



## Survey on Predacious Coccinellids of Pulse Crops Cultivating in Guntur District, Andhra Pradesh

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### ABSTRACT

The survey was conducted in ten major pulses cultivating mandals of Guntur district, Andhra Pradesh and collected coccinellid beetles from greengram, blackgram, redgram and cowpea fields of twenty villages (@ two villages per mandal). Coccinellid population varied from vegetative stage to crop maturity stage of all surveyed pulse crops. The peak population of coccinellid adults were found during November month in which all pulse crops were at flowering to pod formation stage. About 999 ladybird beetles were collected, described and identified six species on the basis of morphological characters and genitalia. Among these four species, *Cheilomenes sexmaculata*, *Coccinella transversalis*, *Harmonia octomaculata* and *Micraspis discolor* belonged to subfamily Coccinellinae and tribe Coccinellini, *Scymnus (pullus) coccivora* Ayyar in subfamily Scymninae and tribe Scymnini, *Brumoides suturalis* belonged to subfamily Chilocorinae and tribe Chilocorini of family Coccinellidae. *Cheilomenes sexmaculata* (47%) and *Coccinella transversalis* (44%) were found as the most abundant species in different pulse-ecosystems, while very few population of *Harmonia octomaculata* (5%), *Micraspis discolor* (2%), *Scymnus (pullus) coccivora* (1%) and *B. suturalis* (1%) were observed feeding on aphids in and around Guntur region, A.P.

Key words: Predacious coccinellid species, Pulses, Survey.

The ladybird beetles have been known worldwide as predators on number of insects and distributed in many countries of Asia, including India (Singh and Brar, 2004). They are of great economic importance as predators both in their grub and adult stages on various important crop pests such as aphids, coccids and other soft bodied insects, while the species, *Coccinella transversalis* feed on many species of aphids (Mani, 1995). The ladybird beetles are commonly known as ladybugs or coccinellid beetles. The vernacular term 'Lady' is in reference to biblical Mother Mary. Coccinellidae is the largest family of order Coleoptera. The family name is derived from Latin-Greek word Kokkos means berry or seed referring to round and convex body structure of the beetles. However, some taxonomists give other explanation for the family name as it was derived from Latin word 'Coccinus' meaning scarlet colour. The family Coccinellidae, belongs to the super family Cucujoidea, order Coleoptera, suborder Polyphaga, comprises about 360 genera and more than 6000 species. The ladybird beetles are oval to hemispherical in shape with clavate antennae,

securiform maxillary palpi and pseudotrimerous tarsi and often brightly coloured with red, orange or yellow elytra, which is frequently spotted with black or yellow stripes (Ali *et al.*, 2014). Many workers recognize six subfamilies within this family including Chilocorinae, Coccinellinae, Coccidulinae, Scymninae, Sticholotidinae and Epilachininae. Of these six subfamilies, five are predacious and one subfamily Epilachininae is phytophagous (Ashfaque *et al.*, 2013). Survey is useful to determine the dependence of any species on a given habitat and occurrence of prey and the abiotic factors (Afshin *et al.*, 2012). Sandhya Rani *et al.* (2013) conducted survey during *rabi* and summer seasons reported that *Cheilomenes sexmaculata* was the predominant species in pulses ecosystem from khammam district of Andhra Pradesh. Rekha *et al.* (2009) conducted survey on coccinellid beetles in Madurai District of Tamil Nadu and reported that *Coccinella transversalis* (Fabricius), *Menochilus sexmaculatus* (Fabricius) and *Brumoides suturalis* (Mulsant) were found in cereals, pulses and vegetable crop ecosystems. Chanmamla (2009) conducted survey in and around Tirupathi and

collected coccinellid beetles from maize, rice, cowpea, field bean, cucumber, ground nut, brinjal, horse gram and sesamum fields and also reported that *Coccinella transversalis* and *Cheilomenes sexmaculata* were the most abundant species and *Brumoides suturalis* population was very low (1%) out of 12 identified species from different ecosystems.

