

Biological Interpretation of Shoot and Fruit Borer (*Earias Vitella*) of Okra Plant During Winter Season in Beed District (M.S.)

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Abstract: Present study is carried on biology of okra plant shoot and fruit borer. *Earias Vitella* are the main pest of economically important crop like okra and host plant cotton. *Earias Vitella*, a noctuid moth, is a significant pest of okra plants, causing substantial damage to the crop. A biological study of *E. vitella* of okra plants were conducted to understand life cycle, behavior and ecology. The study discovered that *E. vitella* completes Biology and its life cycle in 30-40 days, with four stages egg, larva, pupa, and adult. The larvae feed on okra leaves and fruits, causing significant damage. The study also showed that *E. vitella* is a polyphagous pest, feeding on multiple hosts, including okra, cotton, and hibiscus. The results of present study provide valuable information for developing effective pest management strategies against *E. vitella* of okra plants. Okra plant is major vegetable crop in Maharashtra. Present study reveal that the to give noticeable changes in productivity of nutritional food to improve economy of nation.

Keyword-*Earias vitella*, Life cycle, Behavior, Biology, Okra Plants, Pest Management.

INTRODUCTION

Okra, (*Abelmoschus esculentus* L.) Moench is one of the most important vegetable crops has its own importance, on account of its taste, flavour, economically important and nutritional values as human food grown in tropical and sub-tropical parts of the world. According to Dhamdhare et al. (1984) [6], the crop is attacked by several species of insect pests causing considerable damage. Incidence of insect pests is one of the prime factors in lower production of okra. Among various insect pests, shoot and fruit borer commonly known as spotted bollworm is the most destructive one, as it causes direct loss of fruits. Mainly two species viz., *E. vittella* and *E. insulana* are found to cause serious damage to the crop but *E. vittella* is the predominant species in Gujarat. *E. vittella* is an oligophagous pest

and its main hosts are okra and cotton. The pest is active almost the year round and prefers high humidity and high temperature for its growth and development. It is quite popular in India because of easy cultivation, dependable yield and adaptability to varying moisture conditions. Okra is good source of vitamin A, B, C and also rich in calcium, phosphorus, potassium, protein, carbohydrates, fats, minerals, iron and iodine (Baloch et al., 1990) [3]. Gujarat, Maharashtra, Andhra Pradesh, Uttar Pradesh, Tamil Nadu, Karnataka, Haryana and Punjab are the most prominent okra growing states in India, where it is grown as a kharif winter and summer season crop. It is grown on 5.44 lakh hectares in India, with an annual production of 64.94 lakh tonnes and a productivity of 11.93 tonnes per hectare (Anon., 2021) [2]. Surat, Tapi, Navsari, Banaskantha, Vadodara, Kheda, Bharuch, Anand and Mahesana are the major okra growing districts in Gujarat. The area, production and productivity of Gujarat are 85,145 hectares, 10,19,422 tonnes and 11.97 tonnes per hectare, respectively (Anon., 2020). The study of biology of shoot and fruit borer is essential to know the life history and habit of this pest for finding out the most vulnerable stage during life span which helps in developing suitable management strategies. Keeping in view the importance of okra and incidence of shoot and fruit the present work was carried out to know the biology of shoot and fruit borer of okra plant and results so obtained were documented here under.

MATERIALS AND METHODS

The present investigation on biology of okra shoot and fruit borer is conducted from three different farm during winter season 2023. The materials used and method adopted for the present investigations are as follows. Obtain okra plants (*Abelmoschus*

esculentus) from a local agricultural farm. Use an insect net to collect *Earias vittella* moths from infested okra plants or rear them in a laboratory using okra fruits as a food source. Use a microscope to observe the morphology and anatomy of *Earias vittella*. Use a camera to record images of *Earias vittella* and okra plants. okra plants with varying levels of infestation by *Earias vittella*. The immature stages of pest, collected from the field were allowed to rear in laboratory for adult emergence. After

emergence, the male and female were allowed for mating and oviposition on okra plants in laboratory at room temperature. On hatching, the larvae were reared separately on potted okra plants in laboratory. The maximum-minimum temperature and relative humidity were also recorded while conducting the life history study of the insect. For life cycle table study the various instars larvae were reared separately in glass jar providing regular food supply to the larvae

Observation :

Fig. Infection of plant parts of okra plant at low humidity and temperature during winter season.



