

# Survey and seasonal abundance of chrysopids in mango ecosystem of Konkan region

S.A. MORE, B.D. SHINDE AND RUPALI KHARAT



International Journal of Plant Protection, Vol. 4 No. 1 (April, 2011) : 95-98

See end of the article for authors' affiliations

Correspondence to :  
**S.A. MORE**  
All Indi Coordinated  
Research Project  
(Potato), National  
Agricultural Research  
Project, PUNE (M.S.)  
INDIA

## SUMMARY

The survey of mango orchards conducted during the year 2007 and 2008 indicated the prevalence of chrysopid in four districts of Konkan region. The species, *M. boninensis* of chrysopid was recorded in all the Tahsils of four districts while the species *C. carnea* was noticed in five Tahsils. *M. boninensis* was found predominant in mango ecosystem of Konkan region. The population of chrysopids was found maximum during the first fortnight of November and December when the temperatures were low and relative humidity was high at the same time the natural population of insects viz., mango hoppers, mealy bugs, scales and thrips were higher on mango trees. The activity of predator remained low during high temperature in the month of April to August.

More, S.A., Shinde, B.D. and Kharat, Rupali (2011). Survey and seasonal abundance of chrysopids in mango ecosystem of Konkan region. *Internat. J. Pl. Protec.*, 4(1): 95-98.

## Key words :

Survey, Mango,  
*Mallada*,  
*Chrysoperla*,  
Seasonal  
abundance

Mango (*Mangifera indica* Linn.), belonging to the family Anacardiaceae, is universally considered as the finest tropical fruit of the world and has been called, in the orient, "King of the fruits." In many languages it is called the "mother of all fruits". This fruit is rightly known as 'national fruit of India', owing to its nutritional richness, unique taste and flavour, religious and medicinal importance. It is the third widely produced fruit crop of the tropics after banana and citrus. Mango is currently being grown in at least 111 countries spread over five continents with an area of 46.67 m ha with total production of 33.73 m MT. The average productivity is 8.09 tonnes /ha. India ranks first in the world with total production of 13.79 m MT from about 22.05 m ha, which is nearly 43 per cent of the total world area under mango. Other countries which follow India in mango production (m MT) are China (3.75), Pakistan (2.25), Mexico (2.00), Thailand (1.80), Indonesia (1.60) and Brazil (1.54). In India, Maharashtra is one of the major mango growing state which ranking second in terms of area (0.445 million ha) and production (0.71 million tonnes), contributing about 19.13 per cent of total mango production of the country (Anonymous, 2008). Konkan

is the major and famous mango-producing region of Maharashtra.

In Maharashtra, the mango crop is heavily attacked by different sucking insect pests viz., mango hoppers (*Idioscopus* spp. and *Amritodus atkinsoni* (Letheirry), mealy bug (*Ferrisia virgata* (Ckll.), *Drosicha mangiferae* Green), thrips (*Scirtothrips dorsalis* Hood), scales (*Aspidiotus destructor* Sign.), aphids (*Toxoptera aurantii*) and other insect pests like stem borers (*Batocera* spp.), bark eating caterpillars (*Inderbella quadrinotata* walker and *Inderbella tetraonis* M.), shoot borer (*Chlumetia transversa* Walker), leaf Webbers (*Orthaga eudrusalis* Walker), mango fruit fly (*Bactrocera dorsalis* H.) and stone weevil (*Sternochetus mangiferae* Fab.). These pests appear in epidemic as well as in sporadic forms and cause great concern to the entomologists and mango growers. Number of natural enemies of insect pests of mango were reported in mango ecosystem of Konkan region and the different stages of chrysopid also found naturally in the mango ecosystem of the Konkan region of Maharashtra, India.

