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**TP Haldavanekar**  
Department of Horticulture,  
College of Agriculture, Dr.  
Balasaheb Sawant Konkan  
Krishi Vidyapeeth, Dapoli,  
District- Ratnagiri,  
Maharashtra, India

**YR Parulekar**  
Department of Horticulture,  
College of Agriculture, Dr.  
Balasaheb Sawant Konkan  
Krishi Vidyapeeth, Dapoli,  
District- Ratnagiri,  
Maharashtra, India

**AP Pawar**  
Department of Horticulture,  
College of Agriculture, Dr.  
Balasaheb Sawant Konkan  
Krishi Vidyapeeth, Dapoli,  
District- Ratnagiri,  
Maharashtra, India

**PC Haldavanekar**  
Department of Horticulture,  
College of Agriculture, Dr.  
Balasaheb Sawant Konkan  
Krishi Vidyapeeth, Dapoli,  
District- Ratnagiri,  
Maharashtra, India

**PC Mali**  
Department of Horticulture,  
College of Agriculture, Dr.  
Balasaheb Sawant Konkan  
Krishi Vidyapeeth, Dapoli,  
District- Ratnagiri,  
Maharashtra, India

#### Correspondence

**TP Haldavanekar**  
Department of Horticulture,  
College of Agriculture, Dr.  
Balasaheb Sawant Konkan  
Krishi Vidyapeeth, Dapoli,  
District- Ratnagiri,  
Maharashtra, India

## Generation mean analysis of F<sub>5</sub> progenies of brinjal (*Solanum melongena* L.) grown under Konkan agroclimatic condition

**TP Haldavanekar, YR Parulekar, AP Pawar, PC Haldavanekar and PC Mali**

#### Abstract

The field experiment was conducted at the Educational Research Farm, Department of Horticulture, College of Agriculture, Dapoli (M.S.) during the *rabi* season of the year 2013-2014. Treatments comprising 28 F<sub>5</sub> progenies of brinjal along with control were replicated twice in Randomized Block Design (RBD). Various growth parameters viz. plant height, number of secondary branches per plant, number of leaves per plant and plant spread, all flowering characters, fruit parameters and yield and yield attributing characters were found significant during present investigation. Whereas number of primary branches varied non-significantly. Highest plant height (123.45 cm), Highest number of primary branches (5.6), highest number of secondary branches (9.7) were recorded in genotypes T<sub>3</sub>, T<sub>11</sub> as well as T<sub>28</sub> and T<sub>27</sub> respectively. Genotype T<sub>28</sub> took minimum days (36.5) for 1st flowering and genotype T<sub>5</sub> has taken minimum days (41 days) for 50% flowering. Highest fruit length (19.26 cm) observed in genotype T<sub>26</sub>, whereas fruit girth (26.94 cm) and weight (173.74 g) was highest in genotype T<sub>13</sub>. Significantly minimum days (50 days) for 1st harvest by genotypes T<sub>5</sub> and T<sub>28</sub>. Maximum harvesting span (74.5 days) was recorded in genotype T<sub>5</sub>. Number of harvest was recorded highest (13.5) in genotype T<sub>10</sub>. Genotype T<sub>28</sub> recorded maximum number of fruits (30.6) per plant. Overall yield per plant (1.99 kg) and yield/ha (55.26 t) was highest in genotype T<sub>5</sub>. On the basis of overall plant growth habit, yield and yield attributing characters out of 29 genotypes 19 promising genotypes were selected for further studies. These genotypes were T<sub>4</sub>, T<sub>5</sub>, T<sub>6</sub>, T<sub>8</sub>, T<sub>9</sub>, T<sub>10</sub>, T<sub>12</sub>, T<sub>13</sub>, T<sub>15</sub>, T<sub>16</sub>, T<sub>17</sub>, T<sub>19</sub>, T<sub>21</sub>, T<sub>22</sub>, T<sub>24</sub>, T<sub>25</sub>, T<sub>26</sub>, T<sub>27</sub>, and T<sub>28</sub>.

**Keywords:** Brinjal, growth, quality parameters, yield

#### Introduction

Brinjal (*Solanum melongena* L.) belongs to the family Solanaceae having chromosome number 2n=24, is a common and popular vegetable crop grown in the subtropics and tropics. The name brinjal is popular in Indian subcontinents and is derived from Arabic and Sanskrit. It is known by various names viz. *Eggplant* (Australia), *Garden egg* (West Africa), *Aubaingan*, *Badanekai*, *Vangi* and *Aubergine* etc. Whereas the name eggplant has been derived from the shape of the fruit of some varieties, which are white and resemble shape of chicken eggs (Anon., 2014) [1].

