



## Diversity and Seasonal Abundance of Coccinellid Beetles (Coleoptera: Coccinellidae) in Rice Fields during Rabi Season

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### Abstract:

The present investigation was conducted in the rice fields of Bhandara District during rabi season to study the diversity and seasonal abundance of coccinellid beetles. Seventeen different coccinellid beetle species reported during present study are, *Adalia decempunctata*, *Antis ocellata*, *Aphidecta obliterata*, *Beatriz molisset*, *Coccinella undecimpunctata*, *Coccinella novemnotata*, *C. linnaeus*, *C. trifusciata*, *Hipodermia variegata*, *Hormonia quadripunctata*, *Micrapis discolor*, *Mulsantia picta*, *Pyrota insulata*, *P. tenuicostatis*, *Psyllobora vigintimaculata*, *Scarabaeid grapevine* and *Subcoccinella vigintimaculata*. Out of these 17 species, 9 species were found to be predators feeding on various pests of rice and 8 species were reported as pests. Eight dominant coccinellid beetles recorded during present study are *Beatriz molisset*, *C. undecimpunctata*, *C. novemnotata*, *Coccinella linnaeus*, *Hormonia quadripunctata*, *Micrapis discolor*, *Pyrota insulata*, and *P. tenuicostatis*. Two species, *Antis ocellata* and *Subcoccinella vigintimaculata* were reported for the first time and is therefore, a new addition to coccinella fauna of Bhandara district. The highest population of *Hormonia quadripunctata* (12.5 adults /m<sup>2</sup>) was recorded during 3rd week of March at about 42 DAT (Days after transplantation).

**Keywords:** Coccinellid beetles, dominant, seasonal abundance, rabi season and rice fields.

### INTRODUCTION

Rice is the staple food of nearly 65% of the total population in India, which played a critical role in food security (Gour *et al.*, 2003). It accounts for about 31.4% of the cultivated area and about 40% of the country's total food grain production. Though, Bhandara district occupies first position in area and rice production in Maharashtra, per hectare yield of 1,304 kg is very low (ICAR, 2002). Among the various factors, the insect pests are the major one responsible for the lower yield of rice crop in Bhandara and other low productivity districts of our country. The indiscriminate use of insecticides for pest control led to disturbances in natural ecosystem, leading to resurgence of pests such as yellow stem borer, *Scirpophaga incertulus*, leaf folder, *Cnaphalocrosis medinalis*, brown planthopper, *Nilaparvata lugens* and whitebacked planthopper, *Sogatella furcifera*, etc. (Anonymous, 1995). In several instances, a rich diversity of natural enemies has been reported in rice ecosystem. These natural enemies play an important role in keeping the population levels of major insect pests under EP (Equilibrium point) under normal conditions. Therefore, to avoid indiscriminate use of pesticides as well as associated residues problems, the natural prevalence of predators and parasites in rice fields should be encouraged towards eco-friendly pest management programme. Keeping this background in mind, the present investigation was undertaken to study the diversity and population fluctuation of coccinellid predatory beetles in the rice ecosystem of Bhandara district.

### MATERIAL AND METHODS

Various farmers' fields were surveyed during rabi rice crop season to study the diversity and seasonal abundance of coccinellid beetle in Bhandara district. The beetles were collected by different methods such as hand picking, forceps, sweep nets, pitfall and light traps. Early morning and evening time was preferred for the collecting and sampling. The collected beetles were transferred to killing bath containing ethyl acetate (C<sub>4</sub>H<sub>8</sub>O<sub>2</sub>) solution and kept for 30 minutes to kill them (Shrivastava, 2001). The killed beetles thus collected were put on the killing tray and separated for identification. Photographs were taken by good quality digital SLR camera. The collected specimens were stretched, pinned and labeled and kept in store boxes and cabinet for further studies. Small sized beetles were preserved in 70% alcohol. Identification of the specimen up to species level is done with the help of available literature.

Weekly survey of selected fields was made for random sampling of some dominant predatory beetles for rabi season of a year to study their population trends. The population of coccinellid beetles was estimated at weekly interval in 1 × 1 meter quadrat, from five randomly selected spots in each field site under study. The predatory beetles' population was assessed after counting the adults. Whenever the predatory beetles preying pests were noticed, they were collected and were further provided with different pest species to confirm their predatory behavior. The predators noticed and collected in this way were killed and preserved in bottles and 70% alcohol.

The population of predatory coccinellid beetles (lady bird beetles) was recorded in 1 × 1 m. quadrat sample from five randomly selected spaces.

