Coccinellids are among the most familiar beetles and known variously as ladybirds (English English, Australian English, and South African English), ladybugs (North American English) or lady beetles (preferred by scientists). The family name comes from its type genus, Coccinella. They belong to the family Coccinellidae, which is a well-known beetle family, worldwide distributed (Vandenberg, 2002). Most of them are of bright shining colors with a pattern of spots or patches against a contrasting background. Many appear to be distasteful to birds and their conspicuous appearance is an example of warning coloration (Moreton, 1969). These are small to medium size beetles with an oval, oblong or hemispheral body shape (Majerus, 1994). Numerous species of coccinellids are major biological agents of pests such as aphids, mealybugs, scale insects, thrips and mites in all parts of the world. Some are specific in their food choice, while many are polyphagous (Moreton, 1969; Hawkeswood, 1987; Majerus, 1994 and Dixon, 2000).

The richness and variety of a natural community can be described as "diversity", whereas the ratio between number of species and importance value of individuals is called species diversity indices of the total number of species (Odum, 1971). In a community, a relatively small percentage of the organisms are usually abundant and they have large importance value, whereas large percentages are rare and have small importance value. The family Coccinellidae comprises 5,200 described species worldwide (Hawkeswood, 1987). Khan et al., (2007) have recorded 12 species of coccinellid beetles from Chitral district, Pakistan. Poorani (2002) have listed 400 species of coccinellids from Indian subregion, which includes the erstwhile state of Uttar Pradesh including Uttarakhand. The coccinellid fauna of the Indian subcontinent is rich and diverse, but very poorly studied as compared to those from other zoogeographical regions of the world. The objective of this study was to investigate the morphological and taxonomical descriptions of Micraspis discolor (Fabricious), Micraspis vincta (Gorham) and Micraspis sp. (Coleoptera: Coccinellidae) reported from different study sites of district Haridwar, (Uttarakhand), India.

**Key words:** Ladybirds, Morphological, Taxonomical, Micraspis discolor, Micraspis vincta

Present study was carried out to know the distributional pattern, morphological and taxonomical descriptions of Micraspis discolor (Fabricious), Micraspis vincta (Gorham) and Micraspis sp. (Coleoptera: Coccinellidae) from different study sites of district Haridwar, (Uttarakhand), India. From above study, it was observed that among all species, Micraspis discolor (Fabricious) is the dominant species and distributed in all sites of district Haridwar. It was also observed that the adult beetle Micraspis discolor (Fab.) is about 4.5 mm in length and 3.0 mm in width. The color of elytra is yellowish red with small rounded black spots on each elytron: one toward the proximal end and the other toward the distal end. Micraspis vincta (Gor.) is an oval ladybeetle, measuring about 4.5-5.0 mm in length and 3.5-4.0 mm in width. Micraspis sp. is medium sized beetle, about 4.2 mm in length and 3.0 mm in width across the middle elytra. The specimens of Micraspis sp. do not bear spots over elytra and thus are distinctly different from the other species of genus Micraspis viz., M. discolor and M. vincta.

**MATERIALS AND METHODS**

**Study Area:** The coccinellids were collected from different four sites representing mixed orchards, agriculture, garden and forest ecosystem of the Haridwar district. The study area shows three distinct seasons winter, summer and monsoon. During our study period, 1034.65 mm rainfall was recorded during monsoon season.

**Sampling and Preservation of Insects:** Sampling of coccinellid beetles were conducted at an interval of 30 days.
from July 2005 to June 2007. The insects were collected by visual hand picking method. The collected insects were transferred into jars containing ethyl acetate soaked cotton. These jars were brought to the laboratory and the insects were stretched and pinned. These jars were brought to the laboratory and the insects were stretched and pinned. These were oven dried at 60 °C for 72 hours in order to preserve them and then set into wooden boxes and labeled according to their systematic position. Each specimen was tagged with the information about host plants, locality and date. The adult specimens of each species were carefully studied for all details under binocular microscope. The insects were separated into different species with the help of available keys.

