Original Research Article

EVALUATION OF PURPLE SEGMENTED BRINJAL (*Solanum melongena* L.) GENOTYPES FOR GROWTH AND YIELD CONTRIBUTING CHARACTERS UNDER COIMBATORE CONDITION.

ABSTRACT

Aim: Brinjal (*Solanum melongena* L.) is one of the most important vegetable crops which is grown in India and throughout the world which belongs to Solanaceae family with chromosome number 2n =24. This investigation is mainly aimed to evaluate the brinjal genotypes and identify the superior genotypes with high yield, good quality and tolerance to shoot and fruit borer tolerance.

Study Design: The experimental materials consisted of twenty-one genotypes and two check were laid out in Randomized Block Design (RBD) with two replications.

Place and duration of Research: The study was carried out at Horticulture orchard, Department of Vegetable Science, Horticulture College and research Institute, Tamil Nadu Agricultural University, Coimbatore during 2022.

Methodology: In this study, twenty-one genotypes along with two genotypes were collected from various part of Tamil Nadu. Plants were raised in portrays and 30 days old plants were transplanted to main field at 60 X 60 cm spacing. Growth and yield parameters were observed and recorded.

Results: Based on *per se* performances CBE-SMSV-006 found to be superior genotype since, it recorded highest marketable fruit yield, number of flowers per cluster, number of fruits per cluster and minimum fruit and shoot borer infestation followed by CBE-SMSV-108. Hence, CBE-SMSV-006 and CBE-SMSV-108 are the promising genotypes which can be used for further breeding programme.

Conclusion: The study will provide detail knowledge on selecting the superior genotypes for further crop improvement in brinjal.

Keyword: Brinjal; Per se performance; genotype; purple segment; fruit yield; fruit traits; marketable yield.

1. INTRODUCTION

Brinjal (*Solanum melongena* L.) is widely cultivated as one of the important vegetable crops in India and throughout the world. It is commonly known as poor man's cup, eggplant, aubergine in many parts of the globe. It is believed to be originated in India, belongs to the family *Solanaceae.* As it is the native crop of the country, it has started to cultivate since time immemorial. Brinjal having highly prolific, precocious bearing habit and usually finds its place as the poor man's crop. It is very popular among the people of all social status and hence, it is called as vegetable of masses. Brinjal is most popular, common vegetable crop grown in almost all parts of India except higher altitudes, all the year round. Brinjal is the important vegetable crop in India. It contributes about 9% of total vegetable production in our country. The important brinjal growing countries in the world are China, India, Japan, Egypt, Syria, Philippines and Western Europe.

In India major Brinjal growing states are West Bengal, Orissa, Bihar, Karnataka, Andhra Pradesh, Uttar Pradesh, Maharashtra and Tamil Nadu. In India it is grown under the area of about 0.75million ha with an annual production of 12.98 million tonnes (www.nhb.gov.in). In Tamil Nadu, it is grown under the area of about 15,084 ha with production of about 3,02,408 tonnes with 25 t/ha (www.nhb.gov,in). Since the total cultivated area under brinjal is very limited, brinjal crop improvement is the only way to meet the demand in the market.

In Tamil Nadu, it is grown in rainy as well as winter season. To meet the market demand throughout the year which needs genetic advancement for high yield and productivity in the existing germplasm of brinjal. It is grown in almost all the district of Tamil Nadu and mostly in Dindigul, Theni, and Madurai. In all these districts, people prefer only green colored fruits but in Chennai, Vellore, Tiruvallur, Ranipet region, people prefer purple colored oblong fruit rather than green type. Poriyal, brinjal sambar, brinjal curry, chutney, smashed brinjal, filled brinjal fry, veggie kebab brinjal fry, etc. are some of the foods that are frequently produced in these areas. For these recipes, fruits of a variable size are recommended based on the requirement of recipes. In order to meet the consumer preference of these districts, it is necessary to identify the best performing genotypes of purple colored brinjal with resistance to shoot and fruit borer, high yield potential, earliness and good qualitative and quantitative characters for further crop improvement.