### MATERIAL AND METHODS

The survey was conducted to collect coccinellid beetles from 10 mandals *viz.*, Guntur, Bapatla, Mangalagiri, Chebrolu, Ponnur, Kakamanu, Pedanandipadu, Thadikonda, Thullur and Vatticherukur and two villages were chosen from each mandal of Guntur district (Fig. 1). Each village was visited thrice and collected ladybird beetles by hand pick and sweep net method from different habitats like greengram, blackgram, redgram and cowpea fields. The village and crop wise collected coccinellid specimens were kept separately in neat labeled plastic vials. These species were described based on morphological character and identifications was conducted at Department of Entomology, Agricultural College, Bapatla. Specimens were sent to Dr. J. Poorani, Principal Scientist (Systematist in Coccinellidae), National Research Centre for Banana, Trichy, Tamila Nadu to confirm the species.

### RESULTS AND DISCUSSION

Totally 999 ladybird beetles were collected during survey of blackgram, greengram, cowpea and redgram crops from August, 2015 to January, 2016 in Guntur region, A.P. Six species *viz.*, *Cheilomenes sexmaculata* (Fabricius), *Coccinella transversalis* (Fabricius), *Harmonia octomaculata* (Fabricius), *Micraspis discolor* (Fabricius), *Scymnus (pullus) coccivora* Ayyar and *Brumoides suturalis* (Fabricius) were identified. The data on month wise crop wise collected predacious coccinellid species revealed that coccinellid population varied from vegetative stage to crop maturity stage of all surveyed pulse crops (Table.1). The maximum number of *Cheilomenes sexmaculata*, *Coccinella transversalis* and *Harmonia octomaculata* adults were recorded during August to January months in all pulse crops except Redgram. The peak

population of coccinellid adults were found during November month in which all pulse crops were at flowering to pod formation stage. The congenial microclimate and prey availability might be the one of the reasons for their abundance of these generalist predators. These observations are supported by the findings of Vijayababu *et al.*, (2016) who reported that *C. sexmaculata* was more abundant during October to January months. Neeraja *et al.*, (2010) who conducted survey in pulse crops and reported that as the crop matures aphid population declined due to the abundance of *C. transversalis*, *C. sexmaculata* from December to March. Few number of *M. discolor* adults were recorded only in blackgram crop from August to October months. The very few number of new species *Scymnus (pullus) coccivora* Ayyar adults observed during August in blackgram and during October in Greengram crop. Less population of *B. suturalis* recorded from all pulse crops from August to October.

Out of six species, *C. sexmaculata* was prevailed in all above surveyed crops (Table. 2). These findings are in conformity with the findings of Robert *et al.*, (2012) who reported in cowpea and Sandhyarani *et al.*, (2013), Shailaja *et al.*, (2014) and Megha *et al.*, (2015) in pulses ecosystem that *C. sexmaculata* was the predominant species. The species, *C. transversalis* recorded from blackgram, greengram and cowpea crops only, but not from redgram crop. These findings are in line with the findings of Sharma *et al.*, (2010) who reported that adults of *C. transversalis* were recorded along with *Aphis craccivora* infesting greengram (Fig. 2). The data on species composition of redgram revealed that very few number of *Harmonia octomaculata* (19), *Cheilomenes sexmaculata* (9), *Brumoides suturalis* (1) adult beetles were collected from redgram ecosystem. Manjula and Prasannalaxmi (2014) recorded higher no of coccinellid beetles *C. sexmaculata*, *Coccinella transversalis*, *C. septempunctata* and *Scymnus* spp from groundnut: cowpea followed by groundnut: redgram inter cropping systems. Chanmamla (2009) also reported these six species from cowpea and groundnut crops while *B. suturalis* from cowpea as new report from Tirupathi region of A.P.