Brinjal is also valued for its medicinal properties and has got anti- cholesterol property primarily due to presence of poly- unsaturated fatty acid (Linoleic and lenolenic) present in flesh and seed of fruit in higher amount (65.1%). Presence of magnesium and potassium salt in fruits is also important in anti-cholesterol action. In native medicines, role of brinjal in treatment of liver diseases, cough due to allergy, rheumatism, cololithiasis leucorrhoea and intestinal worms has been mentioned (Gopalkrishan, 2007) [4]. Agroclimatic conditions of Konkan region are ideal for brinjal cultivation. It is grown all the year round due to mild climatic conditions. It has occupied prominent place in rice based cropping system. In konkan wide variation in growth, fruit characters and consumer's acceptability exists which are well adapted to this region and are tolerant to bacterial wilt. Such genotypes were collected and crosses were made to develop a genotype having better taste and adaptability. These F<sub>5</sub> progenies were assessed brinjal for its growth, qualitative and yield assigning characters.

#### Materials and methods

The research experiment was carried out at Hi-tech nursery, Educational Research Farm, Department of Horticulture, College of Horticulture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli (M.S.) during the *rabi* season 2013-14. The soil of research plot was lateritic and acidic in reaction with pH ranging from 5.1 to 6.2. The site was considered on the

basis of suitability of land for the cultivation. The topography of the plot was fairly uniform, properly levelled suitable for cultivation of brinjal crop. The experiment consisted of twenty nine progenies of F5 generation of brinjal and studied in Randomized Block Design with two replications with spacing of 60 cm in between two rows plant to plant and 60 cm in between two plants within a row. The observations concerning various parameters were recorded at 30 days interval. The projected yield per hectare was calculated on the basis of yield per plot, occupied by brinjal and was analyzed statistically to express the results.

### Treatment Details

Treatment comprises of twenty-nine brinjal progenies. The twenty-nine promising progenies were selected based on the characters like plant height, branching habit, earliness, harvesting span, fruit shape, size and yield from F4 generation derived from crossing of 10 selected local types of brinjal developed from half diallel method followed by selection of desirable types during subsequent generations. The seeds for raising of F5 generation were followed from selfed fruits of selected progenies of F4 generation. These F5 progenies were raised during present investigation along with recommended check. The list of progenies studied is given below;

The list of progenies studied is given below

Treatment	Progenies	Treatment	Progenies
T1	Suvarna Pratibha CCC (Control)	T16	84-1
T2	87-2	T17	72-3
T3	74	T18	60
T4	57-4	T19	79
T5	72-1	T20	56-4
T6	80-2	T21	60+
T7	84 sp	T22	81-2
T8	99-2	T23	99-1
T9	100	T24	83-5
T10	62	T25	56-2
T11	77-1	T26	80-1
T12	77+	T27	88-2
T13	81-4	T28	64
T14	63-3	T29	99-3
T15	80		

### Results and discussion

The results obtained from the above experiment revealed that wide range of variability was observed in plant height, plant spread, number of secondary branches, number of leaves, days to first flowering, days to fifty per cent flowering, fruit length, fruit girth, fruit weight, number of harvest, harvesting span, number of fruits per plant, per plant yield and per hectare yield, indicating greater scope for making selection. However, number of primary branches per plant was non-significantly varied among the 28 F5 progenies.

Data in relation to growth, flowering and qualitative characters of 29 brinjal progenies of F5 generation presented in the Table 1. Among all treatments, highest plant height was recorded in T3 (123.45 cm) whereas, the treatment T5 recorded lowest plant height (52.15 cm). The maximum primary branches were recorded in treatment T28 (5.6). While the minimum primary branches were recorded in treatment T1 (3.7). The maximum number of secondary branches were recorded in treatment T27 (9.7). Whereas, the lowest number of secondary branches were noted in treatment T29 (4.8). In present investigation, highest number of leaves were recorded in treatment T16 (225.6 cm) whereas treatment T7 (101.5 cm) recorded lowest number of leaves among all brinjal genotype

and control. The highest plant spread was observed in the treatment T27 (81.13 cm) whereas lowest plant spread was observed in treatment T5 (44.39 cm). Above results regarding variation in growth parameters are in conformity with the findings of Shafeeq *et al.*, (2007) [13], Khapate *et al.*, (2012) and Magar (2014) [7] reported in brinjal.