2. MATERIALS AND METHODS

The current study was conducted in the Department of Vegetable Science, Horticulture orchard, Horticulture College and Research Institute, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu during the year 2022 which is situated at 11.5^0 latitude, 79.8^0 longitude and 426.6^0 altitude above mean sea level with an objective of evaluation of purple segmented brinjal genotypes for yield, quality and tolerance to shoot and fruit borer. For this investigation, a total of twenty-one genotypes viz, CBE SM SV 001, CBE SM SV 006, CBE SM SV 007, CBE SM SV 106, CBE SM SV 107, CBE SM SV 108, CBE SM SV 109, CBE SM SV 080, CBE SM SV 081, CBE SM SV 084, CBE SM SV 100, CBE SM SV 113, CBE SM SV 114, CBE SM SV 115, CBE SM SV 116, CBE SM SV 110, CBE SM SV 117, CBE SM SV 118, CBE SM SV 119, CBE SM SV 105 , CBE SM SV 120 and two check varieties PLR 1 and PLR 2 which are collected from various parts of Tamil Nadu are evaluated.

The portray nursery are raised and 30-day old seedlings of all twenty-one genotypes are transplanted to main field at a spacing of 60 × 60 cm in raised bed with installed drip irrigation system under randomized block design method with two replications. All the intercultural operation and input application is done periodically. Five randomly selected plants in each replication of each genotype are evaluated for twenty one characters viz, Plant height (cm), Plant spread (cm), Number of branches per plant, Days to first flowering, Days to 50 percent flowering, Days to first harvest, Number of flowers per cluster, Number of fruits per cluster, Fruit length (cm), Fruit girth (cm), Single fruit weight (g), Calyx length (cm), Pedicel length (cm), number of Fruits per plant, Fruit yield per plant (g), Shoot borer infestation (%), Fruit borer infestation (%) and marketable yield per plant (kg).

3. EXPERIMENTAL RESULTS AND DISCUSSION

Analysis of Variance for growth and yield character (Table 1), The per se performance (Table 2) and top performance of genotypes for different characters (Table 3) are discussed below

Plant height (cm): The present study showed that, among all the genotypes, CBE-SMSV-106 recorded highest plant height of 136.6 cm followed by CBE-SMSV-105 of 126 cm. Similar record was reported by Kumar *et al*. (2014), Barsha Tripathy *et al.* (2017), Rani *et al.* (2018), V. Silambarasan *et al.* (2020) and R Kanchana *et al*. (2021).

Plant spread (cm): The plant spread was found to be maximum in the genotype CBE-SMSV-084 (113.1 cm) followed by CBE-SMSV-106 (112.9 cm). similar findings were recorded by Kanchan *et al.* (2021).

Number of branches per plant: Maximum number of branches per plant was observed in the genotype CBE-SMSV-106 of 13.6 followed by CBE-SMSV-109 of 13.4. Similar observation was reported by Barsha Tripathy *et al.* (2017), Rani *et al.* (2018), V. Silambarasan *et al*, (2020) and R Kanchana *et al*. (2021).

Days to first flowering: The genotype CBE-SMSV-001 (36.5) reported the earliest to produce flowering followed by CBE-SMSV-080 (44.9). Similar observation was reported by Kumar *et al*. (2014), Rani *et al*, (2018), V. Silambarasan *et al*. (2020) and Kanchana *et al*. (2021).

Days to 50 percent flowering: The minimum number of days to produce 50 per cent flowering was observed in the genotype CBE-SMSV-001 (50.2) followed by CBE-SMSV-080 (55.1). Earliness was also reported by Barsha Tripathy *et al.* (2017), Hadassah C. *et al.* (2018) and R Kanchana *et al*. (2021).

Days to first harvest: The minimum number of days for the first harvest was observed in genotype CBE-SMSV-001 of 53.9 days followed by CBE-SMSV-106 of 61.8 days. Similar earliness was reported by Hadassah Chinthaguthi *et al.* (2018), Rani *et al.* (2018), V. Silambarasan *et al*. (2020) and R Kanchana *et al*. (2021).

