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EVALUATION OF RESISTANT GENOTYPE AGAINST BRINJAL SHOOT AND FRUIT BORER (*Leucinodesorbonalis* Guenee)

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Abstract

Brinjal shoot and fruit borer (BSFB), *Leucinodesorbonalis* Guenee, is a devastating pest of brinjal (*Solanummelongena* L.) in all brinjal growing countries across the globe. Ten genotypes of brinjal were evaluated against the pest in experimental field of Khulna University, Bangladesh following arandomized block design with three replications. The genotypes were BARI Hybrid Begun-2, BARI Hybrid Begun-4, BARI BT-4, Begun-4, BARI Begun-9 and BARI Begun-10, Local Cultivar-1, Local Cultivar-2, Local Cultivar-3, Local Cultivar-4 and BARI Begun-4among the ten brinjal genotypes, reduced shoot and fruit infestation were recorded in local cultivar-1 and BARI Begun 2. On degree of infestation, BARI hybrid BT begun 4 appeared to be resistant while rest of the genotypes were susceptible or highly susceptible. Volume index was documented to be high in BARI hybrid Begun 4 and low in local cultivar 3, while shape index was high in cultivar 2 and low in BARI hybrid begun 4 and BARI Begun-10. BARI Hybrid Begun 4 possessed greater meso and pericarp thickness although those were not resistant. Above all, using resistant genotypes of BARI hybrid BT begun 4 may be considered as a last resort inan optimized IPM package to ensure maximum brinjal productivity.

Introduction

In Bangladesh, brinjal is one of the most popular and favoured vegetables which is grown throughout the country.It is commercially cultivated in Jessore, Rajshahi, Narsinghdi, Dhaka, Comilla, and Bogra districts. It is grown in both Rabi and Kharif season in Bangladesh. Rabi brinjal has been cultivated over 82000 acres of land and the total production was 360000 Tons and Kharif brinjal has been cultivated over 47000 acres of land and the total production was 170000 tons (BBS, 2020). Regarding nutritional value, brinjal possesses a very low caloric value but high content of vitamins, minerals, and bioactive compounds for human health (Raigón *et al.*, 2008; Plazas *et al.*, 2014b; Docimo *et al.*, 2016).

Brinjal is quite susceptible to several environmental stresses, especially acute temperature, drought, salinity, and inadequate moisture stresses (Kalloo, 1993) which affect the growth and development of the plant. It has a relatively longer growth period and life span, brinjal is more vulnerable than other vegetable crops to a broad range of plant diseases, pests, nematodes, and weeds. The major handicap to the sustainable productivity of brinjal in Bangladesh is the high incidence of insect pests.

In total 9 species of insects belonging to 7 families of 4 orders have been reported as a pest in brinjal field e.g. Epilachna beetle (*Epilachnadodecastigma*), Jassid (*Amrascabiguttula*), Whitefly (*Bemisiatabaci*), Shoot and fruit borer (*Leucinodesorbonalis*), Rice bug (*Leptocorisaacuta*), Aphid (*Aphis gossypii*), Thrips (*Thripshawaiiensis*) and Leaf hopper (*Amrascadevastans*) (Amin *et al.*, 2018). Among them, Brinjal Shoot and Fruit Borer (BSFB) is reported to induce about 16 and 70% damage to shoots and fruits, respectively (Kar *et al.*, 2020). It is recognized as the most damaging pest of brinjal

(Taylo *et al.*, 2016). It scales down the productivity as well as the quality of marketable fruits of brinjal. The larval stage of the pest is mainly catastrophic and can cause severe damage to fruits and shoots. Newly hatched larvae invade the vascular bundle of the plant and hit translocation of food and nutrients towards shoots. Approximately 4-6 healthy fruits can be destroyed because of the attack of a single Larvae (Jayaraj and Manisegaran, 2010). Because of the concealed mode of life, it is the most serious pest of brinjal (Sardana *et al.*, 2004). This insect pest is accountable for 70-92% of yield loss (Chakraborti and Sarkar, 2011).