**Table 1. Occurrence of coccinellid species in blackgram and greengram, cowpea, redgram crop ecosystems during the surveyed period from August, 2015 to January, 2016**

S. No	Name of the species	Number of adults collected in Blackgram					Number of adults collected in Greengram								
		Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Total	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Total
1.	<i>C. sexmaculata</i>	20	11	45	89	10	5	185	15	22	32	80	10	6	170
2.	<i>C. transversalis</i>	16	20	35	80	10	9	170	10	15	20	60	10	5	120
3.	<i>H. octomaculata</i>	10	2	-	10	-	-	22	-	-	-	-	-	-	-
4.	<i>M. discolour</i>	5	5	5	-	-	-	15	-	-	-	-	-	-	-
5.	<i>S. (pullus)</i> <i>coccivora</i> Ayyar	1	1	-	-	-	-	5	-	-	4	-	-	-	4
6.	<i>B. suturalis</i>	2	1	2	-	-	-	1	-	-	2	-	-	-	2

S. No	Name of the species	Number of adults collected in Cowpea					Number of adults collected in Redgram								
		Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Total	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Total
1.	<i>C. sexmaculata</i>	16	20	30	50	10	8	134	2	2	2	3	-	-	9
2.	<i>C. transversalis</i>	16	20	29	39	15	10	129	-	-	-	-	-	-	-
3.	<i>H. octomaculata</i>	1	2	2	5	1	1	12	9	10	10	-	-	-	19
4.	<i>M. discolour</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5.	<i>S. (pullus)</i> <i>coccivora</i> Ayyar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.	<i>B. suturalis</i>	1	-	-	-	-	-	1	-	1	1	-	-	-	1

**Table 2. Crop wise distribution of coccinellids.**

S.no	Crops	Coccinellid species	No.of adult beetles collected	Prey
1)	Blackgram	<i>Cheilomenes sexmaculata</i>	185	<i>Aphis craccivora</i>
		<i>Coccinella transversalis</i>	170	
		<i>Harmonia octomaculata</i>	22	
		<i>Micraspis discolor</i>	15	
		<i>Scymnus (pullus) coccivora</i> Ayyar	5	
		<i>Brumoides suturalis</i>	1	
2)	Greengram	<i>Cheilomenes sexmaculata</i>	170	<i>Aphis craccivora</i>
		<i>Coccinella transversalis</i>	120	
		<i>Scymnus (pullus) coccivora</i> Ayyar	4	
		<i>Brumoides suturalis</i>	2	
3)	Cowpea	<i>Cheilomenes sexmaculata</i>	134	<i>Aphis craccivora</i>
		<i>Coccinella transversalis</i>	129	
		<i>Harmonia octomaculata</i>	12	
		<i>Brumoides suturalis</i>	1	
4)	Redgram	<i>Harmonia octomaculata</i>	19	<i>Aphis craccivora</i>
		<i>Cheilomenes sexmaculata</i>	9	
		<i>Brumoides suturalis</i>	1	
			Total : 999	