Number of flowers per cluster: The genotype CBE-SMSV-120 reported the highest number of flowers per cluster of about 4.7 followed by CBE-SMSV-006 (4.5). Similar record was reported by Abhay Wagh *et al*. (2016), Barsha Tripathy *et al.* (2017) and V. Silambarasan *et al.* (2020).

Number of fruits per cluster: The maximum number of fruits per cluster was recorded in the genotype CBE-SMSV-120 (4.5) followed by CBE-SMSV-006 (4.4). Similar observation is recorded by N Nirmala *et al.* (2013), Abhimanyu Chaturvedi *et al.* (2016) and V. Silambarasan *et al.* (2020).

Fruit length (cm): The maximum length of the fruit was observed in the genotype CBE-SMSV-081 (22.79cm) followed by the genotype CBE-SMSV-100 (21.35 cm). Similar findings were reported by Kumar *et al*. (2014), Barsha Tripathy *et al.* (2017), V. Silambarasan *et al*, (2020) and R Kanchana *et al*. (2021).

Fruit girth (cm): The genotype CBE-SMSV-115 (20.53 cm) recorded the highest fruit girth followed by CBE-SMSV-080 (18.39 cm). Similar observation was reported by Kumar *et al*. (2018), Barsha Tripathy *et al.* (2017), V. Silambarasan *et al*. (2020) and in genotype CO 2 (6.94 cm) by R Kanchana *et al*. (2021).

Single fruit weight (g): The single fruit weight was observed to be highest in CBE-SMSV-100 (160.4 g) followed by CBE-SMSV-080 (159 g). Similar findings were reported by Kumar *et al*. (2014), Barsha Tripathy *et al.* (2017), V. Silambarasan *et al*, (2020) and R Kanchana *et al*. (2021).

Calyx length (cm): Calyx length was found to be in the range of 5.47 cm in CBE-SMSV-117 to 5.41 cm in CBE-SMSV-115. similar findings were reported by Kanchana *et al*. (2021).

Pedicel length (cm): Pedicel length was found to be in the range of 6.31 m in CBE-SMSV-113 to 6.09 cm in CBE-SMSV-116. similar findings were reported by Kanchana *et al*. (2021).

Fruits per plant: the genotype CBE-SMSV-120 (34.6) reported the highest number of fruits per plant followed by CBE-SMSV-006 (29.2). Similar findings are reported by Rani *et al.* (2018), Hadassah Chinthaguthi *et al.* (2018), V. Silambarasan *et al*, (2020) and R Kanchana *et al*. (2021).

Fruit yield per plant (kg): CBE-SMSV-006 recorded the highest yield per plant of 2.41 kg followed by CBE-SMSV-108 of about 2.11kg Similar observation was recorded by Hadassah Chinthaguthi *et al.* (2018), Rani *et al.* (2018), V. Silambarasan *et al*, (2020) and R Kanchana *et al*. (2021).

Shoot borer infestation (%): the genotype CBE-SMSV-006 recorded the lowest infestation of shoot borer of 10.19 followed by CBE-SMSV-105 (11.88). Similar observation was also reported by Abhay Wagh *et al*. (2016) and R Kanchana *et al*. (2021).

Fruit borer infestation (%): CBE-SMSV-006 (10.12) recorded the lowest incidence of fruit borer followed by CBE-SMSV-105 (11.05). Similar findings is reported by Niranjana *et al,* (2016) and Kumar *et al*. (2014).

Marketable yield per plant: CBE-SMSV-006 recorded the highest marketable yield per plant of 2.16 kg followed by CBE-SMSV-108 of about 1.87 kg Similar observation was recorded by Hadassah Chinthaguthi *et al.* (2018), Rani *et al.* (2018), V. Silambarasan *et al*, (2020) and R Kanchana *et al*. (2021).