There are several measures to mitigate this including spraying of chemical insecticides, application of botanical pesticides, adopting IPM technologies, using resistant varieties and so on.. A survey report revealed that 98% of Bangladeshi farmers are dependent entirely on spraying insecticides to control BFSB (Karim, 2004). So, it is a burning question to identify and use of most effective resistant varieties, proper chemical insecticide and effective botanical pesticides to ensure eco-friendly pest management under IPM technology.

Materials and Methods

The present study was carried out at the experimental field of the Germplasm Centre of Khulna University, Bangladesh during September 2020 to May, 2021. The study area is situated at 24.09° North latitude and 90.26° East Longitudes with an elevation of 8.4 meter from the sea level.The climatic condition of Khulna University has unimodal rainfall pattern; most of the rainfalloccurs during the months of May to September. The average rainfall is usually higherthan 200 mm during November to March. The warmer months are April, May and June with mean maximum temperature of 31-34°c and the cold months are November, December and January when the temperature ranges from 10-19°C.

The area belongs to the Ganges flood plain (AEZ-13), clay loam in texture having low organic matter (1.12%) moderately slow permeability and deficient in nitrogen, potassium and Sulphur. The soil is mostly alkaline and somewhat saline in nature having pH 6.5 to 8.5.

Brinjal seeds of 10 varieties *viz.* BARI Hybrid Begun-2, BARI Hybrid Begun-4, BARI BT-4, Begun-4, BARI Begun-9 and BARI Begun-10, Local Cultivar-1, Local Cultivar-2, Local Cultivar-3, and Local Cultivar-4 and BARI Begun-4 which were collected from Horticulture Division, Bangladesh Agricultural Research Institute (BARI), Joydebpur, Gazipur, the local ones from the farmers of the Khulna region. A small seedbed measuring 5 m x 1 m was prepared and seeds were sown there. Standard seedling raising practice was followed.

The plots were lightly irrigated regularly for ensuring proper development of the seedlings. The seedbed was mulched for ensuring seed germination, proper growth and development of the seedlings. Thirty-six day-old (3/4 leaf stage) healthy seedlings were transplanted in 50 cm apart in 2.0 meter ×2.5 size plots in rows in three replications laid out inRCBD design with 3 replications. Each row separated by 50 cm which contained 16 plants of each variety. After transplanting light irrigation was given to each pit. Dead or damaged seedlings were replaced immediately by new ones from the stock. Supple mentary irrigation was applied at an interval of 2-3 days. Propping of each plant using bamboo sticks (l m height) was done for providing extra support to avoid lodging of theplants. Weeding andmulching were given whenever necessary. Cow dung @ 15 tons, 250, 150 and 125 kg of Urea, TSP and MoP, respectively per hectare. The half of cow dung and TSP were applied as basal dose during land preparation. The remaining cow dung, TSP and, one- third of MoP were applied in the pits at transplantation of brinjal seedlings. The entire dose of urea and the rest of MoPwere applied as top dressing. The first top dressing of urea (one third) was made at 15 days after transplanting. One third of urea and one- third of MoP at the time of flower initiation and rest of urea and MoP at the time of fruit development.

The incidence of *Leucinodesorbonalis Guenee* was recorded at seven days intervals starting from the

first appearance of shoot and fruit borer after transplanting the brinjal crop and continued till the harvesting of the crop. The infestation and intensity of *Leucinodesorbonalis* Guenee on young plants were recorded by counting infected and healthy shoots on randomly counted at each picking (weekly). Damaged (%) on shoot and fruit was calculated by recording the number of total and infestedshoot and fruit.

The observation was converted into percentage and germplasm were classified according to the scoring pattern adopted. The germplasm was categorized as Highly Resistance (%), Resistant (0-15%), Moderately Resistant (16-30%), Susceptible (31-45%) and Highly Susceptible (above 46%) respectively. The fruit characters studies include length, diameter, shape and volume index, length of peripheral seed-ring and seedless area, thickness of mesocarp and pericarp.

