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Study the Abiotic Factors Affecting Amplitude Fluctuation in the Population Dynamics of Okra Shoot and Fruit Borer (*Earias vittella*) on Okra in Uttar Pradesh

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ABSTRACT: The present investigation was studied in *Zaid* season 2022 at student's instructional farm, A.N.D. University of agriculture and Technology, Kumarganj, Ayodhya (U.P.). In the course of research, the Incidence that the population of shoot and fruit borer initiated after sowing till harvesting. The highest incidence of shoot borer was observed on Okra crop at 16th SW (13.40 %) and lowest 20th SW (0.36 %). The highest incidence of Fruit borer 18th SW (24.4 %) and lowest 22nd SMW (1.1 %). Correlation observed between the shoot borer population and abiotic parameters showed non-significant positive correlation with minimum and maximum temperature was observed non-significant negative correlation, while relative humidity showed significant negative correlation and rainfall had non- significant negative correlation. Correlation observed between the fruit borer population and abiotic parameters showed non-significant positive correlation with minimum and maximum temperature, while relative humidity showed non-significant negative correlation and rainfall had significant positive correlation. This study provides basic knowledge about the incidence and damage caused by this pest, and its behavior towards various abiotic factors.

Keyword: *Earias vittella*, Population, Correlation, abiotic factors.

INTRODUCTION

Okra (*Abelmoschus esculentus*), popularly known as lady's finger, is a popular vegetable crop in India. It belongs to the Malvaceae family and is grown all year. It is grown in many tropical and subtropical sections of the world, in addition to India.

The total area under okra in India is 0.51 million hectares, with 6.00 million tonnes of green fruits produced, and a productivity of 11.0 metric tonnes per hectare in 2016-17. West Bengal is India's leading producer of okra, followed by Bihar and Gujarat (Anonymous, 2017). The okra shoot and fruit borer is the most common insect pest of the crop, causing economic losses in practically all okra-growing countries. In India, according to Krishnainah (1980), the bug attacks the fruit and causes 35 percent damage in harvestable fruit.

Earias spp. attack developing points, but after fruiting bodies form, they feed primarily on the inside of squares, flowers, and fruits. During the course of its life, a larva will cause damage to multiple fruiting bodies. Poly-culture, which involves cultivating two or more crops on the same piece of land at the same time, creates plant diversity, which influences the population dynamics of insect herbivores in agricultural and natural populations.

Okra production is limited by a variety of biotic and abiotic variables. Fruit and shoot borer (*Earias vittella*), Jassid (*Amrascabiguttula biguttula* Ishida), Fruit borer (*Helicoverpa armigera* Hub.), whitefly (*Bemisia tabaci* Gennadius), aphid (*Aphis gossypii* Glover), semilooper (*Anomisflava* F.), red cotton bug (*Dysdercus cingulatus*), blister beetle (*Mylabris pustulata* Thumb), Fruit and shoot borer, Jassid, and whitefly are some of the most common insect pests. The typical loss from these insects is 40%. The spotted boll worm (*Earias vittella*) is a serious pest that causes severe agricultural damage. The onslaught of this insect pest is said to have resulted in a 54.04 percent reduction in marketable production (Kumar *et al*., 2014).

E. vittella, the adult female of the okra shoot and fruit borer, lays eggs on leaves, floral buds, and fragile fruits. Before fruit production, small brown caterpillars dig into the top shoot and feed inside the shoot. As a result of the wilting and drying of the shoots, plant damage develops in the branches. Later, caterpillars burrow into fruits and feed within, resulting in smaller, malformed pods on the afflicted plant.

In the vegetative stage, the larva bores into tender terminal shoots, while in the fruit formation stage, it bores into flower buds, flowers, and early fruits. Shoots that have been harmed droop, wither, and die. Deformed shoots droop, wither, and dry up on the diseased fruits. Fruits that have been infested have a distorted appearance and are unsafe for ingestion. Both the nymph and adult jassid suckers sap from the underside of the leaf, causing yellowing, curling, and

bronzing. The leaves become cup-shaped, dry up, and fall to the ground as a result of the sap sucking. Plants are harmed as a result of sap loss and, more than likely, toxin injection. White fly nymphs and adults cause damage in three ways: (i) they reduce plant vitality by sucking cell sap; (ii) they obstruct photosynthesis activity by growing sooty mould on the honey dew they secrete; and (iii) they obstruct photosynthesis activity by growing sooty mould on the honey dew they secrete. It has a negative impact on the plant's growth (iv) It also spreads a number of viral illnesses, including leaf curl and leaf roll.

