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

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Received-02.11.2015, Revised-12.11.2015

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 (Bijjur 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 zickkenella 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 Opius 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.
Table 1. insect-pests of pea

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

Table 2. Natural enemies associated with insect pests of pea

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

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 (Hübner) (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
Ophionymia 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 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 studied 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 pismis (Harris) and semiloopers, Plusta orichalceae (Fab.) and P. eriosoma (D.) were noticed as the major pests of pea whereas, Bijjur 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. Mekhli 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, Neochyrsocharis formosa and Neochyrsocharis 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 (Goureau) (Diptera: Agromyzidae). The various parasitoids recorded were 5 eulophids (Chrysocharis horticola Mani, Diglyphus horticola Khan, Diglyphus sp., Pediobius indicus Khan and Euderus agromyzae) and 2 braconids (Opisus sp. and Dacnusa sp.).

ACKNOWLEDGEMENT

The authors are thankful to the anonymous reviewers for their critical suggestion.

REFERENCES