Numbers of fruits per plant were recorded from 5 randomly selected plants from each plot.Random samples of fruits of 5 plants (10 fruits from each plant) were taken from each plot...

For calculating various parameters, following formula were used

Shape Index = Length fruit/fruit diameter,
Volume Index = Length fruit x fruit diameter,
RLPS = Length of peripheral seed ring/Total length of fruit,
RLSA = Length of seed less area/Total length of fruit,

Where, RLPS = Ratio of Length of Peripheral Seed Ring and RLSA = Ratio of Length of Seedless Area.

Total number of infested shoots and fruitsdue to the infestationby the natural population of BSFB from randomly selected 5 plants/replication were counted and recorded at every 10 days interval from 30 days after transplanting (DAT). Infestation percentage of BSFB on shoots and fruits were calculated.Relative resistance of theplants against BSFB was estimated on the basis of shoot and fruit damage severity.Those pest damage grading were done on this basis the grading index followed by Subbratnam and Butani(1981) (Table 1).

Tables 1. Pest damage grading due to BSFB attack on shoots and fruits of brinjal (Subbratnam and Butani, 1981).

Grading	Percent shoot infestation	Percent fruit infestation
Highly resistant (HR)	< 1.0%	< 5.0%
Resistant (R)	1.1-2.0%	5.1-15.0%
Moderately resistant (MR)	2.1-3.0%	15.1-25.0%
Susceptible (S)	3.1-5.0%	25.1-40.0%
Highly susceptible (FIS)	> 5.0%	> 40.0%

BSFB= Brinjal shoot and fruit borer

The critical difference was calculated for the comparison of different germplasm of brinjal. Simple correlation (r)between shoot and fruit borer *Leucinonedsorbonalis* Guen. and fruit infestation of different germplasm of brinjal and Fruit Characters. The quantitative data for the character were statically analyzed for Analysis of variance and the means were compared by DMRT as well as the correlation between these characters and the degree of fruitinfestation (Gomez and Gomez, 1984).

Results and Discussion

Brinjal cultivar-2 gave the tallest (85.83 cm) and it was the shortest in BARI begun-4 (plant height 45.83 cm) in length among the tested cultivars (Table 2). Plants of other varieties were attended medium height. The highest number of leaves were also obtained from Local Cultivar-4.

Length and breadth of the leaves of BARI Hybrid Begun-2 and BARI Hybrid Begun-4 were the highest than the other ones.Average number of shoots and infested shoot were observed in BARI Begun-10 (39.33 and 16.67 plant^{-1}, respectively).

Table 2. Growth Parameter of the varieties and shoot infestation

Variety	Plant Height (cm)	Average No. of Leaves Plant^{-1}	Average length of Leaf (cm)	Average Breadth of Leaf (cm)	No of Shoots Plant^{-1}	No. of Infested Shoots Plant^{-1}
BARI Hybrid Begun-2	62.50b	53.33bc	33.00a	18.33ab	30.67	13.67abc
BARI Hybrid Begun-4	55.33bc	50.33bcd	31.00ab	19.83a	28.33	11.00bc
BARI BTBegun-4	57.00bc	45.33bcd	28.67bc	13.00bcd	36.00	14.00abc
BARI Begun-9	53.17bc	44.00cd	26.33cd	14.67abcd	29.00	9.00c
BARI Begun-10	55.23bc	39.89d	30.67ab	19.33a	39.33	16.67a
Local Cultivar-1	51.17bc	57.17bcd	28.50bc	17.00abc	34.67	12.00abc
Local Cultivar-2	59.17bc	52.67bcd	30.17abc	13.17bcd	31.67	16.33ab
Local Cultivar-3	49.67bc	58.00b	22.00e	12.00cd	31.67	12.00abc
Local Cultivar-4	85.83a	73.67a	24.33de	11.00d	26.00	11.33abc
BARI Begun-4	45.83c	46.50bcd	27.58bcd	13.17bcd	30.67	16.00ab
LSD (0.05)	13.68	13.26	4.10	5.87	-	5.38

