Plant Archives Vol. 25, No. 1, 2025 pp. 180-182 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org

DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2025.v25.no.1.027

POPULATION BUILD-UP OF PEA POD BORER (*ETIELLA ZINCKENELLA*) IN RELATION TO WEATHER PARAMETERS DURING *RABI* SEASON

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(Date of Receiving-12-11-2024; Date of Acceptance-21-01-2025)

ABSTRACT

The present study was conducted at the Organic Research farm at Karguan ji, Department of Entomology, Institute of Agricultural Sciences, Bundelkhand University, Jhansi, (U.P.) in *Rabi* season 2023-2024 for the study of population build-up of pea pod borer in relation to weather parameters. The results revealed the initial occurrence of a larval population with 0.12 larvae per five plants at the 49th SMW. The population was gradually increased and attained a peak level at the 4th SMW. The correlation studies revealed that the larval population was negatively significant with maximum and minimum temperature, and negatively non-significant with evening relative humidity. The multiple regression depicted the effect on the Pea pod borer larval population, taking meteorological factors into account.

Keywords: *Etiella zinckenella*, correlation, multiple regression, population build-up

Introduction

Pea, *Pisum sativum* L. is an important pulse crop that belongs to the Fabaceae family and is grown in all states of the country (Singh *et al.*, 2001). During the *Rabi* season, it is grown for its taste, nutritive value, and food. The Pea has chromosome number 2n=14 and it is a self-pollinated crop. It is the Indian subcontinent's main vegetable crop. Dried peas are used as pulses, and green pods are utilized as vegetables. It is among the most significant vegetable crops in terms of increased profits, environmental friendliness, and job creation. The fruit of the pea is called Pod. In India, there are two types of peas commonly grown which are Field Pea (*Pisum sativum* var. *hortance*) and Garden pea (*Pisum sativum* var. *arvens*). Singh *et al.*, (2002) reported that the content of nutritive value in the 100-gram pea contains protein (7%), moisture (74%), carbohydrates (18 grams), calcium (22 mg), phosphorus (122 mg), iron (2 mg) with vitamins A, B complex and C. In addition, the food value, and its use in silage making for the livestock feed. India is the biggest producer and consumer of pulses worldwide. With 0.6 tonnes/ha of global productivity, it shares 36.6% of the world's land and 27% of its production. An estimated 28.42 metric tonnes of pulses are produced in India, where 30.20 million hectares are under cultivation (Anonymous, 2022).

Low productivity can be caused by a variety of biotic and abiotic factors. Pea productivity is significantly impacted by abiotic elements such as temperature, rainfall, humidity, and soil fertility. The main causes of the low pea productivity are biotic factors, especially insect infestations. The achievement of ideal productivity levels is impeded by the existence of these pests. In the pea, several insect pests are attacked which are pea pod borer, pea stem fly, pea aphid, gram pod borer, leaf miner, red spider mite and thrips occur during the seedling stage to pod formation (Lal *et al*., 2006). The pea pod borer (*Etiella zinckenella*) is a serious pest of vegetable pea that appears during the blooming and pod stages and severely harms the crop, is thought to be a primary factor restricting vegetable pea production (Vaibhav *et al*., 2018). The pea pod borer solely caused 50.9% pod infestation with 77.64% seed damage which resulted in yield losses of about 23.9% (Yadav and Chauhan, 2000).

Materials and Methods

The present study was conducted at the Organic Research farm at Karguan ji, Department of Entomology, Institute of Agricultural Sciences, Bundelkhand University, Jhansi, (U.P.) in *Rabi* season 2023-2024. The vegetable pea variety "IPFD-1012" was sowed in the first week of November in the 2.20 × 2.30 sq. meter plot. The experiment was laid out with an RBD design with a 30 × 10 cm^2 spacing.

Method of observation

The observation of the larval population of the pea pod borer on the vegetable pea during research work and the data was recorded in the morning hours at weekly intervals from the sowing to the harvesting of the crop. The data record of the population of pea pod borer was tagged on the five randomly selected plants. The observation of weekly meteorological data including temperature, relative humidity, and rainfall was recorded from the Agrometeorological observatory station, RLBAU, Jhansi (U. P.). To investigate how various abiotic factors affect the prevalence of pod borers, a straightforward correlation between the pest population and abiotic factors was calculated using the normal statistical method (Steel and Torrie, 1980).

