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## Evaluation of brinjal (*Solanum melongena* L.) genotypes for growth and yield characters under Chhattisgarh condition

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### Abstract

Eighteen brinjal genotypes/varieties were evaluated at Horticultural Research cum Instructional Farm, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) during the *rabi* season of 2015-2016 for nineteen characters. The experiment was arranged in Randomized Complete Block Design with 3 replications. 2013/BRLVAR-5 took the shortest period of days to 50% flowering. 2013/BRLVAR-6 recorded significantly higher number of fruits (2.80) followed by 2013/BRLVAR-1 (2.16), 2014/BRLVAR-3 (1.80) and 2014/BRLVAR-1 (1.73). Fruit length was maximum in Kashi Taru (21.23 cm) followed by 2013/BRLVAR-4 (18.02 cm) which were significantly superior to other genotypes. 2014/BRLVAR-1 was found superior over rest of other genotypes with respect to most of desirable characters like plant height (91.31 cm), plant spread (100.06 cm), fruit yield per plant (2.77 kg), marketable fruit yield (971.50 q/ha), while minimum values for most of the parameters were observed in KS-224 and 2014/BRRVAR-2.

**Keywords:** Brinjal, *Solanum melongena*, genotypes/varieties, yield

### 1. Introduction

Brinjal (*Solanum melongena* L.) is one of the most important fruit vegetable belonged to the family Solanaceae. Vavilov (1928) [12] has mentioned that its centre of origin was the Indo-Burma region. It has been a staple vegetable 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 (Chaudhary, 1976) [2]. The unripe brinjal fruit is primarily used as cooked vegetable for preparation of various dishes in different region of the world. It has got much potential as raw material in pickle making and dehydration industries (Singh, 1963) [9]. Among the solanaceous vegetables, brinjal is the most common, popular and principal vegetable crop grown in many geographical parts in India. The area under brinjal cultivation is estimated at 648 thousand hectares with total production of 12303 thousand metric tonnes and productivity of 18.98 metric tonnes per hectare (Anon., 2015-16). Brinjal is mainly cultivated on small family farms and it is a source of cash income for resource poor farmers. Keeping in view the above facts and considering the potential of brinjal as off season crop in hilly area, this investigation has been carried out to increase the production productivity of brinjal crop by using suitable genotypes at proper sowing time.

### Materials and Methods

The present investigation was conducted at Horticultural Research cum Instructional Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur (21°16' N latitude and 81°36' E longitude with an altitude of 289.56 m above the mean sea level) (C.G.), India during the *rabi* season of 2015-16. Eighteen genotypes (2013/BRLVAR-1, 2013/BRLVAR-2, 2013/BRLVAR-3, 2013/BRLVAR-4, 2013/BRLVAR-5, 2013/BRLVAR-6, 2014/BRRVAR-1, 2014/BRRVAR-2, 2014/BRRVAR-3, 2014/BRRVAR-4, 2014/BRLVAR-1, 2014/BRLVAR-2, 2014/BRLVAR-3, 2014/BRLVAR-4, Kashi Taru, Swarna Mani, KS-224 and Punjab Sadabahar) were sown in different rows on a raised bed nursery followed by normal nursery practices. The experiment was laid out in randomized block design with three replications at the spacing of 75 cm and 60 cm between rows and plants, respectively. All the recommended cultural practices were followed to raise a healthy crop and data were recorded for nineteen plant growth and fruit yield characters *viz.*, days to 50% flowering, plant height (cm), number

of primary branches per plant, plant spread (cm), number of fruits per cluster, number of cluster per plant, number of pickings, fruit stalk length(cm), fruit length (cm), fruit girth (cm), fruit weight (g), fruit colour, fruit shape, TSS (%), pericarp thickness (mm), number of fruits per plant, fruit yield per plant (kg), fruit yield per plot (kg) and marketable fruit yield (q/ha). The data thus obtained were analyzed statistically for Performance of brinjal genotypes and their characters, plant branching habit, fruit shape and fruit surface colours and identifying suitable brinjal genotypes for Chhattisgarh plains.

## Results and Discussion

Results obtained from the study have been averaged in Table 1 and discussed in this paper.

### 4.2.1.1 Days to 50% flowering

Days to 50% flowering was recorded from the date of transplanting and it ranged from 45.33 days (2013/BRLVAR-5) to 74.00 days (KS-224) with an overall mean of 60.75 days. The minimum number of days to 50% flowering was found in 2013/BRLVAR-5 (45.33 days) followed by Punjab Sadabahar (46.66 days), Kashi Taru (47.33 days) and the maximum number of days to 50% flowering was found in KS-224 (74.00 days).

