

Performance of Brinjal (*Solanum melongena* L.) parents and hybrids for yield and yield attributing characters under high altitude region of Andhra Pradesh

Sivakumar V¹., Uma Jyothi K¹., Venkataramana C²., Paratparao M¹. Rajyalakshmi R³. and Umakrishna K¹.

¹Horticulture College, Dr. YSR Horticultural University, Tadepalligudem, West Godavari, A.P. Pin-534101.

²HRS, Dr. YSR Horticultural University, Lam Farm, Guntur

³HRS, Dr. YSR Horticultural University, Nuziveedu, Krishna

Corresponding author Email ID: cvr.venkat@gmail.com

(Received: April 2015, Accepted: April 2016)

Abstract

Ten parent (including seven lines and three testers), resulting twenty one hybrids and a check were evaluated for yield and yield attributing characters in brinjal at Horticultural research Station, Pandirimamidi, East Godavari District, Andhra Pradesh. The experiment was conducted during summer, 2014 in randomized block design with three replications. Among the parents used for investigation Pusa Shyamala, Heera and Gulabi were high yielding of 4.18, 3.32 and 2.84 kg per plant respectively. The hybrids Heera x Bhagyamathi, Heera x Shyamala and Heera x Gulabi recorded high yield of 5.35, 4.97 and 4.94 kg per plant respectively, while the check Ravaiyya recorded 2.28 kg per plant. Among the genotypes IC 090053 x Gulabi was the earliest genotype. Based on their performance parents can be used for further breeding programme and hybrids could be exploited for cultivation.

Introduction

Brinjal (*Solanum melongena* L., $2n = 2x = 24$) is one of the most commonly grown vegetables in India and also other parts of the world which is highly productive and often referred to as poor man's crop (Bindu *et al.*, 2004). It can be grown round the year in almost all parts of the country (except in the plains) due to its wide adaptability. It is cultivated for its tender and immature fruits under tropical and subtropical conditions in our country. It has been a stable vegetable crop in our diet since ancient times. Both poor and rich like it, contrary to the common belief, it is quite high in nutritive value and can well be compared with tomato (Chaudary, 1976). Brinjal also has medicinal properties. Its fruits are excellent for remedy liver problems. India ranks second after China in area and production of the brinjal. The cultivated area of brinjal in India is about 7.22 lakh hectares with production of 134.43 lakh tonnes and productivity of 18.6 tonnes per hectare, while West Bengal is leading state in area of 1.61 lakh hectares as well as production of 29.66 lakh tonnes and productivity of 18.4 tonnes per hectare (Anon., 2013). 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 of brinjal varieties/hybrids for yield and its components in high altitude region. Keeping this in view, the present investigation was undertaken to study the

performance of hybrids in high altitude region of Andhra Pradesh.

Material and Methods

The present investigation was undertaken at Horticultural research Station, Pandirimamidi, East Godavari District, Andhra Pradesh. The parents and the hybrids were evaluated during summer, 2014. The experimental material consists of seven lines *viz.*, IC 090053, IC 285140, IC 421194, IC 545893, IC 90806, Pusa Shyamala and Heera and three testers namely Bhagyamathi, Gulabi and Shyamala and Line x Tester mating design was followed in this study. Thus a total of 21 hybrids were synthesized by making crosses between lines and the testers during *Kharif* 2013. All the 21 hybrids along with their corresponding ten parents were evaluated in a randomized block design in three replications during summer 2014. Thirty days old seedlings were transplanted at a spacing of 90 x 75 cm. The crop received timely management practices as per recommendations package of practices. The crop was maintained properly till last harvest and 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 and hybrids for nine quantitative characters are presented for growth

and yield parameters. Genotypes differed significantly among themselves for plant height exhibited a range of 98.60 (Pusa Shyamala x Bhagyamathi) to 139.28 cm (IC 421194) with a grand mean of 126.13 cm. The range for plant height among the lines was from 99.55 (IC 545893) to 139.28 cm (IC 421194), whereas, 120.40 (Shyamala) to 138.05 cm (Gulabi) among the testers. The plant height of crosses varied from 98.60 (Pusa Shyamala x Bhagyamathi) to 139.07 cm (IC 421194 x Gulabi), while the check Ravaiyya exhibited mean plant height of 120.98 cm.