The formula was used to calculate the percent infestation of the pod:

$$\text{Pod infestation (\%)} = \frac{\text{Total number of infested pods}}{\text{Total number of pods}} \times 100$$

Results and Discussion

The occurrence of the data on the pea pod borer (*Etiella zinckenella*) was noted at weekly intervals and depicted in Table 1 and Fig. 1.

Population build-up of pea pod borer

The observation on the incidence of pea pod borer

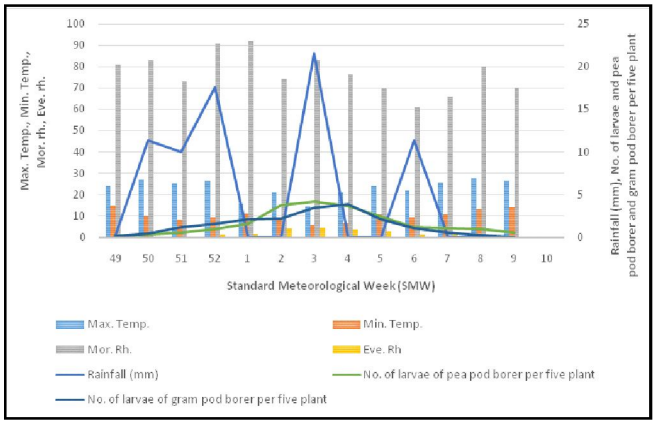

Fig. 1: Population occurrence of insect pests in the field pea in relation to weather parameters during *Rabi* season 2023-2024.

Table 1: Population occurrence of insect pests in field pea in relation to weather parameter during *Rabi* season 2023-2024.

SMW	Temprature (°C)		Relative Humidity (%)		Rain Fall (mm)	No. of larvae of pea pod borer / five plants
	Max.	Min.	Mor.	Eve.		
49	24.0	14.7	81.0	41.0	0.00	0.12
50	26.8	9.5	83.0	58.0	11.35	0.34
51	25.0	8.0	73.0	61.0	10.00	0.55
52	26.4	9.2	91.0	72.0	17.60	0.93
01	15.7	10.8	92.0	71.0	0.00	1.54
02	21.1	8.2	74.0	39.0	0.00	3.71
03	14.2	5.4	83.0	41.0	21.50	3.61
04	20.8	6.2	76.4	43.0	0.00	4.14
05	23.8	10.5	69.7	39.0	0.00	2.41
06	21.7	9.1	61.0	34.0	11.35	1.11
07	25.7	10.4	65.9	35.6	0.00	1.01
08	27.4	13.0	79.9	42.0	0.00	0.96
09	26.4	13.8	70.0	56.0	0.00	0.54

during the *Rabi* season 2023-24 revealed that the occurrence of *E. zinckenella* on pea started from 47th SMW (Table 1) and continued over the growing time of pea. The population of pea pod borer ranged from 0.12 to 4.14. The initial incidence of larvae was started at 49th SMW with 0.12 larvae per plant. At this time, the maximum temperature (24.0), minimum temperature (14.7), morning rh (81.0), evening rh (41.0), and rainfall (0.00) were noted. After that, the population was gradually increased and attained a peak level at the 4th SMW with 4.14 larvae per plant. At this time, the maximum temperature (20.8), minimum temperature (6.2), morning rh (76.4), evening rh (43.00), and rainfall (0.00) were noted. Thereafter, the crop became at maturity stage at 9th SMW and population (0.54), and this time maximum temperature (26.4), minimum temperature (13.8), morning rh (70), evening rh (56), and no rainfall were noted (Table 1).

The present finding was similar to Kumar *et al.*, (2018) reported that the pea pod borer population reached a peak level in the early February weeks. Mallikarjuna *et al.*,(2012) and Abdallah *et al.*,(1998) also reported that the pea pod borer is a pest of various leguminous crops and attacked from February to March month attaining a

Table 2: Correlation and Multiple regression studies between insect pests and weather parameters.

Insect pests of field pea	Temp. (°C)		Relative humidity (%)		Rain fall (mm)
	Max.	Min.	Mor.	Eve.	
Pea Pod borer	-0.68	-0.70	-0.01	-0.35	0.08
Multiple regression	$Y=6.22-0.09X_1-0.36X_2+0.04X_3-0.04X_4-0.06X_5$				$R^2=0.826$

peak level of population.

