which exhibited significant and positive standard heterosis for this trait. These findings were in agreement with those of Chaudhari *et al.* (2020) [5], Makasare *et al.* (2020) [11], Rameshkumar and Vethamonai (2020) [16], Singh *et al.* (2021) [21] and Nikhila *et al.* (2022) [13].

Total soluble solids (%)

TSS value affects the taste of the fruit, because it can indicate the level of sweetness of the fruit. TSS is dominated by total sugar content and a small portion of soluble proteins, amino acids and other organic materials (Hadiwijaya *et al.*, 2020). Higher TSS gives the good fruit taste, and consumer preference will be more for such fruits. So, the positive standard heterosis is desirable. The hybrids exhibited wide range of standard heterosis from -19.31 per cent (NBL-75 × NBL-117) to 9.62 per cent (GNRB-1 × CH-215) for this trait. Two hybrids *viz*., GNRB-1 × CH-215 (9.62 per cent) and GNRB-1 × NBL-5 (8.06 per cent) showed significant and positive heterosis for this trait. Similar results were reported by Patel *et al*. (2017) [14, 15], Zeal (2019) [24] and Chaudhari *et al.* (2020) [5].

Ascorbic acid (mg/100 g)

Generally, the higher ascorbic acid content would increase the nutritive value of the fruits, which would help better retention of colour and flavour (Sasikumar, 1999) [19]. The standard heterosis ranged from -9.08 per cent (CH-215 × NBL-75) to 2.46 per cent (GNRB-1 × CH-215) for this trait. Out of 21 hybrids, top three hybrids *viz*., GNRB-1 × CH-215 (2.46 per cent) and GNRB-1 × NBL-5 (1.39 per cent) exhibited non-significant and positive standard heterosis. Similar findings were also reported by Balwani *et al*. (2017) [3], Patel *et al.* (2017) [14, 15] and Chaudhari *et al.* (2020) [5].

Total phenol content (mg/100g)

Phenol contents in fruits of brinjal are accounted towards the resistance to shoot and fruit borer in brinjal (Shaukat *et al.* 2018) [20]. But after cutting brinjal fruit, it is prone to browning due to excess phenol content, which results in loss of eye appeal for consumers (Mishra *et al*. 2012). Negative heterosis is desirable for this trait. The maximum to minimum standard heterosis ranged from -5.43 per cent (NBL-75 × NBL-117) to 6.70 per cent (GNRB-1 × CH-215) per cent for this trait. The hybrids *viz*., NBL-13 × NBL-117 (-5.43 per cent), NBL-13 × NBL-75 (-2.61 per cent) and CH-215 × NBL-18 (-1.81 per cent) exhibited negative and non-significant standard heterosis. Similar results were obtained by Balwani *et al*. (2017) [3] and Patel *et al*. (2017) [14, 15].

Heterosis for growth parameters is an indication of heterosis for yield, because growth and yield parameters are strongly associated (Dubey *et al*., 2014) [8]. The ideal plant type should have longer plant height with more number of branches per plant; was the major parameters which acts as source trait to support yield and its components. Among top three hybrids, with respect to plant height, one cross CH-215 × NBL-5 exhibited standard heterosis in desirable direction, while for number of branches per plant, none of the top three hybrids recorded significant standard heterosis in desired direction indicated that these traits are not much more important in contributing yield. Similar results were reported by Dubey *et al.* (2014) [8] and Ansari (2017) [2].

Component wise examination of the crosses revealed that the top yielding crosses manifested high heterosis for number of fruits per plant, a major yield component. However, in some crosses *viz.*, GNRB-1 × NBL-13, GNRB-1 × NBL-18 and GNRB-1 × NBL-117, though considerable heterosis was observed for number of fruits per plant but they did not exhibited significant heterosis for fruit yield per plant. The low heterosis exhibited by above crosses for fruit yield mainly due to non-significant heterosis for fruit weight and fruit length. This indicates that the yield is a very complex character and depends upon interrelationships among various component characters. Almost identical results have been reported by Singh *et al.* (2021) [21] and Nikhila *et al.* (2022) [13].

There is a biological balance between the principle yield components, number of fruits on one hand and fruit weight, fruit length and fruit diameter on other hand, for high heterotic expression of yield. It is evident from the result that high heterosis for all the yield components results in high heterosis for yield in top three crosses. Almost identical results have been reported by Chaudhari *et al.* (2020) [5], Makasare *et al.* (2020) [11], Rameshkumar and Vethamonai (2020) [16], Singh *et al.* (2021) [21] and Nikhila *et al.* (2022) [13].