The number of primary branches per plant exhibited a range of 6.94 (IC 285140 x Gulabi) to 10.20 (Heera x Gulabi) with a grand mean of 8.29. The range for number of primary branches per plant among the lines was from 8.51 (IC 421194) to 10.14 (IC 285140). Among the testers, the number of primary branches per plant varied from 7.70 (Bhagyamathi) to 8.11 (Shyamala). The number of primary branches per plant of crosses varied from 6.94 (IC 285140 x Gulabi) to 10.20 (Heera x Gulabi), while the check Ravaiyya exhibited 7.98 number of primary branches per plant.

Days to 50% flowering ranged from 32.33 (IC 545893 x Shyamala) to 41.33 days (IC 090053 x Shyamala) with an overall mean of 38.40 days. The lines flowered from 38.00 (Pusa Shyamala) to 44.00 days (IC 545893), whereas testers ranged from 35.33 (Shyamala) to 42.33 days (Bhagyamathi). Among the crosses, the days to 50% flowering ranged from 32.33 (IC 545893 x Shyamala) to 41.33 days (IC 090053 x Shyamala). The cross IC 545893 x Shyamala flowered earliest (32.33 days) compared to the check Ravaiyya (33.33).

The number of flowers per cluster exhibited a range of 3.60 (Shyamala, IC 90806 x Shyamala and Pusa Shyamala x Shyamala) to 5.00 (IC 90806 x Bhagyamathi) with a grand mean of 4.11. The range for number of flowers per cluster among the lines was from 3.67 (Pusa Shyamala) to 4.20 (IC 90806). Among the testers, the number of flowers per cluster varied from 3.60 (Shyamala) to 4.00 (Gulabi). The number of flowers per cluster of crosses varied from 3.60 (Pusa Shyamala x Shyamala and IC 90806 x Shyamala) to 5.00 (IC 90806 x Bhagyamathi), while the check Ravaiyya recorded 4.40 mean number of flowers per cluster.

The fruit length exhibited a range of 7.54 (IC 545893) to 17.98 cm (Pusa Shyamala x Bhagyamathi) with a grand mean of 11.66 cm. The range for fruit length among the lines was from 7.54 (IC 545893) to 16.97 cm (Pusa Shyamala). Among the testers, the fruit length varied from 8.01 (Shyamala) to 15.32 cm

(Gulabi). The fruit length of crosses varied from 8.57 (IC 285140 x Bhagyamathi) to 17.98 cm (Pusa Shyamala x Bhagyamathi), while the check Ravaiyya exhibited mean fruit length of 8.06 cm.

The fruit girth exhibited a range of 11.02 (IC 285140 x Gulabi) to 19.11 cm (IC 90806 x Shyamala) with a grand mean of 14.59 cm. The range for fruit girth among the lines was from 12.17 (IC 285140) to 17.33 cm (IC 545893). Among the testers, the fruit girth varied from 12.38 (Gulabi) to 15.93 cm (Shyamala). The fruit girth of crosses varied from 11.02 (IC 285140 x Gulabi) to 19.11 cm (IC 90806 x Shyamala), while the check Ravaiyya exhibited mean fruit girth of 18.07 cm respectively.

Fruit weight of parents and crosses varied from 45.67 (IC 285140) to 105.27 g (Heera x Shyamala) with a grand mean of 78.19 g. Among seven lines, IC 285140 recorded the lowest fruit weight of 45.67 g and Heera recorded the maximum fruit weight of 102.40 g. The fruit weight range among testers varied from 60.87 (Bhagyamathi) to 73.80 g (Shyamala). The cross IC 285140 x Bhagyamathi recorded the minimum fruit weight of 49.93 g and Heera x Shyamala recorded the maximum fruit weight of 105.27 g. The check Ravaiyya recorded 93.53 g respectively.

