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Performance of Parents and Hybrids for Yield and Yield Attributing Characters in Manjarigota Type of Brinjal (*Solanum melongena* L.)

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The present study was carried out to know the performance of parents and their hybrids for different traits attributing for yield in Manjarigota type of brinjal at the Division of Vegetable Crops, Indian Institute of Horticultural Research (IIHR), Hessaraghatta, Bangalore during the period between July-2010 to May-2011. Among the parents used for investigation T_3, T_2 and L_3 were high yielding of 1.60, 1.30 and 1.26 kg per plant respectively. The hybrids L_4 x T_2, L_3 x T_2 and L_7 x T_1 recorded high yield of 2.73, 2.41 and 1.86 kg per plant and showed highest estimated yield of 57.40, 53.70 and 41.40 tonnes per hectare respectively in Manjarigota type of brinjal. The hybrid L_4 x T_2 was most promising for various traits which contribute to highest per plant yield. Based on their performance parents can be used for further breeding programme and hybrids could be exploited for cultivation in Manjarigota background.

Key words: Brinjal, Manjarigota, hybrids, yield.

Brinjal (*Solanum melongena* L.) is one of the most important vegetable crops of the country. A great variation with regard to fruit colour, shape and vegetative growth exists among the indigenous materials. Based upon its highest production potential and availability of the produce to consumers it is also termed as poor man's vegetable. India ranks second after China in area and production of the brinjal. Brinjal shares 8.1 percent of production in total vegetable production in India. The cultivated area of brinjal in India is about 6.80 lakh hectares with production of 118.96 lakh tonnes and productivity of 17.5 tonnes per hectare, while West Bengal is leading state in area, production & productivity of 1.58 lakh hectares as well as production of 28.70 lakh tonnes and productivity of 18.1 tonnes per hectare (Anon., 2011). The possible exploitation of hybrid vigour in brinjal has been taken up at several research centres. However, very little systematic attention has been paid by plant breeders to study performance for yield and its components in Manjarigota type brinjal. Manjarigota type of brinjal is of purple colour with white strips on it and most preferred in Maharashtra, Karnataka, Andhra Pradesh and parts of Tamil Nadu. The genotypes performing well can be released as a variety or can be used further in heterosis breeding programme.

Materials and Methods

The present investigation was undertaken at the Division of Vegetable Crops, Indian Institute of Horticultural Research (IIHR), Hessaraghatta, Bangalore. The experimental field is located at an altitude of 890 meters above MSL, 13°58' N latitude and 78°E longitude.The parents and the hybrids were evaluated during the period between July-2010 to May-2011. The experimental material consists of seven parents viz; IIHR-228(L_1), IIHR-569(L_2), IIHR-574(L_3), IIHR-575(L_4), IIHR-587(L_5), IIHR-592(L_6) and IIHR-570(L_7) used as lines and three testers namely IIHR- 438-2(T_1), IIHR- 500A (T_2) and IIHR-571(T_3) and L x Tester mating design was followed in the study. Thus a total of 21 hybrids were synthesised by making crosses between lines and the testers during Kharif 2010. All the 21 hybrids along with their corresponding 10 parents were evaluated in a randomised block design in three replications during summer 2011. Observations on five randomly selected plants were recorded for various yield attributing traits to see the performance of parents and hybrids.

Results and Discussion

The *per se* performance of parents (Lines and Testers) (Table 1), hybrids (Table 2) and top three performing hybrids for different characters are presented in (Table 3) for growth, earliness and yield parameters.