Amongst many insect predators, the chrysopids are reported to be the well-defined potential predators feeding on immature and

Received :

October, 2010

Accepted :

December, 2010

adult stages of many soft-bodied insects like aphids, hoppers, whiteflies, thrips, scales, midge flies as well as eggs of Lepidopteron insects. Among them, *Chrysoperla carnea* (Stephens), *Mallada boninensis* (Okamoto), *Chrysopa* sp. (Leach) and *Apterochrysa crassinervis* are most predominant (Singh, 1994). Two species of chrysopids viz., *M. boninensis* and *Chrysoperla lacciperda* were found preying on nymphs and adults of mango hoppers, *Amritodus atkinsoni* (Letheirry), *Idioscopus nitidulus* (Letheirry), and *Idioscopus clypealis* (Letheirry), (Fasih and Srivastava, 1990) while *Chrysoperla scalestes* (Banks) and *Chrysopa* sp. preying on mango mealy bug, *Drosicha mangiferae* (Green) (Herting and Simmonds, 1972). From economic point of view, family *Chrysopidae* is of the greatest importance as the members are suspected to exert strong restraint upon the incipient increase of a variety of pests. However, survey and seasonal abundance have not been undertaken in mango ecosystem of Konkan region of Maharashtra. Therefore, present investigation was undertaken to survey and record the different species of chrysopids in mango eco-system and to study the seasonal abundance of chrysopids in mango eco-system of Konkan region of Maharashtra.

## MATERIALS AND METHODS

### Survey and identification of chrysopids from mango orchards:

Survey on the occurrence of chrysopids in mango ecosystem was carried out in thirteen mango growing Tahsils of Konkan region during the month of December 2007 and 2008. The population of chrysopids was recorded on five randomly selected shoots from five mango trees in the mango orchards. Five mango orchards from each village and three villages from each Tahsil were selected for recording the population. At the same time, the adults of chrysopids were also collected by installing light traps in the mango orchards. The transparent plastic bag was used at the bottom of funnel of the trap. The adults of chrysopa attracted towards the light traps during night hours were collected and transferred in the mating chamber for their mass multiplication. Thus, adults collected from the field as well as those obtained by rearing were used for their taxonomic identification.

### Seasonal abundance of chrysopids in mango ecosystem:

For recording the population of chrysopids in mango ecosystem, 10 trees were selected from the mango

orchard and kept without application of pesticides for two years. The population of chrysopid was recorded on five shoots of five trees at fortnightly interval from August 2007 to July 2008 and data were correlated with temperature and relative humidity.

## RESULTS AND DISCUSSION

The results obtained from the present investigation are summarized below :

### Survey of chrysopids in mango orchards of Konkan region (Pooled):

The pooled data (Table 1) showed that chrysopid eggs were observed throughout the mango growing areas of Konkan region of Maharashtra state. The species, *M. boninensis* was recorded in all five Tahsils while *C. carnea* in four Tahsils of Sindhudurg district. The maximum eggs of chrysopids were observed in Vengurle (0.89 eggs/shoot/ tree) followed by Malwan (0.53 eggs/shoot/ tree). In Ratnagiri district, *M. boninensis* was found in five Tahsils and both species in Lanja Tahsil. The highest eggs were noticed in Mandangad (1.01 eggs/shoot/ tree) followed by Dapoli (0.81 eggs/shoot/ tree) in Ratnagiri district. The species, *M. boninensis* was found in both the Tahsils of Raigad and Thane districts. The maximum eggs of chrysopids were observed in Srivardhan (0.54 eggs/shoot/ tree) of Raigad and Dahanu Tahsil (0.56 eggs/shoot/ tree) of Thane district. Among all Tahsils of Konkan region, the highest eggs of chrysopids were recorded in Mandangad Tahsil (1.01 eggs/shoot/ tree) followed by Vengurle (0.89 eggs/shoot/ tree).

The population was observed in different number during the 2007 and 2008 survey. This might be due to different climatic conditions, availability of host insects. Similar observations were recorded by earlier workers like Fasih and Shrivastava (1990) who also reported two species of chrysopids viz., *Chrysoperla lacciperda* (Kimminis) and *M. boninensis* preying on nymphs of mango hoppers in mango ecosystem in Uttar Pradesh while Balkrishnan *et al.* (1991) recorded *M. boninensis* feeding on mealy bugs in mango ecosystem.

