



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2018; 6(3): 1642-1644

© 2018 JEZS

Received: 01-03-2018

Accepted: 05-04-2018

Visvash Vaibhav

Department of Entomology,
Sardar Vallabhbhai Patel
University of Agriculture &
Technology, Meerut, Uttar
Pradesh, India

Gaje Singh

Department of Entomology,
Sardar Vallabhbhai Patel
University of Agriculture &
Technology, Meerut, Uttar
Pradesh, India

Rajat Deshwal

Department of Entomology,
Sardar Vallabhbhai Patel
University of Agriculture &
Technology, Meerut, Uttar
Pradesh, India

Nand Kishor Maurya

Department of Entomology,
Sardar Vallabhbhai Patel
University of Agriculture &
Technology, Meerut, Uttar
Pradesh, India

Vishvendra

Department of Entomology,
Sardar Vallabhbhai Patel
University of Agriculture &
Technology, Meerut, Uttar
Pradesh, India

Correspondence**Visvash Vaibhav**

Department of Entomology,
Sardar Vallabhbhai Patel
University of Agriculture &
Technology, Meerut, Uttar
Pradesh, India

Seasonal incidence of major pod borers *Etiella zinckenella* (Treitschke) and *Helicoverpa armigera* (Hubner) of vegetable pea in relation with abiotic factors

Visvash Vaibhav, Gaje Singh, Rajat Deshwal, Nand Kishor Maurya and Vishvendra

Abstract

Field experiment was carried out to study the seasonal incidence of major pod borers (*Etiella zinckenella* Treitschke and *Helicoverpa armigera* Hubner) on vegetable pea and its relation with abiotic factors under natural conditions at the old campus, SVP University of agriculture and technology, Meerut (U.P.). During the observation the population of *E. zinckenella* larval reached its peak (12.66 larvae/10 plants) in the all control plots on 26th February (8th standard weeks) when the maximum and minimum temperature 22.07°C and 12.55°C, respectively, relative humidity 81.07% and rainfall 11.72 mm was recorded. The larval population of *E. zinckenella* showed negative correlation with maximum temperature ($r = -0.007$) while positively correlated with minimum temperature ($r = 0.378$) and the correlation between larval population and relative humidity was found positive ($r = 0.313$) and also positive with rainfall ($r = 0.393$). The observation on the population of *H. armigera* larval reached its peak (10.33 larvae/10 plants) in all control plots on 26th February (8th standard weeks) when the maximum and minimum temperature 22.07°C and 12.55°C, respectively, relative humidity 81.07% and rainfall 11.72 mm was recorded. The larval population of *H. armigera* showed negative correlation with maximum temperature ($r = -0.034$) while minimum temperature ($r = 0.364$), relative humidity ($r = 0.351$) and rainfall ($r = 0.384$) were positively correlated during crop season *i.e.* Rabi 2014-15.

Keywords: Vegetable pea, seasonal incidence, abiotic factors, *Etiella zinckenella*, *Helicoverpa armigera*

1. Introduction

Pea *Pisum sativum* (L.) is cultivated as an important vegetable as well as a pulse crop throughout the world. It can be grown around the year under variable conditions. It is grown on an area of 528.71 thousand hectares in the World and ranks fourth in production (441.53 thousand tons) among grains legume after soybean, groundnut and beans. India grows pea on about 4.34 lacks ha area producing 38.69 metric tonnes. Out of it, U.P. produces 17.826 metric tonnes contributing 46.07% of total production [1].

The high yielding in vegetable pea could not be achieved due to a large number of insect pest attacking vegetable pea. The crop is known to suffer from a number of insect pests like pod borers (*Etiella zinckenella* Tr. and *Helicoverpa armigera* Hub.), pea stem fly (*Melanagromyza phaseoli* Tyron), pea leaf miner (*Chromatomyia horticola* Goureaux), aphid (*Acyrtosiphon pisum*) and thrips (*Caliothrips indicus* Bagnall). These are serious insect pest and often cause substantial loss to the crop [8]. Insect pest In western Uttar Pradesh, in addition to other insect pests, the pod borers *Etiella zinckenella* (Treitschke) and *Helicoverpa armigera* (Hübner) are most serious insect pest of vegetable pea appearing during the flowering and pod stage which seriously damages the crop and is considered to be a major limiting factor for the production of vegetable pea [12].

