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# Screening of brinjal varieties resistant to brinjal shoot and fruit borer, *Leucinodes orbonalis* (Guenee)

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ABSTRACT

The experiment was conducted with sixteen brinjal varieties at College Farm, College of Post Graduate Studies, Barapani under Central Agricultural University, Imphal, Manipur in the year 2014-15 to evaluate their reaction against *L. orbonalis.* The incidence of *Leucinodes orbonalis* in shoot was recorded from twenty randomly selected plants in each plot and fruit damages were recorded as number of infested fruit in twenty randomly selected fruit in each plot. All the varieties were infested by *L. orbonalis*. No significant difference was observed among the different varieties in shoot damage. In fruit damage, green long-183 recorded lowest damage with 7.22 per cent fruit infestation but it was comparable with swarna shyamli (8.89 per cent), navkiran (8.89 per cent) and utsav (9.16 per cent). Highest incidence of 15.6 per cent was recorded in kashi taru.

## 1. Introduction

Brinjal or eggplant (*Solanum melongena* L.) is widely grown vegetable of tropical and subtropical parts of the world. Brinjal or eggplant *(Solanum melongena* L, 2*n = 2x* = 24) is an important solanaceous vegetable crop in many countries particularly India, Japan, Indonesia, China, Bulgaria, Italy, France, USA and several African countries. It is one of the most important vegetable crops in Africa, probably the fourth one after tomato, onion and okra (Grubben & Denton, 2004). It is grown in almost all states, with an area of 679.4 thousand hectare under cultivation and production of 12438.7 thousand metric tons (Anonymous, 2015). The major brinjal growing states in India are Andhra Pradesh, Karnataka, West Bengal, Maharashtra, Orissa, Madhya Pradesh, Bihar, Gujarat and Chhattisgarh. As per FAOSTAT (2016) data, China is the top producer (61% of world output) while India ranks second (25%) in brinjal production. In India, brinjal is extensively grown under diverse agro-climatic conditions throughout the year (Nayak et al. 2014).

Brinjal is a hardy crop than other vegetables. Due to its hardiness, it can be grown successfully in dry areas with minimum irrigation facility. It is a moderate source of Vitamins and minerals .On the other hand, susceptibility of a host plant might be due to enrichment of essential and necessary food materials, especially carbohydrate and proteins have been reported by Sadasivam and Manickam (1992) and Dhaliwal and Dilawari (1993). The brinjal is attacked by 53 species of insect pests (Nayar *et al*., 1995). The production of brinjal has been seriously affected due to a steady increase in insect pest infestation, especially the fruit and shoot borer (BSFB), Leucinodes orbaonalis Guenn. (Pyralidae: Lepidoptera) which reduces the productivity as well as quality of the fruits. Various insects cause enormous losses to brinjal in all the seasons throughout year in Bangladesh (Alam, 1969). Among them the most serious and destructive one is the brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenee, in Bangladesh (Alam and Sana, 1964; Alam, 1969) and India (Tewari and Sandana, 1990), (Jat and Pareek, 2003), (Rahman,2007) and in other countries of the world (Dhankar, 1988).

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As a result of its feeding inside the fruit, fruits become unmarketable and yield losses upto 90 percent (Baral,et., 2006). It also reduces the content of vitamin C in fruit up to 50 percent (Sharma, 2002). Hence, many farmers are leaving to grow eggplant because of this pest (Gapud and Canapi, 1994). Chemical control is widely used means of managing the pest but repeated use of broad spectrum synthetic chemicals result in environmental contamination, bio-accumulation and bio magnification of toxic residues and disturbance in ecological balance (Dadmal *et al.,* 2004). It is necessary to look other alternate and safer methods against the incessant use of chemical pesticides. Keeping in mind the economic importance of brinjal in daily use, where use of insecticides is not desirable, the present studies were undertaken to find out the source of resistance against brinjal shoot and fruit borer, *Leucinodes orbonalis* (Guenee).

## 2. Materials and Methods

The experiment was conducted at College Farm, College of Post Graduate Studies, Barapani under Central Agricultural University, Imphal, Manipur in the year 2014-15. The main aim of the study was to find out the resistant/tolerant brinjal varieties against brinjal shoot and fruit borer *Leucinodes orbonalis* (Guenee). The crop was transplanted at 60 x 60 cm spacing with each plot measuring 4 $m^2$. Different varieties - Navkiran, PPL-74, No.3, Green long-183, Pk-331, Naaz , Kiran , Utsav , Swarna shyamli , VNR-60, Arka keshav , Arka navneeth, NS-358, NS-797, Arka nedhi and Kashi taru were used for screening of brinjal varieties. After transplanting at different growth phase, the levels of infestation were taken at 10 days' interval that is 90, 100, 110, 120, 130 and 140 days. At the time of harvesting, the fruits of each plot were harvested separately and numbers of healthy and infested fruits per plot were counted. The incidence of *Leucinodes orbonalis* in shoot was recorded from twenty randomly selected plants in each treatment and fruit damage was recorded as number of infested fruit in twenty randomly selected fruit in each plot. Both the observations were converted into percent infestation. The data were collected on the number of fruit borer larvae, damaged and undamaged fruits and fruit yield was subjected to analysis of variance (ANOVA).