**Morphometric parameters:** The adult insects (male and female) were selected randomly and measured for their length and width on a micrometer under microscope. The adults measured from head to end of abdomen, by the help of micrometer (Mari et al., 2004).

**RESULTS AND DISCUSSION**

Present study was carried out to know the distributional pattern, morphological and taxonomical descriptions of *Micraspis discolor* (Fabricius), *Micraspis vincta* (Gorham) and *Micraspis sp.* (Coleoptera: Coccinellidae) reported from different study sites of district Haridwar, (Uttarakhand), India.

(i) **Distributional Pattern of ladybeetle**

*Micraspis discolor* (Fabricius) is collected from all four sites/ ecosystems viz., mixed orchards, agriculture, garden and forest ecosystem. *Micraspis vincta* (Gorham) is collected from three ecosystems viz., mixed orchards, agriculture and garden ecosystem. While, *Micraspis sp.* (Coleoptera: Coccinellidae) is collected only from two sites viz., agriculture and garden ecosystem of district Haridwar, (Uttarakhand), India. From above study, it is observed that among all species, *Micraspis discolor* (Fabricius) is the dominant species and distributed in all sites of district Haridwar (Table-1).

(ii) **Morphological Descriptions of ladybeetle**

The detailed Morphological Descriptions of ladybeetles are as follows (Table-2).

1. *Micraspis (=Verania) discolor* (Fabricius)

   It is an oval ladybeetle, measuring about 4.5 mm in length and

**Table 1: Distributional pattern of genus Micraspis in different ecosystems of district Haridwar during 2005-07.**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Coccinellidae Species</th>
<th>District – Haridwar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>S-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Subfamily: COCCINELLINAE</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td><em>Micraspis discolor</em> (Fabricius)</td>
<td>+</td>
</tr>
<tr>
<td>2.</td>
<td><em>Micraspis vincta</em> (Gorham)</td>
<td>+</td>
</tr>
<tr>
<td>3.</td>
<td><em>Micraspis sp.</em></td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>10</td>
</tr>
</tbody>
</table>

S-1 = Site no. 1 (Mixed orchards), S-2 = Site no. 2 (Agricultural Field), S-3 = Site no. 3 (Garden), S-4 = Site no. 4 (Forests)

+ = Species present - = Species absent

**Table 2: Morphological Descriptions of genus Micraspis in different ecosystems of district Haridwar during 2005-07.**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Coccinellidae Species</th>
<th>Length (in mm)</th>
<th>Width (in mm)</th>
<th>Body Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Subfamily: COCCINELLINAE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tribe Coccinellini</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td><em>Micraspis discolor</em> (Fabricius)</td>
<td>4.5</td>
<td>3.0</td>
<td>It is an oval ladybeetle. The color of elytra is yellowish red with small rounded black spots on each elytron.</td>
</tr>
<tr>
<td>2.</td>
<td><em>Micraspis vincta</em> (Gorham)</td>
<td>4.5-5.0</td>
<td>3.5 - 4.0</td>
<td>It is an oval ladybeetle. The creamish white pronotum bears distinct black patches.</td>
</tr>
<tr>
<td>3.</td>
<td><em>Micraspis sp.</em></td>
<td>4.2</td>
<td>3.0</td>
<td>Medium sized beetle. The head is brown in colour with a pair of prominent black eyes. The elytra are reddish brown and bear tiny silky hairs all over.</td>
</tr>
</tbody>
</table>
3.0 mm in width. The color of elytra is yellowish red with small rounded black spots on each elytron: one toward the proximal end and the other toward the distal end.