2. Materials and Methods

The present study was carried out at the old campus, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut-250110 (U.P.) during the Rabi seasons of the year 2014 – 15. Vegetable pea variety 'PSM-3' was sown manually 10 cm deep on 12 November, 2014. The experiments were laid out in Randomized Block Design (RBD). Row to row and plant to plant spacing was 25 cm and 10 cm, respectively.

2.1 Method of recording observation

The larval population of *E. zinckenella* and *H. armigera* present on the vegetable pea crop during experimental period was recorded in the morning hours at weekly intervals from sowing (DAS) to till the last picking of pods. The observation for the populations of *E. zinckenella* and *H. armigera* larvae were recorded from ten plants per plot of each replication was selected randomly and the number of larvae calculated during each observation from untreated control plots. Weekly meteorological data on minimum temperature and maximum

temperature in degree centigrade, relative humidity (%) and rainfall (mm) hours were recorded from Agrometeorological observatory IIFSR, Modipuram, Meerut-250110 (U.P.) during the experimental period. With a view to study the impact of different abiotic factors on pod borers incidence, a simple correlation between population of pest and abiotic factors was worked out using standard statistical procedure as suggested by Steel and Torrie [14].

3. Results and Discussion

Table 1: Seasonal incidence of larval population of pod borers *E. zinckenella* and *H. armigera* in vegetable pea during season *Rabi* 2014-15.

S.W.	Larval population of <i>E. Zinckenella</i> /10 plants	Larval population of <i>H. armigera</i> /10 plants	Weather parameters			
			Temperature °C		Relative humidity (%)	Rainfall (mm) (mm)
			Max.	Min.		
44	00	00	29.35	13.85	62.78	0.0
45	00	00	26.57	9.71	61.78	0.0
46	00	00	25.92	8.85	61.21	0.0
47	0.33	00	28.21	10.57	58.07	0.0
48	0.66	0.33	26.07	7.42	56.92	0.0
49	1.66	0.66	19.57	8.00	68.56	3.4
50	2.00	1.33	15.42	5.92	74.92	0.0
51	2.66	2.00	18.5	5.78	72.00	0.0
52	3.66	3.00	16.42	9.88	85.35	2.2
1	5.00	4.33	15	7.21	83.21	1.0
2	5.66	5.00	16.9	7.64	82.56	0.0
3	6.33	5.66	16.68	9.44	85.78	1.5
4	7.33	6.33	19.85	7.88	72.28	0.0
5	9.00	7.00	23.2	7.07	70.42	0.0
6	10.00	8.66	24.31	9.37	69.06	0.0
7	11.33	9.00	26.97	14.84	68.92	0.1
8	12.66	10.33	22.07	12.55	81.07	11.72
9	12.33	9.66	24.54	10.21	61.34	2.91
10	11.66	9.00	26.42	13.78	70.64	0

3.1 Seasonal incidence of *Etiella zinckenella*

The data presented in Table-1 and Fig-1 revealed that the peaked larval population of *Etiella zinckenella* were recorded during experiment from 12th November in the all the control plots. The larval population start increases third week of November to fourth week of February (47th to 8th standard week) and ranged from 0.00 to 12.66 larvae/ 10 plants. The peak activity of *E. zinckenella* larvae (12.66 larvae/10 plants) on 26th February (8th standard weeks) when the maximum and minimum temperature 22.07 °C and 12.55 °C, respectively, relative humidity 81.07% and rainfall 11.72 mm was recorded. Abiotic parameters played a key role in the build-up of larval population. These findings are in agreement with the finding of Abdallah *et al.* [1] reported that *E. zinckenella* is a pest of various leguminous crops in the cropping season. The

pest showed peak activity in February to March. Mallikarjuna *et al.* [6] were also in agreement of present findings who reported pea pod borer, *Etiella zinckenella* peaked during the 1st week of s December.

