

Seasonal Incidence of Brinjal Shoot and Fruit Borer, *Leucinodes orbonalis* Guenée (*Solanum melongena* L.) in Trans Yamuna Region of Allahabad, India

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ABSTRACT

Seasonal incidence of brinjal shoot and fruit borer (BSFR) (*Leucinodes orbonalis* Guenée) on brinjal crop was studied during kharif 2016-17 on brinjal variety pusa purpual round at central agriculture field, SHUATS (Sam Higginbottom University of Agriculture, Technology and Sciences), Allahabad, Uttar Pradesh, (India). The incidence of pest population was recorded on shoots as well as fruits of brinjal crop. Maximum numbers of larvae were commenced from 34th standard week (August third week) on shoot with an average 3.85% infestation. The borer population increased and gradually reached peak level of 33.5% of larval population at 42nd standard week (October third week). The population increased and gradually reached peak level 33.5% larval population and decline in the trend was noticed this may be due to fail in congenial weather parameters. Per cent fruit infestation: was commenced from 39th standard week (third week of September) on shoot with an average 4.6% infestation. The borer population increased and gradually reached peak level of 40.5% of larval population at 46th standard week (second week November) The population increased and gradually reached peak level 40.5% larval population and decline in the trend was noticed this may be due to fail in congenial weather parameters.

Key words: *Leucinodes orbonalis* Guenée Brinjal Population dynamics.

INTRODUCTION

Vegetable cultivation is one of the most profitable and dynamic branches of agriculture. It has become an important source of income for both farmers and field labours, serving as a vehicle for reducing poverty in rural areas. Brinjal (*Solanum melongena* Linnaeus) also known as eggplant is referred as the “King of vegetables” originated from India and now grown as a vegetable

throughout the tropical, sub-tropical and warm temperate areas of the world. It is a most important vegetable in the Indian Subcontinent that accounts for almost 50% of the world’s area under its cultivation area under its cultivation. However, in India, the area is estimated as 7.5% of the total area of vegetables with 8% of the total production of vegetables⁴.

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Brinjal (*Solanum melongena* L.) is one of the major vegetables in India extensively grown under diverse agro-climatic conditions throughout the year. Due to its nutritive value, consisting of minerals like iron, phosphorous, calcium and vitamins like A, B and C, unripe fruits are used primarily as vegetable in the country⁶. Brinjal is one of the most important solanaceous vegetables in South-East Asian countries. The major brinjal growing states in India are Andhra Pradesh, Karnataka, West Bengal, Tamil Nadu, Maharashtra, Orissa, Uttar Pradesh, Bihar and Rajasthan. Globally, India ranks second and China ranks first in the production of brinjal (57.9% of world output). In India, this crop occupies 71.13 lakh hectare area along with annual production of 135.57 (lakh tone) and productivity 19.1 MT per hectare. In Uttar Pradesh, the area under cultivation of brinjal is 3430 hectare producing 111.70 MT and the productivity is 8 MT/ha. *Leucinodes orbonalis* (Guen.). The major constraints in economic cultivation of brinjal, insect pest infestation is a major bottleneck which poses threat for its production reported that the shoot and fruit borer (on shoot) were more prevalent during vegetative phase of crop. The yield loss by this pest varied from 0.08-1.11 q/ha based on inconsumable pest of damaged fruits and 0.46- 3.80 q/ha when whole of the damaged fruits was taken into consideration. The borer infestation was 78.66% on top shoots in vegetative phase and then shifted to flowers and fruits with infestation reaching 66.66% in fruiting phase⁷.