Data in a column with same letter do not differ significant by LSD Test

Fruit characteristics are consideredas the important ones forresistant breeding and fruit yield. There were significant differences among the brinjal varieties in respect of yield contributing character and yield (Table 3). The highest number of flowers and fruits were found in Local Cultivar-4 (106 and 32, respectively) and those were the lowest in BARI Begun-4 (44.33 and 9.00, respectively). The highest infested fruits and larvae were obtained from BARI Hybrid Begun-2 and BARI Hybrid Begun-4 (21.67 and 13.33, respectively). Average fruit weight per plant was the highest (9.53 kg) and weight of individual fruit in BARI BT Begun-4 (273.63 g). Average yield was recorded from Local Cultivar-3 (165.00 t/ha) followed by BARI BT Begun-4 (99.23 t/ha).

Table 3. Yield contributing parameters and fruit yield of the varieties and number of larvae

Variety	No. of Flowers Plant^{-1}	Total No. of Fruits Plant^{-1}	No. of Infested Fruit Plant^{-1}	No. of Larvae Plant^{-1}	Average Fruit Weight Plant^{-1} (Kg)	Weight of Individual Fruit (g)	Fruit Yield (t/ha)
BARI Hybrid Begun-2	56.67b	27.00ab	21.67a	9.67ab	7.23bcd	133.67d	115.42b
BARI Hybrid Begun-4	73.67ab	23.67abc	17.67ab	13.33a	7.97ab	94.47e	71.45cd
BARI BTBegun-4	6300ab	21.33bcd	1.00e	2.00e	6.27bcd	273.63a	99.23bc
BARI Begun-9	67.00ab	14.33de	5.33de	3.67de	5.23d	74.50f	33.84d
BARI Begun-10	71.67ab	15.33cde	8.00cde	5.00cde	5.53d	79.23f	38.69d
Local Cultivar-1	75.33ab	20.67bcd	1467abc	4.00de	7.56abc	136.40d	90.23bc
Local Cultivar-2	80.67ab	17.00cde	13.00bcd	6.00bcde	6.93bcd	131.47d	71.55cd

Local Cultivar-3	86.00ab	27.33ab	20.67ab	7.67bcd	9.53a	188.27c	165.00a
Local Cultivar-4	106.00a	32.00a	18.33ab	9.00bc	7.73ab	64.50g	66.24cd
BARI Begun-4	44.33b	9.00e	4.00e	2.33e	5.60cd	206.34b	59.68cd
LSD (0.05)	44.37	9.16	7.99	4.28	2.03	6.23	41.22

Data in a column with same letter do not differ significantly by LSD Test

There were significant variations among the varieties in respect of shoot infestation (Table 4). Infestation percent of shoot by BSFB was recorded in brinjal germplasm, ranged from 32.33 to 52.33%. The maximum shoot infestation (52.33%) was found in BARI Begun-4, which was statistically similar to Local Cultivar-2 (51.40%) followed by Local Cultivar-4 (43.67%). The lowest shoot infestation was recorded from Local Cultivar-1 (32.33%).

Infestation percent of fruit borer was recorded in brinjal germplasm, ranged from 4.20 to 80.60. Minimum mean infestation in fruits was found in BARI BTBegun-4 (4.20%) while maximum in BARI Hybrid Begun-2 (80.60). Mean percent infestation of shoot and fruit borer in fruits has been presented in Table 4.

