

Full Length Research Paper

# Diversity and distribution of ladybird beetles in District Dir Lower, Pakistan

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**This paper communicates the diversity, distribution and host importance of ladybird beetles collected from District Dir Lower, Pakistan. A survey was conducted in the District Dir Lower over a period of two years. Specimens of coccinellid beetles were collected from Maidan, Jandool, Timergara and Adenzai. Identification of these beetles showed that 14 different species belonging to sub-families Coccinellinae, Chilocorinae, Scymninae and Epilachninae are present in the selected area. Out of 14 species from Dir Lower, two species *Hypraspis rahatiana* and *Cryptogonus faizhanum* were reported for the first time from Pakistan and is therefore, a new addition to Coccinellid fauna of Pakistan.**

**Key words:** Dir Lower, Pakistan, ladybird beetles, fauna.

## INTRODUCTION

Predaceous ladybird beetles (Coleoptera: Coccinellidae) (Latreille, 1807; Hodek and Honek, 1996) occur within the subfamilies *Chilocorinae*, *Coccinellinae*, *Coccidulinae*, *Scymninae*, *Sticholotidinae* whereas the *Epilachninae* are phytophagous. Although subfamilies of the Coccinellidae are more or less worldwide in distribution, many tribes within these subfamilies are restricted to particular biogeographical regions. About 6000 species of Coccinellidae are known worldwide (Vandenberg, 2000) with over 300 species known from the Indo-Pakistan sub-continent (Rahatullah et al., 2010). About 90% of coccinellid species are considered beneficial because of their predatory activity, mainly against homopteran insects and phytophagous mites injurious to various agricultural and forest plants. Some members of Epilachninae are however, serious pests of brinjal and cucurbits in Pakistan. Ladybird beetles undergo complete metamorphosis with distinct egg, larval, pupal and adult stages (Shah, 1985). Their life cycle is completed in one month depending upon location and temperature; two or three generations are generally produced in a year. Adults overwinter in sheltered locations such as tree holes and other natural hiding places (Majerus and

Kearns, 1989). Gilani (1976) reported ten coccinellid species from the Faisalabad, Pakistan. Sasaji (1977) discussed the phylogenetic relationship among *Harmonia* species by the larval characters, between *H. axyridis* and *H. yedoensis*. Inayatullah and Siddiqui (1978) studied the skeletal anatomy of the abdomen of *Coccinella septempunctata* L., *Coccinella undecimpunctata* L. and discussed their taxonomic importance.

Khan et al. (2007) conducted survey of predatory Coccinellids in the Chitral District, Pakistan. Ghani and Mohyiddin (1982) described seven species from Pakistan. Shah (1985) studied the Coccinellids of Peshawar valley and recorded 16 species along with geographical distribution and host plants. Din (2002) described predatory Coccinellid fauna of Chitral. Rafi et al. (2005) reported some species of predatory Coccinellids from Bagh, Sudhnuti and Poonch districts of Azad Jammu Kashmir. Keeping in view in importance of these useful predators, the present studies were conducted to enlist the species of Coccinellidae in Dir Lower.

## The study area

Coccinellidae were collected from the Lower Dir area. District Dir is stretched over an area of 1,582 km<sup>2</sup> of Malakand, lying along the Afghanistan border between

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Chitral and Peshawar. Almost all coccinellid collection areas are administratively controlled by the Lower Dir District, the lower part of River Panjkora which raises high in the Hindu Kush at latitude 35.45 and joins the Swat River near Chakdara which is the main point of entry to the District (latitude 34.40). Dir is a mountainous area with peaks rising to 4876 m in the northeast and to 3048 m along the watersheds with Swat to the East and Afghanistan to the West (Anonymous, 1998; Rahatullah et al., 2010). Our objectives were: 1) document species of Coccinellidae found in the Dir Lower district, 2) record the distribution and seasonal occurrence of the species, 3) create awareness regarding Coccinellidae and their importance.

## MATERIALS AND METHODS

The following strategy was adopted for exploring species diversity and elaborating distribution of the coccinellid species in the District Dir Lower.

### Sample collection

To obtain in-depth knowledge of the general ecology of ladybird beetles, the area was visited frequently during the last quarter of 2007. It was more convincing to divide the study area into four sampling regions, namely, Maidan, Jandool, Timergara and Adenzai tehsils (Table 1). Collection of beetles was done from different parts of these regions during 2008, from early spring to the autumn season. Each locality was visited frequently, bi-weekly, in general till the end of October 2008. A total of 224 plant species were studied for their host importance in different localities. The Coccinellid specimens were collected by hand netting and hand picking from each selected locality. Collected specimens were placed in a killing bottle and then pinned and placed in a collection box. Very small specimens were mounted on points. Each specimen was labeled noting the place of collection, date of collection, collector's name and host plant species.