### 4.2.1.2 Plant height (cm)

It is evident from Table 1 that significant differences were recorded in plant height by brinjal genotypes. 2014/BRLVAR-1 with a plant height of 91.31 cm was recorded as the tallest followed by 2014/BRLVAR-4 (87.12cm) and 2013/BRLVAR-2 (83.74). Minimum plant height (41.43 cm) was noted in 2014/BRRVAR-2. Thus a wide range of plant height (41.43 cm to 91.31 cm) was observed in the test cultivars. The tallness, shortness and other morphological differences are varietal and climacteric characteristics, which are controlled and expressed by certain genes and climatic factors. These findings are in agreement with that of Mohanty *et al.* (2001) [7] who reported that assessment of brinjal cultivars in black soil of Orissa, the greatest plant height was recorded in BB-11 followed by Bhawanipatna Local and Black Beauty. Rai *et al.* (1998) [8] also reported differences in plant height among varieties/hybrids of brinjal put under evaluation and screening trials.

### 4.2.1.3 Number of primary branches per plant

The number of primary branches per plant ranged from 6.40 (KS-224) to 15.40 (2014/BRLVAR-4) with overall mean of 10.38. The maximum number of primary branches per plant was observed in 2014/BRLVAR-4 (15.40) followed by 2013/BRLVAR-6 (13.86), 2013/BRLVAR-3 (13.20) and 2013/BRLVAR-5 (13.06) while minimum number of primary branches was found in KS-224 (6.40). These results are in close conformity with the findings of Deotale *et al.* (1998) [3] and Rai *et al.* (1998) [8] who reported significant variation among the cultivars of brinjal for the number of branches per plant.

### 4.2.1.4 Plant spread (cm)

Plant spread range of 64.81 cm to 100.06 cm was recorded in the harvesting period among the cultivars. Highest plant spread (100.06 cm) was observed in 2014/BRLVAR-1 followed by 2014/BRLVAR-2 (93.27cm), 2014/BRLVAR-3

(91.41) whereas the minimum plant spread was found in KS-224 (64.81 cm). Plant spread was recorded by plants in east-west and north- south direction in randomly selected plants at harvesting stage and average was worked out in centimetre with summing up of observations.

### 4.2.1.5 Number of fruits per cluster

The number of fruits per cluster ranged from 1.00 (2014/BRRVAR-1, 2014/BRRVAR-2, 2014/BRRVAR-3, 2014/BRRVAR-4, Swarna Mani and KS- 224) to 2.80 (2013/BRLVAR-6) with overall mean of 1.35. The maximum number of fruits per cluster was observed in 2013/BRLVAR-6 (2.80) followed by 2013/BRLVAR-1 (2.16), 2014/BRLVAR-3 (1.80) and 2014/BRLVAR-1 (1.73) which was similar to 2014/BRLVAR-4(1.73). The minimum number of fruits per cluster (1.00) was observed in all the other genotypes *viz.* 2014/BRRVAR-1, 2014/BRRVAR-2, 2014/BRRVAR-3, 2014/BRRVAR-4, 2013/BRLVAR-3, 2013/BRLVAR-5, Swarna Mani and KS-224.

### 4.2.1.6 Number of clusters per plant

The number of clusters per plant ranged from 1.00 (2014/BRRVAR-1, 2014/BRRVAR-2, 2014/BRRVAR-3, 2014/BRRVAR-4, Swarna Mani and KS-224) to 16.80 (2013/BRLVAR-5) with overall mean of 8.34. The maximum number of clusters per plant was observed in 2013/BRLVAR-5 (16.80) which was similar to Punjab Sadabahar (16.80) followed by 2013/BRLVAR-2 (15.60), 2013/BRLVAR-6 (13.73) and 2013/BRLVAR-3 (13.06). The minimum number of cluster per plant (1.00) was observed in all the other genotypes *viz.* 2014/BRRVAR-1, 2014/BRRVAR-2, 2014/BRRVAR-3, 2014/BRRVAR-4, Swarna Mani and KS-224.

### 4.2.1.7 Number of pickings

The number of pickings ranged from 3.06 (2014/BRLVAR-3) to 6.86 (2013/BRLVAR-5) with overall mean of 4.63. The highest number of picking found in 2013/BRLVAR-5 (6.86) followed by 2013/BRLVAR-6 (6.00), 2014/BRLVAR-2 (5.53) and 2013/BRLVAR-3 (5.33). The lowest number of picking found in 2014/BRLVAR-3 (3.06).