**Fig. 1. Marked areas of map showing the surveyed mandals of Guntur district, A.P.**

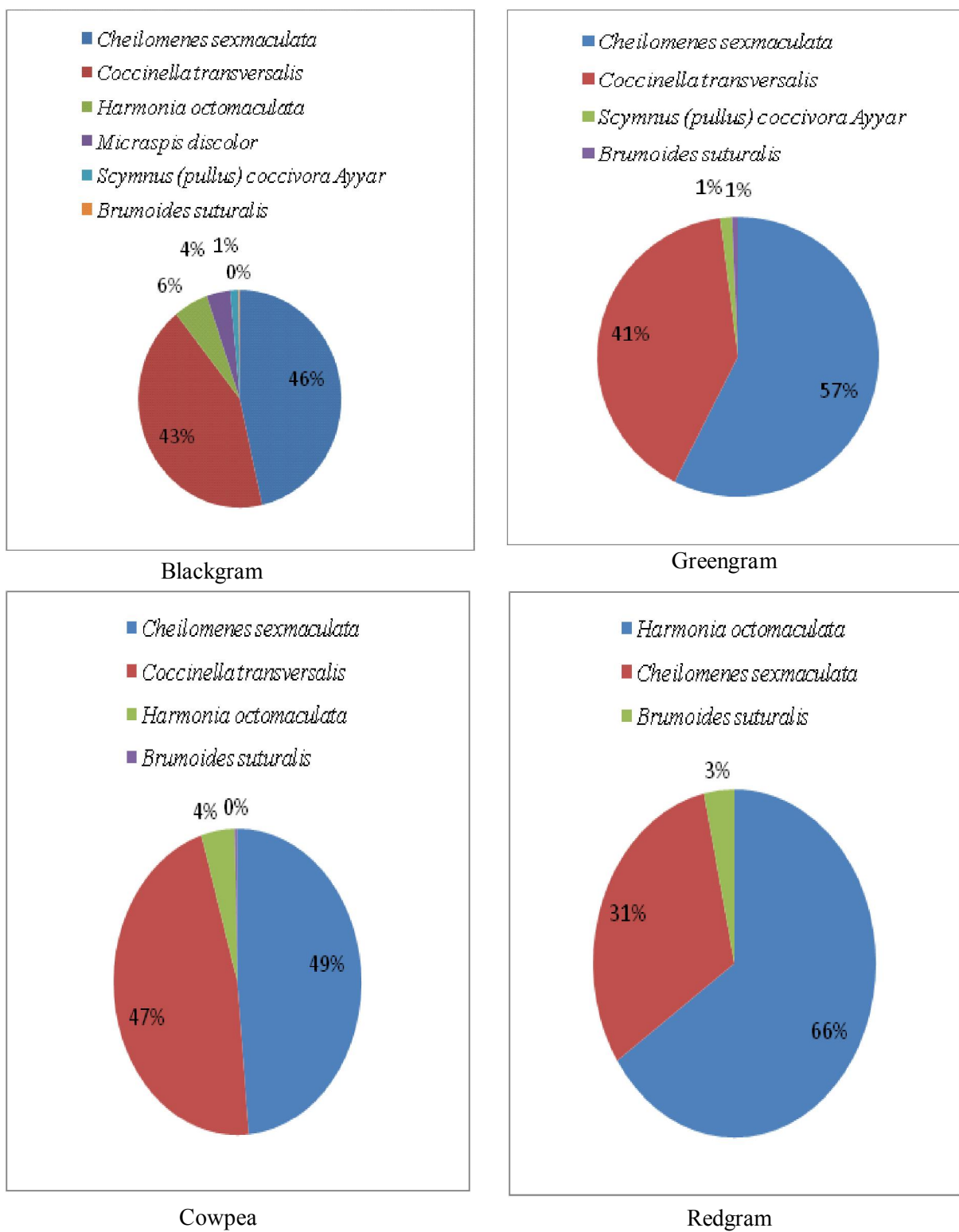
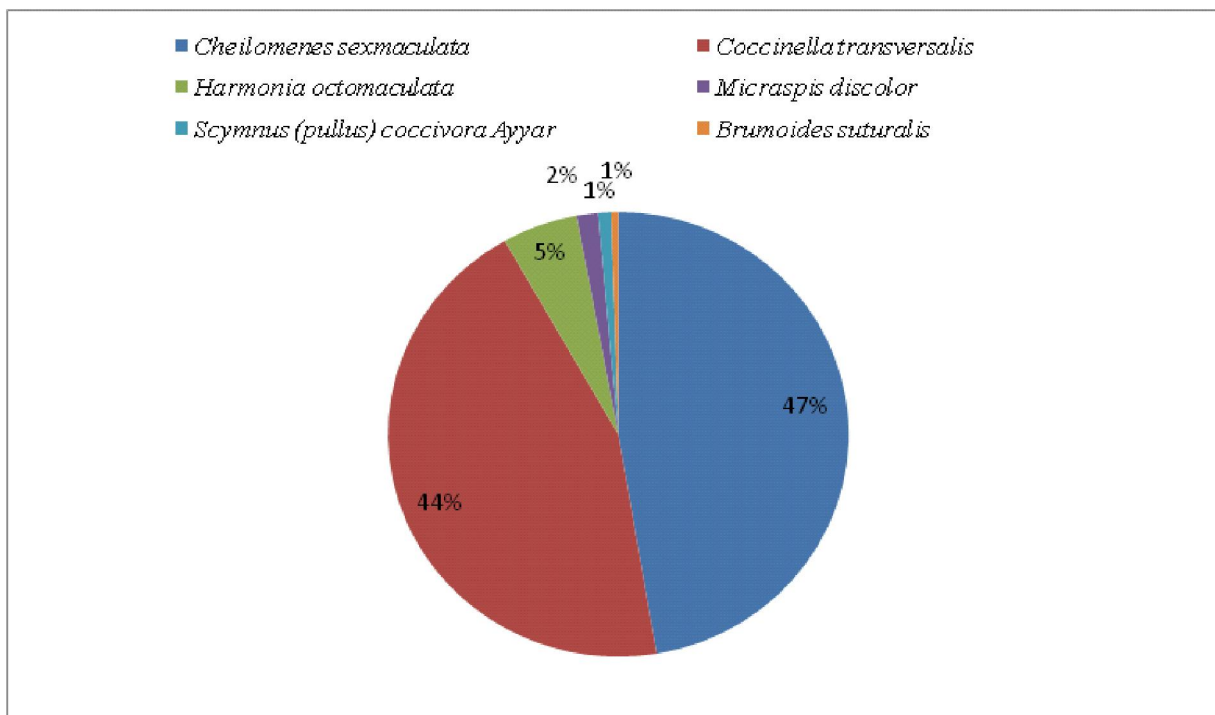


