

New Additions of Coccinellid Beetles (Coleoptera: Coccinellidae) to the already reported Species from Uttarakhand, India.

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Abstract: A survey on Coccinellid beetles (Coleoptera: Coccinellidae) were determined in fruit orchards and oak forest of Nainital district, Uttarakhand. This study yielded 23 coccinellid species, belonging to 16 genera; 5 tribes and 5 sub families. Of these recorded species, eight species viz., *Chilocorus infernalis* (Mulsant), *Oenopia kirbyii* (Mulsant), *Adalia tetraspilota* (Hope), *Micraspis univittata* (Hope), *Harmonia eucharis* (Mulsant), *Solanophila* spp., *Scymnus saciformis* (Mots.) *Telsimia bangalorensis* (Kapur) were recorded for the first time from Uttarakhand. [Joshi P. C., Khamashon L., Kaushal B. R. and Kishore Kumar. **New Additions of Coccinellid Beetles (Coleoptera: Coccinellidae) to the already reported Species from Uttarakhand, India.** Nat Sci 2012; 10(6):26-30]. (ISSN: 1545-0740). <http://www.sciencepub.net/nature.6>

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Introduction

The predatory insects include flies, midges, beetles, true bugs, lacewings, and wasps. Majority species of coccinellid are predaceous in nature feeding on small insects. The family which the lady beetles belong, the coccinellidae, is extremely diverse in their habitat. They inhabit in all types of terrestrial ecosystems. They are one of the most important group of the natural predatory or enemy complex of many horticultural and agricultural crop pests such as scale insects, mealy bugs, aphids, mites (Dixon, 2000; Omkar and Pervez, 2000), and leaf hoppers. Coccinellid beetles play an important role in checking population of many small insect pests. Hawkeswood (1987) reported about 5200 species of coccinellid worldwide. While Booth and Pope (1989), reported about 4500 species of coccinellid, with 330 genera are distributed across the world. 400 species under 79 genera of coccinellid beetles were recorded from Indian sub-continent (Poorani, 2002). The coccinellid diversity of Uttarakhand is rich but study on taxonomy is far lacking. The knowledge of their habitat and diversity will benefit in identifying the predators and eventually use as biocontrol agents.

Materials and Methods

Study area

The present study was carried out in Nainital district, Uttarakhand, India. District Nainital is a unique district of Kumaun region having tropical type, subtropical type, temperate, sub alpine and alpine zones in its lap. On one side the Tarai & Bhabhar belt contains the climate resembling with plain areas on the other the hilly terrain having an

elevation up to 3500 Metres. It is situated between 29°26' to 29°30' N latitude and 79°37' to 79°41' E longitude. Four study sites were selected to conduct this research viz.,

Site I

The first site is at Ramnagar (29°23'40" N latitude and 79°08'30" E longitude; 340-359m altitude). The site is about 2 km away from the main town of Ramnagar. The selected site is a mixed orchard of litchi (*Litchi chinensis*) and mango (*Mangifera indica*). Ground vegetation is covered with grasses and herbs no tree other than mango and litchi were found in side the orchard.

Site II

This site is at Bhowali (29°22'97" N latitude and 79°3'45" E longitudes; 1654-1702 m altitude). The sampling site is about 2 km away from Bhowali. The orchard comprises of peach, lemon and plum. The available space is used for agricultural purposes.

Site III

The site is at village Dhagakhhet (29°20'873" N latitude and 79°28'863" E longitude; 1167-1204 m altitude). It is around 22 km away from Nainital. The selected mixed orchard comprises of mango (*Mangifera indica*), lemon (*Citrus*), guava, pear (*Pyrus communis*). Apart from these, the available space is used in agricultural purposes.

Site IV

This site is at Nainital (29° 23' 57'' N latitude and 79° 27' 79'' E longitudes; 2016 m altitude). The sampling site is a forest ecosystem predominantly of *Quercus leucotrichophora* and *Quercus floribunda*. Apart from these two species of trees other inhabitants of the sampling site include *Rhododendron arborium*, *Ilex*, *Cedrus deodara*. Shrubs and herbs occupy the undergrowth. No cultivation is found in and in the vicinity of the sampling site.

Sampling method

Sampling of coccinellid beetles was conducted at regular interval. Sampling techniques that provide accurate assessment of coccinellid density are critical for evaluation and it include dislodgement (sweep net), passive collection (trap) or visual estimation. Methods to sample coccinellids have been evaluated in numerous systems and the preferred techniques vary with habitat and species (Elliott and Michels, 1997). Frazer (1988) reported that accurate estimation of coccinellid densities is difficult and errors in sampling may underestimate their densities by a factor of 10. Hand picking method was used for collection of coccinellids (Jonathan, 1995). The sampling was carried out at random and at an interval of 30 days. Collection of coccinellid beetles was conducted from May 2009 to April 2011.

