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Studies on succession of insect pest complex associated with pea at Bikaner

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Abstract
A study on succession of insect pest complex associated with pea was conducted at Instructional farm, College of Agriculture, SKRAU, Bikaner during *rabi*, 2016-17. As many as 7 species of insect pests have been recorded in all stages of the pea. Among them stem fly and leaf miner had appeared in the vegetative stage with peak infestation during 2nd week of January and 1st week of February, respectively. Whereas, sucking pests like whitefly and aphid appeared during the vegetative stage and continues up to young podding stage of the crop. Gram pod borer, pea pod borer and blue butterfly were appeared from flowering to maturity stage *i.e.* 3rd week of December to 1st week of March. The overall observations recorded during the crop period reported that stem fly, gram pod borer and pea pod borer has attained the status of major pest.

Keywords: Gram pod borer, pea, pea pod borer and pea stem fly

1. Introduction
Pea (*Pisum sativum* Linn.) is the prime vegetable crop of Indian sub continent. Pea is cultivated for the fresh green seeds, tender green pods and dried seeds and foliage. Garden pea is cultivated on a large scale in the states like Uttar Pradesh, Madhya Pradesh and Jharkhand. It is also grown in Himachal Pradesh, Punjab, West Bengal, Haryana, Bihar, Uttarakhand, Jammu and Kashmir, Orissa, some parts of Rajasthan and Maharashtra. In south it is grown in Karnataka and the hilly regions like Ooty and Kodaikanal of Tamil Nadu. Pea is cultivated for the fresh green seeds, tender green pods and dried seeds and foliage (Duke 1981) [3]. Pea is a highly nutritive vegetable. Pea pods have high nutritive value for human consumption and contain 7.2 per cent protein, 19.2 per cent carbohydrate, 0.8 per cent mineral matters, 80 per cent phosphorus and 1.8 per cent iron in fresh pea. While in dried pea it contains 19.7 per cent protein, 56.6 per cent carbohydrate, 2.1 per cent mineral matters and 4.4 per cent iron. Besides being a rich source of vitamins A, B, B_2 and C. The average production of pea is 60-70 q ha^{-1} for fresh and 15-20 q ha^{-1} for dried pea (Choudhary, 1967) [2].
Various abiotic and biotic factors cause losses in the pea crop so that the yield of it is reduced. Among the biotic constraints, the losses caused by insect-pests are a major limiting factor in realization of optimum yield of the vegetable pea crop. It is known to be ravaged by several insect pests during it its various crop stages. Insect pests like pea pod borer, *Etiella zinckenella*, pod borer, *Helicoverpa armigera*, blue butterfly, *Lampedes boeticus*, pea stemfly, *Ophiomyia phaseoli*, cotton jassid, *Emrasca devastans*, pea leaf miner, *Phytomyza atricornis*, aphid, *Myzus persicae* and mite, *Tetranychus telarius*, pod fly, *Melanogromyza obtusa* and tobacco caterpillar, *Spodoptera litura* are serious pests and causes substantial loss to the crop (Mittal and Ujagir (2007) [5]. Hence, there is a great scope to study on insect pests of pea. An attempt is made here to determine what appear to be the major pests of pea crop at Bikaner.

2. Materials and Methods
The experiment was conducted at Instructional farm, College of Agriculture, SKRAU, Bikaner during *rabi*, 2016-17. A plot size of 100 m^2 with Azad P-1 variety was raised with row to row and plant to plant spacing of 30 x 30 cm, respectively, by following standard agronomical practices and maintained without insecticidal application to study the succession of insect pests associated with pea crop. The crop was sown in November. The incidence of insect pests was recorded right from germination till the harvest of the crop at weekly intervals. Observations were recorded on the population of different insect pests of pea on 10 randomly selected tagged plants. The immature stages of the pests were collected and brought to the

laboratory for rearing. The collected adult insects were also killed in killing bottle, mounted either on insect pins or paper points depending on its size and labeled properly. The specimens were identified in Department of Entomology at Bikaner.

3. Results

The studies on diverse insect pest complex of pea was made in the year of experimentation *i.e. rabi*, 2016-17. The result obtained in the study indicates that pea crop was attacked by number of insect pests on different stages of the crop. Effects were also made to arrange the insect-pests with their systematic position by incorporating the information on their common name, scientific name, order, family, stages of insect pest and economic status as well. The various insect pests recorded from experimental location during study period presented in Table-1. The insect abundance, which occurred consistently ubiquitously and causing appreciable damage, were categorized as major insect pests. Those insects appeared for a short period or in fairly low numbers were categorized as minor pest. The stem fly *Ophiomyia phaseoli*, pea pod borer (*Etiella zinckenella*) and gram pod borer (*Helicoverpa armigera*) were recorded as major pests. The pea leaf miner (*Chromatomyia horticola*), pea aphid (*Acyrthosiphon pisum*), blue butter fly (*Lampides boeticus*) and white fly were recorded as 'minor' pests.

