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VARIETAL RESPONSE OF SOME SELECTIVE WINTER BRINJALS AGAINST BRINJAL SHOOT AND FRUIT BORER

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ABSTRACT

Choudhury MAR, Rahman MM, Alam MZ, Hossain MM, Khaliq QA (2019) Varietal response of some selective winter brinjals against brinjal shoot and fruit borer. *Int. J. Expt. Agric.* 9(2), 6-10.

An experiment was conducted to observe ten brinjal varieties namely BARI F_1 Begun-4, Getco Hybrid F_1 Begun, Metal Hybrid F_1 Begun, BARI Begun-1, BARI Begun-6, BARI Begun-8, BARI Begun-9, BARI Begun-10, local genotypes Green ball and Singnath against brinjal shoot and fruit borer (BSFB) *Leucinodes orbonalis* Guenee and to determine their comparative level of resistance against BSFB and fruit-bearing performance under a natural photoperiod in winter season. The yield contributing characters *viz*., fruit length, fruit diameter, number of fruit plant^{-1} and weight fruit^{-1}, shoot and fruit infestation and yield were recorded. The highest fruit length was recorded in BARI Begun-8, (26.23 cm) and the lowest was observed in local genotype Green ball (7.50 cm). Fruit diameter varied from 3.50 to 8.82 cm. significantly the highest number of fruit plant^{-1} was harvested from BARI Begun-1 (25.56) and the lowest number from BARI Begun-6 (7.84). The highest number of healthy and infested fruit plot^{-1} was obtained from BARI Begun-1 (306.67) and BARI Begun-8 (118.66), respectively and the lowest number of healthy and infested fruit plot^{-1} was recorded from BARI Begun-9 (83.68) and BARI Begun-6 (48.04), respectively. Weight per fruit ranged from 60.30 to 180.13 g. The highest healthy and infested fruits yield plot^{-1} was harvested from BARI Begun-1 (24.57 kg) and BARI Begun-8 (12.09 kg) and the lowest healthy and infested fruits yield plot^{-1} was harvested from BARI Begun-9 (9.79 kg) and Green ball (4.21 kg), respectively. The highest number of shoot infestation plant^{-1} was observed in BARI Begun-8 (0.65) and the lowest number in BARI Begun-1 (0.31). The BARI Begun-1 showed the rational level of resistance and remarkable fruit-bearing performance against BSFB.

Key words*: *brinjal variety, Leucinodes orbonalis Guenee, yield contributing characters

INTRODUCTION

Brinjal, *Solanum melongena* Linnaeus is one of the most important vegetables in South and South-East Asia (Thapa 2010). In Bangladesh, brinjal is the second most important vegetable crop next to potato in respect of hectarage and production (BBS 2012). The total area of brinjal cultivation is 50 thousand ha, where 32 thousand ha in Rabi season and 18 thousand ha in kharif season (BBS 2016).

Brinjal is subjected to severe damage by different insect pests leading to a significant loss in yield and among them, brinjal shoot and fruit borer (BSFB) is a key pest and an internal feeder. It inflicts damage to both shoots and fruits (Srinivasan 2008). In Bangladesh, the brinjal yield loss caused by this pest has been estimated up to 67% (Islam and Karim, 1991) and Choudhury *et al*. (2015) found 7.74-17.30% shoot and 19-43% fruit infestation occurred by BSFB. On the other hand, fruit infestation by this pest ranges from 20.70 to 88.70% in various parts of India (Haseeb *et al*. 2009). No conclusive control measure of BSFB is still available. Farmers mostly depend on chemical insecticides for controlling of BSFB (Singh and Singh, 2003). Indiscriminate use, overuse, and misuse of insecticides create several adverse effects on human health, agroecosystem and natural enemies and pollinators (Maclntyre *et al.* 1989).