Genotypes differed significantly among themselves for days to first flower opening and it ranged from 36.86 (T_1) to 38.60 (T_2) days among the testers, 34.80 (L_7) to 39.40 (L_4) days among the lines (Table 1) and 33.73 (L_3 x T_1) to 39.33 (L_4 x T_2) days among the hybrids (Table 2), Days to fifty per cent flowering ranged from 44.66 (T_3) to T_2 (47.66) days

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Table 1. *Per se* performance of parents (Lines and Testers) for earliness, growth and yield parameters

Parents	Days to first flower opening	Days to 50 per cent flowering	Per cent fruit set	Days to first fruit harvest	Fruit length (cm)	Fruit diameter (cm)	Average fruit weight (g)	No. of fruits per plant	Yield per plant (kg)	Estimated yield (t/ha)	No.of seeds per fruit (g)	Plant height (cm)	No. of primary branches
LINES													
L_1	36.46	45.00	52.79	61.66	4.83	4.08	93.00	11.00	1.06	23.55	3.86	40.11	4.88
L_2	36.60	43.66	59.97	57.33	5.33	4.68	51.66	19.66	1.02	22.73	3.76	45.55	5.00
L_3	38.60	45.00	53.52	61.33	6.33	4.47	63.00	21.00	1.26	28.70	7.46	49.44	4.11
L_4	39.40	47.33	55.45	62.00	5.55	4.65	76.66	14.66	1.12	25.03	4.23	43.22	5.66
L_5	38.20	46.00	56.21	63.33	4.83	4.73	79.33	14.00	1.10	26.10	3.96	35.66	5.55
L_6	37.00	44.00	58.93	58.66	5.27	3.75	72.33	14.66	1.08	24.07	4.63	55.55	4.55
L_7	34.80	45.33	57.65	54.33	7.16	4.84	81.00	14.33	1.17	25.99	3.13	62.66	5.55
SEm±	0.54	0.30	0.65	0.89	0.19	0.16	2.26	0.54	0.03	0.94	0.48	0.50	0.18
CD@5%	2.69	1.49	3.18	4.36	0.48	0.81	11.07	1.34	0.18	4.63	2.35	2.47	0.92
CD@1%	3.57	1.99	4.23	5.81	1.27	1.08	14.73	1.78	0.24	6.16	3.13	3.29	1.23
TESTERS													
T_1	36.86	45.66	51.15	56.33	6.83	3.94	80.66	15.33	1.20	26.66	5.03	56.22	5.77
T_2	38.60	47.66	54.26	59.00	8.61	6.25	95.33	12.66	1.30	28.88	8.16	55.89	5.11
T_3	37.40	44.66	59.25	49.33	6.88	5.78	87.00	17.66	1.60	35.62	6.40	50.55	4.55
SEm±	0.35	0.20	0.42	0.58	0.12	0.10	1.48	0.35	0.02	0.61	0.31	0.33	0.12
CD@5%	2.69	1.49	3.18	4.36	0.48	0.81	11.07	1.34	0.18	4.63	2.35	2.47	0.92
CD@1%	3.57	1.99	4.23	5.81	1.27	1.08	14.73	1.78	0.24	6.16	3.13	3.29	1.23

among the testers, 43.66 (L_2) to 47.33 (L_4) days among the lines (Table 1) and 43.00 to 48.00 (L_1 x T_2) days among the hybrids (Table 2). So, the early yield can be realized from the hybrid (L_3 x T_3), the results are in confirmation with Shafeeq *et al.* (2007).

There was significant difference for per cent fruit set and it ranged from 51.15 (T_1) to 59.25 (T_3) among the testers, 52.79 (L_1) to 59.97 (L_2) among the lines (Table 1) and 53.32 (L_1 x T_3) to 68.78 (L_4 x T_1) among the hybrids (Table 2). Parents used in the experiment differed significantly among themselves for days to

Table 2. *Per se* performance of hybrids for earliness, growth and yield parameters