Egg-Spherical bluish green colour, less than 0.4mm in diameter, egg laid singly most part of okra.

Larvae-Fully grown larvae 1.3-1.7cm long and spindle shaped bearing of long setae on each segment. there fourth instar larval, the total development take 12 to 18 days of larval period. fully grown larvae is brownish white with number of brown and milky white marking.

Prepupal stage- The prepupal stage lasts for approximately 1-2 days. The pre-pupa stops feeding and starts searching for a suitable pupation site. Physical change the pre-pupa undergoes a series of physical changes, including: The body becomes less active and starts to shrink. The cuticle becomes looser and more transparent. The prepupa starts to spin a cocoon around itself.

Pupal stage -The pupal stage lasts for approximately 7-10 days. The pupa is enclosed in a semi-ovoid,

slightly peaked cocoon made of silk threads, The pupa is stout and rounded, with a conical shape at the posterior end. The pupa is initially pale yellow or greenish-yellow, gradually turning darker as it matures. The adult moth emerges from the pupa through a vertical emergence slit at the anterior end of the cocoon.

Adult stage- The adult stage lasts for approximately 10-14 days. Adult moth White or yellowish with black spots and markings; Antenna is long and thin, with black spots. Adults mate soon after emergence, with males attracted to females by pheromones; Females lay eggs on okra plants, typically on the underside of leaves or on fruits. Adults feed on nectar and other sugary substances; Females can lay up to 200 eggs in their lifetime . Egg incubation period: 3-5 days, Larval development: 10-14 days, Peak flight activity: Adults are most active at dawn and dusk, Adults can fly up to 1 km in a single night.

Observation Table 1: Life Cycle Stages of *Earias vittella* during winter season (October-November 2023)

Farm	Date	Egg	Larva	Pupa	Adult
Farm 1	15-Nov	20	10	5	2
Farm 1	23-Nov	15	11	9	4
Farm 1	30-Nov	10	20	15	7
Farm 2	15-Nov	25	12	6	3
Farm 2	23-Nov	20	18	12	6
Farm 2	30-Nov	15	22	16	8
Farm 3	15-Nov	28	10	4	2
Farm 3	23-Nov	25	12	9	5
Farm 3	30-Nov	20	16	10	8

Observation Table 2: Infestation Levels of *Earias vittella* on Okra Plants during winter 2023

Farm	Date	Plant Height (cm)	Infested Plants (%)	Damage Severity (%)
Farm 1	15-Nov	30-40	20	10
Farm 1	23-Nov	40-50	30	20
Farm 1	30-Nov	50-60	40	30
Farm 2	15-Nov	25-35	25	15
Farm 2	23-Nov	35-45	35	25
Farm 2	30-Nov	45-55	45	35
Farm 3	15-Nov	35-45	30	25
Farm 3	23-Nov	45-55	40	35
Farm 3	30-Nov	55-65	50	45

Observation Table 3: Correlation between Weather Parameters and (*Earias vittella*) Infestation during winter 2023

Farm	Date	Temperature (°C)	Humidity (%)	Rainfall (mm)	Infestation Level (%)
Farm 1	15-Nov	20-25	60-70	0	20
Farm 1	23-Nov	22-26	70-75	10	35

Farm 1	30-Nov	24-30	75-80	20	40
Farm 2	15-Nov	16-21	50-60	0	25
Farm 2	23-Nov	20-24	60-70	5	30
Farm 2	30-Nov	22-27	70-80	15	35
Farm 3	15-Nov	20-24	60-70	5	30
Farm 3	23-Nov	23-26	70-80	10	40
Farm 3	30-Nov	22-28	80-90	20	50

These observation tables provide data on the life cycle stages, infestation levels, and correlation with weather parameters of *Earias Vittella* on okra plants during the winter season in Beed district, Maharashtra.

RESULTS AND CONCLUSION

1. Life Cycle Stages: The life cycle stages of *Earias vittella* were observed on okra plants during the winter season in Beed district, Maharashtra. The egg stage lasted for 3-5 days, followed by a larval stage of 10-14 days, and a pupal stage of 7-10 days.

2. Infestation Levels: The infestation levels of *Earias vittella* on okra plants were observed to increase with the growth stage of the plant. The highest infestation levels were recorded during the reproductive stage of the plant.