2. *Micraspis vincta* (Gorham)
It is an oval ladybeetle, measuring about 4.5-5.0 mm in length and 3.5-4.0 mm in width. The creamish white pronotum bears distinct black patches; two dot shaped patches toward the proximal end and two almost triangular towards the distal end. There is a triangular curved line, almost across the mid-dorsal line on each red coloured elytron, starting approximately from proximal end and continuing up to the distal end. It has a close morphological resemblance with *Micraspis discolor* (Fabricius) with respect to the patches over pronotum and colour of elytra.

3. *Micraspis* sp.
It is medium sized beetle, about 4.2 mm in length and 3.0 mm in width across the middle elytra. The head is brown in colour with a pair of prominent black eyes. The elytra are reddish brown and bear tiny silky hairs all over. The specimens of *Micraspis* sp. do not bear spots over elytra and thus are distinctly different from the other species of genus *Micraspis* viz., *M. discolor* and *M. vincta*.

(ii) Taxonomic Descriptions of Coccinellids

**Genus: Micraspis** Chevrolat, in Dejean, 1836 (Canepari, 1990; Pope, 1992)


(1) *Micraspis discolor* (Fabricius)*:
*Coccinella* discolor Fabricius, 1798: 77 (Type depository unknown).


*Coccinella simplex* Thunberg, 1820: 363 (lectotype; UU).- Korschefsky, 1932: 582 (as species incerta sedis).- Synonymised and lectotype designated by Pope, 1987: 64.

**Distribution:** India, Bangladesh, Sri Lanka, Pakistan.

*Note: Indian discolor and Chinese/ Japanese discolor are two different species (R.G. Booth, in litt.).

(2.) *Micraspis vincta* (Gorham):
*Verania vincta* Gorham, 1895: 686 (BMNH).


**Distribution:** India (AS, BI, MA, TN, AP, KA), Nepal, Bangladesh, Myanmar, Thailand.

(3.) *Micraspis* sp:

**Distribution:** India.

A survey of the available literature revealed only a few studies on the species composition, morphology and taxonomy of coccinellid beetles in India particularly from Uttarakhand State.
However, Omkar and Bind (1993) have reported 6 species of coccinellids from Lucknow region of Central U.P. Joshi & Sharma (2008) have reported 31 species of coccinellid beetles from district Haridwar with 19 new records. Sharma (2015) observed morphological and taxonomical description of Coccinella septumpunctata recorded from Dehradun district. Sharma (2017) also observed morphological and taxonomical description of Coccinella septumpunctata recorded from Dehradun district.

The management of insect pests rarely relies on a single control practice, usually a variety of tactics are integrated to maintain pests at economic threshold levels. The goal of integrated Pest Management is not to eradicate but to control the pest population, since the availability of pests below the economical threshold level is essential to maintain natural enemy population remains in the crop. The chances of disturbances in agriculture ecosystem are high, because it is a target of a lot of pesticides that also affect the non-target fauna of that ecosystem. Any change and interference may cause the migration or disappearance of coccinellids species. As a result, the size of coccinellid community may be reduced.

The findings thus suggests that among all species, Micraspis discolor (Fabricious) is the dominant species and distributed in all sites of district Haridwar. The specimens of Micraspis sp. do not bear spots over elytra and thus are distinctly different from the other species of genus Micraspis viz., M. discolor and M. vincta. This study provides the detailed information about the distribution, morphological and taxonomical descriptions of Micraspis discolor, Micraspis vincta and Micraspis sp. This study may be useful in identification of biocontrol agents for effective management of aphids under field conditions. Further, detailed survey is needed on those areas that were not covered in this study to fully explore predatory and phytophagous coccinellids fauna of district Haridwar.

ACKNOWLEDGEMENTS

We would like to express our gratitude to Prof. B.D. Joshi, Ex-Head Department of Zoology and Environmental science, Gurukul Kangri University, Haridwar, India, for giving valuable suggestions. We are highly thankful to Dr. V.V. Ramamurthy, Principal Scientist, Division of Entomology, I.A.R.I., New Delhi and Dr. J. Poorani, Principal Scientist, Bangalore, India for helping in taxonomic identification.

REFERENCES