The use of seeds of susceptible poor quality brinjal genotype is one of the most important causes of attack by insect pests and diseases which commonly affect the brinjal production. The use of resistant variety may solve this problem to a great extent. If brinjal resistant variety(s) can be identified, against BSFB, its total production may be increased. And the resistant crop plant can provide the basic foundation on which structures of integrated pest management (Panda and Khush, 1995). The brinjal seed is under the non-notified crops category, traders can import seeds from abroad without any difficulties. There are a lot of brinjal varieties are available in the market. Farmers choose any one of the brinjal variety without knowing the quality. The farmers only trust the traders to select any variety. Sometimes they may succeed or fail to achieve their goal. To help the brinjal farmers of Bangladesh from such uncertainty the present study was undertaken to identify the relative level of tolerance and the good number of fruit-bearing brinjal genotypes.

MATERIALS AND METHODS

The study was conducted at the experimental farm of Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Gazipur, Bangladesh during the winter season of September to March 2014-2015. Seeds of ten brinjal genotypes *viz*., BARI Begun-1, BARI Begun-6, BARI Begun-8, BARI Begun-9, BARI Begun-10, BARI F_1 Begun-4, Metal Hybrid F_1 Begun, Getco Hybrid F_1 Begun, Singnath and Green ball were collected from the Horticulture Research Center (HRC) of Bangladesh Agricultural Research Institute (BARI) and local market of Joydebpur, Gazipur, Bangladesh.

The experimental plots were arranged in a randomized complete block design (RCBD) with three replications. The unit plot size was 3.0 m x 3.0 m. Plots and blocks were 1.5 m and 2.0 m apart, respectively. Brinjal plants

were transplanted at a row distance of 1.0 m (3 rows in each plot) and plant spacing of 60 cm (5 plants in each row). Land preparation, manuring and fertilization and cultural operation were done according to Rashid (1999). Seeds of ten brinjal genotypes were sown in individual small nursery seedbed (3.0 m x 1.0 m). Thirty five-days old seedlings were transplanted randomly in the experimental plots.

Data on different parameters *viz*., BSFB infestation, plant growth, yield contributing characters and fruit yield were recorded. The total number of shoots and the number of infested shoots were recorded from 5 plants randomly selected from each plot at 7 days intervals. At each harvest data on the number of healthy and infested fruits and their weight plot^{-1} were recorded at 7 days intervals. All collected data analyzed by MSTAT-C Software. The analysis of variance (ANOVA) of different parameters was done and the means were ranked by using Duncan's Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

Number of healthy and infested shoots plant^{-1}

The highest number of healthy shoots was obtained from BARI F_1 Begun-4 (12.01) which was statistically higher than all other tested genotypes. The second-highest number of healthy shoots was recorded from BARI Begun-1 (10.16) which was statistically similar to all other compared varieties except Metal Hybrid F_1 Begun which had the lowest number of healthy shoots plant^{-1} (8.85) (Table 1).

Table 1. Number of healthy and infested shoots plant^{-1} of ten brinjal varieties grown during winter season

Brinjal varieties	Number of healthy shoot plant^{-1}	Number of infested shoot plant^{-1}
BARI Begun-1	10.16 b	0.31 e
BARI Begun-6	9.25 bc	0.25 f
BARI Begun-8	9.25 bc	0.65 a
BARI Begun-9	9.83 bc	0.40 d
BARI Begun-10	9.60 bc	0.51 c
BARI F_1 Begun-4	12.01 a	0.40 d
Metal Hybrid F_1 Begun	8.85 c	0.38 d
Getco Hybrid F_1 Begun	9.18 bc	0.53 bc
Singnath	9.20 bc	0.46 c
Green ball	9.18 bc	0.58 b
CV (%)	5.55	7.69

Means within the same letter (s) within a column do not differ significantly (P<0.05) according to DMRT

