

Overview of Insect Pests and Their Impact on Major Cereal Crops of Kashmir

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ABSTRACT

This work incorporates detailed field observations on insect pests associated with major (field) cereal crops of valley of Kashmir. The work has been conducted in different months of 2018-2019. Different Insect pests were observed during the course of work. Some insect pests cause little damage to crops like rice, maize, wheat, mustard etc and these are called minor pests. Some cause severe damage to these crops and are included in major pests. After the completion of survey it was found that most of the insect pests belong to orders Lepidoptera, Orthoptera, Hemiptera and Coleoptera. The most predominant insect pests of these crops observed were cutworms (*Agrotis spp.*), stem borer (*Chilo partellus*), army worm (*Mythima seperata*), grasshoppers (*Oxya nitidula*), green leaf aphid, leaf hopper and rice skipper. The work was carried out in order to have check on most serious insect pests of these crops that are responsible for the decline of productivity and income of the Kashmir. Therefore, the present study was an attempt to observe the potentiality of insect pests such as grasshoppers, stem borers, aphids, cutworms, armyworms, leaf hoppers, caterpillars of the important cash crops viz. rice, maize, wheat and conversely, to have check on their population. Therefore, the present study can form a basis for controlling these pest species in future, when there are likely chances of outbreaks.

KEYWORDS: Lepidoptera, Coleoptera , *Chilo partellus*, *Oxya nitidula*, *Mythima seperata* Kashmir, insect pests

1. INTRODUCTION

Due to unique geographical position and temperate climate, Kashmir offers an ideal environment for research. Surrounded by high chain of mountains (Himalayas) the valley of Kashmir is cut off from Jammu in south and by Ladakh in north while the Pir-Panjal range which encloses the valley from the west and the south, separates it from the great plains of northern India. Since Kashmir is one of the hotspots for agricultural and horticultural practices, the insect pests affect these industries drastically causing great economic losses. Therefore, there is an urgent need to study them. A number of insect pests found here that damage different crops and thus resulting in the decrease in productivity. This causes the economic loss of the valley of Kashmir. Hence different pests are controlled by means of different works and researches. Different insect pests are found on different crops like paddy, maize, wheat, mustard etc that cause less than 5 % damage are not considered as pests. The insects which cause damage between 5 - 10% are called minor pests and those that cause damage above 10% are considered as major pests. In Kashmir, some insect pests like grasshoppers, crickets, armyworms, cutworms, aphids, rice skippers, stem borers are by far the most serious agents of damage to agricultural crops. The major source of income in Kashmir is

agriculture and horticulture, it was therefore suggested that in the present work, a preliminary survey, surveillance of insect pests of some crops has been carried out.

2. MATERIAL AND METHODS

2.1 Study Area: An extensive field surveys for collection of various insect pests of agricultural crops of Kashmir were carried out in different areas of Kashmir. Four sites, site A from central Kashmir (Srinagar), site B from Budgam, site C from Anantnag and site D from Kulgam were selected. The survey was conducted from time to time in both wild and cultivated areas.

2.2 Insect collection: The insects were collected by using different methods. The appropriate time for insect collection was from the 2nd week of April until third week of July. Various insect collection methods employed were hand picking, beating, net sweeping and traps. Many insects were also abundantly collected from different crops by sweeping net, made of heavy white muslin cloth and was used with a sweeping motion to capture insects in crops, grasses or any other type of vegetation. Aerial net was used to collect the insects during flight. The insects were then kept in collection jars, collection tubes, paper bags or polythene bags so as to carry them into laboratory. The rearing cages used during the study were made of wood with a wire mesh above the bottom of cage on which food for the insects was kept. Rearing cages were frequently monitored for emergence of adults. For insect preservation both dry and liquid preservation methods were employed. Dry preservation was mostly carried for adult insects and soft bodied insects like aphids, flies were preserved in 70-75% ethyl alcohol and formalin (4%). Identification of collected specimen were done mostly by considering morphological characters. A number of adult specimens of different insects (both males and females) were examined and morphometrical parameters viz total body length (TBL), antennal length (AL), tegmen length (TL), tegmen width (TW), head length (HL), pronotum length (PL) etc were analyzed . Dry mounts were also prepared for better understanding of certain characters like size, color, texture etc.

3. RESULTS

A no. of insect pests were recorded from different seasons infesting crops like maize ,wheat, rice, mustard etc. The major Insect pests were grasshoppers (*Oxya nitidula*), *Chilo partellus*, *Agrotis Spp.* *Mythimna seperata*. The minor pests recorded were green leaf aphid, hairy caterpillar, leaf hopper, white grub, Rice skipper, damselflies, bihar hairy caterpillar. The major insect pests were mostly reported during the period of April to last week of July. The insect pests observed belonged to different orders mostly from Lepidoptera followed by Coleoptera, Orthoptera and Hemiptera. Table 1 depicts some important insect pests of Kashmir Valley. Figures 1-4 shows distribution of different insect orders at different sites.

