

Diversity of cereal crop pest associated Coccinellid beetles from agro-ecosystem of Kolhapur district, Maharashtra, India.

A. R. Bhusnar
B.

Yashwantrao Chavan Warana Mahavidyalaya, Warananagar.

Abstract

The diversity of Coccinellid beetles in the cereal crop ecosystems of the Kolhapur district has been studied from August 2020 to February 2022. Morphological taxonomy was observed to study diversity of Coccinellid beetles. They were highly diversified group of beetles with variety of colours. Coccinellid beetles are effective biocontrol agents of cell sap-sucking pests. A total of 9 species of ladybird beetles belonging to 6 genera were reported from the Kolhapur district of Maharashtra, all reported species are highly adapted to the climatic condition of Kolhapur. All of them are found predatory; observed on different cereal crops feeding on different small insects.

Key word: Coccinellid, Diversity, Lady bird beetle, Cereal, Ecosystem.

Introduction

The Coccinellid beetles are important biocontrol agents of cell sap-sucking pests, both adults and larvae suppress the pest population below the economic level of damage. In India, Chemical pesticides are widely used for pest control, which kills biocontrol agents and causes extensive damage to the environment, and also reduces the quality of grains. Improving crop yield by using fertilizers and pesticides resulted in contamination and disturbance in natural ecosystems, ultimately harming biodiversity and community health (Hughes *et. al.*, 2002). Considering its importance, many researchers have tried to find its biodiversity. Biodiversity is a highly valuable natural resource; it gives information regarding the current status of species evolution, species richness, species abundance, etc. The life cycle of Coccinellid beetles is completed on average in one month. They are undergoing complete metamorphosis with distinct egg, larval, pupa, and adult stages.

About 6000 species of Ladybird beetles, (Coleoptera-Coccinellidae) are known worldwide (Vandenberg, 2002). Coccinellidae is a very diverse group and its necessary to study them very closely, so the present study was done.

II) Materials and Methods

Ladybird beetles have collected from the Warana region, during August. 2020 to February 2022 by using an insect collecting net and hand peaking at 7 days intervals during morning and evening hours. For identification, observations have been made on taxonomical features with the help of a compound microscope and hand lens and photographed with the help of camera cannon Company. Identification of insect pests was made up of consulting literature by Beheim Agarwala & Dixon 1992, Andersen 1999, Borumand, 2000, Djavanishir, 1976, Dixon, 2000. Hodek & Honek 1996, Iperti 1999, Jafari, 2011, Magro, 1992. Sathe and Bhosale 2011. Skaife 1979.

Study area

Kolhapur city is situated on the banks of the Panchganga river and is surrounded by Sahyadri mountain ranges. Kolhapur is about 387 km from Mumbai, the financial capital of India. Situated at a latitude of 16.69130 and longitude is 74.24486., Kolhapur has a pleasant climate for the major portion of the year. It has an abundance of natural resources like water, fertile soil, minerals, natural vegetation, and animal wealth. It is one of the most agriculturally advanced districts in Maharashtra and is known for being a leading district in agro-based industry.

III) Results

***Cheilomenes sexmaculata* Fabricius (Fig.1, 2, 3 & 4):** Colour orange, light red, yellow, pinkish, head with a black marking in posterior half, Length 3.4-6.4 mm, width 3.2-5.5 mm. Antenna short and compact, Body outline oval to subrounded, dorsum moderately convex and shiny; pronotum with a T-shaped median marking joined to a broad black band along posterior margin; elytra with six black webbed lines including two posterior black spots, sutural line narrow to moderately broad black stripe. The ventral side is uniformly yellow with reddish or yellowish legs. Pristernal process with a pair of subparallel carinae reaching up to the middle. Males are comparatively small and more active than females.

***Coccinella transversalis* Fabricius (Fig. 6 & 7):** Length 3.7-6.6 mm, width 3.4-5.6 mm. Form elongate oval, convex. Head black with a pair of creamy yellow, subtriangular frontal spots, one on either side of the inner margins of the eyes. Pronotum black, anterolateral corners light cream. Scutellum black. The elytra are orange or red, the front part of the elytra has two comma-shaped spots, while the back half of the elytra have a large dark black spot like a hammer. The tip of the elytra has a black mark-like arrow; a sutural line with an irregular black stripe. Elytral pattern variable with the markings in various states of confluence. Post-coxal plates on the abdominal incomplete, with an associate oblique line.

