



## Growth and Yield Attributes with Shoot and Fruit Borer Resistance in Parents and F<sub>1</sub> Hybrids of Brinjal

P. Irene Vethamoni\* and S. Praneetha

Department of Vegetable Crops,  
HC &RI, Tamil Nadu Agricultural University,  
Coimbatore – 641 003, Tamil Nadu

An experiment was carried out with twenty lines and three testers to develop green fruited brinjal F<sub>1</sub> hybrids with cluster bearing habit, striped fruit, shoot and fruit borer resistance and high yield. The lines and testers were raised in the crossing block and crossing was carried out in L x T mating design and hybrid seeds were obtained. Among the sixty hybrids developed, six hybrids with high yield and shoot and fruit borer resistance were identified and raised in the field and their growth, yield, shoot and fruit borer resistance were studied. Based on mean performance, the parent L15 was found to be the best for plant height, no. of fruits, fruit yield and marketable yield with less borer infestation. Among the hybrids, the maximum number of fruits (54.8) was recorded in the hybrid L15 x T2 followed by L2 x T2 (43.4) and L16 x T2 (42.2) respectively. The maximum per plant yield of 4.2 kg/plant was recorded by the hybrid L15 x T2. The hybrid L2 x T2 stood in the second place by recording 3.6 kg and L16 x T2 was in third position with a yield of 3.4 kg. The minimum borer infestation of shoot (12.0 %) was recorded in the hybrid L15 x T2 followed by L2 x T2 (12.4 %) and L12 x T2 (12.9 %). The minimum borer infestation of fruit (13.0 %) was recorded in the hybrid L15 x T2 followed by the hybrid L12 x T2 (13.8 %). Among the F<sub>1</sub> hybrids, the performance of L15 x T2 was superior for growth and yield characters. The shoot and fruit borer damages were also recorded at lower level in the same hybrid.

**Key words:** Mean performance, Shoot and fruit borer resistance, Hybrids, Yield, Brinjal

Brinjal (*Solanum melongena* L.), also known as eggplant, is an important solanaceous vegetable crop grown round the year in India. The unripe fruits are used as a cooked vegetable. It has adapted to a wider range of climatic condition from north to south and west to east. In Tamil Nadu, it is grown in winter as well as in rainy season to meet the market demands throughout the year. With increasing popularity of F<sub>1</sub> hybrids of brinjal, it is imperative to develop such hybrids, having excellent quality coupled with high yields as well as pest and disease resistance. Among all the insect/pests, the shoot and fruit borer (*L. orbonalis* Guenee) is the most destructive insect/pest of brinjal throughout India. The yield loss due to the pest is to the extent of 70 to 92 per cent (Eswara Reddy and Srinivasa, 2004). For the management of this pest, farmers usually resort to spray of synthetic pesticides. This practice of indiscriminate use of pesticides leads to build up of pesticide residues in the produce, destruction of beneficial insects, pest resurgence, exposure of farm workers to pesticides and environmental pollution. Hence, the present study was conducted to identify superior hybrids for yield and shoot and fruit borer resistance.

### Materials and Methods

The present investigation on performance of cluster bearing, striped and green fruited brinjal F<sub>1</sub> hybrids and their parents for shoot and fruit borer resistance, growth and yield was carried out in the Department of Vegetable Crops, Faculty of Horticulture, Tamil Nadu Agricultural University, Coimbatore during 2013-2014 which is situated at 11° N latitude and 77° E longitude at an elevation of 426.6 m above MSL. The experimental materials for the present study comprised of 20 lines, namely EC 315014 (L1), IC 354546 (L2), IC 261786 (L3), IC 249344 (L4), IC 090781 (L5), IC 090907 (L6), IC 099677 (L7), IC 354578 (L8), IC 354721 (L9), EC 316200 (L10), Padanthalumoodu (L11), IC 089914 (L12), IC 099763 (L13), IC 099630 (L14), IC 374928-1 (L15), IC 090111-1 (L16), IC 112749 (L17), CO 1 (L18), Arka Shirish (L19), IC 034479-1 (L20) and three testers namely, IC 310889-1 (T1) and IC 099630 (T3) from NBPGR, New Delhi and ABSR-2 (T2) from IIVR, Varanasi. The parents were crossed in a line x tester mating design to obtain sixty hybrids. Among the sixty hybrids, the mean performance of six high yielding, shoot and fruit borer resistant hybrids (L2xT2, L4xT2, L9xT2, L12xT2, L15xT2 and L16xT2) and their parents were evaluated in a randomized block design with five replications. Forty five days