### Seasonal abundance of chrysopids in mango ecosystem:

It was seen that the population in terms of eggs of chrysopids was noticed during the first fortnight of September (Table 2). The maximum number of eggs were found during second fortnight of March, February and January (2.84, 2.72 and 2.46 eggs per shoot per tree,

respectively) when the temperature was in the range of 17.80 to 25.55°C and relative humidity was high (66.50 to 72.25%). During this period the population of soft bodied pests like hoppers, thrips, mealybugs and scale

were also observed in mango orchards. The activity of predator remained low under high temperature (24.10 to 28.20) during the month of April to August and 73.25 to 96.25 per cent relative humidity and in this period

**Table 1 : Composition of chrysopid in mango growing areas of Konkan region (Pooled) (2007-2008)**

Sr. No.	District	Tahsil	Average eggs of chrysopid per shoot per tree						Species observed
			Village					Mean	
			1	2	3	4	5		
1.	Sindhu-durg	Vengurle	1.04	1.00	0.64	1.18	0.59	0.89	<i>M.boninensis, C. carnea</i>
		Kudal	0.04	0.00	0.51	0.80	0.18	0.30	<i>M.boninensis, C. carnea</i>
		Kankawali	0.00	0.22	0.22	1.18	0.45	0.41	<i>M.boninensis, C. carnea</i>
		Malwan	0.56	0.42	0.40	0.32	0.96	0.53	<i>M. boninensis</i>
		Deogad	0.00	0.44	0.60	0.00	0.77	0.36	<i>M. boninensis</i>
2.	Ratanagiri	Lanja	0.76	0.02	0.04	0.92	0.55	0.45	<i>M.boninensis, C. carnea</i>
		Dapoli	1.68	0.78	1.22	0.00	0.41	0.81	<i>M. boninensis</i>
		Rajapur	1.00	0.55	0.64	0.00	0.10	0.45	<i>M. boninensis</i>
		Mandangad	1.10	0.44	1.48	1.70	0.35	1.01	<i>M. boninensis</i>
3.	Raigad	Srivardhan	0.35	0.93	0.95	0.00	0.50	0.54	<i>M.boninensis, C. carnea</i>
		Roha	0.03	0.00	0.44	0.36	1.35	0.43	<i>M. boninensis</i>
4.	Thane	Palghar	0.80	0.32	0.00	0.00	0.00	0.22	<i>M. boninensis</i>
		Dahanu	0.94	0.00	0.98	0.00	0.9	0.56	<i>M. boninensis</i>

**Table 2 : Seasonal population of chrysopids in mango ecosystem of Konkan region**

Sr. No.	Month	Fort night	Temp. (°C)	Rain (mm)	RH (%)	Chrysopids eggs population per shoot				Per plant	
						Plant 1	Plant 2	Plant 3	Plant 4	Plant 5	Mean
1.	Aug. 07	I	25.45	283.3	96.25	00.00	00.00	00.00	00.00	00.00	00.00
		II	25.87	116.70	87.25	00.00	00.00	00.00	00.00	00.00	00.00
2.	Sept. 07	I	25.72	51.10	94.25	00.00	00.00	01.80	00.00	00.00	00.36
		II	26.27	239.45	92.5	00.00	00.00	00.00	00.80	00.00	00.16
3.	Oct. 07	I	26.90	4.40	79.25	00.60	00.00	00.00	00.00	00.00	00.12
		II	26.02	0.00	82.75	00.00	00.00	00.00	03.20	00.20	00.68
4.	Nov. 07	I	26.05	1.26	85	02.40	00.00	00.00	03.60	00.80	01.36
		II	21.45	0.00	81.75	00.00	01.00	02.20	00.00	00.20	00.68
5.	Dec. 07	I	22.87	0.00	75.5	02.80	00.20	03.80	00.00	00.60	01.48
		II	23.87	0.00	78.5	00.00	01.00	02.20	00.00	00.20	00.68
6.	Jan. 08	I	22.20	0.00	72.5	01.40	03.60	01.20	02.60	00.40	01.84
		II	19.87	0.00	68.5	00.00	00.50	00.80	03.00	00.80	02.46
7.	Feb. 08	I	17.80	0.00	66.5	02.00	02.60	01.40	00.00	02.60	01.72
		II	22.07	8.00	72.25	04.20	02.00	02.20	01.60	03.60	02.72
8.	Mar. 08	I	23.95	0.00	61.75	06.60	03.40	00.80	01.00	00.00	02.36
		II	25.55	0.00	69.25	03.60	04.20	01.60	02.20	02.60	02.84
9.	April 08	I	24.10	0.00	76.75	01.00	00.00	02.20	00.00	00.60	00.76
		II	27.32	0.00	73.75	00.00	00.00	02.60	00.00	00.00	00.52
10.	May 08	I	26.82	0.00	79.25	00.00	00.00	00.00	00.00	00.00	00.00
		II	28.20	3.00	74.75	00.00	00.00	00.00	00.00	00.00	00.00
11.	June 08	I	29.10	0.00	73.25	00.00	00.00	00.00	00.00	00.00	00.00
		II	26.87	3530	82.5	00.00	00.00	00.00	00.00	00.00	00.00
12.	July 08	I	26.62	46.00	91.25	00.00	00.00	00.00	00.00	00.00	00.00
		II	25.70	283.30	96.25	00.00	00.00	00.00	00.00	00.00	00.00