Comparable range of fruit infestation was 20.23 to 45.61% reported by Jat (2003), though they used different set of varieties/cultivars in their experiment. Kumar and Shukla (2002) was found 33 to 53% damage of fruits in 12 different cultivars of brinjal. Similarly, Ashoke and Abhishek (2002) while evaluating 12 brinjal cultivars infield conditions reported 33.65- 53.02% fruit infestation of *L. orbonalis* larvae. Conversely, Chaudhary and Sharma (2000) found very low attack of brinjal shoot and fruit borer (2.88-5.64%) during screening of nine genotypes of brinjal.

General equilibrium position of shoot infestation of different entries of brinjal was calculated on the basis of their infestation, which is varied between 9.0 to 52.33% shoot infestations (Table 4and 5). Only one genotype of brinjalviz, RARI BT Begun-4 had 9.00% shoot infestation showing tolerance. Four entries like, BARI Hybrid Begun-4, BARI Begun-9, Local Cultivar-1 and Local Cultivar-4 weresusceptibleagainst this pest and other 5 varieties namely BARI Hybrid Begun-2, BARI Hybrid Begun-4 BARI Begun-10, Local Cultivar-2 and Local Cultivar-3 were categorized as highly susceptible genotype, respectively (Table 5). None of the varieties were found moderately tolerant and resistance againstfruit borer. Another categorization of tested entries against shoot and fruit borer done on the basis of rank allotted to the shoot as well as fruit infestation.

Table 4. Categorization of different germplasm of brinjal by ranking method based on shoot & fruit infestation

Sl. No.	**Germplasm**	**Shoot Infestation (%)**	**Rank**	**Fruit infestation (%)**	**Rank**
1	BARI Hybrid Begun-2	43.27bc	HS	80.60a	HS
2	BARI Hybrid Begun-4	39.13cd	S	75.60a	HS
3	BARI BTBegun-4	9.00cde	T	4.2c	T
4	BARI Begun-9	34.50ef	S	34.20bc	S
5	BARI Begun-10	42.50bc	HS	53.90abc	HS
6	Local Cultivar-1	32.33f	S	71.93ab	HS
7	Local Cultivar-2	51.40a	HS	55.23abc	HS
8	Local Cultivar-3	36.67def	S	72.77ab	HS
9	Local Cultivar-4	43.67b	HS	57.50abc	HS
10	BARI Begun-4	52.33a	HS	45.47abc	HS

Table 5. Categories of the brinjal varieties of the present study based on average rank of shoot and fruit infestation

Sl. No.	Category	Range of infestation	Name of germplasm based on	
			Shoot infestation	Fruit infestation

1	Highly Resistance (HR)	‹ 5%	0	
2	Resistance	5.1-15	BARI BT Begun -4	BARI BT Begun -4
3	Moderately Resistance (MR)	15.1-25%	0	0
4	Susceptible(S)	25.1-40.0%	BARI Hybrid Begun-4, BARI Begun-9, Local Cultivar-1 and Local Cultivar-3	BARI Begun-9
5	Highly Susceptible (HS)	Above 40%	BARI Hybrid Begun-2, BARI Begun-10, Local Cultivar-2 and Local Cultivar-4	BARI Hybrid Begun-2, BARI Hybrid Begun-4, BARI Begun-10, Local Cultivar-1 and Local Cultivar-2 Local Cultivar-3 and Local Cultivar-4

The variationindegreeofinfestationofanypest is the combined effect of genetic architecture of crop variety and abiotic factor. The germplasm/variety cited above are not resistant/moderately resistant to this pest except the genetically modified variety BARI BT Begun-4. So, it can be mentioned that breeding program of thiscrop is necessary for development of resistant variety of pure line.

The mean length of fruit ranged 6.00 to 26.67 cm (Table 6). Only one genotype viz. Loval cultivar-2 were short fruited (fruit length 6 cm); while 5 genotypes like BARI Begun-4, BARI hybrid Begun-2, BARI Hybrid Begun-4, BARI BT Begun-4 and Local Cultivar-4 hadmedium length of fruits (fruit length 7-10 cm). Other four genotype i.e. BARI Begun-9, BARI Begun-10. Local Cultivar1 and Local Cultivar-3 were having extra-long fruits (fruit length 12-22 cm). There was positive non-significant correlation between the length of fruit and the degree of fruit infestation (Table 6).

