

INSECT-PEST COMPLEX ON *PISUM SATIVUM* L. AND THEIR NATURAL ENEMIES AT PANTNAGAR

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Abstract: A pest complex of about five insect pests belonging to three orders and 3 families were recorded at Pantnagar infesting the pea var. 'Pant P-13' at different stages of crop growth in an overlapping manner. Two species each belonged to the order Lepidoptera and Diptera, whereas, Hemiptera shared with one species. All the major parts of this legume plant viz., pod/seed, leaf and stem were found to be infested. Out of five insect species, two recorded as foliage feeders, one as sap suckers, one as pod feeders and one as stem feeder. Leaf miner, *Chromatomyia horticola* was observed as the major pests on pea. During the course of investigation, three species of natural enemies were found to be associated with insect pest of pea of which *Diglyphus* sp. was recorded major one.

Keywords: Insect-pest complex, natural enemies, *Pisum sativum*

INTRODUCTION

Field pea, *Pisum sativum* (Linn.) also called as mater in Hindi, is an important winter season grain legume crop largely confined to cooler temperate zones. In India, field pea occupies an area of 0.76 million ha with an annual production of 0.67 million tonnes. The average productivity is 866 kg/ha. Many abiotic and biotic factors limit the productivity of pea. Among the biotic constraints, insect pests are probably main factors limiting the pea yield. Large numbers of insect pests attack all parts of the plant at different stages, from seedling to harvest. As many as 24 insect species have been reported infesting the pea crop at different stages (Bijur and Verma, 1995). Among the insect pests, pea stem fly (*Melanagromyza phaseoli* Tryon), pea leaf miner (*Chromatomyia horticola* Goureau), pea aphid (*Acyrthosiphon pisum*), and pod borer complex (*Helicoverpa armigera* (Hub), *Lampides boeticus* (L.) and (*Etiella zinckenella* Tr.) and thrips (*Caliothrips indicus* Bagnall) often cause substantial loss to the crop. 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 Pantnagar.

MATERIAL AND METHOD

The field experiment to study insect pest complex of pea was conducted at Norman E. Borlaug Crop Research Centre (NEBCRC) of Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, Uttarakhand during Rabi season of 2012-13. Seeds of pea (variety 'Pant P-13') were sown on 8th November with spacing of row to row and seed to seed, 30 cm and 10 cm, respectively. The field was

monitored regularly either daily or at an interval of 1-2 days for the observation of insect-pests on crop. 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 Pantnagar.

RESULT AND DISCUSSION

Five insect pests were recorded during the cropping season at different stages of pea of which 2 each belonged to Lepidoptera and Diptera whereas one species to Hemiptera (Table 1). It was observed that the pest species infested different parts viz., leaves, shoot and pod. Major pest which caused significant damage was *Chromatomyia horticola*. During the course of investigation, three natural enemies' viz., *Coccinella septempunctata*, *Diglyphus* sp. and *Opium* sp. were found to be associated with insect pest of pea irrespective to the insect pest (Table 2). Details pertaining to insect pests and their natural enemies are given as under.

Insect pests

Foliage feeding pests

Thysanoplusia orichalcea (Fab.) (Noctuidae: Lepidoptera) – Semilooper

The larvae of this pest bite hole in the leaves and cause severe damage by reducing photosynthesis area. Its infestation was observed in the field from pod formation to pod maturity stage of pea. According to its relative abundance it is considered as rare pest on pea.

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Table 1. insect-pests of pea

Order	Family	Insect pest	Common name	Plant part affected	Crop stage	Relative abundance	Status
Lepidoptera	Noctuidae	<i>Thysanoplusia orichalcea</i> (Fab.)	Semilooper	Leaves	Pod formation – pod maturity	+	Stray
		<i>Helicoverpa armigera</i> (Hubner)	Gram pod borer	pods	Pod formation – pod maturity	+	Stray
Hemiptera	Aphididae	<i>Acyrthosiphon pisum</i> (Harris)	Aphid	Sap sucker on leaves, shoot	Vegetative	++	Minor
Diptera	Agromyzidae	<i>Ophiomyia phaseoli</i> (Tryon)	Stemfly	Stem	Seedling – vegetative	++	Minor
		<i>Chromatomyia horticola</i> (Goweau)	Pea leafminer	leaves	Vegetative – pod maturity	++++	Major