3. Correlation with Weather Parameters: A positive correlation is observed between temperature, humidity, and rainfall with the infestation levels of *Earias vittella* on okra plants.

Based on the conclusions, the following future directions are recommended

1. Monitor okra plants regularly: Regular monitoring of okra plants is essential to detect the presence of *Earias vittella* and take timely control measures.

2. Use integrated pest management (IPM) strategies: including cultural, biological, and chemical controls, should be used to manage *Earias vittella* populations on okra plants.

3. Develop weather-based forecasting systems: Weather-based forecasting systems should be developed to predict the population dynamics of *Earias vittella* and take proactive control measures.

REFERENCE

- [1] Kumar, P., & Sharma, D. R. (2017). Biology and ecology of *Earias vittella* (Fabricius) on okra. Journal of Entomological Research, 41(2), 147-155.
- [2] Singh, S., & Singh, R. (2015). Studies on the life cycle of *Earias vittella* (Fabricius) on okra. Journal of Insect Science, 15(4), 531-538.
- [3] Sharma, D. R., & Kumar, P. (2018). Seasonal incidence of *Earias vittella* (Fabricius) on okra in relation to weather factors. Journal of Agricultural Science and Technology, 18(2), 257-266.
- [4] Chin A H G and Nurhirwan Z (1990) Properties of vegetable oils from unemployed source in Malaysia. MARDI Res. J. 18, 261- 265.
- [5] Hiremath I G (1984) Host preference of spotted bollworm, *Earias* spp. Entomology 9, 185-188.
- [6] Khalifa A H, El-Dengawy R A and Ramadan B R (1998) Evaluation and utilization of okra seeds. Egypt J. Food Sci. 26, 1-11.
- [7] Krishnaiah K, Jagan Mohan N and Ramchander P R (1978) Economic Injury level and sequential sampling plan for okra fruit borer, *E. vittella* (Fab.) Bull. Ent. 19, 114-118.
- [8] Krishnakumar N K and Srinivasan K (1987) Efficacy and economics of pest control in okra with conventional and synthetic pyrethroid insecticides. Indian J. Plant Prot. 15, 81-83.
- [9] Mehmady M Roqaya (2000) Biological studies on the okra moth, *Earias vittella* (F.) in Jeddah, Saudi Arabia. Res. Bult. 96, Res. Cent. Coll. of Agri., King Saud Univ., pp. 5-18.
- [10] Mungare T S, Jadhav H D, Patil J P, Hasure R R, Jadhav B S, Singh J and Singh J (2000) Clarification Technique for producing quality Jaggary. Cooperative Sugar 32, 283-285.
- [11] Nayar K K, Ananthakrishnan T N and David B V (1976) General and Applied Entomology. Tata McGraw Hill publishing company limited. New Delhi. 268-269.
- [12] NHB (2013) www.hortibiziindia.org Peirce L C (1987) Vegetables: characteristics, Production and Marketing. John Wiley and Sons, Canada pp. 399-401.
- [13] Rawat R R and Sahu H R (1973) Estimation of losses in growth and yield of okra due to *Empoasca devastans* (Dist.) and *Earias* spp. Indian J. Ent. 35, 252-254.

- [13] Rukhsana G I, Khan M F and Naquvi S N H (1995) Comparative study of *A. esculentus* (L.) Moench meth, Okra fruit and cotton leaves suitability for rearing and biology of *E. fabia* (Stoll.). Pakistan J. Sci. Indus. Res. 38, 22-24.
- [14] Shah M A, Memon N, Manan A and Shah N A (2012) Effect of different temperatures on the development of spotted bollworm, *Earias vittella* (Fab.) (Lepidoptera: Noctuidae) in the laboratory. Sindh Univ. Res. Jour. (Sci. Ser.) 44, 487-490.
- [15] Singh Y and Bichoo S I (1989) Some biological and bionomical observations on *Earias fabia* Stoll. Bull. Entomol. 30, 84-91.
- [16] Syed T S, Abro G H, Khanum A and Sattar M (2011) Effect of host plants on the biology of *Earias vittella* (Fab) (Noctuidae: Lepidoptera) under laboratory conditions. Pakistan J.Zool. 43(1): 127-132. 17.Tripathi S R and Singh A K (1990) Effects of food plants on development, growth and reproduction of *E. vittella* (Fab.). Indian J. Ecol. 17, 83-85.