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Seasonal incidence of major insect pests infesting field pea

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Abstract
Seasonal incidence of insect-pests *viz. Etiella zinckenella, Helicoverpa armigera, Polyommatus boeticus, Chromatomyia horticola* and *Caliothrips indicus* on field pea was studied under field conditions during *rabi* 2015-16. Peak population of *H. armigera* (1.22 larvae/ plants), *E. zinckenella* (5.94 larvae/plant), *P. boeticus* (1.55 larvae/plant), *C. horticola* (3.4 larvae/leaf) and *C. indicus* (3.05 /plant) was recorded on 8th, 10th, 12th, 8th and 7th Standard meteorological weeks (SMW), respectively. *Etiella zinckenella* population shows significant positive correlation with temperature (max.-min.) *i.e.* r=0.715* and 0.821*. However *C. indicus* and *C. horticola* population was found significant negatively correlated with temperature maximum (r=-0.508* and r=-0.712*) and minimum (r=-0.659* and r=-0.680*), respectively. Whereas positive and significant correlation was found between *C. horticola* population and morning relative humidity (r= 0.731*).

Keywords: Seasonal incidence, field pea, *E. zinckenella, H. armigera, P.boeticus, C. horticola* and *C. indicus*

1. Introduction
Field pea is an important grain legume crop in India and mostly cultivated in *rabi* season and grown on an area of 0.47 million hectares in India with the production of 4.48 million tonnes [1]. In Haryana, it occupies an area of 14.05 thousand hectare with annual production of 104.50 thousand tonne [2]. The main cause of low productivity of this crop is generally attributed to heavy incidence of insect-pests. The major insect-pests attacking field pea are stemfly, *Ophiomyia phaseoli*, leaf miner, *Chromatomyia horticola*, thrips *Caliothrips indicus* and pod borer complex comprising of blue butterfly, *Lampides boeticus*, pea pod borer, *Etiella zinckenella* and gram pod borer, *Helicoverpa armigera* [10]. There 10-15 per-cent reduction in yield of field pea was reported due to insect pest [2]. The percent pod damage by pod borer, *E. zinckenella* in field pea ranged from 1.0 to 4.0 percent [1]. Infestation of *E. zinckenella* pest has been reported up to 17.5 percent in Haryana [6]. *H. armigera* is also highly polyphagous and also a serious pest of pea crop. Blue butterfly, *P. boeticus* (Lycaenidae: Lepidoptera) is considered as one of the major borers of pulses [5]. It is regular and serious pest in Haryana also for the last few years and average 8 percent damage on pod and locule basis has been reported [7]. Maximum leaf damage (40 percent) by Pea leaf miner, *C. hortiola* has been recorded in early maturing variety HFP-8909 [13]. The overall mean population of *C. indicus* has been recorded on garden pea 10.47 per leaf per plant [8]. So by generating the information regarding major pests incidence in field pea will help in strategizing the management options. Keeping in view the importance of the crop, the present study was undertaken to know the seasonal incidence of important insect-pests on field pea and their association with weather parameters.

2. Materials and Methods
Field pea crop variety HFP-529 was raised on 16 November, 2015 with plot size of 100sq.m. at Research Farm of Pulses Section, Department of Genetics and Plant Breeding, CCS Haryana Agricultural University, Hisar. For this experiment randomized block design (RBD) was selected with three replication. The crop was grown by following the good agricultural package of practice. As and when pest appeared on the crop, data with respect to the same was recorded at weekly intervals till harvesting of the crop. For *H. armigera, P. boeticus, C. horticola and C. indicus* five plants per plot of each replication was selected randomly during each observations and counted different stages (larval, nymphal, pupal) of pests from the plant

leaves, flower buds and pods through visual counting/ground sheet method and for *E. zinckenella* five plants was selected and larval population was counted visually from pods of the plants by opening the pods. These species were identified from Department of Entomology, Indian Agricultural Research Institute, New Delhi. Data on incidence of major insect pests was correlated with the weather data *viz.*, maximum and minimum temperature, morning and evening relative humidity, rainfall and sunshine hours.

3. Results and Discussion

3.1 Seasonal incidence of major insect pests

The activity of *H. armigera* on field pea crop was commenced from 5th SMW (1st week of February), and reached its peak (1.22 larvae/plant) in 8th SMW (4th week of February) and after this the population was declined up to 13th SMW (last week of March). These studies are more or less in agreement with the findings of Chatar *et al.* (2010) [3] who reported the pest population declined gradually towards the maturity of the crop. The minimum larval population was (0.11 larvae/plant) in 13th SMW. These finding were in accordance with Kumar and Nath (2003) [9] who observed the infestation of *H.armigera* in pigeonpea from February till the first half of April.