**RESULTS AND DISCUSSIONS**

**Diversity of Coccinellid beetles in rice fields during rabi season:**

During rabi (December-May) seasons, a total of 17 species belonging to 13 genera of family coccinellidae were recorded and identified. Of the 17 species, 8 beetles were observed as pests (6 common and 2 rare) and remaining 9 species were recorded as predators. Of the 9 predatory beetles, 8 beetles were found to be the dominant and 1 was recorded as a common species. The most dominant predatory coccinellid beetles recorded in rabi season during present study are, *Beatriz molisset*, *Coccinella undecimpunctata*, *C. novemnotata*, *C. linnaeus*, *Homonia quadripunctata*, *Micrapis discolor*, *Pyrota insulate*, and *P. tenuicostatis*. Poorani (2002) published a

checklist of the Coccinellidae of Indian sub-region in which she described 79 genera and 400 species of ladybeetles along with their distribution in the subcontinent. Omkar and Pervez (2004) published a catalogue which provides the prey record of 261 known predaceous coccinellids of India belonging to 57 genera. The scientific names of coccinellid beetles, pest/ predatory status and their relative abundance during rabi season have been given in Table 1.

**Seasonal abundance of coccinellid beetles during rabi season:**

Although both pests and many predatory carabid beetles were recorded in rice fields during present investigation, only those considered being important predatory beetles regulating the pest population were counted during weekly survey. The data on the seasonal abundance of predatory coccinellid beetles is represented in Table 2 and depicted graphically in Figure 1.

**Table 1 :** Diversity of Coccinellid beetles in rice fields during rabi season

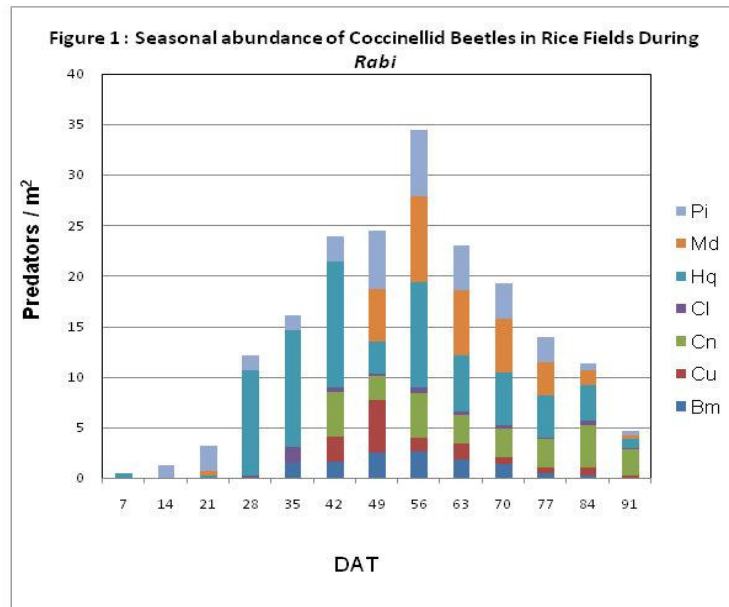
Sr. No.	Scientific Name of beetle	Pests (Ps) / Predators (Pr)	Relative Abundance
1	<i>Adalia decempunctata</i> (Else vier, 1985)	Pr	2
2	<i>Antis ocellata</i> (Dixon, 1940)	Ps	3
3	<i>Aphidecta oblectrata</i> (Springer, 1997)	Ps	2
4	<i>Beatriz molisset</i> (Honek, 1996)	Pr	1
5	<i>Coccinella undecimpunctata</i> (Linnaeus,1996)	Pr	1
6	<i>C. novemnotata</i> (Hagen,1974)	Pr	1
7	<i>C. linnaeus</i> (Elsevier, 1967)	Pr	1
8	<i>C. trifusciata</i> (Linnaeus, 1998)	Ps	2
9	<i>Hipodermia variegata</i> (Goeze, 1996)	Ps	2
10	<i>Homonia quadripunctata</i> (Fabricus, 1981)	Pr	1
11	<i>Micrapis discolor</i> (Sasaji, 1968)	Pr	1
12	<i>Mulsantia picta</i> (Grobler, 1962)	Ps	2
13	<i>Pyrota insulate</i> (Duges,1976)	Pr	1
14	<i>P. tenuicostatis</i> (Duges,1998)	Pr	1
15	<i>Psyllobora vigintimaculata</i> (Mulsant,1930)	Ps	2
16	<i>Scarabaeid grapevine</i> (Mulsant,1997)	Ps	2
17	<i>Subcoccinella vigintioctopunctata</i> (Dreistadt,1998)	Ps	3