The yield of genotypes ranged from 1.51 (IC 545893) to 5.35 kg (Heera x Bhagyamathi). The lines exhibited a mean yield range from 1.51 (IC 545893) to 4.18 (Pusa Shyamala), while the testers exhibited yield ranging from 1.60 (Shyamala) to 2.84 kg (Gulabi). Among the crosses, the yield ranged from 2.28 (IC 090053 x Shyamala) to 5.35 kg (Heera x Bhagyamathi), while the check recorded mean yield of 2.28 kg in Ravaiyya.

Plant height and number of primary branches are important growth parameters from production point of view. Genotypes having medium height and more number of branches give more yields in brinjal. In the present study, parents and hybrids differed significantly among themselves for growth characters. The cross IC 421194 x Gulabi recorded the highest plant height, while the highest yielding crosses viz., Heera x Bhagyamathi, Heera x Shyamala, Heera x Gulabi and Pusa Shyamala x Gulabi had relatively medium plant height with more number of primary branches. These results are in line with finding of Suresh *et al.* (2012) and Rajasekhar (2014).

The earliest flowering was observed in IC 090053 x Gulabi and it was on par with best check

Ravaiyya. These findings are in consonance with Chowdhury *et al.* (2010) and Suresh *et al.* (2012). The genotype IC 90806 x Bhagyamathi had more number of flowers per cluster, while number of fruits per cluster was highest in the genotype Pusa Shyamala x Gulabi. This variation may be due to more number of long or medium styled flowers or more fruit set in Pusa Shyamala x Gulabi than IC 90806 x Bhagyamathi. Similar results reported by Shafeeq (2005) and Murthy *et al.* (2011).

Fruit length, fruit girth and fruit weight were important yield attributing characters. Maximum fruit length was recorded in Pusa Shyamala x Bhagyamathi, while fruit girth was noticed in IC 90806 x Shyamala. The genotype Heera and Heera x Shyamala were on par with each other for average fruit weight and were treated as superior for this trait. Similar differential response for yield and yield attributes in different genotypes of brinjal was reported by Rameshbabu and Patil (2008), Prabhu *et al.* (2009), Suresh *et al.* (2012) and Rajasekhar (2014).

Four crosses *viz.*, Hera x Bhagyamathi, Heera x Gulabi, Heera x Shyamala and Pusa Shyamala x Gulabi recorded significantly higher yield per plant than the commercial check. The cross Hera x Bhagyamathi had relatively more number of primary branches, medium plant height, fruit length, fruit girth and fruit weight. The cross Heera x Shyamala recorded medium plant height, highest number of primary branches, relatively early flowering, fruit length and highest fruit weight. The cross Heera x Gulabi recoded relatively medium plant height, highest number of primary branches, number of flowers per cluster, fruit length, fruit weight and number of fruits per cluster, while the other cross Pusa Shyamala x Gulabi recoded relatively medium plant height, number of flowers per cluster, fruit length and number of fruits per cluster. The above results are in agreement with the findings of Shafeeq *et al.* (2007), Murthy *et al.* (2011), Rameshkumar *et al.* (2012) and Rajasekhar (2014).