Hybrids	Days to first flower opening	Days to 50 per cent flowering	Per cent fruit set	Days to first fruit harvest	Fruit length (cm)	Fruit diameter (cm)	Average fruit weight (g)	No. of fruits per plant	Yield per plant (kg)	Estimated yield (t/ha)	No.of seeds per fruit (g)	Plant height (cm)	No. of primary branches
L_1 x T_1	38.86	46.66	53.83	62.00	5.99	4.22	82.33	15.00	1.22	27.17	3.00	42.61	5.66
L_1 x T_2	37.13	48.00	66.07	61.00	5.72	4.27	96.66	13.66	1.36	30.36	1.16	46.77	6.44
L_1 x T_3	36.20	45.33	53.32	47.33	6.32	5.91	77.33	17.66	1.27	28.36	4.66	49.11	5.55
L_2 x T_1	35.66	43.66	57.14	55.00	7.66	5.31	64.66	19.66	1.27	28.29	3.66	48.55	8.22
L_2 x T_2	38.40	47.66	59.98	63.00	6.05	4.69	74.00	17.33	1.28	28.51	2.00	54.44	4.22
L_2 x T_3	34.93	43.33	63.25	58.33	6.11	4.39	106.00	11.66	1.26	28.06	1.03	56.11	4.44
L_3 x T_1	33.73	44.00	56.35	52.00	6.60	4.53	83.00	19.33	1.60	35.55	8.10	50.11	6.76
L_3 x T_2	38.93	47.33	53.65	62.00	6.83	4.72	108.33	24.00	2.41	53.70	7.96	44.77	7.77
L_3 x T_3	34.26	43.00	66.80	46.00	8.23	6.58	103.00	16.66	1.63	36.21	3.60	54.55	5.55
L_4 x T_1	38.53	47.66	68.78	57.66	6.44	4.27	63.00	22.33	1.38	30.66	4.53	52.66	6.99
L_4 x T_2	39.33	48.66	68.55	58.66	9.09	6.45	109.33	26.00	2.73	57.40	2.76	68.62	5.44
L_4 x T_3	37.46	46.66	60.60	61.33	4.48	3.60	109.66	17.33	1.54	34.21	3.80	48.44	4.88
L_5 x T_1	36.73	47.66	54.82	56.00	6.44	5.13	105.00	17.33	1.75	38.95	2.26	46.55	7.88
L_5 x T_2	38.73	47.00	68.42	61.66	7.74	4.45	87.00	17.33	1.53	34.14	3.00	46.00	5.66
L_5 x T_3	36.80	46.33	63.78	56.66	5.44	5.41	73.33	21.33	1.54	34.88	2.66	42.22	6.44
L_6 x T_1	34.93	44.66	67.84	58.33	5.88	4.49	91.00	13.00	1.17	25.99	3.60	64.11	8.44
L_6 x T_2	36.00	45.33	66.84	56.33	8.85	7.17	79.66	19.00	1.46	32.51	8.23	50.44	6.55
L_6 x T_3	37.53	44.66	54.13	58.00	5.33	4.13	74.33	23.33	1.69	37.55	6.96	52.66	5.77
L_7 x T_1	33.86	43.33	64.23	54.00	6.99	4.68	105.00	19.66	1.86	41.40	6.10	55.44	6.99
L_7 x T_2	38.33	46.33	64.10	59.00	6.05	3.74	80.66	17.33	1.37	30.51	5.36	50.44	5.66
L_7 x T_3	37.26	46.00	55.06	54.66	7.99	4.76	84.66	17.33	1.33	29.55	4.06	50.44	6.10
SEm±	0.54	0.30	0.65	0.89	0.19	0.16	2.26	0.54	0.03	0.94	0.48	0.50	0.18
CD@5%	2.69	1.49	3.18	4.36	0.48	0.81	11.07	1.34	0.18	4.63	2.35	2.47	0.92
CD@1%	3.57	1.99	4.23	5.81	1.27	1.08	14.73	1.78	0.24	6.16	3.13	3.29	1.23

Table 3.The best performing top three parents (Lines & Testers) and hybrids of brinjal for earliness, growth and yield parameters