Least significant difference (LSD) was used to separate the treatment mean at 0.05 % level of probability as described by Gomez & Gomez (1984).

## 3. Results and Discussion

The incidence of *Leucinodes orbonalis* shoot was recorded from twenty randomly selected plants in each plot and fruit damage was recorded as number of infested fruit in twenty randomly selected fruit in each plot. The observations were converted into percent infestation. Shoot infestations caused by brinjal shoot borer on sixteen selected brinjal varieties at 90, 100, 110, 120,130 and 140 days after transplanting have been presented in the table format. Lowest incidence of shoot infestation was found in the varieties like **Navkiran** (1.11%), **Utsav**(1.11%) **and** VNR-60(1.11%) and followed by Pk-331(1.39%), Naaz(1.39%)**,** Arka keshav(1.39%) **and NS-797**(1.39%) **and h**ighest incidence was recorded in **Kiran**(1.95%)**, PPL-74**(1.94%)**, Arka navneeth**(1.94%) **and Kashi taru**(1.94%) and has no significant difference among the varieties. Fruit infestation caused by fruit borer on sixteen selected brinjal varieties at different days after transplantation (DAT) are recorded in the table. In fruit damage, Green long-183**(7.22%)** recorded lowest and also closely comparable with **Navkiran**(8.89%)**,** Swarna shyamli (8.89%) and **Utsav**(9.16%)**.** Highest incidence was recorded in Kashi taru(15.61%) and followed by **Arka navneeth** (14.17%), **NS-797**(14.17%) and on an average, the varietiesVNR-60(13.61%), Arka nedhi(12.22%) and Arka keshav(12.21%) were found to be moderately high.

## Conclusion

The results indicate sixteen varieties of brinjal (*Solanum melongena),* were evaluated against the level of incidence of shoot and fruit borer in brinjal at the College Farm, College of Post Graduate Studies, Barapani under Central Agricultural University, Imphal, Manipur in the year 2014-15. The studies were based on identifying their level of infestation against brinjal shoot and fruit borer. The varieties Green long-183**(7.22%)** recorded performing best against fruit borer and moderately **(1.39%)** better on shoot borer.
Therefore, Promising performance can be achieved by selecting the right variety reducing incidence of serious pest for higher yield.

**Table. Fruit infestation caused by brinjal Shoot and fruit borer on sixteen selected brinjal varieties at different days after transplantation (DAT), 2014-15.**