From the nutrient point of view, quality is considered as an important factor in any vegetable crop. Brinjal is being a commercial and popular vegetable in India and Gujarat, it is needless to emphasis the importance quality parameter for consumption of fresh and processed produce. Quality traits are not directly co-related with yield. Among the top three crosses, two *viz.*, GNRB-1 × CH-215 and CH-215 × NBL-5 exhibited significant and desired standard heterosis for total soluble solids. Similar kind of results were reported by Patel *et al*. (2017) [14, 15], Zeal (2019) [24] and Chaudhari *et al.* (2020) [5].

The magnitude of heterosis found in present study stressed the importance of using genetically divergent parents in hybridization programme. Apart from these hybrids, there are some F_1 hybrids not showing significant heterosis but were still better than the superior parents. Further, maximum heterosis observed in F_1 hybrids was not expressed by the best performing parents, but at least one poor or average performing parent was involved in these significantly high heterotic F_1 hybrids.

Table 1: Analysis of variance for parents and their hybrids for various characters

Source of variation	d.f	Days to 50 % flowering	Flowers per plant	Branches per plant	Plant height (cm)	Fruit length (g)	Fruit diameter (cm)	Fruit weight (g)	Fruits per plant	Fruit yield per plant (kg)	Total soluble solids (%)	Ascorbic acid (mg/100 g)	Total phenol content (mg/100 g)
Replication	2	9.98	72.53	0.05	11.87	0.44	0.21	26.26	1.69	0.039	0.027	0.02	0.003
Genotypes	28	106.97**	446.86**	0.75**	117.93**	1.83**	2.29**	210.08**	78.10**	0.269**	0.44**	0.037*	0.008**
Parents	6	41.22**	267.99**	0.86**	151.36**	0.531	0.92*	92.91**	35.43**	0.086*	0.18**	0.06**	0.009*
Hybrids	20	128.98**	505.29**	0.69**	111.26**	2.298*	2.81**	240.05**	96.36**	0.33**	0.54**	0.024	0.008*
Parents *vs* Hybrids	1	55.25*	98.56 *	0.75*	103.88*	0.51	1.66	358.33**	27.86*	0.15*	0.19*	0.029	0.017*
Error	56	12.18	23.58	0.13	24.25	0.56	0.39	18.32	3.20	0.035	0.044	0.019	0.004
Total	86	42.73	174.02	0.32	54.46	0.97	1.05	80.93	27.55	0.11	0.17	0.025	0.005

*- Significant at 5 per cent and **-Significant at 1 per cent

Table 2: Promising top three hybrids for fruit yield per plant (kg) with standard heterosis and component traits showing desired heterosis

Sr. No.	Hybrids	Fruit yield per plant (kg)	Standard heterosis over check GAOB-2	Useful and significant standard heterosis for component traits
1	GNRB-1 × CH-215	2.52	18.23*	Days to 50 % flowering, fruit diameter, fruit weight, fruits per plant, total soluble solids
2	CH-215 × NBL-5	2.49	16.61*	Plant height, fruit diameter, fruit weight, fruits per plant
3	GNRB-1 × NBL-5	2.45	15.04*	Fruit diameter, fruit weight, fruits per plant, total soluble solids