Conversely, the highest number of infested shoots plant^{-1} was recorded from BARI Begun-8 (0.65). The second-highest number was recorded from Green ball (0.58) which was statistically similar to Getco Hybrid F_1 Begun (0.53) but significantly different from those of other genotypes. The next higher infested shoots plant^{-1} were recorded from BARI Begun-9 (0.40) which was statistically similar to BARI F_1 Begun-4 (0.40) and Metal Hybrid F_1 Begun (0.38) plots. Significantly the lowest number of infested shoots plant^{-1} as obtained from the variety BARI Begun-6 (0.25), which was followed by BARI Begun-1 (0.31) and they were statistically different (Table 1). The present study showed that the number of healthy shoots plant^{-1} varied variety to variety and shoot infestation was less observed than fruit initiation. It was probably due to the availability of fruit in the field and BSFB prefer fruits over the shoots.

Number of healthy and infested fruits plot^{-1}

Healthy and infested fruits plot^{-1} was harvested during the entire fruiting period varied among the tested 10 brinjal varieties. Significantly the highest number of healthy fruits was obtained from BARI Begun-1 (306.67) plot. The second-highest numbers of healthy fruits were harvested from the plots of BARI Begun-8 (162.96) which was followed by BARI F_1 Begun-4 (148.74), Getco Hybrid F_1 Begun (143.09), BARI Begun-10 (137.77) and Singnath (135.60) plots, respectively and they were statistically similar. The lowest numbers of healthy fruits plot^{-1} were recorded from BARI Begun-6 (69.49) plots, which was statistically identical to that of BARI Begun-9 (83.68) plots (Table 2). Production of the higher and lower number of healthy fruits plot^{-1} of different genotypes was probably due to the hereditary traits of individual variety and also some environmental factors especially soil nutrition, temperature, and pest management approaches. Yadav *et al.* (2002) opined that the highest coefficient of variation coupled with moderate to high genetic advance and high heritability for fruits plant^{-1} which was in agreement with the present findings.

Vice versa, statistically significant variation was observed among the brinjal cultivars in respect of overall brinjal shoot and fruit borer infestation plot^{-1} during the entire fruiting period. The highest number of overall infested fruits plot^{-1} was recorded in BARI Begun-8 (118.66). The second highest infested fruits plot^{-1} was found in BARI Begun-1 (76.73) followed by Metal Hybrid F_1 Begun (71.82), Getco Hybrid F_1 Begun (63.94) and BARI Begun-9 (60.56), respectively and they were statistically similar. The lowest number of infested fruits

plot^{-1} recorded from BARI Begun-6 (48.04) which followed by Singnath (59.24) and BARI Begun-10 (57.71) and those were statistically similar (Table 2).

Table 2. Number of healthy and infested fruits plot^{-1} of ten brinjal varieties grown during winter season

Brinjal varieties	Number of healthy fruits plot^{-1}	Number of infested fruits plot^{-1}
BARI Begun-1	306.67 a	76.73 b
BARI Begun-6	69.49 e	48.04 e
BARI Begun-8	162.96 b	118.66 a
BARI Begun-9	83.68 e	60.56 cd
BARI Begun-10	137.77 bcd	57.71 d
BARI F_1 Begun-4	148.74 bc	68.24 bcd
Metal Hybrid F_1 Begun	112.83 d	71.82 bc
Getco Hybrid F_1 Begun	143.09 bc	63.94 cd
Singnath	135.60 cd	59.24 d
Green ball	151.17 bc	65.15 bcd
CV (%)	9.22	10.77

Means within the same letter (s) within a column do not differ significantly (P<0.05) according to DMRT

Significantly the highest number (118.66) of infested fruits plot^{-1} was harvested from BARI Begun-8. This might be due to less number of hairs and prickles, its less density, erectness and the higher number of succulent leaves. Ishaque and Chaudhury (1984) found that the susceptible variety of brinjal had a larger leaf area. Ali *et al*. (1994) studied morphological characters of plant, leaf, and fruits of 28 brinjal varieties/lines (entries) for their antixenosis against the brinjal shoot and fruit borer. They observed that small-sized fruits, ovals, slightly long, intermediate long and long shaped fruits with purple and greenish-white to green colored fruits showed the lower percent of fruit infestation than those with the larger size, round-shaped and purple black and black colored fruits. Malik *et al*. (1986) suggested that lines bearing thin fruits with shorts, small calyx, and thin shoots were tolerant to *Leucinodes orbonalis.*