***Brumoides suturalis* Fabricius (Fig. 04):** Commonly called three-striped lady beetle. Adult body length 2.8-3.8 mm, width 2.2-2.4 mm. Body oval in shape. Elytra yellowish white with 3 brownish black longitudinal strips two on elytra and one on mid-dorsal elytra. Pronotum orange in colour, finely pitted, projected on each anterolateral side. Head brown, not concealed. Eyes larger and dark brown. Antennae 8-segmented. Maxillary and labial palpi 4- and 3-segmented, respectively. Preferably feeding on mealy bugs.

***Harmonia axyridis* Pallas (Fig. 08):** Length 4.7-7.6 mm, width 3.6-5.6 mm. Form elongate oval, moderately convex. The Head is orange in colour and has a V shape black mark in the center of the head. Colour orange yellow or red with black markings on pronotum and elytra, highly variable with various degrees of fusion or reduction Elytra with external margins narrow, rounded,

and thickened; a distinct, concave groove present in the humeral region. The anterior part of the elytra has two pale black spots. There is a grey mark in the center, and the back of the elytra is black with two distinct markings, the posterior margin is curved. Preferably feeding

on Aphids of Rice, maize, wheat, etc.

Hippodamia variegata, Goeze (Fig. 09): Yellow or pale orange colour, largest species. Size 7.2 mm length and 4.6 mm width, some of the large spots found on elytra. The Head is triangular dark black colour, with two white spots at the posterior and a shaped white mark present at the middle part of the head. There are two black spots found at the anterior-lateral corner of the elytra, one black spot present at the anterior-central position of the elytra, and a big ear hone-shaped spot present at the central part of the posterior half of the elytra. Preferably feeding on aphids of wheat, rice, Jawar, etc.

Hippodamia convergene Fabricius (Fig.10): Elytra is yellow to orange with brownish or blackish spots, without hairs, and smoothly pitted. Body length 5.2-6.4 mm and width 3.4 mm. Body shape oval and creamy red colored. Head brown with prominent black eyes. Antennae are about 1.4 mm long and 11-segmented. Labial palpi 3-segmented, Black and white pattern behind the head and black spots on red forewings. Polymorphs are found in elytra, elytral spots varying from few to 12 spots, commonly six along with one spot on the mid-dorsal line of the junction near the scutellum. Pronotum yellow-white with brownish black large areas along the posterior margin of the pronotum and has four fingere-like thick anterior projections.

Hippodamia septammaculata Fab. (Fig.11 & 12): Body length 5.8 mm and width 4.3 mm. Body shape oval and yellow colored. Head Black with prominent black eyes. Labial palpi 3-segmented. Antennae are about 1.6 mm long and 11-segmented. Black and white pattern behind the head and black W-shaped spots present on the anterior part of the elytra. An earphone-like dark black mark is present on the posterior part of the elytra. Elytra yellow, without hairs, and smoothly pitted.

Hippodamia parenthesis Fab. (Fig.13): *H. Parenthesis* has an oval shape yellow colour body, measures about length 5.7 mm, and width of 4.3 mm. triangular black head, with a two-minute white spot present at the posterior position of the head. T-shaped mark present at anterior half part of the head. Three black spots are present at the antero- central position of the elytra with equal distance in a triangular position, Two dark black spots are present at antero-lateral position of the elytra, and two earphones like patches are present at the posterior part of the elytra.

Chilocorus politus Mulsant (Fig.14): Uniform orange-red colour, 4.3 to 5.5 mm length, semi rounded in shape, body with dorsum glabrous or pubescence; Labial palpi 3-segmented. Antennae about 1.3 mm long and 11-segmented. outer elytral margin slightly reflexes, antenna stout, composed of 8 unequal segments; maxilla elongated, Eyes approximately oval, sides of elytra moderately expanded to apex. femora of legs comparatively large