Fig. 2. Crop wise Species composition of coccinellid predators in pulses ecosystem.

Table 3. Coccinellid beetles recorded from different mandals of Guntur district, A.P during 2015-16.

S.No	Coccinellid species	Mandals of Guntur district								Total no of species			
		Guntur	Bapatla	Mangalagiri	Chebrolu	Ponnur	Kakamanu	Pedanandipadu	Thadikonda		Thullur	Váticherukur	
A)	Sub family : Coccinellinae												
(I)	Tribe : Coccinellini												
1)	<i>Coccinella transversalis</i> (Fabricius)	100	49	40	60	50	40	25	30	10	40	444	
2)	<i>Micraspis discolor</i> (Fabricius)	-	14	1	-	-	-	-	-	-	-	15	
3)	<i>Cheilomenes sexmaculata</i> (Fabricius)	90	53	75	30	30	25	45	35	40	50	473	
4)	<i>Harmonia octomaculata</i> (Fabricius)	11	12	6	-	5	3	7	4	-	5	53	
B)	Sub family : Scymninae												
(II)	Tribe : Scymnini												
1)	<i>Scymnus (pullus)</i> <i>coccivora</i> Ayyar	2	3	4	-	-	-	-	-	-	-	9	
C)	Sub family : Chilocorinae												
(III)	Tribe : Chilocorini												
1)	<i>Brumoides suturalis</i> (Fabricius)	1	2	2	-	-	-	-	-	-	-	5	
	Total no of species	204	133	128	90	85	68	77	69	50	95	999	



**Fig. 3. Mandal wise species composition of coccinellid predators in Guntur district of A.P.**

The data on species composition of coccinellids collected from different mandals was given in (Table 3). Among the six coccinellid species associated with different pulse ecosystems, *C. sexmaculata* and *C. transversalis* were found to be the most abundant species in all ten surveyed mandals of Guntur district, A.P (Fig 3).

The survey was conducted in farmers' fields where crop protection measures taken especially against sucking pests in pulse crops. This might be the reason for less population of coccinellid predators. Shah and Ali (2014) conducted a survey on coccinellid biodiversity under pesticide under pressure crop ecosystem and reported that less number of lady beetle species in pesticide treated vegetable ecosystem. Chakraborty *et al.*, (2014) conducted survey in vegetable crop ecosystem, observed 21.87 Per cent to 60.94 Per cent reduction in *C. sexmaculata*, *C. transversalis*, *H. octomaculata*, *M. discolor* and *B. suturalis* population due to the application of herbicide, insecticide and fertilizer in bhendi ecosystem. Sakthivel and Qadri (2010) reported that coccinellid beetles population drastically reduced *Scymnus* spp one day after spray with dichlorovos, phosalone, dimethoate and metasystox. They also reported that 29.7 Per cent population reduction with pungam

oil while 35.2 Per cent with neem oil spray against spiraling whiteflies in mulberry plantation.

#### CONCLUSIONS:

The present surveyed data on coccinellids of different pulse crops concluded that *C. sexmaculata*, *C. transversalis* and *H. octomaculata* were the abundant and prevailing species in almost all pulse crop ecosystems of Guntur region, Andhra Pradesh. Hence, these species can be multiplied and supplied to the farmers as a part of IPM based management strategies especially against sucking pests like aphids in pulses.

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