MATERIAL AND METHOD

The present investigation was undertaken to evaluate efficacy of certain chemicals and neem products against shoot and fruit borer on brinjal at the Central Research Farm of Sam

Higginbottom University of Agriculture, Technology and Sciences, Allahabad, Uttar Pradesh during *Kharif* season 2016. The research farm is situated on the right side of Allahabad. Field trial was laid out in randomized block design (RBD) with 3 replications and 8 treatments including untreated control during *kharif* 2016-17 to evaluate the efficacy of four chemicals i.e., carbosulfan 0.05%, quinalphos 0.05%, cypermethrin 0.05%, Chlorpyrifos 0.05% and with compared neem oil 2%, NSKE 5%, neem leaf extract 5% against shoot and fruit borer on brinjal. Crop was raised in plots measuring 2x2 m with a spacing 60x60 cm between rows and plant, respectively. Transplanting was done on July 29th in 2016. Crop was raised according to all agronomic package of practices under irrigated condition except the plant protection measure. Three rounds of insecticidal spray of different treatment were imposed on need basis during the crop season. All the treatments were imposed by using hand compression sprayer. First spray was given 42 days after transplanting (10th Sept 2016) and the remaining sprays was given at fortnightly intervals. The spraying was done during evening hours and care was taken to avoid drift of insecticides. No sprays were given in untreated control.

Data collection

Five plants were randomly selected from each plot and tagged. Weekly observations were throughout the cropping season.

On Shoot -

Number Basis: The total number of shoots and number of shoots infested of five selected plants from each treatment replication wise were recorded.

No. of shoot infested

$$\% \text{ Shoot infestation} = \frac{\text{No. of shoot infested}}{\text{Total no. of shoot}} \times 100$$

On Fruit –

Number Basis: at each picking, the total number of fruits and number of fruits infested

of five selected plants from each treatment replication wise were recorded.

No. of fruit infested

$$\% \text{ Fruit infestation} = \frac{\text{No. of fruit infested}}{\text{Total no. of fruit}} \times 100$$

STATISTICAL ANALYSIS

Data were analyzed by using MSTAT software for analysis of variance. Percentage of shoot and fruit damaged by ESFB was transformed before analysis. ANOVA was made by *F* variance test and the pair comparisons were performed by Duncan's Multiple Range Test¹.

RESULT AND DISCUSSION

Per cent shoot infestation:

Studies on the incidence of shoot and fruit borer population with weather parameters given in table 4.1 below. Shoot infestation of *Leucinodes orbonalis* Guenee 2016 Kharif season was commenced from 34th standard week (August third week) on shoot with an average 3.85% infestation. The borer population increased and gradually reached peak level of 33.5% of larval population at 42nd standard week (October third week). The population increased and gradually reached peak level 33.5% larval population and decline in the trend was noticed this may be due to fail in congenial weather parameters. The pest builds up was correlating with max

temperature and declined as it falls. Kaur *et al.*³, made the similar findings.

Per cent fruit infestation:

Studies on the incidence of shoot and fruit borer population with weather parameters given in table 4.2 below fruit infestation of *Leucinodes orbonalis* Guenee 2016 Kharif season was commenced from 39th standard week (third week of September) on shoot with an average 4.6% infestation. The borer population increased and gradually reached peak level of 40.5% of larval population at 46th standard week (second week November) The population increased and gradually reached peak level 40.5% larval population and decline in the trend was noticed this may be due to fail in congenial weather parameters. Similar findings have been reported by Shukla and Khatri⁵ reported adult of shoot and fruit borer increased considerably in the month of Oct. to Nov. and decreased in subsequently weeks of Dec. Maximum shoot and fruit damage was recorded in third weeks of Oct. This was supported by Kumar and Singh².

Table 4.1 Seasonal incidence of shoot and fruit borer of Brinjal during Kharif 2016