Table 1. Analysis of variance for growth and yield characters

S.NO.	Characters	Replication (df=1)	Genotypes (df=22)	Error(df=22)
1	Plant height (cm)	0.83	348.5**	3.0
2	Plant spread (cm)	2.78	155.09**	0.65
3	Number of branches per plant	0.234	5.063**	0.223
4	Days to first flowering	6.38	36.09**	0.82
5	Days to 50 %flowering	1.04	34.17**	0.29
6	Number of flowers per cluster	0.0426	1.0551**	0.0162
7	Days to first harvest	3.886	29.282**	0.356
8	Number of fruits per cluster	0.0078	1.6861**	0.0251
9	Number of fruits per plant	0.90	84.47**	0.52
10	Fruit length (cm)	0.101	27.28**	0.189
11	Fruit girth (cm)	0.197	11.025**	0.040
12	Single fruit weight (g)	0.2	19.09**	1.6
13	Calyx length (cm)	0.0024	1.0700**	0.0094
14	Pedicel length (cm)	0.0168	2.3017**	0.0140
15	Shoot borer infestation (%)	0.071	5.940**	0.038
16	Fruit borer infestation (%)	0.07	87.42**	0.13
17	Fruit yield per plant (kg)	0.0001	0.4106**	0.0030
18	Marketable yield per plant (kg)	0.02131	0.31154**	0.00327

*** Significance at 1 per cent level*

Table 2. *Per se* mean performance of brinjal genotypes for growth and yield parameters

Accession number	Plant height (cm)	Plant spread (cm)	Number of branches per plant	Days to first flowering	Days to 50% flowering	No. of flowers per cluster	Days to first harvest	No. of fruits per cluster	No. of fruits per plant
CBE-SMSV-001	103.15	87.2	10.2	36.5	50.2	4.1	53.9	1.35	22.2
CBE-SMSV-006	97.2	103.7	9.8	55.2	66.6	4.5	72.2	4.4	29.2
CBE-SMSV-007	105.6	96.8	13.3	45.9	56.85	3.7	61.6	1.6	24.3
CBE-SMSV-106	136.6	112.9	13.6	46	56.4	3.7	61.8	1.25	23.8
CBE-SMSV-107	122.2	90.5	11.6	52.2	63.8	2.7	67.6	1.7	24.05
CBE-SMSV-108	115.7	103.1	12.2	48.8	57.5	3.7	63.8	3.2	26
CBE-SMSV-109	95.9	90.1	13.4	48.7	57.6	3.1	63.9	2	23.4
CBE-SMSV-080	112.6	86.1	11.5	44.9	55.1	3	64.4	1	16.4
CBE-SMSV-081	116.5	96.7	10.9	52.6	63.3	2.6	70.1	1.35	12.55
CBE-SMSV-084	104.7	113.1	8.3	46.4	56.9	2.8	67	1.15	23
CBE-SMSV-100	111.8	96.1	11.3	48.9	58.9	2.5	71.8	1.95	15.65
CBE-SMSV-113	86.8	87	9.1	55	65.3	4.4	68.7	1.5	16.75
CBE-SMSV-114	112.4	84.3	12.1	50.4	58.7	2.6	66.8	1.24	13.3
CBE-SMSV-115	96.6	102.8	12.9	50.1	58.6	2.7	65.6	1	11.95
CBE-SMSV-116	93	93.3	12.4	50.6	58.2	2.6	66.2	1.25	9
CBE-SMSV-110	97.2	104	9.3	54.2	64.7	4.6	66.7	2.15	21.5
CBE-SMSV-117	104.8	93.3	11.6	52.1	64.7	3.6	68.1	2.6	21.5
CBE-SMSV-118	92.1	96.7	11.8	52.1	61.7	3	68.4	1.25	13.45
CBE-SMSV-119	122.1	96.9	9.6	52.2	61.6	2.6	65.3	1.2	9.95
CBE-SMSV-105	126	105.1	11.6	50.3	57.9	3.6	65.4	1.25	24.9
CBE-SMSV-120	85.5	82.6	8.6	53.9	64.9	4.7	68.6	4.5	34.6
PLR-1 (check)	99.03	106.86	9.58	52.39	56.05	4.3	67.05	2.65	22.10
PLR-2 (check)	96.13	89.14	12.49	51.1	58.9	3.2	69.37	2.25	23.96
Maximum	136.6	113.1	13.6	55.2	66.6	4.7	72.2	4.5	34.6
Minimum	85.5	82.6	8.3	36.5	50.2	2.5	53.9	1	9
Range	51.1	30.5	5.3	18.7	16.4	2.2	18.3	3.5	25.6
Mean	105.809	96.447	11.181	50.021	59.756	3.360	66.274	1.903	20.152
S.E	2.752	1.830	0.330	0.862	0.847	0.157	0.801	0.206	1.355
CD (5%)	3.635	1.685	0.986	1.892	1.117	0.266	1.252	0.331	1.511