Data pertaining to flowering and fruiting character are presented in Table 1. Evaluation of brinjal types showed significant variation among flowering character and fruit characters. Among the flowering characters, T28 and T5 recorded lowest days for initiation of flowering (36.5 days) as well as days to 50% flowering (41 days) respectively. The genetical character in association with environment and management practices decides the magnitude of the characters. Above result are in conformity with the findings of Rajput *et al.* (1996) [10], Shafeeq *et al.*, (2007) [13], Khapate *et al.*, (2012) and Magar (2014) [7] reported in brinjal. The highest length of fruit was observed in the treatment T26 (19.26 cm) and was significantly superior to rest of the treatments whereas lowest fruit length was observed in the treatment T8 (10.28 cm). The variation in fruit length was also reported by Mahaveer *et al.*, (2004) [9], Thapa *et al.*, (2005) [17], Maharana *et al.*, (2006) [8] in brinjal. Fruit girth along with the fruit length decides the size and weight of fruit and ultimately contribute to the yield. T13 recorded highest fruit girth and weight (26.9 cm and 173.7 g) respectively. The variation in weight of the brinjal fruits was also recorded by many scientists working on *viz.* Ramesh *et al.*, (2008) [11], Sanas (2009) [12], Dahatonde *et al.*, (2010) [3], in brinjal progenies.

In any crop improvement study, yield is the utmost important character. Breeders can improve any characters *viz.* quality attributes, morphological characters but cannot compromise with yield as such.

Data in relation to yield characters of 29 brinjal progenies of F5 generation presented in the Table 2. Evaluation of yield and yield attributing character among 28 F5 brinjal progenies showed significant variation. Among the various fruit characters, treatment T20 and T27 had slender fruits, whereas that of T20 and T1 had slender long fruits. The round shape fruits were observed in the treatments T4, T6, T12, T13, T17, T22 and T29. Further, the treatment T2, T3, T5, T7, T8, T9, T10, T11, T14, T15, T16, T18, T19, T12, T23, T24, T25 and T26 had the oblong shaped fruits. These fruit colours were green, light green, whitish green, purple, dark purple with whitish stripes, whitish green stripes, purplish strips. Colour of fruit is hereditary character hence variation might be due to difference in genetic makeup of brinjal progenies of F5 generation obtained from half diallel cross. Among the various fruit characters, the fruits were categorized as per its shape. Treatment T5 (50 days) and T28 (50 days) recorded the minimum days to first harvest. Treatment T5 recorded the maximum days to last harvest (124.5 days). Harvest span also varied significantly between 29 progenies and it was in range of (53.50 days) T1 to (74.50 days) T5. Brinjal is multiple harvest crop. More number of harvest decides yield as well as the period of availability of fruits in the market so as to prevent the glut. The highest number of harvests were recorded in treatment T10 (13.5) and was significantly superior to rest of progenies while the lowest number of harvests (11) were recorded in the progenies T12 and T13. The highest number of fruits per plant was observed in the treatment T28 (30.6) and lowest number of fruits per plant was observed in treatment T1 (12.40).

Yield is a very complex character and number of other character play a role in expression of yield. Yield per plant also varied significantly among all the 28 brinjal progenies of F5 generation and control. The highest yield per plant was observed in the treatment T5 (1.99 kg), however the lowest yield per plant was observed in treatment T1 (0.87 kg). The yield per plant is dependent upon the specific genes and its ability to perform in specific growing condition. Variation observed might be due to difference in genetic makeup of specific genotype and its ability to perform in specific environment, which had influenced flowering, fruit set, fruit weight, number of fruits and ultimately the yield. The variation in brinjal progenies for yield per plant was also noticed by Singh and Gopalkrishnan (1999) [16], Balaji *et al.*, (2013) [2], Kumar and Arumugam (2013) [6].

The data presented in Table 2 revealed that, yield per hectare of 29 brinjal progenies also varied significantly and the highest yield per hectare was observed in the treatment T5 (55.26 tones) and the lowest yield per hectare was observed in

treatment T1 (24.20). Thus, it indicated the wide range of variation in relation to yield per hectare which is the most important qualitative character. The variation in fruit yield per hectare of brinjal progenies was also noticed by Yadav (1996) [18], Maharana (2006) [8], Sanas (2009) [12], Balaji *et al.*, (2013) [2] and Shinde *et al.*, (2014) [14]. From the present findings, it could be concluded that yield and yield contributing characters were significantly varied in 29 progenies of F5 generation obtained from half Diallel mating system.