| Standard week | % Shoot infestation of <i>Leucinodes orbonalis</i> | Temperature | | Humidity % | | Rainfall (mm) | Wind Velocity | Sunshine (hr./day) |
|------------------|--|-------------|-------|------------|---------|---------------|---------------|--------------------|
| | | Max. | Min. | Morning | Evening | | | |
| 30 rd | 0 | 33.68 | 24.22 | 90.42 | 63.71 | 1.11 | 2 | 3.82 |
| 31 st | 0 | 35.34 | 28.02 | 90.71 | 58.71 | 0.42 | 2.77 | 5.45 |
| 32 nd | 0 | 34.08 | 27.74 | 90.57 | 55.42 | 2.2 | 1.33 | 5.82 |
| 33 rd | 0 | 33.8 | 27.14 | 88.2 | 55.4 | 4.3 | 1.28 | 5.1 |
| 34 th | 3.85 | 33.1 | 27 | 91.7 | 56.7 | 25.9 | 2.22 | 2.7 |
| 35 th | 6.25 | 35.82 | 27.28 | 90.57 | 53.42 | 6.94 | 0.25 | 5.07 |
| 36 th | 11.5 | 35.14 | 27.2 | 87.85 | 53.85 | 0.65 | 2.26 | 8.08 |
| 37 th | 15.8 | 35.25 | 27.28 | 89.42 | 54.28 | 4.91 | 1.26 | 8.34 |
| 38 th | 18.5 | 33.28 | 26.87 | 89.14 | 62.57 | 1.14 | 0.87 | 6.62 |
| 39 th | 22.8 | 30.25 | 26.22 | 89.42 | 66.28 | 8.08 | 0.66 | 5.28 |
| 40 th | 26.8 | 34.65 | 26.68 | 87.42 | 53.85 | 6.37 | 2.22 | 7.45 |
| 41 st | 30.7 | 34.48 | 26.34 | 89.85 | 52.28 | 1.42 | 1.01 | 8.52 |
| 42 nd | 33.5 | 35.05 | 25.77 | 89.71 | 51.71 | 0 | 0.81 | 8.77 |

| | | | | | | | | |
|------------------|-------|--------------|--------------|---------------|---------------|---------------|---------------|--------------|
| 43 rd | 27.5 | 34.37 | 24.8 | 90.28 | 53.71 | 0 | 1.01 | 8.75 |
| 44 th | 26.86 | 33.97 | 19.82 | 90.71 | 54.42 | 0 | 1.08 | 8.57 |
| 45 th | 17.5 | 33.14 | 18.2 | 91.85 | 55.71 | 0 | 1.02 | 6.91 |
| 46 th | 10.3 | 32.74 | 16.91 | 91.42 | 53.85 | 0 | 0.66 | 8.51 |
| 47 th | 8.3 | 31.97 | 15.37 | 92 | 48.57 | 0 | 0.61 | 8.42 |
| 48 | 2.5 | 29.51 | 15.15 | 92.85 | 54 | 0 | 6.37 | 0.56 |
| r | | 0.146 | 0.044 | -0.317 | -0.163 | -0.181 | -0.367 | 0.657 |
| t= | | 0.609 | 0.180 | -1.378 | -0.682 | -0.758 | -1.626 | 3.598 |
| Results | | NS | NS | NS | NS | NS | NS | S |