Table 2. Contd…

Accession number	Fruit length (cm)	Fruit girth (cm)	Fruit weight (g)	Calyx length(cm)	Petiole length (cm)	Shoot infestation (%)	Fruit infestation (%)	Fruit yield per plant (kg)	Marketable yield per plant (kg)
CBE-SMSV-001	10.44	13.34	68.8	4.17	5.23	12.7	12.95	1.52	1.32
CBE-SMSV-006	12.5	14.6	82.6	4.25	3.59	10.19	10.12	2.41	2.16
CBE-SMSV-007	8.54	16.43	58.1	5.16	4.3	12.46	13.36	1.41	1.22
CBE-SMSV-106	12.48	15.48	81.95	5.11	4.38	16.63	13.19	1.95	1.69
CBE-SMSV-107	9.4	15.9	59.4	4.15	5.2	12.33	18.95	1.41	1.15
CBE-SMSV-108	10.67	19.37	81.4	4.21	5.38	14.75	11.52	2.11	1.87
CBE-SMSV-109	9.42	16.42	83.25	4.17	4.38	16.23	12.77	1.94	1.68
CBE-SMSV-080	12.79	18.39	159	4.12	5.34	12.17	18.26	1.6	1.13
CBE-SMSV-081	22.79	14.39	127.7	5.14	5.35	16.26	24.37	1.6	1.21
CBE-SMSV-084	10.56	16.37	56.1	4.13	4.38	12.51	20.03	1.29	1.03
CBE-SMSV-100	21.35	13.31	160.4	5.14	5.36	15.32	13.71	1.51	1.06
CBE-SMSV-113	15.59	14.21	95.9	5.27	6.31	13.53	24.89	1.6	1.2
CBE-SMSV-114	10.38	18.27	95.8	5.21	5.25	16.68	22.35	1.27	0.98
CBE-SMSV-115	14.48	20.53	87.9	5.41	4.3	13.08	34.75	1.05	0.68
CBE-SMSV-116	14.45	17.94	83.45	4.16	6.09	12.86	25.4	0.75	0.58
CBE-SMSV-110	8.6	16.9	85	5.14	5.41	12.45	13.48	1.82	1.58
CBE-SMSV-117	8.7	13.65	86.7	5.47	5.4	13.78	15.15	1.86	1.58
CBE-SMSV-118	12.83	16.36	98.5	5.22	3.43	13.93	28.19	1.32	0.95
CBE-SMSV-119	15.62	13.12	80.7	5.17	5.31	12.97	24.09	0.8	0.6
CBE-SMSV-105	12.62	17.49	72.75	5.42	4.39	11.88	11.05	1.81	1.61
CBE-SMSV-120	10.9	12.16	40.3	5.11	4.3	12.79	11.37	1.39	1.23
PLR-1 (check)	11.36	11.5	48.33	3.4	4.19	13.63	21.7	1.87	1.39
PLR-2 (check)	14.12	12.56	44.75	4.77	4.7	12.85	19.51	1.70	1.24
Maximum	22.79	20.53	160.4	5.47	22.79	16.68	34.75	2.41	2.16
Minimum	8.54	11.5	40.3	3.4	8.54	10.19	10.12	0.75	0.58
Range	14.25	9.03	120.1	2.07	14.25	6.49	24.63	1.66	1.58
Mean	12.63435	15.59522	84.29478	4.76087	12.63435	13.56435	18.3113	1.564783	1.31087
S.E	0.76712	0.50568	6.448874	0.123277	0.76712	0.351047	1.365058	0.082548	0.088688
CD (5%)	0.905	0.419	2.646	0.245	0.202	0.407	0.748	0.114	0.158

