



POPULATION DYNAMICS OF MAJOR INSECT PESTS OF PEA (*PISUM SATIVUM* L.) IN RELATION TO WEATHER PARAMETERS IN KANPUR, UTTAR PRADESH

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ABSTRACT

The experiment was carried out in pea crop in RBD and CRD in three replication during rabi cropping season of 2018-19. The purpose of this study was to investigate the effect of fluctuation of abiotic factors (temperature and relative humidity) on population of major insect pests of pea. The outcome disclosed that the mean of highest population of aphid was recorded in 3rd Standard meteorological week and showed significant negative correlation with minimum and maximum temperature, significant positive correlation with lowest relative humidity and non-significant positive correlation with highest relative humidity. The highest population of thrips was recorded on 52nd standard meteorological week (MTW) and it exhibited non-significant negative correlation with minimum temperature and significant negative correlation with maximum temperature. Thrips population was non-significant positively correlated with lowest and highest relative humidity. The mean of peak population of pea leaf miner was observed in 2nd standard meteorological week and its population showed significant negative correlation with minimum and maximum temperature and lowest humidity but non-significant negative correlation with highest humidity. The pea pod bore populations was reached on peak at 3rd standard meteorological week and showed non-significant negative correlation with minimum temperature and highest humidity and significant negative correlation with maximum temperature and lowest humidity.

Keywords: Abiotic factors, Insect pests, Pea, Population dynamics.

INTRODUCTION

Pea (*Pisum sativum* L.) known as matar in Hindi. It belongs to family Fabaceae and subfamily Faboideae. It was first originated in Mediterranean region of Southern Europe and Western Asia (Tiwari *et al.*, 2017). Pea seeds provides 21-25% vegetable protein (Mckay *et al.*, 2003) as well as it is a significant source of starch, fibre, vitamins, micronutrients such as Ca, Ma, Cu, Fe, Mn, Zn, K and P. Its capability to enrich the soil structure by transforming atmospheric nitrogen into nitrate makes it more worthy crop. In India, land under pea cultivation is about 11.50 lakh

ha and total production is about 10.36 lakh tons during 2012-2015 (Tiwari *et al.*, 2017). However, the pea production and productivity both have been experienced drastic loss because of abiotic and biotic factors. The main biotic constraints for low yield of pea are insect pests (Shantibala *et al.*, 2007). All over the world, pea is infested by more than 12 insect pests during different growth stages of plant (Ali, 2002).

A pest is any organism that spreads disease, causes destruction or is otherwise a nuisance. Pest is a living organism mainly insect which is very harmful

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to the plants and it harms agriculture through feeding on crops or parasitizing livestock (Verma, 2017). Not all insects are pests but aphids are the pests (Singh and Singh, 2019). Pea aphids can be controlled by guard crops (Yadav and Arya, 2022). There are many insect pod borer complex *Etiella zinckenella* Treischke, *Helicoverpa armigera* Hubner, *Maruca vitrata*, pea aphid *Acyrtosiphon pisum*, pea thrips *Thrips angusticeps*, pea leaf miner *Phytomyza atricornis*, pea stem fly *Melanagromyza phaseoli* Tyron (Kumar *et al.*, 2017; Vaibhav *et al.*, 2018).

MATERIALS AND METHODS

The present study was carried out at experimental garden of Dayanand Girls Post Graduate College, Kanpur during *Rabi* season of 2018-19. Cultivar 'Rachna' was selected for this study (resistant for powdery mildew). Seeds were collected from Chandra Shekhar Azad University of Agriculture and Technology, Kanpur. Sampling was designed in RBD (randomized block design) method replicated three times in a week. The crop was grown in plots of 4×4 m². The crop was sown at 15th October and the weekly recording of population dynamics of insect pests of pea were started from second week of November onwards till plants reached on maturity. The observation time of insects was early morning 5 a.m. to 8 a.m. Vikrant *et al.* (2013) have mentioned in their research paper that most insects were not very active during morning time so it was the best time to monitoring the insects.

Sampling techniques: The sampling techniques used for recording the population of different pests are mentioned here. The monitoring of pea aphid (*Acyrtosiphon pisum* Harris) was allowed weekly by visual counting of both nymphs and adults/5 plants/plot. Pea thrips (*Thrips angusticeps* Uzel) was counted from 5 randomly selected plant from each plot in each replication. All stages of pests (adults and nymphs) were observed and counted by the magnifying lens. The larvae of pea leaf miner (*Phytomyza atricornis* Meigen) were recorded on randomly selected leaves with live mines of 5 plants per plot in each replication. The larvae of pod borer (*Etiella zinckenella* Treischke) was recorded and counted on five randomly selected plants from each plot.

RESULTS AND DISCUSSION

Pea aphid (*Acyrtosiphon pisum* Harris)

Acyrtosiphon pisum is considered as serious threat for field pea (Wale, 2002). The first appearance of aphids on crop field was marked in 46th standard meteorological week. The mean of highest peak of population of this pest was 3.5 adults/nymphs per 5 plants which was recorded on 3rd standard week. The population was showed negatively significant correlation with maximum and minimum temperature and lowest humidity. These results are similar with the investigations of Kundu *et al.*, 2021. The population of this insect was non-significant positively correlated with highest humidity.

Pea thrips (*Thrips angusticeps* Uzel)

The peak of population of thrips was recorded in 52nd standard week (last week of December). The mean of peak population was 5.33 thrips/5 plants. The population of this minor pest exhibited non-significant negative correlation with maximum and minimum temperature and non-significant positive correlation with lowest and highest humidity. Our result showed close conformity with the findings of Kumar and Singh (2016), Arya and Dubey (2017) and Arya (2019).