### 4.2.1.8 Fruit stalk length (cm)

Significant differences were found among the cultivars for fruit stalk length. Genotype 2014/BRRVAR-1 ranked 1 in term of fruit stalk length (7.10 cm) followed by 2014/BRLVAR-1 (6.95 cm), 2014/BRLVAR-4 (6.86 cm) and 2013/BRLVAR-4 (6.23 cm). The shortest fruit stalk length was observed in 2014/BRRVAR-2 (4.48 cm). Minimum fruit stalk length (5.18 cm) evaluated in Raipur (C. G.) condition.

### 4.2.1.9 Fruit length (cm)

During the course of investigation, different genotypes/varieties had shown significant differences in various growth and yield parameters. Among the genotypes/varieties Kashi Taru (21.23 cm) recorded significantly higher fruit length followed by 2013/BRLVAR-4 (18.02 cm), 2014/BRLVAR-4 (17.83 cm) and Punjab Sadabahar (17.70 cm). The minimum fruit length was found in variety KS-224 (9.16 cm). Such findings of present investigation pertinent to the evaluation of brinjal cultivars were reported by Jaiswal *et al.* (1997) [4] and Deotale *et al.* (1998) [3]. The various growth and yield characters in different cultivar of brinjal were also reported by Rai *et al.* (1998) [8].

#### **Fruit girth (cm)**

The fruit girth ranged from 11.57 cm (Punjab Sadabahar) to 26.46 cm (KS-224). The maximum fruit girth was observed in KS-224 (26.46 cm) followed by 2014/BRRVAR-1 (25.70 cm), Swarna Mani (25.15 cm) and 2014/BRRVAR-4 (23.47 cm). The minimum fruit girth was observed in Punjab Sadabahar (11.57 cm). Similar types of findings were also reported by Mohanty *et al.* (2001) <sup>[7]</sup> and Rai *et al.* (1998) <sup>[8]</sup>, who reported seven round shaped brinjal cultivars for their yield attribute.

#### **4.2.1.11 Fruit weight (g)**

The fruit weight was in range of 43.40 g (2013/BRLVAR-3) to 202.80 g (KS-224) with overall mean of 104.27 g. Significantly the highest fruit weight was observed in KS-224 (202.80 g) followed by 2014/BRRVAR-4 (187.66 g), 2014/BRRVAR-1 (182.33 g) and Swarna Mani (165.33 g) while lowest fruit weight was observed in 2013/BRLVAR-3 (43.40 g). The variation in weight of the fruit was also recorded by the Mahaveer *et al.* (2004) <sup>[5]</sup>, Thapa *et al.* (2005) <sup>[11]</sup> and Mishra *et al.* (2008) <sup>[6]</sup>.

#### **4.2.1.12 Total Soluble Solids (TSS)**

The average TSS (%) ranged from 3.50 (KS-224) to 4.80 (2014/BRLVAR-4) with overall mean of 4.25. The highest TSS was found in 2014/BRLVAR-4 (4.80) followed by 2014/BRRVAR-4 (4.69) which was found to be similar to 2014/BRLVAR-3 and 2013/BRLVAR-5 (4.44) while lowest TSS value was found in KS-224 (3.50).

#### **4.2.1.13 Pericarp thickness (mm)**

The average pericarp thickness ranged from 4.03 mm (2013/BRLVAR-4) to 7.17 mm (2014/BRRVAR-4) with overall mean of 5.46 mm. The maximum pericarp thickness was found in 2014/BRRVAR-4 (7.17 mm) followed by 2014/BRRVAR-1 (6.71 mm), 2014/BRLVAR-1 (6.50 mm) and Swarna Mani (6.18 mm) while minimum pericarp thickness was found in 2013/BRLVAR-4 (4.03 mm).

#### **4.2.1.14 Number of fruits per plant**

The number of fruits per plant ranged from 12.52 (2014/BRRVAR-4) to 46.00 (2013/BRLVAR-3) with overall mean of 27.62. The maximum number of fruits per plant was found in 2013/BRLVAR-3 (46.00) followed by 2013/BRLVAR-5 (44.66), 2013/BRLVAR-2 (38.00) and 2014/BRRVAR-3 (12.52).

#### **4.2.1.15 Yield per plant (kg)**

The fruit yield per plant ranged from 1.02 kg (2013/BRLVAR-1) to 2.77 kg (2014/BRLVAR-1) with overall mean of 1.81 kg. The maximum fruits yield per plant was found in 2014/BRLVAR-1 (2.77 kg) followed by 2014/BRRVAR-3 (2.35 kg), 2014/BRLVAR-2 (2.23 kg) and

2013/BRLVAR-4 (2.22 kg) while minimum fruits yield per plant was found in 2013/BRLVAR-1 (1.02 kg).