Very common (Dominant) – 1, Common – 2, and Rare – 3

**Table 2 :** Seasonal abundance of coccinellid beetles in rice fields during rabi,

Month and Week	DAT	Mean Population of Coccinellids/m <sup>2</sup>						
		Bm	Cu	Cn	Cl	Hq	Md	Pi
Feb. II	7	0	0	0	0	0.5	0	0
Feb. III	14	0	0	0	0	0	0	1.2
Feb. IV	21	0	0	0	0	0.2	0.5	2.5
Mar. I	28	0	0	0	0.2	10.5	0	1.4
Mar. II	35	1.5	0	0	1.6	11.5	0	1.5
Mar. III	42	1.6	2.5	4.4	0.4	<b>12.5</b>	0	2.5
Mar. IV	49	2.5	5.2	2.4	0.2	3.2	5.2	5.8
April I	56	2.6	1.4	4.4	0.5	10.5	8.5	6.5
April II	63	1.8	1.6	2.8	0.4	5.5	6.5	4.4
April III	70	1.4	0.6	2.9	0.3	5.2	5.4	3.5
April IV	77	0.4	0.6	2.8	0.2	4.2	3.2	2.5
May I	84	0.2	0.8	4.2	0.5	3.5	1.5	0.6
May II	91	0	0.2	2.6	0.2	0.8	0.4	0.4

DAT – Days After Transplanting  
 Bm – *Beatriz molisset*  
 Cu – *Coccinella undecimpunctata*  
 Cn – *Coccinella novemnotata*  
 Cl – *Coccinella linnaeus*  
 Hq – *Homonia quadripunctata*  
 Md – *Micrapis discolor*  
 Pi – *Pyrota insulate*



The most dominant predatory coccinellid species, *Homonia quadripunctata* was first appeared (0.5 adults/m<sup>2</sup>) in the 2<sup>nd</sup> week of February at about 7 DAT. The highest peak (12.5 beetles /m<sup>2</sup>) of beetles was recorded in the 2<sup>nd</sup> week of March at about 42 DAT. Thereafter, the number started declining and become traceless in the 2<sup>nd</sup> week of May at about 91 DAT. The second dominant coccinellid species, *Micrapsis discolor* first noticed (0.5 beetles /m<sup>2</sup>) in the 4<sup>th</sup> week of February at about 21 DAT. The highest number (8.5 beetles /m<sup>2</sup>) was recorded in the 1<sup>st</sup> week of April at about 56 DAT. Thereafter, the number of adults started declining and become traceless in the 2<sup>nd</sup> week of May at about 91 DAT. Coccinellid *Beatriz molisset* first noticed (1.5 beetles /m<sup>2</sup>) in the 2<sup>nd</sup> week of March at about 35 DAT. The highest number (2.6 beetles /m<sup>2</sup>) was recorded in the 1<sup>st</sup> week of April at about 56 DAT. Thereafter, the number of adults started declining and become almost traceless in the 1<sup>st</sup> week of May at about 84 DAT. *Coccinella undecimpunctata* first appeared in the 3<sup>rd</sup> week of March at about 42 DAT. The highest number (5.2 beetles /m<sup>2</sup>) was recorded in the 4<sup>th</sup> week of March at about 49 DAT. Thereafter, the number of beetles started declining and become traceless in the 2<sup>nd</sup> week of May at about 91 DAT. *C. novemnotata* first observed (0.2 beetles /m<sup>2</sup>) in the 1<sup>st</sup> week of March at about 28 DAT. The highest population (4.4 beetles /m<sup>2</sup>) was recorded in the 1<sup>st</sup> week of April at about 42 DAT. Thereafter, the number of adults started declining and become traceless in the 2<sup>nd</sup> week of May at about 91 DAT. *C. linnaeus* first appeared (0.2 beetles /m<sup>2</sup>) in the 1<sup>st</sup> week of

March at about 28 DAT and its highest population (1.6 beetles /m<sup>2</sup>) was observed in the 2<sup>nd</sup> week of March at about 35 DAT. Thereafter, the number of adults started declining towards the harvesting. *Pyrota insulata* was first appeared (1.2 beetles /m<sup>2</sup>) in the 3<sup>rd</sup> week of February at about 14 DAT. The highest number (6.5 beetles /m<sup>2</sup>) was recorded in the 1<sup>st</sup> week of April at about 56 DAT. Thereafter, the number started declining and become traceless in the 2<sup>nd</sup> week of May at about 91 DAT.

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