In the present study (Table-2) the correlation of the larval population of *Etiella zinckenella* was found negative with maximum ($r = -0.007$) and positive with minimum ($r = 0.378$) temperature during *Rabi* season 2014-15. It was positively correlated ($r = 0.313$) with relative humidity and also positive ($r = 0.393$) with rainfall. Similarly Dhaka *et al.* [4] who reported that the population of *Etiella zinckenella* on vegetable pea was negatively correlated with minimum and maximum temperature and positively correlated with minimum and maximum relative humidity and with rainfall.

Table 2: Correlation between mean larval population of *Etiella zinckenella* and weather parameters.

Season	Weather parameter	Correlation coefficient (r)
<i>Rabi</i> - 2014-2015	Max. Temp (°C)	-0.00738
	Min. Temp (°C)	0.378567
	Relative Humidity (%)	0.313548
	Rainfall (mm)	0.393006

3.2 Seasonal incidence of *Helicoverpa armigera*.

The observation presented in Table-1 and Fig-1 revealed that the peak larval population of *H. armigera* were recorded during the experiment from 12th November in the all the control plots. The larval population start increases fourth week of November to fourth week of February (48th to 8th standard week) and ranged from 0.00 to 10.33 larvae/ 10 plants. The peak activity of *H. armigera* larval population was

recorded (10.33 larvae/10 plants) on 26th February (8th standard weeks) when the maximum and minimum temperature 22.07 °C and 12.55 °C, respectively, relative humidity 81.07% and rainfall 11.72 mm was recorded. Abiotic parameters played a key role in build-up of larval population. Similarly Dubey *et al.* [5] reported that the *H. armigera* feed on vegetable pea during crop season. The pest showed peak activity in February to March. Prasad *et al.* [9]

reported host range and seasonal incidence of *H. armigera* was maximum adult catches obtain in late week of March.

The correlation (Table-3) of larval population of *H. armigera* was found negative with maximum temperature ($r = -0.034$) and positive with minimum temperature ($r = 0.364$) during Rabi season 2014-15. While it was positively correlated ($r = 0.351$) with relative humidity and ($r = 0.384$) rainfall. Some

findings are similarly and some dissimilarly supported by Prasad *et al.* [10] reported the correlation indicated significantly negatively correlated with minimum temperature and also with rainfall. Dhaka *et al.* [4] who reported that on vegetable pea, *H. armigera* was negatively correlated with minimum and maximum temperature and positively correlated with minimum and maximum relative humidity and rainfall.

Table 3: Correlation between mean larval population of *Helicoverpa armigera* and weather parameters.

Season	Weather parameter	Correlation coefficient (r)
Rabi- 2014-2015	Max. Temp (°C)	-0.03488
	Min. Temp (°C)	0.364592
	Relative Humidity (%)	0.351843
	Rainfall (mm)	0.384015