Characters	Parents			Hybrids		
	I	II	III	I	II	III
Days to first flower opening	L_7 (34.80)	L_1 (36.46)	L_2 (36.60)	L_3 x T_1 (33.73)	L_7 x T_1 (33.86)	L_3 x T_3 (34.26)
Days to 50 per cent flowering	L_2 (43.66)	L_6 (44.00)	T_3 (44.66)	L_3 x T_3 (43.00)	L_2 x T_3 (43.33)	L_7 x T_1 (43.33)
Per cent fruit set	L_2 (59.97)	T_3 (59.25)	L_6 (58.93)	L_4 x T_1 (68.78)	L_4 x T_2 (68.55)	L_5 x T_2 (68.42)
Days to first fruit harvest	T_3 (49.33	L_7 (54.33)	T_1 (56.33)	L_3 x T_3 (46.00)	L_1 x T_3 (47.33)	L_3 x T_1 (52.00)
Fruit length (cm)	T_2 (8.61)	L_7 (7.16)	T_3 (6.88)	L_4 x T_2 (9.09)	L_6 x T_2 (8.85)	L_3 x T_3 (8.23)
Fruit diameter (cm)	T_2 (6.25)	T_3 (5.78)	L_7 (4.84)	L_6 x T_2 (7.17)	L_3 x T_3 (6.58)	L_4 x T_2 (6.45)
Average fruit weight (g)	T_2 (95.33)	L_1 (93.00)	T_3 (87.00)	L_4 x T_3 (109.66)	L_4 x T_2 (109.33)	L_3xT_2 (108.33)
Number of fruits per plant	L_3 (21.00)	L_2 (19.66)	T_3 (17.66)	L_4 x T_2 (26.00)	L_3 x T_2 (24.00)	L_6 x T_3 (23.33)
Yield per plant (kg)	T_3 (1.60)	T_2 (1.30)	L_3 (1.26)	L_4 x T_2 (2.73)	L_3 x T_2 (2.41)	L_7 x T_1 (1.86)
Estimated yield (t/ha)	T_3 (35.62)	T_2 (28.88)	L_3 (28.70)	L_4 x T_2 (57.40)	L_3 x T_2 (53.70)	L_7 x T_1 (41.40)
Number of seeds per fruit (g)	L_7 (3.13)	L_2 (3.76)	L_1 (3.86)	L_2 x T_3 (1.03)	L_1 x T_2 (1.16)	L_2 x T_2 (2.00)
Plant height (cm)	L_7 (62.66)	T_1 (56.22)	T_2 (55.89)	L_4 x T_2 (68.62)	L_6 x T_1 (64.11)	L_2 x T_3 (56.11)
Number of primary branches	L_1 (5.77)	L_5 (5.55)	L_7 (5.55)	L_6 x T_1 (8.44)	L_2 x T_1 (8.22)	L_5 x T_1 (7.88)

first fruit harvest and it ranged from 49.33 (T_3) to 59.00 (T_2) among the testers (Table 1), 54.33 (L_7) to 63.33 (L_5) among the lines (Table 1) and 46.00 (L_3 x T_3) to 63.00 (L_2 x T_2) among the hybrids (Table 2). As, the hybrid (L_3 x T_3) recorded less number of days for fifty per cent flowering it might have contributed for first fruit harvest. These findings were in consonance with Chowdhury et al. (2010)

Lines, testers and hybrid combinations used in investigation differed significantly among themselves for fruit length and it ranged from 6.83 (T_1) to 8.61 cm (T_2) among the testers, 4.83 (L_1) to 7.16 cm (L_7) among the lines (Table 1) and 4.48 (L_4 x T_3) to 9.09 cm (L_4 x T_2) among the hybrids (Table 2) while for fruit diameter it ranged from 3.94 (T_1) to 6.25 cm (T_2) among the testers and 3.75 (L_6) to 4.84 cm (L_7) among the lines (Table 1) and 3.60 (L_4 x T_3) to 7.17 cm (L_6 x T_2) among the hybrids (Table 2). These parameters are important for contributing the total yield. Similar findings were reported by Yadav *et al.* (1997).