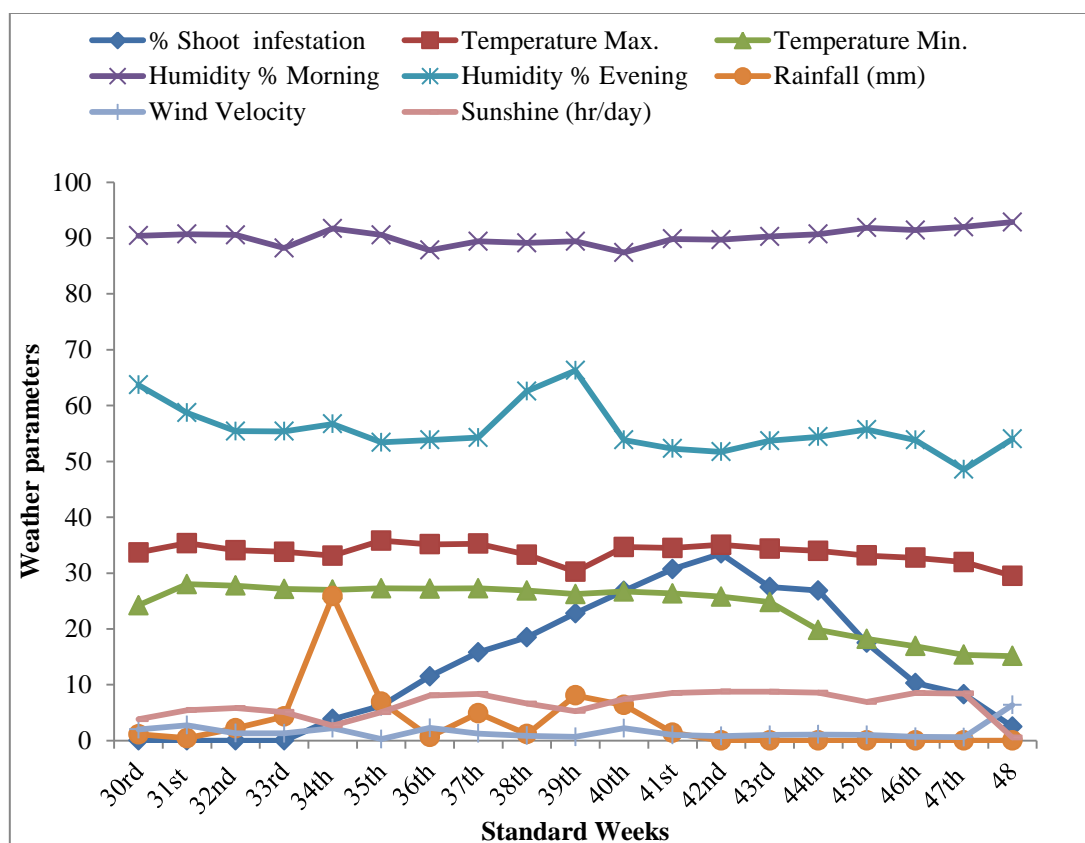


Fig: 4.1 Graphical representation of seasonal incidence of shoot and fruit borer, (*Leucinodes Orbonalis* Guenee) during Kharif 2016.

Table 4.2. Seasonal incidence of shoot and fruit borer of Brinjal during Kharif 2016.

| Standard week | % Fruit infestation of <i>Leucinodes orbonalis</i> | Temperature | | Humidity % | | Rainfall (mm) | Wind Velocity | Sunshine (hr/day) |
|------------------|--|-------------|-------|------------|---------|---------------|---------------|-------------------|
| | | Max. | Min. | Morning | Evening | | | |
| 30 rd | 0 | 33.68 | 24.22 | 90.42 | 63.71 | 1.11 | 2 | 3.82 |
| 31 st | 0 | 35.34 | 28.02 | 90.71 | 58.71 | 0.42 | 2.77 | 5.45 |
| 32 nd | 0 | 34.08 | 27.74 | 90.57 | 55.42 | 2.2 | 1.33 | 5.82 |
| 33 rd | 0 | 33.8 | 27.14 | 88.2 | 55.4 | 4.3 | 1.28 | 5.1 |
| 34 th | 0 | 33.1 | 27 | 91.7 | 56.7 | 25.9 | 2.22 | 2.7 |
| 35 th | 0 | 35.82 | 27.28 | 90.57 | 53.42 | 6.94 | 0.25 | 5.07 |
| 36 th | 0 | 35.14 | 27.2 | 87.85 | 53.85 | 0.65 | 2.26 | 8.08 |