Preservation and Identification of Collected Specimen

The collected insects were transferred into air tight jars containing ethyl acetate soaked cotton. These jars were then brought to the laboratory and the insects were stretched and pinned with entomological pin. These were oven dried at 60° C for 72 hours to preserve them. The insects were set into wooden boxes and labeled them according to their systematic position. The adult specimens of each species were carefully studied under binocular microscope. The insect were separated into different species with the help of available keys. Each coccinellid species collected from the study sites was also described morphologically on the basis of its appearance with the help of available keys (Omkar and Bind, 1993; 1995; 1996; Omkar and Pervez, 1996; 2000; Poorani, 2002). The insects, which could not be identified in the laboratory, were sent to Entomological Section of Forest research Institute (FRI), Dehradun.

Results

Floristic composition

Maximum plant diversity was recorded from site (III) with 37 plants followed by Site (II) with 33 species and Site (I) with 32 plant species. Least

number of plants was recorded from site one with 26 plant species. The highest number of plants was recorded during rainy season.

Taxonomic composition

A total 1870 individuals belonging to 23 distinct confirmed species; 16 genera; 5 tribes and 5 sub families were recorded from four different study sites of district Nainital, Uttarakhand. 14 species were recorded from Site II; 13 species from site (IV) while other two sites contributed 12 species each. Out of these 23 species, 8 species were recorded for the first time in Uttarakhand. Of all recorded species, *Coccinella septumpunctata*, *Coccinella septumpunctata* var *divaricata*, *Hippodamia variegata*, *Cheilomenes sexmaculata* were the most common species and were found in all study sites. *Oenopia kirbyii* was recorded from three sites while *coccinella transversalis*, *Propylea dissecta*, *Adalia tetraspilota*, *Anegleis cardoni*, *Micraspis discolor*, *Micraspis univittata*, *Harmonia eucharis*, *Illeis indica*, *Solanophila* spp., *Scymnus saciformis* and *Telsiminia bangalorensis* were recorded from two sites. The rest including *Chilocorus infernalis*, *Chilocorus nigritus*, *Oenopia sauzeti*, *Harmonia dimittata*, and *Epilachna vigintipunctata* were the least common species and only found in one site each.

Descriptions of those new additions are given below:

Chilocorus infernalis (Mulsant)

The adult *Chilocorus infernalis* round in shape and measures about 4.5 -5.0mm and 3.5 – 4.0 mm in length and width respectively. The elytra of this species is black in colour with two red spots on the middle of each elytron. The entire head and thorax are black in colour. Head bears a pair of black eyes and a pair antenna.

Oenopia Kirbyii (Mulsant)

This insect is round; medium sized about 4.0 – 4.5 mm and 3.2 -3.6 mm in length and width respectively. The head bears a pair of small black eye and antenna. The pronotum is black in colour. The whole margin of the elytra is black in colour, two black spot each are present in each elytra and are surrounded by a light colour region.

Adalia tetraspilota (Hope)

Adalia tetraspilota (Hope) is a medium sized lady beetle, measuring about 4.0 – 4.5 mm in length and 3.5 – 4.0 mm in width. The colour of the elytra is red with one or two or sometimes with three black spot in the middle of each elytra. The pronotum black in colour with white margin. The adults feed on small insects like mealy bug, aphids etc. This insect was collected from peach orchard.

Micraspis univittata (Hope)

Micraspis univittata is a rounded shaped medium sized beetle measuring about 4.5 – 5.00 mm and 3.4-3.8 mm in length and width respectively. The body is creamish yellowish. Head bears two prominent eyes and a pair of antennae. Two dark red spots are visible in the middle of pronotum. Two black lines originated from the posterior end of thorax region and continues as marginal lining along the inner part of each elytron. The whole margin is black in colour. One black horizontal strip is present in each elytron.

Harmonia eucharis (Mulsant)

The adult *Harmonia eucharis* measures about 7.0 – 7.50 mm and 6.6 – 7.0 mm in length and width respectively. The elytra of this species are of

varied colours. Some individuals possess as multiple black spot while others with many white spots on red coloured elytra. Other individuals do not possess black spot on the elytra while, some individuals possess two or three spots on each elytron.

Solanophila spp.

Adult *Solanophila* is a large size oval shaped measuring about 5.5 -6.0 mm to 5.0 mm in length and width respectively. The individuals may have varied body colours. Some may be yellowish with many black spots on the elytra, others with green elytra and may have few to many black spots. The pronotum however possesses two black spots in all individuals.