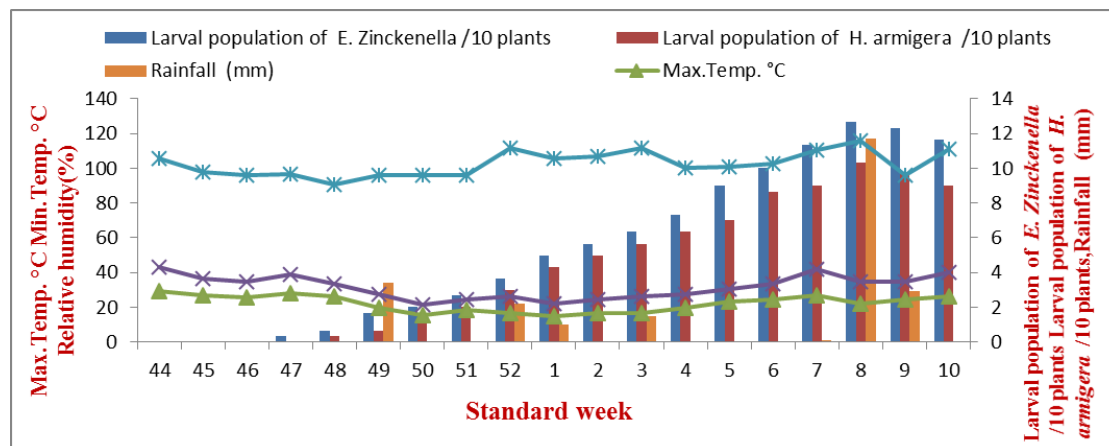


Fig 1: Seasonal incidence of *Etiella zinckenella* and *Helicoverpa armigera*

4. Conclusion

Based on the results of present study, it can be concluded that vegetable pea pod borers (*Etiella zinckenella* Treitschke) commenced from 3rd week of November and remained till 1st week of March. This reached its peak activity during 4th week of February. Whereas *H. armigera* active larval population firstly recorded during 4th week of November, which remained till 1st week of March. The peak activity was recorded during 4th week of February. Therefore, the spraying of insecticides during the first fortnight of February may helpful in checking the pod borer attack on vegetable pea.

5. References

1. Abdallah SA, Barakat AA, Sammour EA, Badawy HMA, Soliman MM. Field evaluation of certain insecticides against cowpea pod borer *Etiella zinckenella*. Bulletin of the Entomological Society of Egypt. 1994; 21:191-197.
2. Anonymous. Annual report of National Horticulture Board, New Delhi India, 2014.
3. Bijjur S, Verma S. Persistence and efficacy of insecticides against pest complex of pea crop. Pesticide Research Journal. 1997; 9(1):25-31.
4. Dhaka SS, Singh G, Yadav A, Mittal V, Singh DV, Singh B. Seasonal incidence of the pod borers, *Etiella zinckenella* (Treitschke) and *Helicoverpa armigera* (Hubner) on vegetable pea in Meerut. Annals of Horticulture. 2011; 4(1):89-94.
5. Dubey OP, Odak SC, Gargav VP. Population dynamics of gram pod borer. Jawaharlal Nehru Krishi Vishwa Vidyalaya Research Journal. 1993; 27(1):59-63.
6. Mallikarjuna J, Kumar CTA, Chakravarthy AK, Santosh R. Seasonal incidence and abundance of pod borers in Dolichos bean, *Lablab purpureus* L. (Sweet) in Bengaluru, Karnataka, South India. Current Biotica. 2012; 6(1):107-112.
7. Mishra PN, Singh G. Insect pests of garden pea and their control. Indian Fmrs. Dig. 1975; 8:40.
8. Mittal V, Ujagir R. Succession of Insect Pests Associated with Pea Crop (*Pisum sativum* Linnaeus) at Pantnagar, India. Environment and ecology. 2007; 25(4):1030-1035.
9. Prasad CS. Host range and seasonal incidence of *Helicoverpa armigera* Hubner in the lower Kumaon Hills of Uttar Pradesh, Indian. Insect Environment. 1997; 3(2):33-34.
10. Prasad D. Eco-toxicological studies on the pest complex of pea. Ph.D. thesis submitted to P.G. School of IARI. New Delhi, 1982.
11. Sandhu G, Sohi AS, Singh D. Comparative incidence of pea stem fly (*Ophiomyia phaseoli*) on pea germplasm. Punjab Vegetable Growers. 1975; 10:84-92.
12. Singh G, Prasad CS, Slohi A, Ali N, Dhaka SS, Kumar A. Evaluation of BioPesticides and Neem Formulations Against Pod Borer in Lentil. Environment and ecology. 2010; 28(1B):661-663.
13. Singh H, Dhooria M. Bionomics of the pea pod borer, *Etiella zinckenella* (Tr.) Indian Journal of Entomology. 1971; 33:123-130.
14. Steel RGD, Torrie JH. Principle and Procedures of Statistics. Second Edition, McGraw Hill Book Company Inc., New York, 1980.