*- Significant at 5 per cent and **-Significant at 1 per cent

Table 3: Magnitude of standard heterosis for various characters in brinjal

Sr. No	Hybrids	Days to 50 % flowering	Flowers per plant	Branches per plant	Plant height (cm)	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (g)	Fruits per plant	Fruit yield per plant (kg)	Total soluble solids (%)	Ascorbic acid (mg/100 g)	Total phenol content (mg/100 g)
1	GNRB-1 × CH-215	-8.91 *	8.80	5.77	8.21	13.57	16.40*	10.44*	27.62**	18.23*	9.62**	2.46	6.70*
2	GNRB-1 × NBL-5	-6.93	6.39	6.73	6.65	12.13	14.80*	9.97*	23.48**	15.04*	8.06*	1.39	6.16*
3	GNRB-1 × NBL-13	-7.43	7.72	-6.73	-4.88	-3.57	-1.64	2.63	24.59**	12.01	-6.29	-2.24	3.62
4	GNRB-1 × NBL-18	8.42*	-11.78*	-8.65*	-5.59	-7.83	-1.20	-6.21	21.27**	12.23	-0.28	-4.17	2.54
5	GNRB-1 × NBL-75	-6.44	-10.95*	-7.69	7.08	-0.46	-9.31	-11.48*	4.70	1.83	3.39	-6.62	2.36
6	GNRB-1 × NBL-117	11.88**	5.56	-7.69	-7.50	-6.12	16.49*	-16.84**	27.07**	12.76	2.40	-6.30	2.36
7	CH-215 × NBL-5	-5.94	0.41	2.88	8.42*	11.63	17.29*	10.16*	17.40**	16.61*	-0.42	-7.26*	-0.72
8	CH-215 × NBL-13	9.41*	-14.52**	-9.62*	-1.63	-5.93	-8.38	-0.66	-11.05	-15.11*	-10.61**	-6.30	0.76
9	CH-215 × NBL-18	12.38**	-20.25**	-8.65*	-4.46	-17.72*	-12.46	-12.32*	-20.72**	-19.95**	-10.96**	-7.26*	-1.81
10	CH-215 × NBL-75	13.37**	-26.56**	-9.62*	-8.42*	-15.59*	-12.41	-18.91**	-16.30**	-16.04*	-17.33**	-9.08*	0.18
11	CH-215 × NBL-117	-5.94	-25.89**	-10.58*	-12.38**	-15.13*	-10.02	-20.32**	-20.99**	-17.58*	-16.27**	-7.26*	-0.72
12	NBL-5 × NBL-13	17.82**	-23.90**	-4.81	-8.35	-8.71	-12.23	-3.86	-16.02**	-22.48**	-12.31**	-5.88	2.72
13	NBL-5 × NBL-18	14.36**	-20.33**	-10.58*	-8.35	-10.57	-13.61*	-14.30**	-16.30**	-20.15**	-9.48**	-6.30	3.08
14	NBL-5 × NBL-75	16.34**	-24.98**	-12.50**	-10.54*	-15.29*	-18.26**	-22.30**	-19.34**	-19.36**	-16.48**	-5.88	-0.91
15	NBL-5 × NBL-117	11.88**	-27.72**	-13.46**	-8.28	-14.52*	-10.06	-17.87**	-20.72**	-25.17**	-18.95**	-6.94	2.54
16	NBL-13 × NBL-18	13.37**	-30.87**	-9.62*	-4.46	-13.00	-10.99	-22.11**	-26.52**	-13.12	0.85	-7.59*	-0.62
17	NBL-13 ×	12.87**	-35.10**	-15.38**	-4.95	-14.60*	-9.31	-	-33.98**	-22.20**	-9.48**	-4.59	-2.61

	NBL-75							23.52**					
18	NBL-13 × NBL-117	15.84**	-41.66**	-18.27**	-9.34*	-18.29**	-9.57	-25.87**	-32.60**	-22.03**	-17.40**	-7.48*	-5.43
19	NBL-18 × NBL-75	10.89*	-36.68**	-14.42**	-3.54	-14.07*	-25.62**	-25.78**	-33.98**	-18.83**	-13.01**	-8.01*	2.54
20	NBL-18 × NBL-117	14.36**	-39.59**	-11.54**	-9.55*	-13.92*	-27.88**	-28.46**	-28.73**	-15.45*	-6.51	-8.87*	3.26
21	NBL-75 × NBL-117	18.32**	-28.05**	-20.19**	-9.27*	-18.21**	-6.03	-21.73**	-43.92**	-15.59*	-19.31**	-5.56	-0.72
	S. Ed. (±)	2.85	3.99	0.30	4.03	0.61	0.51	3.50	1.47	0.16	0.17	0.11	0.05
	C.D. @ 5 %	5.59	0.58	0.58	7.89	1.20	1.00	6.86	2.88	0.31	0.34	0.22	0.10
	C.D. @ 1 %	7.35	0.77	0.77	10.39	1.58	1.31	9.04	3.79	0.41	0.44	0.28	0.13
	Range	-8.91 to 18.32	-41.66 to 8.80	-20.19 to 6.73	-12.38 to 8.42	-18.29 to 13.57	-27.88 to 17.29	-28.46 to 10.44	-43.92 to 27.62	-25.17 to 18.23	-19.31 to 9.62	-9.08 to 2.46	-5.43 to 6.70