The fruit diameter (FD) was between the ranges of 2.70 to 9.10cm (Table 6). Two genotypes were in the range of 0 to 4 cm diameters *viz*, BARI Begun-9 (2.70 cm) and BARI Begun-10 (2.76 cm). Three varieties viz. Local Cultivar-1 (5.66 cm), Local Cultivar-2 (5.90 cm) and Local Cultivar-4 (4.73) was foundmedium diameter (4 to 6 cm) and the other 5 genotypes *viz*, BARI Hybrid Begun-2 (6.53 cm), BARI Hybrid Begun-4 (7.78 cm), BARI BT Begun-4 (9.10cm).

The shape index varied from 1.60 to 2.32). Six genotypes were grouped into round (shape index 1.60-21.86 cm), which were Local Cultivar-3 (1.85), BARI Begun-9 (1.86), BARI Hybrid Begun-2 (1.81), Local Cultivar-1 (1.78), BARI Hybrid Begun-4 (1.60) and BARI Begun-10 (1.60). Four varieties were grouped to oval to longish (shape index 2.10 to 2.32 cm) viz. BARI BTBegun-4 (2.21), Local Cultivar-2 (2.32), Local Cultivar-4 (2.24) and BARI Begun-4 (2.10).

The ratio of the length of peripheral seed ring to total length of the fruit (RLPS) indicating the degree of mechanical seed barrier to the entry of borer varied from (0.132 to 0.641) as given in Table 6. The less RLPS (0.132 to 0.189) was observed in five genotypes, which were BARI Hybrid Begun-4 (0.132), BARI Begun-4 (0.137), BARI hybrid Begun-2(0.140), BARI BT Begun-4 (0.163) and Local Cultiva-2 (0.189). The medium RLPS (0.203 to 0.348) was found in four varieties, which were Local Cultivar-1 (0.203), Local Cultivar-3 (0.249), Local Cultivar-4 (0.300) and Bari Begun-10 (0.348. Thehigh RLPS (above 0.500) was recorded from only one variety named BARI Begun-9 (0.641). The ratioof length of seedless area to the total length of fruit indicating the pulpiness of fruit ranged 0.060 to 0.198.

Table 6. Characters of brinjal fruit in relation to shoot and fruit borer incidence

S. N.	Germplasm	Fruit length (cm)	Fruit diameter (cm)	Shape index (l/d)	Volume index (lxd)	RLPS	RLSA	Thickness of		Fruit infestation (%)
								Pericarp	Mesocarp	
1	BARI Hybrid Begun-2	9.54b	6.53cd	1.81bc	605.00a	0.140d	0.117bc	0.47ab	8.98abc	80.60a
2	BARI Hybrid	7.78b	6.07de	1.60c	614.83a	0.132d	0.156ab	0.55ab	8.86abc	75.60a

	Begun-4									
3	BARI BTBegun-4	10.61b	9.10a	2.21ab	373.00bc	0.163cd	0.195a	0.61a	10.78a	4.20c
4	BARI Begun-9	19.78ab	2.70g	1.86abc	392.67abc	0.641a	0.061c	0.23c	10.01ab	34.20bc
5	BARI Begun-10	21.39ab	2.76g	1.60c	592.00ab	0.347b	0.116bc	0.43b	10.82a	53.90abc
6	Local Cultivar-1	13.44ab	5.66e	1.78bc	507.25ab	0.203bcd	0.154ab	0.48ab	7.39abcd	71.93ab
7	Local Cultivar-2	6.00b	5.90de	2.32a	400.83abc	0.189cd	0.156ab	0.52ab	2.78bcd	55.23abc
8	Local Cultivar-3	26.67a	7.29bc	1.85abc	264.00c	0.249bcd	0.198a	0.51ab	1.87cd	72.77ab
9	Local Cultivar-4	9.70b	4.73f	2.24ab	268.33c	0.300bc	0.146ab	0.43b	2.43cd	57.50abc
10	BARI Begun-4	8.06b	7.81b	2.10ab	367.58bc	0.137d	0.188a	0.56ab	1.83cd	45.47abc
	LSD Value	13.98	0.87	0.46	224.56	0.155	0.066	0.17	7.37	35.98