#### **4.2.1.16 Fruit yield per plot (kg)**

The fruit yield per plot ranged from 36.96 kg (2013/BRLVAR-1) to 99.76 kg (2014/BRLVAR-1) with overall mean of 64.91 kg. The highest fruit yield per plot was observed in 2014/BRLVAR-1 (99.76 kg) followed by 2014/BRRVAR-3 (84.73 kg), 2014/BRLVAR-2 (80.52 kg) and 2013/BRLVAR-4 (80.11 kg) while lowest fruit yield per plot was observed in 2013/BRLVAR-1 (36.96 kg).

#### **4.2.1.17 Marketable yield (q/ha)**

Fresh fruit yield averaged data in the Table 1 indicate significant variation in different cultivars. The genotype 2014/BRLVAR-1 recorded maximum fruit yield (971.50 q) followed by 2014/BRLVAR-2 (770.82 q), 2013/BRLVAR-4 (754.86 q) and 2014/BRLVAR-3 (748.55 q). These observations of present study are in conformity with the findings reported by Jaiswal *et al.* (1997) <sup>[4]</sup> and Srivastava *et al.* (1997) <sup>[10]</sup>. The differences among the cultivars are due to the climatic and genetic factors. The minimum marketable yield under Chhattisgarh plains was found in 2014/BRRVAR-4 (312.66 q). Similar types of findings were also reported by Rai *et al.* (1998) <sup>[8]</sup>.

Evaluation of genotypes is required to know the performance of the varieties in terms of yield and other yield attributing characters. Based on these results, the promising genotypes can be identified. The genotypes performing well can be released as a variety. Unlike many other vegetables, brinjal has considerable regional consumer preference for shape, size and colour of the fruit. So the morphological characters of the fruit are also to be considered while identifying suitable variety for a particular region.

Among the all genotypes studied 2014/BRLVAR-1, 2014/BRRVAR-3, 2013/BRLVAR-4 and 2014/BRLVAR-2 are found best for their yield potential. On the basis of fruit yield per plot the best performing genotypes were 2014/BRLVAR-1, 2014/BRRVAR-3 and 2014/BRLVAR-2. Whereas genotypes 2014/BRLVAR-1, 2014/BRLVAR-2 and 2013/BRLVAR-4 were the best performing genotypes on the basis of marketable yield per hectare.

In Chhattisgarh, purple, green and white coloured brinjal is preferred over striped brinjal. The choice for shape varies depending upon the requirement of the dish being prepared but mostly round, oval and oblong shaped fruits are opted. Among the top performing brinjal genotypes 2014/BRLVAR-1, 2014/BRLVAR-2 and 2013/BRLVAR-4 were whitish purple, light purple and green with oblong, long and oblong shaped respectively. Taking these preferences into consideration the genotypes 2014/BRLVAR-1, 2014/BRLVAR-2 and 2013/BRLVAR-4 can be suggested for commercial cultivation in Chhattisgarh plains.