References

- Anonymous. 2013. *Indian Horticulture Database*, National Horticulture Board, Gurgaon, 130p.
- Bindu, S., Pathania, N.K. and Vishal, G. 2004. Combining ability studies in brinjal (*Solanum melongena* L.). *Himachal Journal of Agricultural Research*. 30(1): 54-59.
- Chaudary, B. 1976. *Vegetable*. National book trust, New Delhi.
- Chowdhury, M.J., Ahmad, S., and Uddin, N. 2010. Expression of heterosis for productive traits in F1 brinjal (*Solanum melongena* L.) hybrids. *The Agriculture*. 8: 8-13.
- Murthy, S.R.K.R., Lingaiah, H.B., Naresh, P., Vinay Kumar Reddy, P. and Satish, K.V. 2011. Heterosis for yield and yield attributing characters in brinjal (*Solanum melongena* L.). *Plant Archives*. 11(2): 649-53.
- Prabhu, M., Natarajan, S., Veeraragavatham, D. and Pugalendhi, L. 2009. The biochemical basis of brinjal shoot and fruit borer resistance in interspecific progenies of brinjal. *Eurasian Journal of Bioscience*. 3: 50-57.
- Rajasekhar, P. 2014. Diallel analysis in brinjal (*Solanum melongena* L.). M. Sc. (Ag.) thesis, Kerala Agricultural University, Trissur.
- Rameshbabu, S. and Patil, R.V. 2008. Characterization and evaluation of brinjal genotypes, *Madras Agriculture Journal*. 95: 18-23.
- Shafeeq, A. 2005. Heterosis and combining ability studies in brinjal (*Solanum melongena* L.). M. Sc. (Agri.), Thesis, University of Agricultural Sciences, Dharwad.
- Shafeeq, A. 2005. Heterosis and combining ability studies in brinjal (*Solanum melongena* L.). M. Sc. (Agri.), Thesis, University of Agricultural Sciences, Dharwad.
- Shafeeq, A., Madhusudan, K., Hanchinal, R.R. Vijayakumar, A.G. and Salimath, P.M. 2007. Heterosis in Brinjal. *Karnataka Journal of Agricultural Science*. 20 (1): 33-40.
- Suresh, K.P., Singh, T.H., Sadashiva, A.T. and Reddy K.M. 2012. Performance of parents and hybrids for yield and yield attributing characters in manjarigota type of brinjal (*Solanum melongena* L.). *Madras Agriculture Journal*. 99(7-9): 438-41.



Table1: *Per se* performance of parents (Lines and Testers) and hybrids for growth and yield parameters

	Plant height (cm)	Number of primary branches	Days to 50% flowering	No. of flowers per cluster	Fruit length (cm)
Lines					
IC 090053	122.69	8.74	40.00	4.13	8.41
IC 285140	138.41	10.14	39.67	4.00	9.65
IC 421194	139.28	8.51	42.00	3.87	11.28
IC 545893	99.55	8.68	44.00	3.73	7.54
IC 90806	138.93	8.91	43.00	4.20	11.62
Pusa Shyamala	112.74	8.83	38.00	3.67	16.97
Heera	116.16	9.51	43.67	4.13	15.52
Testers					
Bhagyamathi	123.23	7.70	42.33	3.87	9.37
Gulabi	138.05	7.83	40.33	4.00	15.32
Shyamala	120.40	8.11	35.33	3.60	8.01
Crosses					
IC 090053 x Bhagyamathi	127.68	6.97	40.33	4.53	8.61
IC 090053 x Gulabi	130.79	7.66	32.67	4.13	10.91
IC 090053 x Shyamala	126.13	7.48	41.33	3.87	8.85
IC 285140 x Bhagyamathi	129.71	7.21	33.33	4.00	8.57
IC 285140 x Gulabi	132.53	6.94	39.00	4.13	13.42
IC 285140 x Shyamala	137.53	7.08	38.67	4.13	9.95
IC 421194 x Bhagyamathi	120.49	7.26	40.33	4.47	9.81
IC 421194 x Gulabi	139.07	7.73	39.33	4.33	12.34
IC 421194 x Shyamala	136.02	7.88	40.33	4.40	9.04
IC 545893 x Bhagyamathi	132.04	8.39	39.00	4.40	8.79
IC 545893 x Gulabi	123.07	7.70	36.33	4.33	10.84
IC 545893 x Shyamala	123.59	7.65	32.33	4.40	8.98
IC 90806 x Bhagyamathi	128.80	7.17	36.67	5.00	10.69
IC 90806 x Gulabi	131.53	8.70	37.33	4.33	14.62
IC 90806 x Shyamala	138.26	9.42	35.33	3.60	10.77
Pusa Shyamala x Bhagyamathi	98.60	7.98	37.67	3.73	17.98
Pusa Shyamala x Gulabi	124.08	7.49	36.33	4.20	15.03
Pusa Shyamala x Shyamala	130.33	9.76	37.33	3.60	10.74
Heera x Bhagyamathi	109.78	8.43	39.67	3.87	13.99
Heera x Gulabi	124.44	10.20	39.67	4.33	15.60
Heera x Shyamala	116.24	9.99	36.00	3.87	12.29
Grand Mean	126.13	8.26	38.62	4.09	11.47
Check					
Ravaiyya	120.98	7.98	33.33	4.40	8.06
CD (P=0.05)	7.97	0.82	2.22	0.49	0.73
SE (m) ±	2.82	0.29	0.79	0.17	0.26