MATERIAL AND METHODS

The present investigation entitles "Succession of okra shoot and fruit borer (*Earias vittella*) and its management" were conducted during *Zaid* season 2022 at student's instructional farm, A.N.D. University of agriculture and Technology, Kumarganj, Ayodhya (U.P.).

A. Experimental location

Geographical location of experiment site fall subtropical climatic zone of Indo-Gangetic plains and situated at 26.47°N latitude and 82.12°E longitude at an altitude of 113 meters from mean sea level. The region receiving mean rainfall about 1200mm, about 80 per cent of total rainfall is received from mid June to end of September and periods is known as monsoon months. The winter months are very cold, whereas summer months are hot and dry. Westerly hot winds start from end of April and continue till the onset of monsoon.

The location is situated almost in the center of Indo-Gangetic belt, having 5091sq. km area which forms distinct subdivision of India. The nearest sea is the way of Bengal, which is at a more than 800km distinct from the site. The soil type of area is sandy to loam textured, alkaline type, typical to Gangetic plain.

B. Experimental layout

It was laid out in randomized block design (RBD), okra was raised and with intercrops *viz*., marigold, coriander, sunflower and maize, at the ratio of 1:1 (main and intercrop) each. After germination, the seedling were thinned out to have a spacing of 60 cm × 30 cm, the marigold transplanting was also done. The plot size 4 m × 3 m. the variety was super anamika of okra while Shweta, Bharat-709 and Caribe-1 were the varieties of maize, sunflower and coriander.

C. Procurement of seed for experiment

Seeds of okra variety Super Anamika were selected against okra shoot and fruit borer is collected from local market. Okra sole crop was raised and with intercrop *viz*., maize, coriander, marigold, sunflower, at the ratio of 1:1 (main and intercrop) each. The variety of Super Anamika for okra while Shweta, Bharat-709, Caribe-1 were the varieties of maize, sunflower and coriander.

D. Determination of population of okra shoot and fruit borer

In order to study the population of okra shoot and fruit borer, Insect pest population was recorded on ten randomly selected plants at field at weekly interval starting with 30 days after sowing to till harvesting.

E. Determination the correlation between the abiotic factors

The incidence of okra shoot and fruit borer will be correlated with the meteorological observation. Meteorological data will be obtained from Meteorological department Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya.

F. Determination of correlation coefficient

The data recorded on the occurrence on insect pest was statistically analyzed in order to determine the correlation coefficient between occurrence of insect-pests and weather factors.

RESULTS AND DISCUSSION

A. Incidence of insect pest

(i) Shoot damage. The data recorded on population of shoot borer during *Zaid*, 2022 have been presented in (Table 1). It is evident from the data that the shoot borer population was first time noticed at 12th SW larva bores into tender terminal shoots in the vegetative stage and flower buds, flower and young fruits in the fruit formation stage. The shoot borer population (1.30%) was noticed at 12th SW at the minimum temperature of 18.5°, maximum temperature of 35.3, relative humidity and rainfall 88.1 per cent, 0 mm. The maximum shoot borer population (13.4%) was recorded in 16th SW at the minimum temperature of 22.04°, maximum temperature of 40.07°, relative humidity 66.5 per cent and rainfall 0 mm. The minimum infestation of 0.36 per cent damaged shoot/plant observed in 20th SW.

(ii) Fruit damage. The data recorded on population of fruit borer during Zaid, 2022 have been present in (Table 1). The fruit borer population was started from 15th SW at the minimum temperature of 19.6°C, maximum temperature of 39.2°C, relative humidity 65.7 and rainfall 0 and mean population (4.6). Its maximum level (24.4%) at temperature ranged from 24 – 37°, relative humidity 77.1 per cent and rainfall 19.2. Its minimum level of infestation (1.1%) at temperature range from 26.07 - 38.71°, relative humidity 75.71 per cent and rainfall 2.0mm. The present study is partial agreement with the finding of Rathore *et al*. (2021); Choudhary and Sharma (2020).

B. Correlation between incidence of insect pest and abiotic parameters during Zaid 2022

To know the effect of abiotic variables on the population of shoot and fruit borer, simple correlation analysis was carried out. The result of the analysis have been presented in Table 2 and details have been given here as below: Correlation observed between the shoot borer population and abiotic parameters showed non-significant positive correlation with minimum and maximum temperature was observed negative, while relative humidity showed significant negative correlation and rainfall had non- significant negative correlation.