Table. 1. Taxonomic composition of coccinellid beetles recorded from different study sites of Nainital district, Uttarakhand during 2009 - 2011

S. No	Coccinellidae species	SITE I	SITE II	SITE III	SITE IV
(A)	Subfamily: Chilocorinae				
(I)	Tribe: Chilcorini				
1	<i>Chilocorus infernalis</i> (Mulsant)*	-	-	-	+
2	<i>Chilocorus nigrinus</i> (Fabr.)	-	-	-	+
(B)	Subfamily: Coccinellinae				
(II)	Tribe: Coccinellini				
3	<i>Coccinella septumpunctata</i> (Linn.)	+	+	+	+
4	<i>C. septumpunctata var divericata</i> (Olivier)	+	+	+	+
5	<i>Coccinella Tansversalis</i> (Fabricius)	-	+	+	-
6	<i>Propylea dissecta</i> (Mulsant)	+	+	+	-
7	<i>Oenopia kirbyi</i> (Mulsant)*	-	+	+	+
8	<i>Oenopia sauzeti</i> (Mulsant)	-	-	+	-
9	<i>Hippodamia variegata</i> (Goeze)	+	+	+	+
10	<i>Adalia decempunctata</i> (Hope)	-	+	-	+
11	<i>Adalia tetraspilota</i> (Hope)*	-	+	-	+
12	<i>Aneleis cardoni</i> (Weise)	+	-	+	-
13	<i>Micraspis discolor</i> (Fabricius)	+	-	+	-
14	<i>Micraspis univittata</i> (Hope)*	+	-	+	-
15	<i>Cheilomenes sexmaculata</i> (Fabricius)	+	+	+	+
16	<i>Harmonia dimidiata</i> (Fabricius)	-	+	-	-
17	<i>Harmonia eucharis</i> (Mulsant)*	-	+	-	+
18	<i>Phrynocaria unicolor</i> (Fabricius)	+	-	-	-
19	<i>Illeis indica</i> (Tim.)	+	-	+	-
(C)	Subfamily: Epilachnae				
(III)	Tribe: Epilachnini				
20	<i>Epilachna vigintioctopunctata</i> (Chevrolat)	+	-	-	-
21	<i>Solanophila spp</i> *	-	+	-	+
(D)	Subfamily : Scymninae				
(IV)	Tribe Scymnini				
22	<i>Scymnus saciformis</i> (Mots.)*	-	+	-	+
(E)	Subfamily Chilocorinae				
(V)	Tribe Telsimiini				
23	<i>Telsiminia bangalorensis</i> (Kapur)*	-	+	-	+

(* indicates new records)

Scymnus saciformis (Mots.)

Scymnus saciformis (Mots.) is an oval shaped small lady bird beetle measuring about 2 mm and 1.2 mm in length and width across the mid elytra. The head is reddish in colour but the eyes are greenish black in colour. Pronotum is greenish black in colour. The elytra are also greenish black in colour but the posterior margin is red in colour. The legs are also red in colour.

Telsimonia bangalorensis (Kapur)

Telsimonia bangalorensis is an oval shaped small lady bird beetle measuring about 2.2 mm and 1.4 mm in length and width across the mid elytra. The whole body is bluish black in colour. The head possess two prominent eyes and two antennae. The whole body is covered with small hairy stuff.

Discussion

15 species viz., *Chilocorus nigritus*, *Coccinella septempunctata*, *Coccinella septempunctata* var *divaricata*, *Coccinella transversalis*, *Oenopia sauzeti*, *Propylea dissecta*, *Hippodamia variegata*, *Adalia decempunctata*, *Harmonia dimitiata*, *Anegleis cardoni*, *Micraspis discolor*, *Cheilomenes sexmaculata*, *Phrynocaria unicolor*, *Illeis indica*, and *Epilachna vigisntiopunctata* were already reported from other parts of the Uttarakhand state (Joshi and Sharma, 2008; Sharma and Joshi, 2010; Joshi *et al.*, 2010). However, *Chilocorus infernalis*, *Oenopia kirbyii*, *Adalia tetraspilota*, *Micraspis univittata*, *Harmonia eucharis*, *Solanophila* spp., *Scymnus saciformis* *Telsimonia bangalorensis* were recorded for the first time from Nainital district, Uttarakhand. Bhagat and Masoodi (1988) reported *Adalia tetraspilota* from Kashmir. Earlier investigations on coccinellid beetles in Uttarakhand reported 34 species (Sharma, 2008). A total of 31 species belonging to 20 genera; 5 tribes and 4 sub families were recorded from Haridwar district, (Joshi and Sharma, 2008) while, 25 species belonging to 15 genera; 5 tribes and 4 sub families from Dehradun district, (Sharma and Joshi, 2010), and 21 species belonging to 12 genera; 3 tribes and 3 sub families from Pauri Garhwal district (Joshi *et al.*, 2010). Kapur (1948) described 12 new species of Coccinellid beetles and revised the genus *Rodolia* by adding three new species from India. Puttarudriah and Channbasavanna (1953) reported 53 species belonging to 23 genera; 8 tribes and 5 sub families from Mysore. Canepari (1986) reported 36 species of coccinellid beetles from Northern India and Nepal. Sathe and Bhosale (2001) reported 21 predatory coccinellid beetles feeding on aphids and several other soft bodied homopterous insects from Maharashtra, India. Sharma *et al.* (2011) reported 8 species coccinellid beetles from Bijnore district, Uttar

Pradesh. Bista and Omkar (2011) reported 7 species of ladybirds including *Micraspis univittata* from Kanchanpur, Nepal.

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