Healthy and infested fruits weight (kg plot^{-1})

The quantity of healthy fruits weight (kg) per plot collected during the entire fruiting period varied with tested brinjal varieties. Significantly the highest quantity of healthy fruits weight was recorded from the plots of BARI Begun-1 (24.57 kg). The next highest quantity was collected from the plots of BARI Begun-8 (16.63 kg) which was followed by Singnath (13.20 kg), Getco Hybrid F_1 Begun (12.43 kg) and Metal Hybrid F_1 Begun (12.26 kg) plots, respectively and no statistical difference among the last three. The lowest quantity of healthy fruits weight was collected from BARI Begun-9 (9.79 kg) plots which were statistically comparable to Green ball (9.86 kg) plots (Table 3). On the other hand, the amount of infested fruits weight (kg) plot^{-1}collected during the entire fruiting period varied with varieties. Significantly the highest amount of infested fruits weight (kg) was recorded from the plots of BARI Begun-8 (12.09 kg). The next highest amount was collected from the plots of BARI Begun-6 (8.67 kg) followed by Metal Hybrid F_1 Begun (7.13 kg) and they were statistically significant. The infested fruits weight (kg) of varieties BARI Begun-1(5.42 kg), Singnath (5.31 kg) and BARI Begun-10 (5.2 kg) were statistically identical. The lowest amount of infested fruit weight was collected from Green ball (4.21 kg) cultivar plots (Table 3).

Table 3. Weight of healthy and infested fruits plot $^{-1}$ of ten brinjal varieties grown during winter season

Brinjal varieties	Weight (kg plot^{-1}) of healthy fruits	Weight (kg plot^{-1}) of infested fruits
BARI Begun-1	24.57 a	5.42 e
BARI Begun-6	12.61 cd	8.67 b
BARI Begun-8	16.63 b	12.09 a
BARI Begun-9	9.79 e	6.59 d
BARI Begun-10	12.85 cd	5.2 e
BARI F_1 Begun-4	11.64 d	5.23 e
Metal Hybrid F_1 Begun	12.26 cd	7.13 c
Getco Hybrid F_1 Begun	12.43 cd	5.39 e
Singnath	13.20 c	5.31 e
Green ball	9.86 e	4.21 f
CV (%)	9.81	5.97

Means within the same letter (s) within a column do not differ significantly (P<0.05) according to DMRT

Yield contributing characters of ten brinjal varieties

Fruit length (cm): The fruit length ranged from 7.50 to 26.23 cm among ten brinjal genotypes. BARI Begun-8 showed the longest fruit length (26.23 cm) which was statistically similar to that of BARI Begun-10 (26.20 cm), Getco Hybrid F_1 Begun (25.07 cm), Singnath (24.60 cm) and Metal Hybrid F_1 Begun (24.50 cm), respectively.

The shortest fruit length was measured in Green ball (7.50 cm) (Table 4). Devi *et al.* (2015) found a maximum fruit length of 21 cm in variety 2010/BRLVAR-1 which is in disagreement with the present results and Lakshman *et al.* (2015) reported the fruit length ranged from 8.61 to 21.64 cm among the twenty nine tested genotypes of brinjal that partially falls within the range obtained in the present study.

Fruit diameter (cm): Fruit diameter ranged from 3.50-8.82 cm. Significantly the highest fruit diameter was recorded in BARI Begun-6 (8.82 cm) which was followed by BARI Begun-9 (7.50 cm), BARI F_1 Begun-4 (5.50 cm) and Green ball (4.50 cm), respectively and they were statistically different from each other. The genotypes BARI Begun-8 (3.80 cm), Metal Hybrid F_1 Begun (3.80 cm), Singnath (3.70 cm) and Getco Hybrid F_1 Begun (3.60 cm) were found statistically similar fruit diameter (Table 4).