3.1 Major Insect Pests

3.1.1 Paddy Grasshopper: Both the nymphs and adults of *Oxya nitidula* the paddy Grasshopper cause damage by eating the leaves leaving behind midrib and stalk intact. These pests were active from May to September.

3.1.2 Cut Worm (*Agrotis Spp.*): Larvae mostly feed on the growing point and result in dead heart.

3.1.3 Stem Borer (*Chilo partellus*): Larvae were seen feeding inside the central whorl resulting in dead heart in the crops mostly found on maize and wheat.

3.1.4 Army Worm (*Mythima seperata*): The larvae feed on foilage, resulting in tattered lamina of leaves. Table 1 depicts different insect pests found during the study.

3.2 Minor Insect pests: These include insect pests that don't cause severe damage to crops. Some of the minor pests found are Green leaf hopper, Sheild bug, Hairy caterpillar, green leaf aphid, maize leaf aphid, rice hispa, rice skippers, and some beetles. Table 2 depicts different insect pests of rice and their damaging stage.

Table 1: Insect pests of different agricultural crops of Kashmir Valley

S no.	Common Name	Scientific Name	Family	Order	Nature Of Damage	Period of Incidence
1	Rice grasshopper	<i>Oxya nitidula</i>	Acrididae	Orthoptera	Both Nymphs and adults cause damage to grains. Leaves are eaten to midrib	2 nd week may- last week june
2	Cutworm	<i>Agrotis spp.</i>	Noctuidae	Lepidoptera	Larvae cut the seedling horizontally	2 nd week april- last week june
3	Armyworm	<i>Mythima seperata</i>	Nocutidae	Lepidoptera	Larvae feed on foliage of plants	2 nd week may- 2 nd week july
4	Green leaf aphid	<i>Rhopalosphum maidis</i>	Aphididae	Hemiptera	Nymphs and adults suck sap from leaves	2 nd week june –ist week sep
5	Leaf hopper	<i>Cicadulina nibula</i>	Cicadellidae	Hemiptera	Nymphs and adults suck sap from leaves	Ist week june -2 nd week july
6	Maize grasshopper	<i>Oxya japonica</i>	Acrididae	Orthoptera	Nymphs and adults cause foliage literally	June 2 nd week-ist week Aug
7	Rice skipper	<i>Parnara guttata</i>	Hesperiidae	Lepidoptera	Caterpillars damage the foliage and also fold leaves longitudinally	2 nd week may- ist week sep
8	Stem borer	<i>Chillo partellus</i>	Pyralidae	Lepidopotera	Larvae feed on plants resulting in dead hearts.	Last week April-2 nd week may

Table 2: Insect Pests of Rice and their damaging stage

Stage	Pests
Nursery	stem borer, gall midge, thrips, root nematode
Vegetative Stage	Stem borer, green leafhopper, <i>Oxya nitidula</i> , rice hispa, cutworm
Reproductive stage	Stem borer, green leaf hopper, grasshoppers, cutworm