Pea leaf miner (*Phytomyza atricornis* Meigen)

First emergence of pea leaf miner in field was marked in 49th standard week, reached on peak at 2nd standard week. The mean number of peak population was 17 larvae/5 plants. The statistical analysis showed that population of leaf miner showed significant negative correlation with minimum and maximum temperature and with lowest humidity. For highest humidity population of this insect showed non-significant negative correlation.

Pea pod borer (*Etiella zinckenella* Treischke)

The first visibility of pod borer was recorded in 48th standard week which gradually increase and attain peak on 3rd standard week with mean number 13 larvae/5 plants. The population of pod borer was showed negative non-significant correlation with minimum temperature and highest humidity and negative significant correlation with maximum temperature and lowest humidity.



Fig. 1: Leaf damaged by Pea leaf miner (*Phytomyza atricornis* Meigen).



Fig. 2: Pod damaged by Pod borer.

Table 1: Population dynamics of major insect pests of pea (*Pisum sativum* L.) during Rabi Season 2018-19.

SMW	SMW			R.H. (%)		Mean no. of Insect/5 plants			
	Min	Max	Lowest	Highest	pea aphid	pea thrips	pea leaf miner	pea pod borer	
46	11.3	31	50	85	0.67	1.33	0	0	
47	7.7	29.1	53	91	1.67	1	0	0.33	
48	10.1	30.4	48	93	1	2	0	0.67	
49	10.5	32.8	38	95	2.67	1.67	0.33	2.67	
50	9.8	28.4	46	92	4.33	2.33	6.33	5.67	
51	9.9	26.4	38	87	10.33	2	4.67	7	
52	7	28.8	42	86	11.67	5.33	9.67	7	
1	9.1	25.5	35	82	18.33	4.67	12.67	12.33	
2	6.4	26.1	30	94	22.33	4.33	17	11.33	
3	4.7	27.2	26	91	35	3.33	10.33	13	
4	6.6	26.2	28	88	22	1	7.67	7	
5	7.2	29.7	38	78	11.33	0.67	7.33	5.33	
6	10.3	28.8	32	79	7	0	5	5	
7	10	29.4	30	84	3	0	4	6.67	
8	15.2	34.2	28	82	3.33	0	1.67	6	
25.26667	9.053333	28.93333	37.46666667	87.13333	10.3106667	1.97733333	5.778	6	

Table 2: Correlation between population of major insect pests and weather factors in pea.

Insect	Minimum Temperature	Maximum Temperature	Lowest Relative Humidity	Highest Humidity
Pea aphid	-0.72672*	-0.67421	-0.624*	0.084743
Pea thrips	-0.49897*	-0.514*	0.038567*	0.335995*
Pea leaf miner	-0.61346*	-0.72814	-0.50894*	-0.02205*
Pea pod borer	-0.4403	-0.62412	-0.73635	-0.0817

*Correlation is significant at 0.05 per cent level.

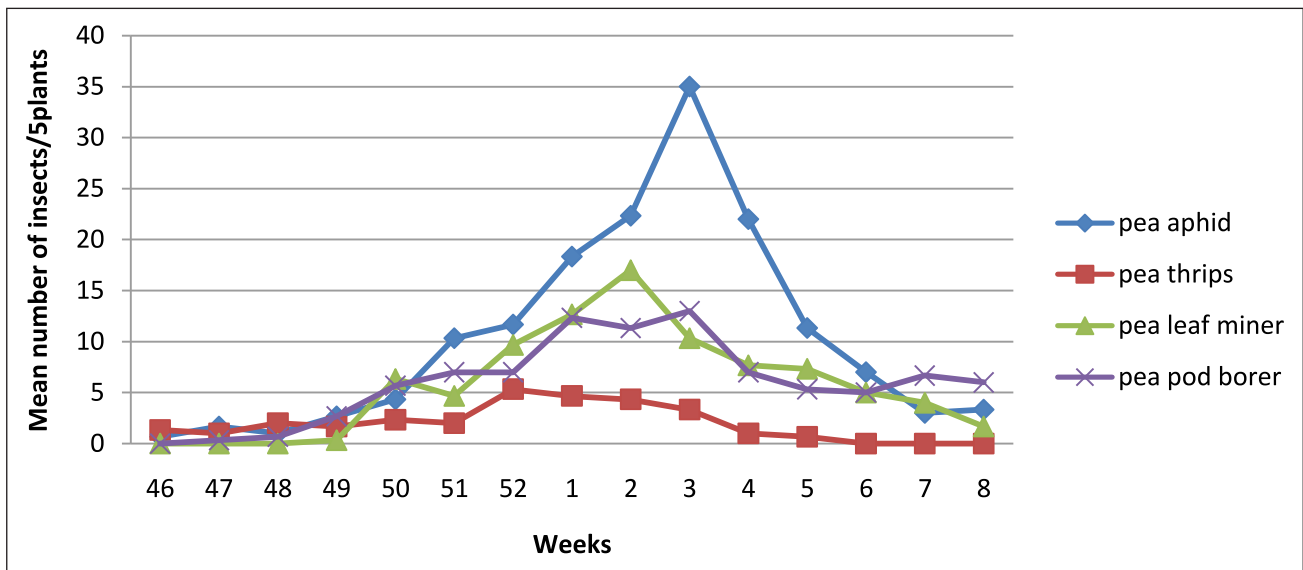


Fig 3: Pea Pod Bearer (*Etiella zinckenella* Treischke).

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