### Conclusion

The present investigation conclude that the selection for F6 generation based on plant architecture, yield and yield contributing characters, fruit parameters, consumer preference. On that basis 19 promising treatment were selected for further study. These treatment are T<sub>4</sub>, T<sub>5</sub>, T<sub>6</sub>, T<sub>8</sub>, T<sub>9</sub>, T<sub>10</sub>, T<sub>12</sub>, T<sub>13</sub>, T<sub>15</sub>, T<sub>16</sub>, T<sub>17</sub>, T<sub>19</sub>, T<sub>21</sub>, T<sub>22</sub>, T<sub>24</sub>, T<sub>25</sub>, T<sub>26</sub>, T<sub>27</sub> and T<sub>28</sub>.

**Table 1:** Mean performance of different growth, flowering and fruiting characters of F5 progenies of brinjal.

Treatment	Plant height (cm)	Plant spread (cm)	No. of primary branches	No. of secondary branches	No. of leaves	Days to 1st Flowering	Days to 50 percent Flowering	Fruit length (cm)	Fruit girth (cm)	Fruit weight (g)
T1	71.49	53.22	3.7	4.9	116	48.5	52	15.01	17.62	77.03
T2	72.77	67	5.4	6.5	175.2	42.5	44	10.85	19.32	61.75
T3	123.45	77.83	4.4	7.3	191.7	41.5	44.5	12.86	21.02	90.51
T4	64.12	53.52	4.3	6.7	123.1	42.5	46	13.32	25.23	131.68
T5	52.15	44.39	4.6	7.4	173.2	34.5	41	14.9	16.43	66.37
T6	87.09	68.36	5	8.3	194	39.5	44	14.59	24.25	144.22
T7	75.07	62.32	3.9	6.3	101.5	41.5	44	12.78	24.35	99.02
T8	82.13	52.61	5.2	5.8	121.3	43	45	10.28	17.24	48.24
T9	67.04	55.59	5.2	8.3	119.8	39.5	43.5	12.63	19.08	72.84
T10	77.81	58.72	4.7	5.8	184	38.5	44	15.82	18.44	86.03
T11	78.39	58.34	5.6	7	128.6	38	43	12.78	20.87	78.69
T12	90.03	57.45	4.6	5.4	101.7	43	45	11.34	26.14	108.24
T13	88.87	68.28	4.5	6.2	109.3	43	44.5	14.22	26.94	173.74
T14	73.37	68.34	5.2	6.1	132.3	42	44	11.81	19.14	57.01
T15	89.43	76.83	5.4	9.1	164.4	42	44.5	12.29	19.96	90.54
T16	71.98	65.69	4.9	5.2	225.6	42.5	44.5	13.36	25.33	117.38
T17	79.44	58.15	4.7	6	123.5	43	44.5	14.17	17.45	74.64
T18	77.78	52.2	4.4	4.8	83.8	41.5	45	12.65	25.44	87.93
T19	76.68	55.58	4.7	6.8	158.1	39.5	43.5	12.85	22.6	90.14
T20	54.36	45.49	5.4	6.8	116.3	38	41.5	10.52	20.18	70.21
T21	53.8	45.05	4.9	6.3	117.5	42	44.5	11.96	23.11	88.64
T22	91.75	69.57	5.1	6.6	186.5	40	43.5	12.25	25.25	100.26
T23	73.96	63.07	4.7	6.3	166.2	42.5	45	12.91	18.76	67.35
T24	78.26	62.93	4.2	6.1	110.1	43.5	45	12.72	21.45	72.22
T25	92.6	66.92	3.9	7.7	143.4	40	43.5	16.77	22.04	105.95
T26	59.79	53.07	4.6	9	166.9	41.5	45.5	19.26	22.65	100.94
T27	99.02	81.13	4.7	9.7	221.2	41.5	45	15.43	19.76	92.22
T28	84.83	69.27	5.6	7.8	138.8	36.5	43.5	13.71	19.26	85.93
T29	74.17	53.22	4.3	4.8	105.1	39.5	42.5	12.15	23.65	90.33
Range	52.15-123.45	44.39-81.13	3.7-5.6	4.8-9.7	101.5-225.6	34.5-48.5	41.0-45.5	10.28-19.26	16.43-26.94	57.01-173.74
Mean	77.99	60.83	4.8	6.72	144.8	41.07	44.34	13.32	21.48	90.69
Result	Sig	Sig	NS	Sig	Sig	Sig	Sig	Sig	Sig	Sig
S.Em+-	8.75	4.4	0.6	0.86	11.46	1.53	0.89	0.52	0.72	3.92
CD@5%	25.35	12.73	1.6	2.49	33.21	4.44	2.57	1.08	2.08	11.36