Table1: Contd...

	Fruit girth (cm)	Fruit weight (g)	Number of fruits/plant	Yield/plant (kg)	Total phenols (mg/100 g)
Lines					
IC 090053	13.87	76.73	28.65	1.82	12.28
IC 285140	12.17	45.67	81.49	2.83	13.02
IC 421194	14.07	81.73	34.73	2.21	10.54
IC 545893	17.33	92.00	29.73	1.51	14.17
IC 90806	16.80	95.47	36.91	2.32	14.64
Pusa Shyamala	13.15	97.22	61.11	4.18	15.25
Heera	16.29	102.40	44.92	3.32	10.59
Testers					
Bhagyamathi	14.52	60.87	46.85	2.33	17.46
Gulabi	12.38	69.00	54.92	2.84	12.12
Shyamala	15.93	73.80	32.25	1.60	17.76
Crosses					
IC 090053 x Bhagyamathi	14.20	54.00	63.07	2.74	11.72
IC 090053 x Gulabi	13.66	68.53	58.74	2.85	12.1
IC 090053 x Shyamala	14.70	58.00	49.47	2.28	13.81
IC 285140 x Bhagyamathi	13.39	49.93	111.24	4.38	13.39
IC 285140 x Gulabi	11.02	54.93	58.73	2.37	12.05
IC 285140 x Shyamala	16.12	68.47	75.38	3.61	10.42
IC 421194 x Bhagyamathi	13.13	63.20	85.15	3.62	13.51
IC 421194 x Gulabi	12.92	71.40	88.44	4.03	13.04
IC 421194 x Shyamala	16.27	79.73	64.68	2.78	9.42
IC 545893 x Bhagyamathi	16.59	74.73	52.76	2.50	11.41
IC 545893 x Gulabi	17.13	94.47	66.81	2.96	11.79
IC 545893 x Shyamala	17.72	89.67	39.23	2.69	9.25
IC 90806 x Bhagyamathi	16.19	93.40	60.58	3.95	14.63
IC 90806 x Gulabi	12.29	74.20	78.66	3.95	15.29
IC 90806 x Shyamala	19.11	98.51	45.34	2.91	14.16
Pusa Shyamala x Bhagyamathi	12.65	94.89	48.58	3.15	15.2
Pusa Shyamala x Gulabi	11.58	72.53	96.10	4.68	14.99
Pusa Shyamala x Shyamala	15.89	79.33	71.73	3.73	13.72
Heera x Bhagyamathi	15.22	92.20	89.76	5.35	15.7
Heera x Gulabi	13.79	88.93	68.38	4.94	14.77
Heera x Shyamala	16.26	105.27	67.77	4.97	14.41
Grand Mean	14.59	78.19	60.38	3.17	13.45
Check					
Ravaiyya	18.07	93.53	36.21	2.28	15.39
CD (P=0.05)	0.56	3.88	12.99	0.68	0.15
SE (m) ±	0.20	1.38	4.60	0.24	0.05