Table 1: Incidence of okra shoot and fruit borer during *Zaid* 2022.

SW	Shoot borer (%)	Fruit borer (%)	Temperature (ºC)		Relative Humidity		Rainfall (mm)
			Max.	Min.	Max.	Min.	
11	0	0	32	16.02	87.5	66.8	0
12	1.3	0	35.3	18.5	88.1	57.7	0
13	4	0	36.8	16.7	78.8	39	0
14	8.4	0	36.3	17.2	70.2	43.7	0
15	15	4.6	39.2	19.6	65.7	42.5	0
16	13.4	10	40.07	22.04	66.5	39.7	0
17	7.5	18.8	38.2	22.2	63.4	39.7	0
18	2.1	24.4	37	24	77.1	46.7	19.2
19	1.4	8	35.92	25.78	79.71	58.00	0
20	0.36	6.8	40.35	26.92	83.71	43.57	0
21	0	3.5	41	23.35	76.42	53.85	0
22	0	1.1	38.71	26.07	75.71	39.00	2.0

Table 2: Correlation between Shoot borer and Fruit borer population and abiotic parameters during *Zaid* 2022.

Insect	Weather Parameters				
	Temperature		Relative Humidity (%)		Rainfall (mm)
	Min.	Max.	Max.	Min.	
Shoot borer	0.288	-0.280	-0.803**	-0.510	-0.166
Fruit borer	0.221	0.448	-0.380	-0.244	0.692*

* Significant, **Highly significant

Correlation observed between the fruit borer population and abiotic parameters showed non-significant positive correlation with minimum and maximum temperature, while relative humidity showed non-significant negative correlation and rainfall had significant positive correlation.

SUMMARY AND CONCLUSIONS

The shoot borer population was first time observed at 12th SW larva bores into tender terminal shoots in the vegetative stage and flower buds, flower and young fruits in the fruit formation stage. The shoot borer population (1.30%) was noticed at 12th SW at the minimum temperature of 18.5°, maximum temperature of 35.3, relative humidity and rainfall beat the minimum temperature of 22.04°, maximum temperature of 40.07°, relative humidity 66.5 per cent and rainfall 0 mm. The minimum infestation of 0.36 per cent damaged shoot/plant observed in 20th SW.

The fruit borer population was started from 15th SW at the minimum temperature of 19.6°, maximum temperature of 39.2°, relative humidity 65.7 and rainfall 0 and mean population (4.6). Its maximum level (24.4%) at temperature ranged from 24-37°, relative humidity 77.1 per cent and rainfall 19.2. its minimum level of infestation (1.1%) at temperature range from 26.07-38.71°, relative humidity 75.71 per cent and rainfall 2.0 mm.

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Conflict of Interest. None.

REFERENCES

Anonymous (2017). Indian Horticulture database. National Horticulture Board, Gurgaon, Haryana, (1), 4.

Balpande, S., & Saxena, A. K. (2019). Population dynamics of major pests of okra. *Indian Journal of Entomology*, *81*(3), 439-442.

Choudhary, S. & Sharma, A. (2020). Population dynamics of shoot and fruit borer, *Earias* spp. infesting Okra. *J Entomol. Zool. Stud.*, *8*(6), 499-501.

Krishnaiah, K. (1980). Methodology for assessing crop losses due to pests of vegetables "Assessment of crop losses due to pest and diseases. Ed. Govindu. H. C. *et al.* USA Tech. Series No. 33: 259-267.

Kumar, U., Singh, D. V., Sachan, S.K., Bhatnagar, A. and Singh, R. (2014). Insect pest complex of okra and biology of shoot and fruit borer, *Earias vittella* (F.). *Indian Journal of Entomology*, *76*(1), 29-31.

Kumar, R., & Singh, P. P. (2021). Population Dynamics of Shoot and Fruit Borer *Earias vitella* on Okra.

Rajput, G. S. & Tayde, A. (2017). Population dynamics and comparative efficacy of certain novel insecticides, botanicals and bioagents, against shoot and fruit borer (*Earias vitella* Fabricius) of Okra crop. *Journal of Entomology and Zoology Studies*, *5*(4), 1667-1670.

Rathore, B. S., Baghla, K. and Thakur, S. (2021). Effect of abiotic factors on seasonal incidence of shoot and fruit borer (*Earias vittella*) on okra. *International Journal of Plant and Environment*, *7*(3), 240-242.

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