\*Corresponding author's email : irenevetha17@gmail.com

old seedlings raised in nursery were transplanted on ridges adopting a spacing of 60 cm x 60 cm. Twenty plants were maintained for each hybrid in each replication. Cultural practices were followed as per the package of practices recommended for Tamil Nadu as per the crop production techniques of horticultural crops (2013).

## Results and Discussion

Data depicting the mean performance of six green fruited brinjal  $F_1$  hybrids for different characters are presented in Table 2 and for parents in Table 1 for growth, yield and shoot and fruit borer resistance parameters.

**Table 1. Mean performance of lines and testers of brinjal for growth and yield characters**

Parents	Plant height (cm)	No. of branches	Days to 50% flowering	Days to first harvest	Single fruit weight (g)	Fruit length (cm)	Fruit girth (cm)	Number of fruits per plant	Fruit yield per plant (kg)	Borer infestation of shoot (%)	Borer infestation of fruit (%)	Marketable fruit yield per plant (kg)
L1	83.86	9.68	68.86	86.57	62.72	12.61	7.87	41.16	2.58	16.42	14.36	2.21
L2	71.23	9.86	70.17	75.50	75.43	10.30	14.53	43.21	3.26	12.40	14.21	2.80
L3	73.54	8.41	71.55	89.76	55.75	12.76	11.55	36.48	2.03	18.42	18.55	1.65
L4	103.42	9.84	71.25	87.43	96.78	13.85	16.49	33.17	3.21	15.84	19.87	2.57
L5	95.71	10.17	69.44	79.16	82.50	12.73	15.44	35.06	2.89	18.27	16.28	2.42
L6	68.62	8.76	73.67	84.15	84.31	12.34	13.45	33.57	2.83	17.18	14.82	2.41
L7	110.18	8.06	72.84	80.24	62.43	11.49	7.58	38.42	2.40	18.21	20.15	1.92
L8	92.16	9.23	68.36	83.92	63.44	12.51	8.47	42.67	2.71	15.82	13.97	2.33
L9	102.56	10.82	78.43	82.46	86.46	13.62	12.89	35.84	3.10	14.23	17.46	2.56
L10	73.84	7.93	69.87	83.58	67.87	8.65	8.55	30.47	2.08	14.87	19.58	1.68
L11	86.52	10.25	71.86	87.24	66.51	11.38	8.92	32.26	2.01	15.87	18.72	2.28
L12	80.16	9.83	72.41	78.43	73.53	12.67	9.53	44.73	3.28	12.74	13.87	2.82
L13	67.85	7.69	75.13	87.83	63.47	13.56	11.84	31.85	2.02	13.86	18.26	1.65
L14	71.34	8.21	73.34	87.15	86.52	12.33	10.49	33.24	2.88	14.35	18.82	2.38
L15	128.67	10.62	70.52	75.16	66.93	13.67	8.90	52.57	3.52	12.26	13.17	3.06
L16	67.26	7.82	71.43	87.83	74.54	14.25	9.88	40.36	3.01	14.14	13.84	2.59
L17	72.18	10.56	74.62	86.27	67.33	12.71	12.56	36.85	2.48	20.53	21.62	1.94
L18	87.25	8.28	73.43	86.53	69.52	11.50	10.84	38.22	2.66	15.81	17.83	2.19
L19	73.68	9.75	74.56	87.75	73.45	11.89	9.48	31.22	2.36	16.43	14.67	2.01
L20	93.17	9.06	75.13	78.17	65.37	12.72	8.61	38.27	2.50	16.58	17.28	2.07
T1	82.16	10.26	84.62	92.16	67.71	12.22	7.48	36.13	2.45	14.18	16.26	2.05
T2	96.12	9.43	70.83	77.41	78.26	13.38	12.37	44.67	3.49	15.26	13.58	3.02
T3	106.28	10.17	73.14	86.42	86.47	12.36	10.46	33.15	2.87	19.89	20.46	2.34
Mean	86.42	9.33	72.84	84.01	72.92	12.41	10.79	37.54	2.72	15.80	16.85	2.30
CD (P=0.05)	5.42	1.56	5.14	5.37	7.33	2.64	2.07	6.86	0.52	1.59	1.75	0.32