*- Significant at 5 per cent and **-Significant at 1 per cent

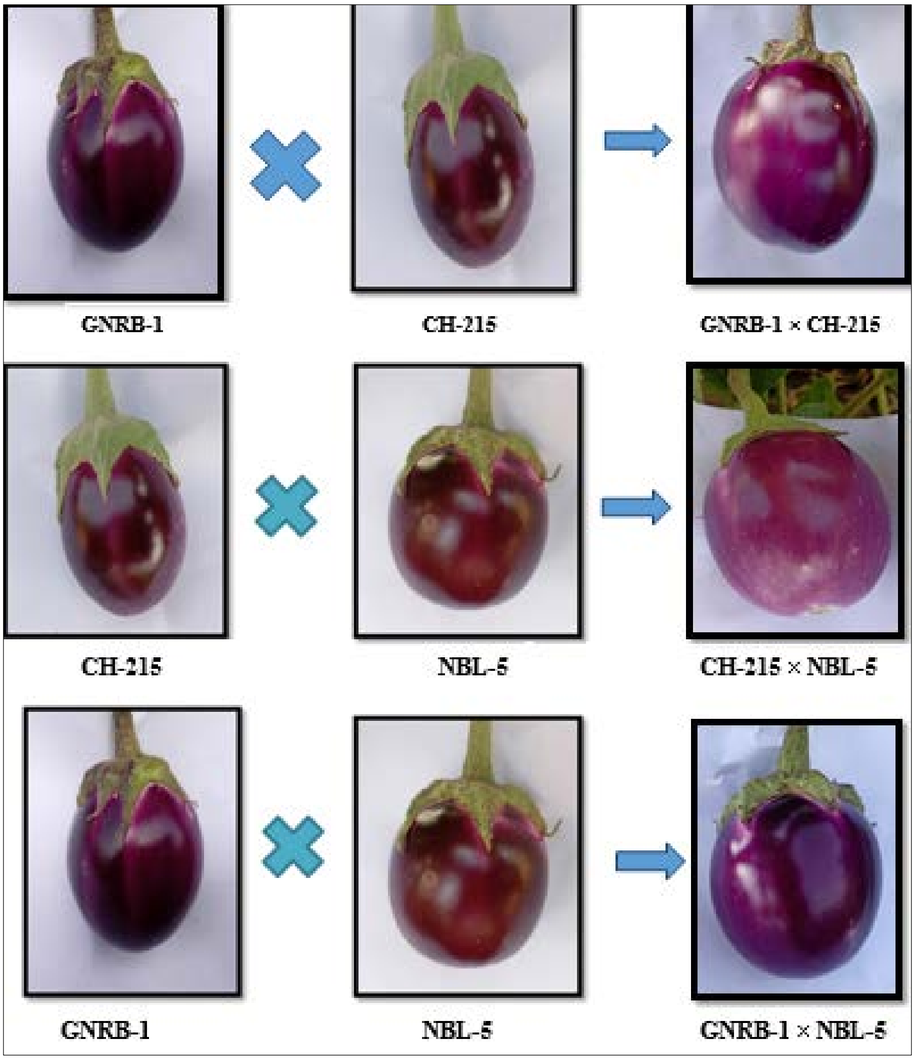

Plate 1: Top three high yielding crosses of brinjal

Conclusion

Among all hybrids, the top three crosses *viz.*, GNRB-1 × CH-215, CH-215 × NBL-5 and GNRB-1 × NBL-5 exhibited high standard heterosis and *per se* performance as shown in table 2 and plate 1. Hence, three crosses *viz.*, GNRB-1 × CH-215, CH-215 × NBL-5 and GNRB-1 × NBL-5 could be exploited commercially to boost the fruit yield in brinjal after thorough testing at different environments. These hybrids were exploited to get better transgressive segregants for different traits.