The pericarp thickness of fruit varied from (2.33 to 6.11 cm) (Table 4.5). Only one genotype was found with medium pericarp (0.15 to 0.35 cm), which was BARI Begun-9 (0.23 cm). The other 9 varieties had broader pericarp (0.47 – 0.56).

The thickness of mesocarp varied1.83 to 10.82 cm (Table 6). The narrow mesocarp (1 to 2.78 cm) was found in four genotypes i.e. Local Cultivar-2 (2.78 cm), Local Cultivar-3 (1.87 cm), Local Cultivar-4 (2.43 cm), BARI Begun-4 (1.83 cm). The medium mesocarp was measured from three varieties ranged (7.0 to 8.98 cm) viz. BARI Hybrid Begun-2 (8.98 cm), BARI Hybrid Begun-4 (8.86 cm) and Local Cultivar-1(7.39 cm). The broader mesocarp was calculated from three varieties ranged above 10.0 cm, which were BARI BT Begun-4 (10.78 cm), BARI Begun-9 (10.01 cm) and BARI Begun-10 (10.82 cm).

Correlation matrix between fruit infestation and fruit length, fruit diameter, shape index, volume index, RLPS (Ratio of Length of Pericarpal Seed ring), RLSA (Ratio of Length of Seedless Area) and thickness of pericarp and mesocarp was develop to asses of effect of fruit character on the infestation of fruit borer (Table 7). It was observed that shape index, RLSA and pericarp has significant negative association with fruity infestation (r = -0.334, -0.365 and -0.384, respectively), whereas thickness of mesocarp was positively significantly correlated (r = 0.445). Other factors like fruit length, fruit diameter, volume index and RLPS had non-significant impact in fruit infestation. However, the shape index is the ratio of fruit length and fruit diameter; fruit length had negative association with fruit infestation, while fruit diameter was associated positively. This indicated that enhancement in fruit length reduces the fruit infestationwhereas the fruit diameter increases the infestation (Table 7).

Table 7. Relationship of fruit infestation with fruit characters in brinjal

Character	Fruit Diameter	Shape index	Volume index	RLPS	RLSA	Pericarp thickness	Mesocarp thickness	Fruit infestation
Fruit length	0.731**	-0.334	0.850**	-0.347	-0.281	0.128	0.518**	-0.091
Fruit diameter		-0.861**	0.978**	-0.124	-0.400*	-0.114	0.858**	0.322
Shape index			-0.747**	-0.041	0.356*	0.237	-0.810**	-0.334
Volume index				-0.207	-0.383*	-0.045	0.804**	0.260
RLPS					0.667**	-0.807**	0.318	0.350
RLSA						0.899**	-0.785**	-0.365*
Pericarp thickness							-0.609**	-0.384*
Mesocarp thickness								0.455*

It can be summarized that long fruit with more thickness of mesocarp were having less infestation of fruit borer in brinjal crop. These investigations was corroborates with the findings ofMote, 1976)who reported that there were negative correlation of thickness of mesocarp and fruit infestation in brinjal.

Conclusion

It can be concluded from the present experiment that out of the 10 Local Cultivars and varieties of brinjal screened against shoot and fruit borer, none was found completely free from infestation of the shoot and fruit borer. However, the genetically modified brinjal variety BARI BT Bgun-4 was recorded lowest percent of shoot and fruit infestation(rating scale- 1) with highly resistant capacity and higher yield than remaining cultivars.

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