The data revealed significant differences in plant height. Among the parents, the maximum plant height of 128.67 cm was recorded by L15 followed by 110.18 cm in L7 and 106.28 cm in T3 and the lowest plant height was recorded in L16 (67.26 cm). Variation in plant height may be due to genetic makeup of the plants. Among the hybrids, the highest plant height (132.5 cm) and number of branches per plant (11.5) were recorded in L15 x T2, whereas, the lowest plant height (67.2 cm) and number of branches per plant (7.8) were recorded in the  $F_1$  hybrid L16 x T2. Among the parents, the maximum number of branches (10.82) was recorded in L9 followed by L 15 (10.62) and the lowest number of branches of 7.69 was recorded in L13. Similar observation were recorded in brinjal by Kamalakkannan *et al.* (2007), Voddoria *et al.* (2007), Shafeeq *et al.* (2007), Chowdhury *et al.* (2010) and Khapte *et al.* (2012).

Among the parents, L2 was the earliest to flower which took 70.17 days for 50 % flowering and L15 was the second earliest one which took 70.52 days for 50 % flowering and it stood first for first harvest (75.16 days). The parent L2 took minimum of 66.63 days for the first harvest. The next accession which showed earliness for 50 % flowering was T2 (70.83

days). This indicated that early flowering genotypes could be used in the breeding programme to necessitate serial harvesting over wide number of days to avoid market glut and to exploit higher prices during certain parts of the year. Earliness in brinjal was reported by Ramesh Babu and Patil (2008), Kalpana Dahatonde *et al.* (2010), Dhaka and Soni (2012) and Ramesh Kumar *et al.* (2012).

Among the parents, the maximum fruit length of 14.25 cm was recorded in L16, followed by L15 (13.67 cm) and L4 (13.65 cm). The minimum fruit length was recorded in L10 (8.65 cm). The maximum fruit girth was measured by the parent L4 (16.49 cm) followed by L5 (15.44 cm) and L6 (13.45 cm). The minimum fruit girth was recorded by T1 (7.48 cm). Among the hybrids, the fruit length was highest in the hybrid L2 x T2 (18.8 cm) and the lowest in the hybrid L4 x T2 (6.5 cm). These findings were in accordance with Chowdhury *et al.* (2010) and Khapte *et al.* (2012). The hybrid L9 x T2 registered the maximum fruit girth (23.1 cm) and fruit width (7.1 cm) and the lowest fruit girth (10.2 cm) and fruit width (3.1 cm) were recorded in the hybrid L12 x T2. The variation might be due to the genetic and environmental effects. Similar results were reported by Khapte *et al.* (2012).

**Table 2. Mean performance of brinjal F<sub>1</sub> hybrids for growth and yield characters**

Hybrids	Plant height (cm)	Number of branches per plant	Fruit length (cm)	Fruit girth (cm)	Fruit width (cm)	Single fruit weight (g)	Number of fruits per plant	Fruit yield per plant (kg)	Borer infestation of shoot (%)	Borer infestation of fruit (%)
L15 x T2	132.5	11.5	9.1	16.1	5.5	56.8	54.8	4.2	12.1	13.0
L2 x T2	71.0	9.5	18.8	20.3	6.2	178	43.4	3.6	12.4	14.5
L4 x T2	103.2	9.3	6.5	12.3	3.7	33.8	35.6	3.0	16.0	19.9
L9 x T2	102.5	10.3	8.5	23.1	7.1	180.3	37.0	3.0	15.1	17.5
L12 x T2	80.5	9.6	8.2	10.2	3.1	39.2	43.0	3.3	12.9	13.8
L16 x T2	67.2	7.8	9.4	20.1	7.0	148.9	42.2	3.4	14.2	13.8
Mean	92.8	9.7	10.1	17.0	5.5	108.6	42.7	3.4	13.8	15.4
SEd	0.951	0.856	0.102	0.149	0.121	1.559	1.709	0.136	0.931	0.929
CD (P=0.05)	1.985	1.786	0.214	0.309	0.253	3.252	3.565	0.283	1.942	1.938