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References

1. Anonymous. Area and production of horticulture crops (final estimates of 2020-21); c2021. http://agricoop.nic.in/sites/default/files/2020-21.pdf [Accessed 16 August, 2022]
2. Ansari SF. Genetic analysis for earliness and heat tolerance along with yield attributing traits in brinjal (*Solanum melongena* L.). Thesis Ph.D., Indira Gandhi Krishi Vishwavidyalaya, Raipur; c2017. p. 48.
3. Balwani AK, Patel JN, Acharya RR, Gohil DP, Dhruve JJ. Heterosis for fruit yield and its component traits in brinjal (*Solanum melongena* L.). J Pharmacogn. Phytochem. 2017;6(5):187-190.
4. Chaitanya V, Reddy RVSK. Phenotypic stability for fruit yield and its components of brinjal. Int. J Bio-Resour. Stress Manag. 2022;13(5):438-447.
5. Chaudhari BN, Patel AI, Vashi JM. Study on heterosis over environments in brinjal (*Solanum melongena* L.). Int. J Curr. Microbiol. Appl. Sci. 2020;9(7):3358-3367.
6. Das S, Mandal AB, Hazra P. Study of heterosis in brinjal (*Solanum melongena* L.) for yield attributing traits. J Crop and Weed. 2009;5(2):25-30.
7. Desai KM, Saravaiya SN, Patel AI, Tank RV, Patel DA. Heterosis for Yield and its Relevant Characters in Brinjal (*Solanum melongena* L.). J Adv. Life Sci. 2016;5(13):5426-5429.
8. Dubey R, Das A, Ojha MD, Saha B, Ranjan A, Singh PK. Heterosis and combining ability studies for yield and yield attributing traits in brinjal (*Solanum melongena* L.). Bioscan. 2014;9(2):889-894.
9. Hadiwijaya Y, Putri IE, Mubarok S, Hamdani JS. Rapid and non-destructive prediction of total soluble solids of guava fruits at various storage periods using handheld near-infrared instrument. In IOP Conference Series: Earth and Environ. Sci. 2020;458(1):12-22.
10. Khapte PS, Singh TH, Sadashiva AT. Heterosis in Manjari gota type of brinjal (*Solanum melongena* L.). Res. Env. Life Sci. 2017;10(5):421-424.
11. Makasare PV, Bagade AB, Kalyankar SV. Identification of heterotic hybrids for yield and yield traits in brinjal. J Pharmacogn. Phytochem. 2020;9(6):333-336.
12. Mishra BB, Gautam S, Sharma A. Browning of fresh-cut eggplant: Impact of cutting and storage. Postharvest Biol. Tech. 2012;67:44-51.
13. Nikhila Jyoti P, Jirankali D, Gowda TH, Dushyanthkumar B. Heterosis studies for yield and yield attributing traits in brinjal (*Solanum melongena* L.). Pharma Innov. J. 2022;11(5):738-741.
14. Patel AA, Gohil DP, Dhruve JJ, Damor HI. Heterosis for fruit yield and its quality characters in brinjal (*Solanum melongena* L.). J Pharmacogn. Phytochem. 2017;6(6):975-978.
15. Patel KD. Study of heterosis, combining ability and stability for yield and quality traits in tomato (*Solanum lycopersicum* L.). Thesis Ph.D., Navsari Agricultural University, Navsari; c2017. p. 255.
16. Rameshkumar D, Vethamonai IP. Heterosis for quantitative and qualitative traits in brinjal (*Solanum melongena* L.). Veg. Sci. 2020;47(1):55-61.
17. Rani M, Kumar S, Kumar M. Estimation of heterosis for yield and its contributing traits in brinjal. J Env. Bio. 2018;39(5):710-718.
18. Santhosha HM, Indiresh KM, Lingaiah HB. Diallel analysis in brinjal (*Solanum melongena* L.) for fruit yield, its attributes and bacterial wilt resistance. J Pharmacogn. Phytochem. 2017;6(6):860-872.
19. Sasikumar A. Screening of eggplant (*Solanum melongena* L.) genotypes for quality and yield. M.Sc., (Hort.) Thesis, Tamil Nadu Agricultural University, Coimbatore; c1999.
20. Shaukat MA, Ahmad A, Mustafa F. Evaluation of resistance in brinjal (*Solanum melongena* L.) against brinjal shoot and fruit borer (*Leucinodes orbonalis* Guen.) infestation. Int. J Appl. Sci. Biotech. 2018;6(3):199-206.
21. Singh S, Sharma HD, Dogra RK, Vinay Verma, Aditika\, Shilpa. Study of heterosis for vegetative and quantitative traits in brinjal (*Solanum melongena* L.). Pharma Innov. J. 2021;10(12):335-338.
22. Siva M, Jyothi KU, Rao AD, Rajyalakshmi M, Patro TSKKK, Emmanuel N, Chennakesavulu B. Stability studies for floral, biochemical and fruit borer incidence characters in brinjal (*Solanum melongena* L.) over Andhra Pradesh conditions. J Pharmacogn. Phytochem. 2020;9(4):137-142.
23. Sujin GS, Karuppaiah P, Saravanan K. Genetic variability and correlation studies in brinjal (*Solanum melongena* L.). Indian J Agric. Res. 2018;51(2):112-119.
24. Zeal AM, Jivani LL, Kachhadia VH, Valu MG, Vadavia AT. Heterosis for fruit yield and its components in brinjal (*Solanum melongena* L.). Pharma Innov. J. 2019;8(9):50-53.