| Name of varieties | % damage by *Leucinodes orbonalis* | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 90 DAT | | 100 DAT | | 110 DAT | | 120 DAT | | 130 DAT | | 140 DAT | | Mean | |
| | Shoot | Fruit | Shoot | Fruit | Shoot | Fruit | Shoot | Fruit | Shoot | Fruit | Shoot | Fruit | Shoot | Fruit |
| Navkiran | 3.33 (8.61) | 5.00 (12.92) | 1.67 (4.31) | 6.67 (12.27) | 0.00 (0.00) | 8.33 (16.67) | 1.67 (4.31) | 8.33 (16.67) | 0.00 (0.00) | 11.67 (19.87) | 0.00 (0.00) | 13.33 (21.34) | 1.11 (2.87) | 8.89 (16.63) |
| PPL-74 | 5.00 (12.92) | 8.33 (16.6) | 3.33 (8.63) | 6.67 (14.76) | 1.67 (4.31) | 6.67 (10.45) | 0.00 (0.00) | 13.00 (21.34) | 0.00 (0.00) | 16.67 (24.04) | 1.67 (4.31) | 18.33 (25.30) | 1.94 (5.02) | 11.67 (19.47) |
| No.3 | 3.33 (8.61) | 8.30 (16.67) | 1.67 (4.31) | 11.60 (19.89) | 1.67 (4.31) | 13.33 (21.34) | 0.00 (0.00) | 15.0 (22.50) | 1.67 (4.31) | 20.00 (26.43) | 10.00 (4.31) | 15.00 (18.44) | 3.05 (4.31) | 13.89 (20.84) |
| Green long-183 | 1.67 (4.31) | 1.67 (4.31) | 3.33 (8.61) | 5.00 (19.89) | 1.67 (4.31) | 6.67 (14.76) | 1.67 (4.31) | 8.33 (16.6) | 0.00 (0.00) | 11.67 (19.89) | 0.00 (0.00) | 10.00 (16.21) | 1.39 (3.59) | 7.22 (15.28) |
| Pk-331 | 3.33 (8.61) | 8.33 (16.67) | 1.67 (4.31) | 11.67 (10.45) | 1.67 (4.31) | 15.00 (22.59) | 0.00 (0.00) | 16.67 (24.05) | 1.67 (4.31) | 18.33 (25.30) | 0.00 (0.00) | 20.00 (26.37) | 1.39 (3.59) | 15.00 (20.89) |
| Naaz | 1.67 (4.31) | 3.33 (8.61) | 3.33 (8.6) | 8.33 (10.45) | 1.67 (4.31) | 8.33 (16.6) | 0.00 (0.00) | 13.33 (21.34) | 0.00 (0.00) | 20.00 (26.56) | 1.67 (4.31) | 18.33 (25.30) | 1.39 (3.59) | 11.94 (18.18) |
| Kiran | 1.67 (4.31) | 6.67 (12.27) | 3.33 (8.63) | 5.0 (12.92) | 3.33 (8.61) | 15.0 (22.59) | 0.00 (0.00) | 15.00 (22.01) | 1.67 (4.31) | 16.67 (23.73) | 1.67 (4.31) | 13.33 (21.14) | 1.95 (5.02) | 11.95 (19.11) |
| Utsav | 1.67 (4.31) | 3.33 (8.60) | 1.67 (4.31) | 5.00 (10.45) | 0.00 (0.00) | 8.33 (16.67) | 0.00 (0.00) | 10.00 (18.05) | 1.67 (4.31) | 13.33 (2075) | 1.67 (4.31) | 15.00 (22.59) | 1.11 (2.87) | 9.16 (16.18) |
| Swarna shyamli | 1.67 (4.31) | 5.00 (10.45) | 1.67 (4.31) | 3.33 (8.61) | 3.33 (8.61) | 6.61 (14.76) | 1.67 (4.31) | 10.0 (18.05) | 0.00 (0.00) | 13.33 (20.75) | 10.00 (4.31) | 15.00 (22.79) | 3.05 (2.87) | 8.89 (15.91) |
| VNR-60 | 3.33 (8.61) | 3.33 (8.60) | 1.67 (4.31) | 6.67 (12.29) | 1.67 (4.31) | 13.33 (21.15) | 0.00 (0.00) | 16.67 (24.04) | 0.00 (0.00) | 21.67 (27.71) | 0.00 (0.00) | 20.00 (26.45) | 1.11 (2.87) | 13.61 (20.03) |
| Arka keshav | 1.67 (4.31) | 8.33 (16.6) | 1.60 (4.317) | 10.00 (18.44) | 0.00 (0.00) | 11.67 (16.6) | 0.00 (0.00) | 11.67 (19.89) | 3.33 (8.61) | 18.33 (25.30) | 1.67 (4.31) | 13.33 (21.34) | 1.39 (3.59) | 12.21 (19.10) |
| Arka navneeth | 3.33 (8.61) | 8.33 (16.6) | 3.33 (8.62) | 10.0 (18.44) | 1.67 (4.31) | 11.67 (19.84) | 0.00 (0.00) | 16.67 (23.85) | 1.67 (4.31) | 20.00 (26.43) | 1.67 (4.31) | 18.33 (25.30) | 1.94 (5.02) | 14.17 (21.73) |
| NS-358 | 3.33 (8.61) | 3.33 (8.60) | 1.67 (4.31) | 6.67 (14.76) | 1.67 (4.31) | 11.67 (19.89) | 1.67 (4.31) | 16.67 (24.04) | 1.67 (4.31) | 21.67 (25.30) | 0.00 (0.00) | 21.67 (27.70) | 1.6 (4.31) | 13.61 (20.04) |
| NS-797 | 5.00 (12.92) | 10.00 (18.44) | 1.67 (4.31) | 10.00 (18.03) | 0.00 (0.00) | 6.67 (14.76) | 0.00 (0.00) | 18.33 (25.30) | 1.67 (4.31) | 20.00 (26.56) | 0.00 (0.00) | 18.33 (25.30) | 1.39 (3.59) | 14.17 (21.40) |
| Arka nedhi | 3.33 (8.61) | 6.67 (14.7) | 1.67 (4.31) | 10.00 (18.03) | 3.33 (6.15) | 10.0 (18.44) | 0.00 (0.00) | 11.67 (19.89) | 1.67 (4.31) | 16.67 (24.04) | 0.00 (0.00) | 18.33 (25.30) | 1.67 (3.89) | 12.22 (19.52) |
| Kashi taru | 3.33 (8.61) | 8.33 (16.60) | 3.33 (8.61) | 11.67 (19.50) | 1.67 (4.31) | 13.33 (21.34) | 1.67 (4.31) | 18.33 (25.30) | 0.00 (0.00) | 21.67 (27.70) | 1.67 (4.31) | 20.00 (26.45) | 1.94 (5.02) | 15.6 (22.81) |
| SEd(±) | 5.20 | 4.81 | 6.05 | 5.04 | 5.60 | 2.62 | 3.49 | 3.05 | 4.65 | 2.72 | 4.57 | 2.46 | 1.50 | 1.66 |
| $CD_{0.05}$ | NS | NS | NS | NS | NS | 5.34 | NS | NS | NS | NS | NS | 5.02 | NS | 3.37 |

***Figures in parentheses are angular transformed values.**

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