### Identification

The specimens were identified with the help of available literature and already identified specimens which are preserved in the insect Museum of KP Agricultural University, Peshawar. All the identified specimens were deposited in the Zoological Museum, Hazara University, Mansehra.

### Description

Descriptions of the specimens were made on the visual observation and obviously differentiable traits.

## RESULTS

A total of 510 specimens of coccinellid beetles were collected from four localities within the district. Identification of these beetles revealed 14 different species within 12 genera belonging to subfamilies

Coccinellinae, Chilocorinae, Scymninae and Epilachninae were present in the area. Detailed descriptions of the specimens are provided as follows:

### *Bromoaid saturalis* Fabricius

#### *Distribution and seasonal occurrence*

*Brumoides saturalis* was the most-frequently encountered species collected from each locality; twenty five specimens were collected from Maidan, Jandool and Timergara, and specimens of these species were abundant in September.

#### *Host and importance*

Fifty four plant species were studied for their host's importance in different localities. Among them, these species were abundantly found on *Pyrus malus* feeding on soft bodied nymphs of aphids.

### *Coccinella septempunctata* Linnaeus

#### *Distribution and seasonal occurrence*

These species is widely distributed in the District and was found in all the localities. Thirty specimens were collected from all the selected localities. Highest number (10) was collected from Maidan, Namazkot. Individuals of these species were abundant from May to September. First specimens were collected on 1st April and last were collected on the 27th October.

#### *Host and importance*

Ninety three plant species were studied for their host's importance. Among them, these species were collected from *Zea mays*, *Solanum melongena*, *Lectuca sativa*, *Triticum aestivum*, *Morus alba* and *Brassica compestris*, feeding on *Aphis craccivora* Koch, *Aphis fabae*, *Scopoli* and *Aphis gossypii* Glover.

### *Coccinella transversalis* Fabricius

#### *Distribution and seasonal occurrence*

Seven specimens of these species were collected from Maidan and Jandool. Five specimens were collected in June and two in July. These species appeared in June and was not available after July.

#### *Host and importance*

Thirty nine plant species were studied for their host's

**Table 1.** Total number of specimens collected from different localities.

Name of area	Total number of specimens
Maidan	255
Jandool	160
Timergara	50
Adenzai	45
Total	510

importance. Among them, these species were collected from *Glycine max*, *L. sativa*, *Hibiscus esculentus* and *Prunus domestica* and *Helianthus annuus* feeding on *A. craccivora* Koch, *A. fabae* Scopoli and *A. gossypii* Glover.

### ***Hyraspis rahatiana***

#### ***Distribution and seasonal occurrence***

Fifteen specimens of these species were collected from Maidan in July and August. These species were available in large number in August.

#### ***Host and importance***

Sixty one plant species were studied for their host's importance. Among them, these species were collected from *H. annuus* and *Z. mays*, feeding on *A. craccivora* Koch, *A. fabae* Scopoli and *A. gossypii* Glover.

### ***Hippodamia varigata* Goeze**

#### ***Distribution and seasonal occurrence***

*Hippodamia varigata* were recorded from all localities and 35 specimens were collected. Highest number of 10 was collected from Maidan and Jandool Smarbagh in months of April and May while one was collected in month of August from Timergara. Individuals of this species were abundant from April to June.

#### ***Host and importance***

Seventy plant species were studied for their host's importance. Among lot of species, *H. varigata* were collected from *T. aestivum*, *Brassica compertris* and *Coriandrum sativum* feeding on *Aphidophagous* in nature.

### ***Halyzia tschischerini* Semenov**

#### ***Distribution and seasonal occurrence***

Twenty-five specimens of these species were collected

from Maidan and Jandool. The species was abundant in October. The first specimen was collected in September.

#### ***Host and importance***

Eighty one plant species were studied for their host's importance. Among lot of species, these species were collected from *Dilbergia sisso*, feeding on powdery mildew, also attacks on different species of Aphids.

### ***Harmonia dimidata* Fabricius**

#### ***Distribution and seasonal occurrence***

Ten specimens of these species were collected from Maidan, Jandool, Timergara and Balambat. They were present in large number in September. The first specimen was collected in August.

#### ***Host and importance***

Fifty plant species were studied for their host's importance. Among lot of species, these species were collected from *Dilbergia sisso* and *Z. mays*; feeding on *Adelges sp.* and *A. craccivora* Koch.

### ***Oenopia sauzeti* Mulsant**

#### ***Distribution and seasonal occurrence***

These species were collected in Maidan and Jandool. Ten specimens were collected in April while two in August from Jandool. Individuals of this were available in large number in April.

#### ***Host and importance***

These species were collected from *Z. mays* and an undetermined ornamental plant, feeding on *A. craccivora* Koch, *A. fabae* Scopoli and *A. gossypii* Glover.