Genotypes differed significantly among themselves for average fruit weight and it ranged from 80.66 (T_1) to 95.33g (T_2) among the testers, 51.66 (L_2) to 93.00g (L_1) among the lines (Table $_1$) and 63.00 (L_4 x T_1) to 109.66g (L_4 x T_3) among the hybrids (Table 2). Similar findings were also reported by Sanwal *et al.* (1998). The genotypes differed significantly among themselves for number of fruits per plant and it ranged from 12.66 (T_2) to 17.66 (T_3) among the testers (Table 1), 11.00 (L_1) to 21.00 (L_3) among the lines (Table 1) and 11.66 (L_2 x T_3) to 26.00 (L_4 x T_2) among the hybrids (Table 2). Similar findings were also reported by Rameshbabu and Patil (2005). Any deviation in the results with findings of others is attributed to differences in the genotypes under study, environmental condition and stage of fruit harvest.

For yield per plant, genotypes differed significantly and it ranged from 1.20 (T_1) to 1.60 kg (T_3) among the testers, 1.02 (L_2) to 1.26 kg (L_3) among the lines (Table 1) and 1.17 (L_6 x T_1) to 2.73 kg (L_4 x T $_2$) among the hybrids (Table 2). Genotypes differed significantly among themselves for estimated yield and it ranged from 26.66 tonnes per hectare (T_1) to 35.62 tonnes per hectare (T_3) among the testers, 22.73 tonnes per hectare (L_2) to 28.70 tonnes per hectare (L_3) among the lines (Table 1) and 27.17 tonnes per hectare (L_1 x T_1) to 57.40 tonnes per hectare (L_4 x T_2) among the hybrids (Table 2). The hybrid (L_4 x T_2) showed maximum fruit length and number of fruits per plant might have contributed to highest yield per plant and estimated yield per hectare. These results are in confirmation with Chadha *et al.* (1990), Sawant *et al.* (1992), and Mankar *et al.* (1995).

Genotypes differed significantly among themselves for number of seeds per fruit and it ranged from 5.03 g (T_1) to 8.16 g (T_2) among the testers, 3.13 g (L_7) to 7.46 g (L_3) among the lines (Table 1) and 1.16 g (L_1 x T_2) to 8.23 g (L_6 x T_2) among the hybrids (Table 2). The variation in seed weight might be due to different fruit size of parents and hybrids after complete ripening of fruit and results are in confirmation with Dharmegowda (1977).

Parents differed significantly among themselves for plant height and it ranged from 50.55 (T $_3$) to 56.22 cm (T_1) among the testers, 35.66 (L_5) to 62.66 cm (L_7) days among the lines (Table 1) and 42.22 (L_5 x T_3) to 68.62 cm (L_4 x T_2) among the hybrids (Table 2). Number of primary branches and it ranged from 4.55 (T_3) to 5.77 (T_1) among the testers, 4.11 (L_3) to 5. 66 (L_4) among the lines (Table 1) and 4.22 (L_2 x T_2) to 8.44 (L_6 x T_1) among the hybrids (Table 2). These results are similar to the findings of Bhutani *et al.* (1980), Singh and Kumar (1988), Gopinath and Madalageri (1986) and Mankar *et al.* (1995). The best three overall performing parents (Lines and testers) and hybrids are presented in (Table 3) for different traits studied in Manjarigota type of brinjal.

In this study the parents L_3, L_4, T_1 and T_2 were good performing for various characters taken under

study, in this perspective they could be exploited further in different breeding programmes .The promising hybrids L_4 x T_2, L_3 x T_2, and L_7 x T_1 can be further subjected to selection to isolate desirable genotypes in Manjarigota type of brinjal.

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