The findings indicated that the population of pea pod borer was negatively significant with maximum temperature (r= -0.68) and minimum temperature (r= -0.70) while negatively non-significant with evening relative humidity (r= -0.35). The morning relative humidity (r= 0.01) and rainfall (r= 0.08) were found positively non-significant with the population of pea pod borer (Table 2).

The present findings are similar to Arshad *et al.*, (2018) reported that the correlation between the population of pea pod borer and, temperature was negative. Also, Vaibhav *et al.*, (2018) reported that the maximum temperature was negatively correlated with pest population while evening relative humidity was found positively significant.

The multiple regression equation was used to assess its effect on the Pea pod borer larval population, taking meteorological factors into account. According to the derived R^2 value of 0.82, 82% of the fluctuation in the larval population was explained by the model's consideration of meteorological factors. This suggests that environmental factors influence the occurrence of pea pod borer modestly. According to the study, if the maximum temperature decreased by 1°C, the relative humidity reduced by 1%, and 1 mm of rain fell, the larval population would decrease by 0.36, 0.04, and 0.06 individuals, respectively. These findings demonstrate the potential influence of meteorological variables, such as temperature, humidity, and precipitation, on pea pod borer population dynamics.

Conclusion

The present study result revealed the occurrence of pea pod borer, *Etiella zinckenella* from the 49th SMW to the 9th SMW. The findings that the pea pod borer is a very harmful insect in field peas. The finding revealed that the population of pea pod borer was increased when the average temperature, average relative humidity, and no rainfall were found. The peak level of the larval population of pea pod borer was attained in the 4th SMW with 4.14 larvae per five plants.

References

Abdallah, S.A., Barakat A.A., Sammour E.A., Badawy H.M.A. and Soliman M.M. (1994). Field evaluation of certain insecticides against cowpea pod borer *Etiella zinckenella*. *Bulletin of the Entomological Society of Egypt.* **21**, 191-197.

Arshad, M., Ahmad S., Sufyan M., Abdin Z.U. and Maqsood S. (2018). Population dynamics of aphids and their natural enemies associated with strip-intercropping in wheat crop. *Pakistan Journal of Zoology*, **50**, 1225-1230.

Kumar, N., Singh H., Kumar L., Vaibhav V., Singh R., Kumar A. and Kumar A. (2018). Seasonal abundance and effect on insect pest associate with vegetable pea crop under abiotic factors of U.P. *Journal of Pharmacognosy and Phytochemistry*, **7(1)**, 1689-1693.

Lal, C. and Verma L.R. (2006). Use of certain bio-products for insect-pest control. *Indian Journal of Traditional Knowledge*, **5(1)**, 79-82.

Mallikarjuna, J., Kumar C.T.A., Chakravarthy A.K. and Santosh R. (2012). Seasonal incidence and abundance of pod borers in Dolichos bean, *Lablab purpureus* L. (Sweet) in Bengaluru, Karnataka, South India. *Current Biotica*. **6(1)**, 107-112.

Singh, N.K., Kumar D., Kumar N. and Singh D.N. (2001). Combining ability for yield and its components in pea. *Annual Agricultural Research*, **22(24)**, 570-575.

Singh, N., Panday O.K. and Dikshit H.K. (2002). Status of germplasm, its management, and utilization in pulse crop. *Farmers Forum*, **2(4)**, 23-27.

Steel, R.G.D. and Torrie J.H. (1980). Principle and Procedures of Statistics. Second Edition, McGraw Hill Book Company Inc., New York.

Vaibhav, V., Singh G., Deshwal R., Maurya N.K. and Vishvendra (2018). Seasonal incidence of major pod borers (*Etiellazinckenella* Treitschke) and *Helicoverpaarmigera* Hubner of vegetable pea in relation to abiotic factors. *Journal of Entomology and Zoology Studies*, **6(3)**, 1642-1644.

Yadav, J.L. and Chauhan R. (2000). Evaluation of insecticides against larval population of *Etiellazinckenella* Treitschke on field pea. *International Journal of Crop Agriculture*, **18(2)**, 169-172.