Considering fruit diameter, Lakshman *et al.* (2015) reported that mean fruit girth ranged from 4.33 to 9.90 cm among all twenty nine tested genotypes. In maximum genotypes, the infestation level by BSFB on shoots and fruits increased with the increase in girth of fruit. The highest fruit girth (9.90 cm) was recorded in genotype 13/BRL VAR 4 with 5.7 and 20 percent shoot and fruit damage, respectively. Whereas it was lowest (4.33 cm) in genotype Punjab Sadabahar with 1.2 percent shoot and 5.2 percent fruit damage. The present finding is in partially in agreement with Lakshman *et al.* (2015).

Weight per fruit (g): Significantly the highest weight fruit^{-1} was obtained from the genotype BARI Begun-6 (180.13g fruit^{-1}) which was statistically different from all other genotypes. The lowest fruit weight was found in BARI Begun-1 (60.3 g fruit^{-1}) which was followed by Green ball (67.1g fruit^{-1}) but they were statistically different (Table 4). The variation of the weight fruit^{-1} in the present study might be due to genotypical quality.

Number of fruits plant^{-1}: Fruits number plant^{-1} ranged was from 7.84-25.56. Significantly the highest number of fruits plant^{-1} was harvested from BARI Begun-1 (25.56) followed by BARI Begun-8 (18.71) and they were statistically different. The Number of fruits plant^{-1} of BARI F_1 Begun-4 (14.47), Green ball (14.42) and Getco Hybrid F_1 Begun (13.80) were statistically similar. The lowest number of fruits plant^{-1} was recorded in BARI Begun-6 (7.84) which was statistically identical to that of BARI Begun-9 (9.62) (Table 4). The numbers of fruits plant^{-1} maybe depend on many factors but genotypical characteristics are the most important quality. According to Shri and Dhar (1995) the number of fruits plant^{-1} a varietal character that is largely governed by genetic and environmental factors.

Table 4. Fruits and yield contributing characters of ten brinjal varieties grown during winter season

Genotypes	Color	Shape	Fruit length (cm)	Fruit diameter (cm)	Weight / fruit (g)	Fruit / plant (no.)
BARI Begun-1	Magenta	Elongate	15.30 b	3.50 e	60.30 h	25.56 a
BARI Begun-6	Light green	Oval	11.20 c	8.82 a	180.13 a	7.84 e
BARI Begun-8	Purple	Cylindrical	26.23 a	3.80 de	110.40 b	18.71 b
BARI Begun-9	Whitish light green	Oval	8.22 d	7.50 b	115.50 b	9.62 de
BARI Begun-10	Purple	Cylindrical	26.20 a	4.00 de	105.40 bc	13.03 cd
BARI F_1 Begun-4	Light green	Oval	8.04 d	5.50 c	75.07 fg	14.47 c
Metal Hybrid F_1 Begun	Purple	Cylindrical	24.50 a	3.80 de	90.03 de	12.31 cd
Getco Hybrid F_1 Begun	Purple	Cylindrical	25.07 a	3.60 de	96.09 cd	13.80 c
Singnath	Purple	Cylindrical	24.60 a	3.70 de	82.30 ef	12.99 cd
Green ball	Whitish green	Oval	7.50 d	4.50 d	67.10 g	14.42 c
CV (%)	-	-	7.96	8.66	7.89	9.78

Means within the same letter (s) within a column do not differ significantly ($P<0.05$) according to DMRT

CONCLUSION

Based on the findings of the present study, it may be concluded that the relative level of resistance and fruits bears performance against brinjal shoot and fruit borer among the tested 10 winter brinjal varieties, the BARI Begun-1 considering the rational level of resistance and notable fruit bearing performance.

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