**Table 2:** Mean performance of different fruit, yield and yield attributing characters of F<sub>5</sub> progenies of brinjal.

Treatment	Fruit shape	Fruit size	Fruit colour	Days to first harvest	Days to last harvest	Harvesting span (days)	No. of harvests	No. of fruits	Yield per plant (Kg)	Yield per ha (t)
T1	Slender	Medium	Light green	63.5	117	53.5	12.5	12.4	0.87	24.2
T2	Oblong	Small	Light green	62	120	58	11.5	25.9	0.97	26.98
T3	Oblong	Medium	Light pale green	57	116	59	12	19.3	1.52	42.21
T4	Round	Medium-large	Light purple	57.5	117.5	60	12	19.7	1.78	49.38
T5	Oblong	Small	Purple	50	124.5	74.5	12	26.9	1.99	55.26
T6	Round	Medium	Purple	57	116	59	12	17.1	1.61	44.63
T7	Oblong	Medium	Whitish green	57.5	117.5	60	12	20	1.39	38.7
T8	Oblong	Small	Whitish green	58.5	117.5	59	12	24.5	1.01	27.94
T9	Oblong	Small- Medium	Whitish green	58.5	116	57.5	12	28.7	1.86	51.67
T10	Oblong	Medium	Light purple	53.5	113	59.5	13.5	24.4	0.93	25.7
T11	Oblong	Medium	Dark purple	51	117	66	12	19.3	1.19	32.92
T12	Round	Medium	Dark green	57	117	60	11	21.9	1.48	41.1
T13	Round	Medium- large	Light green	56.5	117	60.5	11	18.8	1.9	52.83
T14	Oblong	Small	Whitish green	58.5	118	59.5	12	23.3	1.89	52.51
T15	Oblong	Small-Medium	Purple colour	52	116	64	12	25.8	1.59	44.14
T16	Oblong	Medium	Whitish green	62	118	56	12	23.3	1.6	44.3
T17	Round	Medium	Dark purple	58	118	60	12	29.6	1.68	46.54
T18	Oblong	Medium	White	51	117	66	11.5	26.6	1.8	50.04
T19	Oblong	Medium	Green	57	122	65	11.5	21.3	1.19	33.01
T20	Slender	Medium	Whitish green	55	118	63	12	26.2	1.36	37.84
T21	Oblong	Medium	Light green	57.5	116	58.5	12	24.9	1.84	51.11
T22	Round	Medium	Light green	57.5	118	60.5	12	18	1.43	39.57
T23	Oblong	Medium	Light purple	56.5	118	61.5	12	17.8	0.98	27.34
T24	Oblong	Small	Purple	56.5	116	59.5	12	23.3	1.58	43.97
T25	Oblong	Small	Light green	56.5	118	61.5	12	26.7	1.53	42.38
T26	Oblong	Medium	Light green	56.5	116	59.5	12	20.6	1.3	36.2
T27	Slender	Small- Medium	Light green	59	116	57	12	25.3	1.57	43.66
T28	Long, Slender	Small	Purple	50	117	67	12	30.6	1.73	48.13
T29	Round	Small	Light green	56.5	120	63.5	12	26.1	1.22	33.82
Range	-	-	-	50 - 63.5	113 - 124.5	53.50 - 74.50	11.00 - 13.5	12.40 - 30.6	0.871 - 1.99	24.20- 55.26
Mean	-	-	-	56.53	117.5	60.98	11.95	23.05	1.48	40.97
Result	-	-	-	Sig	Sig	Sig	Sig	Sig	Sig	Sig
S.Em+-	-	-	-	1.96	1.3	2.18	0.3	1.64	0.19	5.4
CD@5%	-	-	-	5.68	3.78	6.31	0.87	4.74	0.56	15.63

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