3.1. Whitefly, *Bemisia tabaci*

Among the insect pests, White fly (*Bemisia tabaci*) incidence was recorded earliest during the seedling stage i.e. 3rd week of November and its infestation continued upto 2nd week of February. The nymphs as well as adults were found sucking cell sap from the feeding sites. The pest was found as a minor pest because incidence was below ETL.

3.2. Pea stem fly, *Ophiomyia phaseoli*

During the period of study, the maggot of *O. phaseoli* was found to attack on stem from seedling stage and continued up to the end of vegetative stage. The damage is more severe on seedlings than on the grown up plants. The infestation of this pest found to be economic and it attained the status of major pest in the area during the period of study. The incidence of stem fly was first appeared in third week of November and gradually reached up to maximum level of plants during 2nd week of January. The populations of stem fly decreased very fast during February.

3.3. Leaf miner, *Phytomyza atricornis*

Leaf miner appeared during the vegetative stage of the crop continue damage upto maturity of the crop. The pea leaf miner population appeared in 1st week of December and gradually reached up to maximum level during 1st week of February. The population of leaf miner decreased very fast during march.

3.4. Pea aphid, *Acyrthosiphon pisum*

The attack of aphid was found with minor economic status in pea during the study period because it is found in very few isolated patches. Nymph and adult were found to suck the cell sap from the underside of leaves, top shoots and stem. Aphid appeared during the vegetative stage and continues up to young podding stage of the crop.

3.5. Gram pod borer, *Helicoverpa armigera*

During the period of study, the larvae of *Helicoverpa armigera* were found to feed on leaves, inflorescence, pods and seeds of the plant. The infestation of this pest found to be economic and it attained the status of major pest in the area during the crop period. *Helicoverpa armigera* appeared during the flowering and podding stage and continue till the maturity of the crop. The larval population starts increases during third week of December to first week of March.

3.6. Pea pod borer, *Etiella zinckenella*

The incidence of *Etiella zinckenella* was started from last week of December *i.e.*, during the flowering stage and continue till the maturity of the crop. The infestation of this pest found to be economic and it attained the status of major pest.

3.7. Blue butterfly, *Lampides boeticus*

The larvae were found boring into the flower buds and pods and feeding inside. This was not found to be serious pest and attained the status of minor pest. Blue butterfly appeared during the flowering and podding stage and continue till the maturity of the crop.

4. Discussion

During the course of study from November 2016 to March 2017, stem fly (*Ophiomyia phaseoli* Tryon), white fly (*Bemisia tabaci* Genn.), aphid (*Aphis craccivora Koch*.), leaf miner (*Phytomyza atricornis* Meign.), pod borer (*Helicoverpa armigera* Hub.), pea pod borer *Etiella zinckenella* (Treitschke) and blue butterfly (*Lampides boeticus* Linn.) were observed to be infesting on Pea crop. Several studied have been reported different insect pests infesting pea from India. Prasad *et al.* (1983) [6] reported 19 insect pests occurring on pea from the seedling stage to pod maturation at Delhi. Among them leaf miner, *Chromatomyia horticola* (Gour.), aphids, *Aphis craccivora* (Koch), *Macrosiphum pisum* (Harris) and semiloopers, *Plusia orichalcea* (Fab.) and *P. eriosoma* (D.) were noticed as the major pests of pea whereas, Bijjur and Verma (1995) [1] observed 24 insect pests on pea at Delhi. Similar findings were also reported by Sharma (1994) [7], Kushwaha (2002) [4] and Mittal and Ujagir (2007) [5].

5. Conclusion

Pea crop was found to be infested by seven insect pests. Of them three has attained the major pest status *i.e.* stem fly, gram pod borer and pea pod borer, while the remaining four has attained minor pest status *i.e.* white fly, aphid, leaf miner and blue butterfly. These major insect pests may reduce the yield considerably. Hence studies on succession of insect pests associated with pea should be studied continuously for three years in order to establish the status of pest in the particular area.

Table 1: Insect pest complex associated with pea crop during *rabi*, 2016-17.

S. No.	Common Name	Scientific Name	Order	Family	Damaging stage	Crop stage	Economic status
1	Stem fly	*Ophiomyia phaseoli*	Diptera	Agromyzidae	Maggot	Seedling and Vegetative	Major
2	Whitefly	*Bemisia tabaci* (Genn.)	Hemiptera	Aleurodidae	Nymph & Adult	Vegetative	Minor
3	Leaf miner	*Phytomyza atricornis* (M.)	Diptera	Agromyzidae	Maggot	Vegetative	Minor
4	Aphid	*Acyrthosiphon pisum*	Hemiptera	Aphididae	Nymph & Adult	Vegetative stage and young pods	Minor
5	Blue butterfly	*Lampides boeticus* (Unn.)	Lepidoptera	Lycaenidae	Larva	Flowering and podding	Minor
6	Gram pod borer	*Helicoverpa armigera* (Hub.)	Lepidoptera	Noctuidae	Larva	Flowering and Podding	Major
7	Pea pod borer	*Etiella zinckenella* (Treitschke)	Lepidoptera	Noctuidae	Larva	Flowering and Podding	Major

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