Table 3. Top performance of genotypes for different characters

Sl. no	Genotypes	*Per se* performance of genotypes for various traits
1	CBE-SM-SV- 006	Plant spread, Number of flowers per cluster, Number of fruits per cluster, fruit yield per plant, marketable yield per plant, Number of fruits per plant, fruit weight, calyx length, pedicel length, minimum shoot and fruit borer infestation, protein content, ascorbic acid.
2	CBE-SM-SV-108	Plant height, Plant spread, days to first flowering, days to fifty percent flowering, Number of fruits per cluster, fruit yield per plant, marketable yield per plant, fruit girth, minimum shoot and fruit borer infestation, ascorbic acid.
3	CBE-SM-SV-106	Plant height, Plant spread, fruit yield per plant, marketable yield per plant, Number of fruits per plant, fruit weight, minimum shoot and fruit borer infestation.
4	CBE-SM-SV-109	days to first flowering, days to fifty percent flowering, fruit yield per plant, marketable yield per plant, Number of fruits per plant, fruit weight, calyx length, pedicel length.
5	CBE-SM-SV-105	Plant height, Plant spread, fruit yield per plant, marketable yield per plant, Number of fruits per plant, fruit girth, fruit weight, calyx length, pedicel length, minimum shoot and fruit borer infestation.
6	CBE-SM-SV- 117	Plant height, Plant spread, fruit yield per plant, marketable yield per plant, fruit weigh, minimum shoot and fruit borer infestation.

Brinjal is one of the most important vegetable crops which is having prolific and precocious bearing habit with wide climatic adoptability. The loss of yield is mainly due to brinjal shoot and fruit borer. Controlling of this pest by adopting proper crop improvement programme is very important to meet the future requirement. In the genotypes, genetic variability and the degree to which crop yield and quality parameters are heritable from one generation to another, determines the final output. Hence, genetic diversity acts as a base for crop improvement. For the effective breeding programme, to develop the hybrid or variety, selection of parents is very much important. Based on the phenotypic expression, selection of parents from the genotypes is carried out easily when the traits are controlled by few genes and easily inherited. The description of the genotypes are most important for any breeding programme based on the plant growth, flowering and fruiting behavior. From the simple selection method, variability in quantitative characters can be exploited and the qualitative characters are acts as morphological markers for crop improvement programme.

On evaluation, it is found that CBE-SMSV-006 gives maximum marketable yield per plant, maximum number of flowers per cluster, maximum number of fruits per plant, less incidence of shoot and fruit borer incidence over check varieties PLR-1 and PLR-2 followed by genotype CBE-SMSV-108, CBE-SMSV-106, CBE-SMSV-109 and CBE-SMSV-117. The traits like number of flowers per cluster, number of fruits per cluster, number of fruits per plant and less incidence to shoot and fruit borer may be directly correlated to marketable yield of the crop.

4. CONCLUSION

With respect to traits like, plant spread, number of flowers per cluster, number of fruits per cluster, number of fruits per plant, less incidence of shoot and fruit borer, fruit yield per plant and marketable fruit yield per plant, the genotype CBE-SMSV-006 is excelled which is followed by CBE-SMSV-108, CBE-SMSV-106, CBE-SMSV-109 and CBE-SMSV-117. The highest marketable yield is may be due to less incidence of shoot and fruit borer incidence. The stability of these genotypes can be assessed and further can be used for future breeding programme to develop the varieties and hybrids with high yield, good quality and tolerance to shoot and fruit borer infestation.

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