| | | | | | | | | |
|------------------|-----------|---------------|---------------|--------------|---------------|---------------|---------------|--------------|
| 37 th | 0 | 35.25 | 27.28 | 89.42 | 54.28 | 4.91 | 1.26 | 8.34 |
| 38 th | 0 | 33.28 | 26.87 | 89.14 | 62.57 | 1.14 | 0.87 | 6.62 |
| 39 th | 4.6 | 30.25 | 26.22 | 89.42 | 66.28 | 8.08 | 0.66 | 5.28 |
| 40 th | 5.5 | 34.65 | 26.68 | 87.42 | 53.85 | 6.37 | 2.22 | 7.45 |
| 41 st | 8.5 | 34.48 | 26.34 | 89.85 | 52.28 | 1.42 | 1.01 | 8.52 |
| 42 nd | 13.5 | 35.05 | 25.77 | 89.71 | 51.71 | 0 | 0.81 | 8.77 |
| 43 rd | 26.8 | 34.37 | 24.8 | 90.28 | 53.71 | 0 | 1.01 | 8.75 |
| 44 th | 32.5 | 33.97 | 19.82 | 90.71 | 54.42 | 0 | 1.08 | 8.57 |
| 45 th | 38.8 | 33.14 | 18.2 | 91.85 | 55.71 | 0 | 1.02 | 6.91 |
| 46 th | 40.5 | 32.74 | 16.91 | 91.42 | 53.85 | 0 | 0.66 | 8.51 |
| 47 th | 29.5 | 31.97 | 15.37 | 92 | 48.57 | 0 | 0.61 | 8.42 |
| 48 | 18.75 | 29.51 | 15.15 | 92.85 | 54 | 0 | 6.37 | 0.56 |
| | r | -0.320 | -0.838 | 0.529 | -0.397 | -0.400 | -0.116 | 0.366 |
| | t= | -1.391 | -6.319 | 2.572 | -1.786 | -1.800 | -0.480 | 1.624 |
| Results | | NS | S | S | NS | NS | NS | NS |

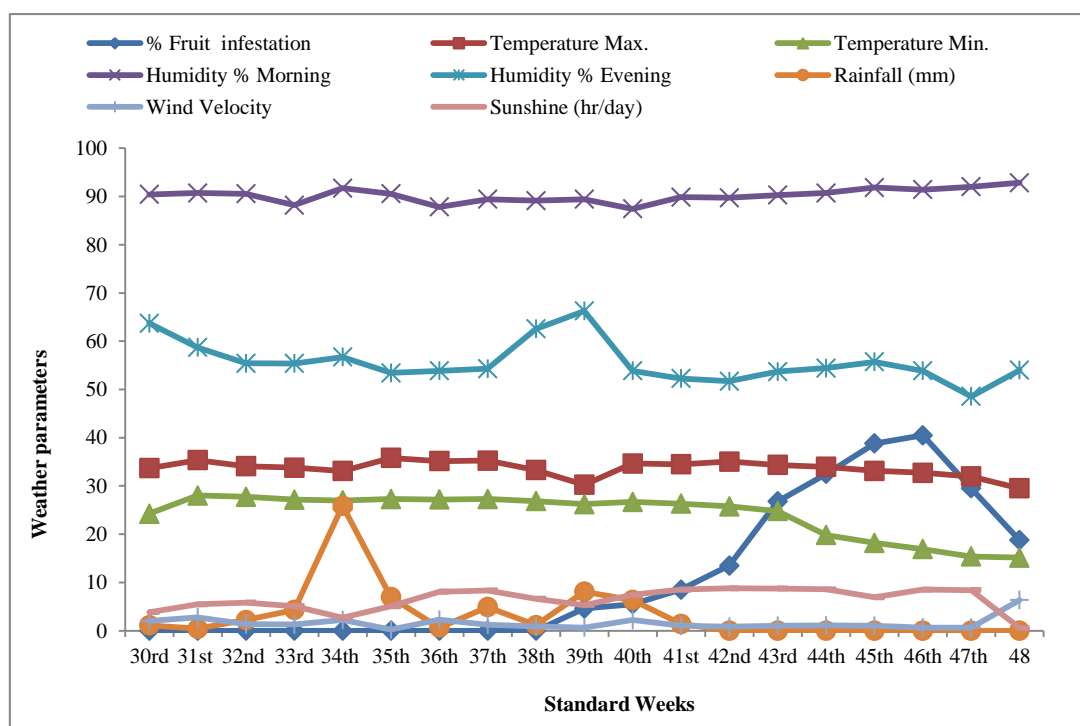


Fig. 4.2. Graphical representation of seasonal incidence of shoot and fruit borer, (*Leucinodes Orbonalis* Guenee) during Kharif 2016.

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