The larval population of *E. zinckenella* on field pea crop was commenced from 5th SMW (0.55 larvae/ plant) and reached its peak (5.94 larvae/ plant) in 10th SMW (2nd week of March) and after this the population was declined gradually up to 13th SMW. The appearance of population of *P. boeticus* on field pea crop was started from 7th SMW (3rd week of February) with peak (1.55 larvae/ plant) in 12th SMW (4th week of March). These findings are in agreement with the finding of Kaushik and Singh (1982) [7] who observed pod damage of the crop in the initial stage of pod formation, but the peak was observed to be in the last week of the March.

The activity of *C. indicus* on the crop was commenced from 4th SMW (last week of January) and reached its peak (3.05 thrips/ plant) during 7th SMW (3rd week of February) and after this the population was declined up to 13th SMW (0.09 thrips /plant). Contrary to this Nitharwal M., (2013) [12] reported that incidence of *C. indicus* started from first week of August and remained throughout the crop season in *Kharif*, 2006 and 2007 with peak of 9.40 and 9.87 thrips/ three leaves in the first week of September during both the years.

Leaf miner, *C. horticola* incidence on field pea crop was started from 5th SMW (1st week of February), and reached its peak in 8th SMW (4th week of February) and after this the population was declined in 13th SMW (0.09 larvae /plant). This may be due to the reason that the green and succulent parts of the plant goes on decreasing after 2nd week of March which are favourable for pest infestation. These findings were in accordance with Mondal and Kumar (2012) and Venkateshwarlu *et al.* (2011) [11, 14] who also observed the maximum infestation from 3rd week of February to 2nd week of March.

Table 1: Average population of pod borer complex, flower thrips and leaf miner on field pea during 2015-16

SMW	Borer complex/ plant			*C. indicus*/plant	*C. horticola*/leaf
	H. armigera	*E. zinckenella*	*P. boeticus*		
1	-	-	-	0.85	-
2	0.2	0.55	-	1.35	1.65
3	0.54	1.13	-	1.84	2.25
4	1.11	2.72	0.10	3.05	3.14
5	1.22	3.98	0.45	1.95	3.40
6	0.78	5.65	0.55	1.45	2.11
7	0.65	5.94	0.75	1	1.90
8	0.43	5.68	1.45	0.59	0.68
9	0.21	4.45	1.55	0.26	0.33
10	0.11	3.99	0.25	0.09	0.09

SMW- Standard Metrological Week

3.2 Correlation

Significant positive correlation was found between *E. zinckenella* larval population and temperature (Max. r = 0.715* and Min. r = 0.812*). Contrary to this Dhaka *et al.* (2011) [4] observed negative and significant correlation of *E. zinckenella* population with both maximum and minimum temperature and this might be due to climatic variation during the period of investigation. Relative humidity (morning and evening) showed negative non-significant effect with larval population. Sunshine hours and rainfall showed positive and non-significant correlation with larval population. This finding was in accordance with Dhaka *et al.* (2011) [4] who observed positive and non-significant correlation between larval population and sunshine hours. All the weather factors showed non-significant effect on *H. armigera and P. boeticus* larval population. Significant and negative correlation was found between *C. indica* population and minimum temperature (r = -0.659*). Contrary to this Nitharwal M. (2013) [12] observed a significant negative correlation of thrips with maximum temperature and positive significant correlation with minimum temperature. Significant and negative correlation was observed between larval population of *C. horticola* and temperature (min. r = -0.712*, max. r = -0.680*) and significant positive correlation with morning relative humidity (r = 0.731*). However, Mondal and Kumar (2012) [11] observed positive and significant correlation with temperature (max. r =0.84 & min. r =0.80) and negative and significant correlation (r = -0.70) with humidity. Rainfall showed negative and non-significant correlation with pest population. This finding is in agreement with Mondal and Kumar (2012) [11] who observed negative and non-significant correlation of rainfall.

Table 2: Correlation between population of major insect pests and weather factor in field pea

Insect	Max. Temp.	Min. Temp.	RH (m)	RH(e)	Rain fall	S.S. (hours)
H. armigera	-0.4232	-0.3740	0.5787	0.2896	0.1060	-0.2451
E. zincknella	0.7153*	0.8214*	-0.1632	-0.1512	0.5296	0.4409
P. boeticus	0.4170	0.5414	-0.1846	0.2062	0.2474	0.0438
C. indicus	-0.5079	-0.6588*	0.4912	0.2508	-0.0357	-0.2595
C. horticola	-0.7118*	-0.6799*	0.7310*	0.4255	-0.0329	-0.3964

*significant at p=0.05

4. Conclusion

The peak activity of *H. armigera*, *E. zinckenella* and *P. boeticus* on field pea crop was observed in 8th, 10th and 12th SMW, when pods were at its maturity. However, *E. zinckenella* has significant positive correlation with temperature (max.-min.), while *C. horticola* have significant negative correlation with temperature and positive with RH. By using the early maturing verities the farmer can avoid harbor infestation of these pests.

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