Sr. No.	Family	Subfamily	Species	Main host	Pest Host plant
1	Coccinellidae	Coccinellinae	<i>C. sexmaculatus</i>	Aphids, White flies, mealy bugs.	Wheat, Sorgham, Rice, Emmer Wheat, Maize, Finger millets.
2	Coccinellidae	Coccinellinae	<i>C. transversalis</i>	Aphids	Wheat, Sorgham, Rice, Maize,
3	Coccinellidae	Coccinellinae	<i>B. suturalis</i>	Mealy bugs	Rice
4.	Coccinellidae	Coccinellinae	<i>H. axyridis</i>	Aphids and small sap suking pests.	Wheat, Rice,
5.	Coccinellidae	Coccinellinae	<i>H. variegata</i>	Laefhoppers, Noctuid larva, Aphids Psyllids	Wheat, Sorgham, Rice, Maize,
6.	Coccinellidae	Coccinellinae	<i>H.convergene</i>	Aphids, Scales Thrips, White flies	Wheat, Sorgham, Rice, Emmer Wheat,
7.	Coccinellidae	Coccinellinae	<i>H. septammaculata</i>	Scale insect, Aphids mealy bugs.	Wheat, Rice, Emmer Wheat,
8.	Coccinellidae	Coccinellinae	<i>H. parenthesis</i>	Aphids, insect eggs, small insects.	Wheat, Rice, Emmer Wheat, Maize,
9.	Coccinellidae	Coccinellinae	<i>C. politus</i>	Scales, white fly, mealy bugs.	Rice,

IV) Discussion

Ankalgi and Jadesh (2016) Studied Diversity and Distribution of Coccinellidae (Coleoptera) in Ankalga Village (Gulbarga District) of Karnataka state, India. The result reveals the occurrence of 12 species belonging to 4 different subfamilies and 9 genera. The subfamily Coccinellidae was dominant with 6 species. Mukherjee and Suman (2017) Studied the abundance and diversity of various species of coccinellid beetles around the agro-climatic zone of Bhubaneswar. It revealed the presence of 10 different species of lady bird beetles. Rasheed and Buhroo (2018) Surveys were conducted on the diversity of Coccinellid

beetles in the horticultural ecosystems in Kashmir, India. The results revealed that 1536 specimens of ladybird beetles collected were identified into three subfamilies, 11 genera, and 13 species. Sundareshwari *et. al.*- (2019) Studied the diversity and abundance of ladybird beetles in selected agricultural fields of Sivakasi about weather factors. A total of 881 specimens belonging to 2 different subfamilies, 5 genera, and 6 species were reported. Mishra and Yousuf (2019) Prepared Notes on Coccinellid beetles (Coleoptera: Coccinellidae) from the forest ecosystem of Uttarakhand, India. A total, of fifteen species of Coccinellid beetles, were identified. Out of these four species have been recorded for the first time from Uttarakhand. Jadhav *et. al.*, (2021) Surveyed to find out ladybird beetle fauna from various sampling sites of 12 villages in the Hatkanangale tehsil of Kolhapur district. A total of 685 specimens of coccinellids were collected from various localities, different climatic conditions, and cropping patterns. 5 species belonging to Coccinellinae tribes and the Coccinellini subfamily were recorded. The present study reported 09 Coccinellid species on cereals crops from the agro-ecosystem of Kolhapur district. All 09 are well adapted to the climatic condition of Kolhapur and all have the potential to effectively control sap-sucking pests.

V) Conclusion

Total 9 species of lady bird beetles belonging 6 genera are reported from Kolhapur district of Maharashtra, all reported species are carnivores and predatory, found on different cereal crops with feeding on different small insects, preferably they feed on aphids. All have ability to suppress cell sap sucking insect pest population below economic level of damage. It can be use for effective eco-friendly control of cell sap sucking insect pests. They are diurnal, mostly mating of beetles was observed at morning only.

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Fig.1



Fig.-2



Fig.-3



Fig.-4



Fig.-9



Fig.-10



Fig.-11

Fig.-12

Fig.1-4 *C. sexmaculata*, Fig.-5-6. *C. transversalis*
 Fig.-7 *B. suturalis*, Fig.8- *H. axyridis*
 Fig.9. *H. variegata*, Fig.-10. *H.convergene*
 Fig.11-12 *H. septammaculata*,
 Fig.13 *H. parenthesis*, Fig.14. *C. politus*

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