**Table 1:** Mean performance of brinjal genotypes

Genotypes	Days to 50% flowering	Plant height (cm)	Number of 1 <sup>o</sup> branches per plant	Plant spread (cm)	Number of fruits per cluster	Number of cluster per plant	Number of picking	Fruit stalk length (cm)	Fruit length (cm)	Fruit girth (cm)	Fruit weight (g)	TSS (%)	Pericarp thickness (mm)	Number of fruits per plant	Fruit yield per plant (kg)	Fruit yield per plot (kg)	Marketable fruit yield (q)
2013/BRLVAR-1	63.000	81.913	8.067	65.340	2.167	8.000	3.733	6.033	12.673	20.227	70.333	4.333	5.517	22.000	1.033	36.960	359.580
2013/BRLVAR-2	56.667	83.747	8.933	83.507	1.200	15.600	3.867	6.420	14.547	16.350	46.000	4.173	4.760	38.000	1.667	59.967	574.213
2013/BRLVAR-3	54.667	79.300	13.200	90.567	1.000	13.067	5.333	5.420	12.580	16.937	43.400	4.427	5.667	46.000	1.800	65.340	632.447
2013/BRLVAR-4	64.333	66.493	15.000	84.867	1.133	10.933	4.400	6.233	18.027	18.283	51.733	3.667	4.037	35.667	2.233	80.110	754.867
2013/BRLVAR-5	45.333	70.500	13.067	80.287	1.000	16.800	6.867	5.593	10.360	17.000	45.533	4.440	4.763	44.667	1.933	69.457	674.173
2013/BRLVAR-6	48.333	80.080	13.867	85.720	2.800	13.733	6.000	5.953	12.300	13.953	55.867	3.933	4.770	35.000	1.100	39.913	389.503
2014/BRRVAR-1	68.667	47.733	7.733	69.487	1.000	1.000	4.867	7.100	9.767	25.700	182.333	4.133	6.713	19.703	1.700	61.130	498.673
2014/BRRVAR-2	73.000	41.433	12.000	71.293	1.000	1.000	4.533	4.480	9.273	20.133	123.000	4.333	5.810	25.067	1.467	53.467	433.570
2014/BRRVAR-3	61.333	42.333	9.000	76.440	1.000	1.000	4.333	5.287	10.453	23.387	134.333	4.120	4.750	37.623	2.367	84.730	699.303
2014/BRRVAR-4	74.333	49.567	11.067	88.980	1.000	1.000	3.733	5.780	11.120	23.477	187.667	4.693	7.173	12.523	1.100	38.590	312.670
2014/BRLVAR-1	61.333	91.313	10.200	100.060	1.733	9.667	4.467	6.953	15.140	15.350	100.333	4.400	6.497	29.000	2.800	99.770	971.503
2014/BRLVAR-2	67.333	56.707	8.267	93.273	1.500	7.533	5.533	6.133	15.713	17.680	104.667	4.400	5.603	22.600	2.233	80.527	770.827
2014/BRLVAR-3	58.667	62.567	8.333	91.413	1.800	8.133	3.067	4.927	17.400	12.653	92.667	4.693	4.653	24.400	2.133	77.493	748.557
2014/BRLVAR-4	62.333	87.127	15.400	82.660	1.733	10.933	4.400	6.867	17.833	12.103	105.667	4.800	4.510	18.633	1.733	63.103	595.143
Kashi Taru	47.333	56.040	8.600	76.820	1.200	12.933	5.133	5.813	21.233	12.367	94.667	4.227	5.150	20.833	1.900	69.047	673.113
Punjab Sadabahar	46.667	51.420	11.267	66.473	1.067	16.800	4.733	5.320	17.700	11.573	69.600	4.080	5.760	24.533	1.633	58.957	569.200
Swarna Mani	66.333	46.060	6.467	83.420	1.000	1.000	4.333	4.593	10.600	25.153	165.333	4.093	6.187	24.567	2.000	71.767	574.230
KS-224	74.000	82.700	6.400	64.813	1.000	1.000	4.067	5.187	9.167	26.460	202.800	3.507	6.027	16.383	1.633	58.167	473.283
Mean	60.759	67.128	10.381	80.856	1.351	8.340	4.633	5.782	13.660	18.265	104.218	4.247	5.464	27.622	1.803	64.916	594.714
SEm	4.550	2.761	0.594	3.401	0.152	0.194	0.453	0.043	1.001	0.716	5.527	0.078	0.133	2.086	0.208	7.325	67.684
CD	13.077	7.968	1.716	9.817	0.439	0.559	1.307	0.123	2.889	2.066	15.953	0.225	0.383	6.021	0.601	21.144	195.361
CV	12.970	7.312	9.918	7.285	19.497	4.024	16.928	1.276	12.689	6.788	9.186	3.181	4.209	13.081	19.979	19.545	19.712

**Table 2:** Plant branching habit, fruit shape and fruit colours among brinjal genotypes

Genotypes	Branching Habit	Fruit Shape	Fruit Colour
2013/BRLVAR-1	Intermediate	Oblong	Deep purple
2013/BRLVAR-2	Intermediate	Long	Deep purple
2013/BRLVAR-3	Intermediate	Long	Deep purple
2013/BRLVAR-4	Intermediate	Oblong	Green
2013/BRLVAR-5	Intermediate	Long	Deep purple
2013/BRLVAR-6	Intermediate	Long	Deep purple
2014/BRRVAR-1	Intermediate	Round	Light purple
2014/BRRVAR-2	Intermediate	Round	Green
2014/BRRVAR-3	Intermediate	Round	Purplish Green
2014/BRRVAR-4	Intermediate	Round	Green with purple strip
2014/BRLVAR-1	Intermediate	Oblong	whitish Purple
2014/BRLVAR-2	Spreading	Long	Light purple
2014/BRLVAR-3	Intermediate	Long	Purple
2014/BRLVAR-4	Intermediate	Oblong	Light purple
Kashi Taru	Intermediate	Long	Purple
Punjab Sadabahar	Intermediate	Long	Purple
Swarna Mani	Intermediate	Round	Dark Purple
KS-224	Spreading	Round	Purple

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