### ***Illies confusa* Timberlake**

#### ***Distribution and seasonal occurrence***

Thirty five specimens of these species were collected from two localities Timergara and Adenzai. The first specimen was collected in September. Individuals of this species were available in large number in October.

#### ***Host and importance***

These species were collected from *D. sisso* and an

undetermined ornamental plant Alta; feeding on Aphidophagous in nature.

### ***Menochilus sexmaculata* Fabricius**

#### ***Distribution and seasonal occurrence***

The species is distributed in Maidan, Jandool, Timergara and Adenzai. Thirty specimens were collected from all the localities. Highest number collected was 6 in August and lowest number 2. Individuals of this species were available in large number from July to end of August in Maidan and Jandool, but in Adenzai the beetle was abundant in April.

#### ***Host and importance***

Host plants of this species were *H. annus* and *Z. mays*, an undetermined ornamental plant, feeding on *Adelgids sp. Bemisia tabaci* and *Pyrilla perpusilla*.

### ***Propylea leuteopustulata* Mulsant**

#### ***Distribution and seasonal occurrence***

The species was recorded from all the localities and 15 specimens were collected. Highest number of 5 was collected from Maidan and Jandool in April and May. Lowest number collected was 1 in August from Maidan. Individuals of this species were abundant from April to June.

#### ***Host and importance***

Thirty one plant species were studied for their host's importance. These species were mostly collected from *Triticum aestivum* and *B. compertris*; feeding on aphids, psyllids and whiteflies.

### ***Cryptogonus nepalensis* Bielawski**

#### ***Distribution and seasonal occurrence***

These species were collected from Maidan in June.

#### ***Host and importance***

Seventy plant species were studied for their host's importance. Among lot of species, these species were collected from mot grass; it is in a predator of scale insects.

### ***Cryptogonus faizihanum***

#### ***Distribution and seasonal occurrence***

Fifteen species were collected from Maidan and Jandool in August.

#### ***Host and importance***

Seventy plant species were studied for their host's importance. These species were collected from mot grass; it is a predator of scale insects.

### ***Epilachna sp.* Linnaeus**

#### ***Distribution and seasonal occurrence***

Twelve specimens of these species were collected from two localities Jandool and Adenzai. These species were available in large numbers in July. The first specimen was collected in May and the last specimen was collected in July.

#### ***Host and importance***

Host plants of this species were *Z. mays*, *T. aestivum* and *Solenum tuberosum*. It is phytophagous in nature.

## **DISCUSSION**

During the present study, 14 species from 12 genera belonging to sub families Coccinellinae, Chilocorinae, Scyninae and Epilachninae were collected from the Dir Lower district. *B. saturalis* were collected from all localities. The species were most abundantly found on *P. malus* feeding on soft bodied nymphs of aphids. A total of 50 specimens of *Coccinellina septempunctata* L. were collected from all localities. This species was previously reported by Irshad (2001), (Tables 2 and 3) Rehman et al. (1960), Gilani (1976), Gilani and Mohyuddin (1982), Ahmad et al. (1999), Shah (1985) from Pakistan. It was collected from a large number of plants including *Z. mays*, *Hibiscus esculentus*, *S. melongena*, *L. sativa* and *G. max* etc. *Coccinellina transversalis* was also collected from Maidan and Jandool. It was reported by Gilani (1976), Shah (1985) and Irshad (2001). The species was collected from *G. max*, *L. sativa*, *H. esculentus* and *P. domestica*. Five specimens of *C. transversalis* were collected from *H. annus* in Maidan. *Hyperaspis rahatiana* was also collected from Maidan. This species were reported for the first time from Pakistan and is a new addition to *Coccinellidea fauna* of Pakistan. The host plants of the species were *Z. mays* and *H. annus*. *H. varigata* was reported with 12 specimens from Jandool,

**Table 2.** List of total number of species collected from different localities.

Maidan	Jandool	Timergara	Adenzai
<i>Brumoides saturalis</i>	<i>B. saturalis</i>	<i>B. saturalis</i>	<i>B. saturalis</i>
<i>Coccinella septempunctata</i>	<i>C. septempunctata</i>	<i>C. septempunctata</i>	<i>C. septempunctata</i>
<i>Coccinella transversalis</i>	<i>Coccinella transversalis</i>	-	-
<i>Hyperaspis rahatiana</i>	-	-	-
<i>Hippodamia varigata</i>	<i>H. varigata</i>	<i>H. varigata</i>	<i>H. varigata</i>
<i>Halyzia tschitscherini</i>	<i>H. tschitscherini</i>	-	-
<i>Harmonia dimidata</i>	<i>H. dimidata</i>	<i>H. dimidata</i>	<i>H. dimidata</i>
<i>Oenopia sauzeti</i>	<i>Oenopia sauzeti</i>	-	-
-	-	<i>Illeis confusa</i>	<i>Illeis confuse</i>
<i>Menochilus sexmaculata</i>	<i>M. sexmaculata</i>	<i>M. sexmaculata</i>	<i>M. sexmaculata</i>
<i>Propylea leuteopustulata</i>	<i>P. leuteopustulata</i>	<i>P. leuteopustulata</i>	<i>P. leuteopustulata</i>
<i>Cryptogonus nepalensis</i>	-	-	-
<i>Cryptogonus faizihanum</i>	<i>C. faizihanum</i>	-	-
-	<i>Epilachna sp.</i>	-	<i>Epilachna sp.</i>