**Distributi
on of
different
insect
pests at
different**

collection sites

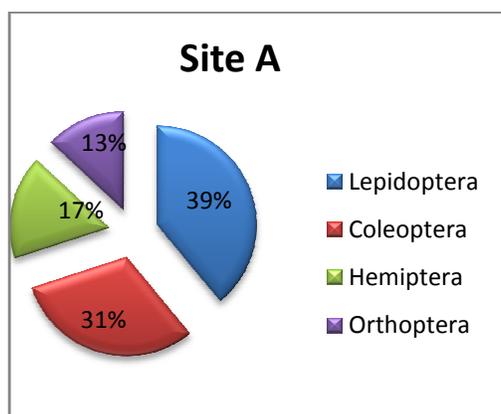


Fig 1

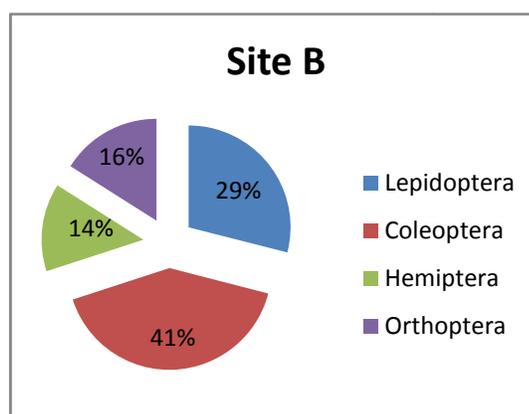


Fig 2

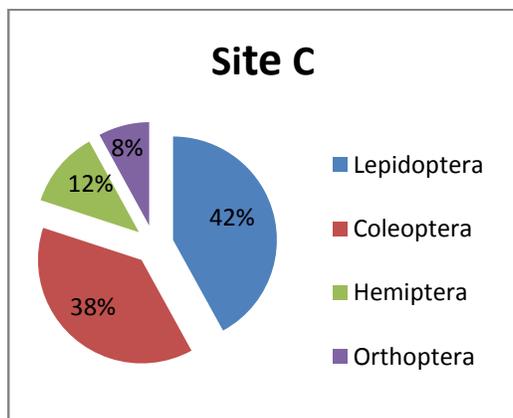


Fig 3

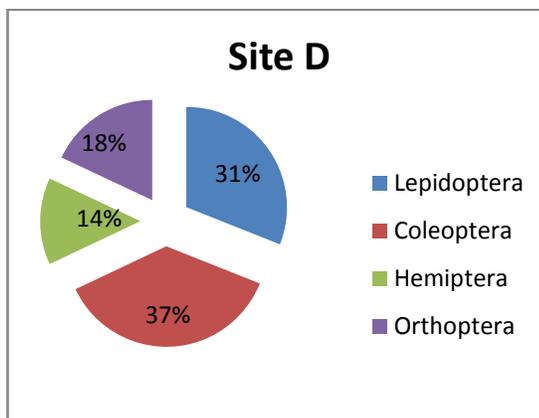


Fig 4

4. Discussion

In Kashmir, different insects were abundantly found in different fields having crops of importance like rice, maize, mustard, wheat and other grasses. The study was carried out for different months (2018-2019) which revealed its abundance from April to July with least population in the months of November and December. A few specimen of some insect species were collected during the months of March and April. Most of the insect pests were collected during the first week of May, the reason for the late emergence of some insects could be attributed to long rainy season during the year 2019. The insects were found in abundance during mid summer and adults during late summer and early autumn. Their abundance was due to availability of optimum ecological conditions particularly temperature, relative humidity and food for their development and other biological activities. Results showed that the population of these insects was recorded almost negligible during the months of January, February, March and April. This was due to non-availability of favourable climatic conditions like temperature and due to lack of food.

Grasshoppers go through five larval instars before becoming adults. Males and females varied in size, the males were smaller than females. Different morphometrical parameters were measured which revealed that males differ significantly from females. The results were in conformity with the results of Suhail *et.al.*, (1994), Ahmad *et.al.*, (2007, 2008) and Usmani *et.al.*, (2012). The adults of *Oxya nitidula* exist in three colour morphs in Kashmir valley, the green morph, the brown morph and the straw coloured morph. Our results were in conformity with the results of Singh (1977) and Roonwal (1977) who also reported the polymorphism in *Oxya nitidula*.

Chillo partellus, is the most destructive pest and its damage reaches upto 75% and sometimes the crop is totally damaged if remains uncontrolled (Latif *et al.*, 1960). The young larvae *Chillo Partellus* feeds on leaves making shot holes and then bore its way through central whorl reaching growing tips of plant. The larval period takes 28-35 days. Diapause termination was found dependent on favourable environmental conditions (Kfir *et al.*, 1991). Males are smaller and darker than females.

Mythimna separata (armyworm) adults are dull yellowish to reddish brown in colour. Eggs are pale cream in colour and are normally laid under leaf sheaths of maize and wheat plants. Caterpillars are up to 40mm when fully grown. Young caterpillars are green while large caterpillars are pale greenish in colour. Female fertility varies from 300-1600 eggs. Moth life span is about 2-3 weeks. The larvae usually pupate along edges and boundaries of fields or along edges of roads. Pupal phase lasts 13-21 days.

Cutworm (*Agrotis ipsilon*) damage crops early when plants are small and have tender issue. Although cutworms are active throughout the summer but are rarely a problem after spring. They cause damage to crops by chewing stems of young plants just above or slightly below the soil line. Cutworm found in Kashmir can climb the stem of plants and thus damaging leaves by eating them.

During the course of present investigation insects that were found on crops mostly belonged to orders Coeloptera, Lepidoptera, Orthoptera and Hemiptera. However other minor insect pests were also found that belonged to order Hymenoptera, Homoptera, and Diptera. The insects belonged to families Acrididae, Noctuidae, Aphididae, Hesperidae, Cicadellidae, Coccinellidae, Cicadidae and Arctiidae. Thus it was found that all insects found were not serious pests but can be a potential pest as at many areas of south Kashmir viz khudwani, Ashmuji and Kokernag damage was recorded more than usual. While other insects like borers, armyworms and cutworms are serious pests of crops. The main affected crops were rice, maize and wheat and mustard. So far no control measures have been applied for these insects in Kashmir valley as its population was found to be regulated by its natural enemies (birds). Also damage done by some insects was not found upto the economic threshold. As mentioned above it can become a potential pest if not regulated.

5. Conclusion

Among the different insect pests recorded the most of them belonged to Lepidoptera, coleoptera, hemiptera and orthoptera in terms of their density and occurrence. Presence of large area with greater plant diversity provides diverse resources that contributed to insect diversity. Favorable climatic conditions and food availability also affects insect diversity on agricultural crops. There should be emphasis on the biological control by using natural enemies of these pests to get efficient results and also restore the ecological balance. In case of severe infestation the chemical control can also be recommended to prevent heavy losses. Plant pest interaction has to be studied in detail to devise different methods so that the pest does not cause losses to the level of economic threshold. The present study revealed that some of these insects studied are not key pests of agricultural crops but has the tendency to become potential pests in near future. So from the present study it can be concluded that major insect pests that damage the crops severely need an effective management strategies and also status of these crops need to be reviewed from time to time.

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