Table 2. Natural enemies associated with insect pests of pea

Order	Family	Scientific name	Common name	Host	Relative abundance	Status
Hymenoptera	Eulophidae	<i>Diglyphus</i> sp.	Diglyphus	<i>Chromatomyia horticola</i>	++++	Major
	Braconidae	<i>Opius</i> sp.	Opius	<i>Chromatomyia horticola</i>	++	Minor
Coleoptera	Coccinellidae	<i>Coccinella septempunctata</i>	Coccinellid beetle	<i>Acyrthosiphon pisum</i>	++	Minor

Chromatomyia horticola (Goweau) (Agromyzidae: Diptera) - Pea leafminer

The larva of this pest makes white tunnel in between the epidermal layers of the leaf in a zig-zag manner. Later on leaf becomes brown and rusty. Its infestation was observed in the field from vegetative to pod maturity stage of pea. The infestation was commenced during the last week of December first on lower leaves followed by middle and then upper leaves. On the basis of its relative abundance it is considered as a major pest on pea crop.

Sap sucking pests

Acyrthosiphon pisum (Harris) (Aphididae: Hemiptera) – Aphid

The nymphs and adults suck the sap from under surface of the leaves and tender shoots. It marked its appearance at the vegetative stage of crop growth. It is a pest of minor importance on pea as evidenced by its lower relative abundance.

Pod damaging pests

Helicoverpa armigera (Hubner) (Noctuidae:

Lepidoptera) - Gram pod borer

The larva of this pest bores into pod and feeds on seeds. It thrusts its head inside the pod leaving the rest of its body outside. It was observed in the field from pod formation to pod maturity stage of crop. It was relatively less abundant in the field and considered as rare pest.

Stem feeding pest

Ophiomyia phaseoli (Tryon) (Agromyzidae: Diptera) – Stem fly

The maggots feed by boring into the stem. The leaves of infested plants turn yellow. The stems turn brown and become little swollen. The incidence of this pest was observed in the field from seedling to vegetative stage of crop. On the basis of its relative abundance it is considered as a minor pest on pea.

Natural enemies

Parasitoids

The parasitoids recorded were *Diglyphus* sp. (Eulophidae: Hymenoptera) and *Opius* sp. (Braconidae: Hymenoptera). They were observed to parasitize the larvae of leaf miner, *C. horticola* in appreciable population. On the basis of relative abundance *Diglyphus* sp. is considered as major parasitoid in pea ecosystem limiting the population of pea leafminer whereas, *Opius* sp. recorded minor one.

Predators

Only one predatory species viz., *Coccinella septempunctata* was observed during the investigation. It was noticed as a potential predator of the aphid, *Acyrthosiphon pisum*. On the basis of its relative abundance it is considered as the predator of minor importance in pea ecosystem.

Several studies have been reported different insect pests infesting pea from India. Prasad *et al.* (1983) 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, Biju and Verma (1995) observed 24 insect pests and 11 natural enemies on pea at Delhi. Several parasites and predators have been reported in pea ecosystem from India and abroad. All natural enemies in pea ecosystem belong to the Chalcidoidea, Ichneumonidea and Cynipodea (Hymenoptera). Of these, chalcidoid parasitoids constitute the most dominant group (Murphy and LaSalle 1999). Darvas *et al.* (1999) reported *Diglyphus begini* as the dominant species on *Chromatomyia fuscula* in southeastern Norway. Mekhlif and Abdul-Rassoul (2002) reported that

Diglyphus isaea Walker and *Cirrospilus vittatus* Walker were found dominant larval parasites on *Phytomyza horticola* Goureau. Gencer (2004) reported seven parasitoids species belonging to the Eulophidae (Chalcidoidea). Of these, *Diglyphus isaea*, *Neochrysocharis formosa* and *Neochrysocharis arvensis* were found to be the most common parasitoids of leafminers. Bhat and Bhagat (2009) reported the occurrence of 7 hymenopteran parasitoids of agromyzid leaf miner, *Chromatomyia horticola* (Gourear) (Diptera: Agromyzidae) from Kashmir. The various parasitoids recorded were 5 eulophids (*Chrysocharis horticola* Mani, *Diglyphus horticola* Khan, *Diglyphus* sp., *Pediobius indicus* Khan and *Euderus agromyzae*) and 2 braconids (*Opius* sp. and *Dacnusa* sp.).

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