Among the hybrids, the highest value for single fruit weight (180.3 g) was noticed in L9 x T2 and the lowest in L4 x T2 (33.8 g). Among the parents, the maximum single fruit weight of 96.78 g was recorded by the L4 followed by L14 (86.52 g) and T 3 (86.47 g). The lowest fruit weight was recorded in L3 (55.76 g). The higher fruit weight might be attributed to large fruit size. This result is in confirmation with that of Kamalakkannan *et al.* (2007), Shafeeq *et al.* (2007), Chowdhury *et al.* (2010) and Khapte *et al.* (2012).

Among the hybrids, the maximum number of fruits per plant (54.8) was recorded in L15 x T2 followed by L2 x T2 (43.4) and L16 x T2 (42.2). The minimum number of fruits was recorded in L4 x T2 (35.6). Among the parents, L15 recorded the maximum number of fruits (52.57) followed by L12 (44.73) and T2 (44.67). The number of fruits per plant directly influences the yield. These findings are in accordance with those of Kamalakkannan *et al.* (2007), Shafeeq *et al.* (2007), Chowdhury *et al.* (2010) and Khapte *et al.* (2012).

The marketable yield per plant which is constituted by the fruits which are free of infection by fruit borer is the most important parameter in brinjal. It depicts the profit of the grower and it is decided mainly by the percentage of infestation by fruit and shoot borer. Lesser the fruit infestation, higher would be the marketable yield per plant. The maximum marketable yield of 3.06 kg was recorded by L15 followed by T2 (3.02 kg) and L12 (2.82 kg). The minimum marketable yield was recorded by L3 and L13 (1.65 kg). Thus, the genotypes with higher marketable yield possess relatively higher genetic tolerance to shoot and fruit infestation in brinjal. Similar results were recorded by Praneetha (2002).

Among the parents, the maximum per plant yield of 3.52 kg/plant was recorded by L15. T2 stood in the second place by recording 3.49 kg/plant and L12 was in the third position which recorded a yield of 3.28 kg/plant. The lowest yield of 2.01 kg was recorded in L11. Among the hybrids, the maximum per plant yield of 4.2 kg/plant was recorded by the hybrid L15 x T2. The hybrid L2 x T2 stood in the second place by recording 3.6 kg/plant and L16 x T2

was in the third position with a yield of 3.4 kg/plant. The minimum per plant yield (3.0 kg) was recorded in the hybrids L4 x T2 and L9 x T2. These results are similar to the findings of Kamalakkannan *et al.* (2007), Shafeeq *et al.* (2007), Chowdhury *et al.* (2010) and Khapte *et al.* (2012).

The shoot and fruit infestation affects the growth of the plant as well as yield. Among the parents, the minimum percentage of shoot infestation (12.26 %) was recorded in L15 followed by L2 (12.40 %) and L12 (12.74%). The highest shoot infestation was recorded in L17 (20.53 %). The fruit infestation was minimum in L15 (13.17 %) followed by T2 (13.58 %) and L12 (13.87 %). The maximum fruit infestation was noticed in L17 (21.62). Among the hybrids, the minimum percentage of shoot infestation of 12.0 % was recorded in the hybrid L15 x T2 followed by L2 x T2 (12.4 %) and L12 x T2 (12.9 %). The maximum shoot borer incidence was recorded in the hybrid L4 x T2 (16.0 %). The minimum percentage of fruit infestation was (13.0 %) recorded in the hybrid L15 x T2 followed by the hybrid L12 X T2 (13.8 %). The maximum fruit infestation was recorded in the hybrid L4 x T2 (19.9 %). Similar results for borer incidence were recorded by Kamalakkannan *et al.* (2007). Among the F<sub>1</sub> hybrids the performance of L15 x T2 was superior for both growth and yield characters. The shoot and fruit borer damages were also recorded at lower level in the same hybrid. The hybrid L4 x T2 was highly susceptible for shoot and fruit borer infestation.

### Conclusion

Among the six F<sub>1</sub> hybrids, the hybrid L15 x T2 was superior for both growth and yield characters with minimum percentage of shoot and fruit borer incidence.

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