**Table 3.** Coccinellids and their host plant relationships.

Name of species	Host plant	Season of collection
<i>Brumoides saturalis</i>	<i>Pyrus malus</i>	September
<i>Coccinella septempunctata</i>	<i>Z. mays</i> , <i>S. melongena</i> , <i>L. sativa</i> , <i>T. aestivum</i> , <i>M. alba</i> and <i>B. compestris</i>	April - October
<i>Coccinella transversalis</i>	<i>T. aestivum</i> , <i>H. annus</i> , <i>M. alba</i> and <i>B. compestris</i>	June - July
<i>Hyperaspis rahatiana</i>	<i>Z. mays</i> and <i>H. annus</i>	July-August
<i>Hippodamia varigata</i>	<i>T. aestivum</i> , <i>B. compestris</i> and <i>C. sativum</i> .	April- August
<i>Halyzia tschitscherini</i>	<i>D. sisso</i>	September-October
<i>Harmonia dimidiata</i>	<i>Z. mays</i> and <i>D. sisso</i>	August-September
<i>Oenopia sauzeti</i>	<i>Z. mays</i> and other ornamental plants	April- August
<i>Illeis confuse</i>	<i>D. sisso</i>	September-October
<i>Menochilus sexmaculata</i>	<i>H. annus</i> , <i>Z. mays</i> and other ornamental plants	April- August
<i>Propylea leuteopustulata</i>	<i>T. aestivum</i> and <i>B. compertris</i>	April- June
<i>Cryptogonus nepalensis</i>	Mot grass	June
<i>Cryptogonus faizihanum</i>	Mot grass	August
<i>Epilachna sp.</i>	<i>Z. mays</i> , <i>T. aestivum</i> and <i>S. tuberosum</i>	May-July

20 specimens from Maidan, 4 specimens from Timergara and 3 specimens from Adenzai. *H. variegata* was reported by Gilani (1976), Shah (1985) and Irshad (2001) from Pakistan. The species was collected from wide range of host plants including *T. aestivum*, *Brassica compestris* and *Coriandum sativum* feeding on *Aphidophagous* in nature. *Halyzia tschitscherini* was collected from Maidan and Jandool from *D. sisso* feeding on powdery mildew, also attacks on different species of Aphids. *Harmonia dimidata* were found in all localities. These species were collected from *D. sisso* and *Zea mays*; feeding on *Adelges* sp. and *A. craccivora* Koch. *Oenopia sauzeti* was collected from Maidan and Jandool. Host plants of these species were *Z. mays*, *H. annus*, an undetermined ornamental plant feeding on *A. craccivora*

Koch, *A. fabae* Scopoli and *A. gossypii* Glover. *Illeis confusa* was collected from Timergara and Adenzai. This species was collected from *D. sisso*.

*Menochilus sexmaculata* was recorded from all localities. Total 35 specimens were collected. Previously it was reported by Shah (1885) from Peshawar, Pakistan. It was collected from *H. annus*, *Z. mays*, *H. esculentus* and *P. domestica* feeding on *Adelgids* sp. *B. tabaci* and *P. perpusilla*. *P. leuteopustulata* were recorded from all localities. These species were collected from *Triticum aestivu* and *B. compertris*; feeding on aphids, psyllids and whiteflies. *Cryptogonus nepalensis* was rarely distributed in Maidan and collected from mot grass. *Cryptogonus faizihanum* was collected with two adults from Maidan and Jandool. The host plants of this species were mot

grass. *C. faizihanum* was reported for the first time from Pakistan. *Epilachna* sp. was collected from Jandool and Adenzai. Species of subfamily Epilachninae were reported by Ghani and Mohyuddin (1982) from Pakistan. Shah (1985) reported species of the subfamily from Peshawar valley. These species were collected from *Z. mays*, *T. aestivum* and *S. tuberosum*. It is phytophagous in nature. Among the fourteen species recorded in the present study from Dir Lower, *H. rahatiana* and *C. faizihanum* species were reported for the first time from Pakistan (Table 2).

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