population of host pests was also more on mango trees. The chrysopids has positive relationship with host insect and humidity. As the host insect population number reduced, the reduction in the predator population was also observed. However, the activity of predator remained low under high temperature. The present findings are in conformity with the earlier workers, Neuenschwander and Michelakis (1980) who recorded the seasonal distribution of chrysopids on olive trees in Crete. *C. carnea* had highest oviposition rate on the olive trees, with peak numbers of larvae occurring from mid May to mid June and evenly distributed in the orchard. The adult population was reproductively active in winter. Wei *et al.* (1986) recorded that the predatory *C. boninensis* completed 10 to 11 overlapping generations in a year in China. All the stages in the life cycle could be found in the field throughout the year. Urbanja *et al.* (2001) observed the population of the generalist predator, *C. carnea* on the citrus leaf miner, *P. citrella* in major citrus growing areas of Spain.

Predation of *P. citrella* increased as the season progressed, reaching maximum up to 38 per cent at the end of summer. Rao and Shivankar (2002) recorded the highest population of *M. boninensis* in spring (2.9 predators per tree) as compared to monsoon (1.7 predators per tree) and autumn (1.6 predators per tree) in citrus orchard.

---

Authors' affiliations:

**B.D. SHINDE AND RUPALI KHARAT**, Department of Entomology, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, RATNAGIRI (M.S.) INDIA

---

## REFERENCES

- Anonymus (2008)**. Food and Agricultural Organization, FAO, Stat. www.fao.org.
- Balakrishnan, M.M., Sreedharan, K., Venkatesha, P., Krishnamoorthy and Bhat, P.K. (1991)**. Observations on *Ferrasia virgata* Ckll. (Homoptera: Pseudococcidae) and its natural enemies on, with new records of predators and host plants. *J. Coffee Res.*, **21**(1): 11-19.
- Fasih, M. and Srivastava (1990)**. Parasites and predators of insect pest of mango. *Insect Pest Control*, **32**(2): 39-41.
- Herting, B. and Simmonds, F.J. (1972)**. A catalogue of parasites and predators of terrestrial arthropods section. *A host or prey / enemy*. Vol.II Homoptera, CAB. England: 210pp.
- Neuenschwander, P. and Michelakis, S. (1980)**. The seasonal and spatial distribution of adult and larval chrysopids on olive trees in Crete. *Acta Oecologica Applicata*, **1**(1): 93-102.
- Rao, C.N. and Shivankar, V.J. (2002)**. Incidence of citrus leaf miner *Phyllonistis citrella* and its natural enemies in central India. *Indian J. Agric. Sci.*, **72**(10): 625-627.
- Singh, S. P. (1994)**. Production and use of Chrysopid predators. *Tech. Bull.* No. 10, PDDB, Bangalore: 1-14pp.
- Urbanja, A., Munoz, A., Garrido, A. and Jacas, J. A. (2001)**. Incidence of *Chrysoperla carnea* Stephens (Neuroptera: Chrysopidae) during the predation of *Phyllonistis citrella* Stainton (Lepidoptera: Gracillariidae). *Boletin De Sanidad Vegetal, Plagas*, **27**(1): 65-73.
- Wei, C.S., Huang, B.Z. and Guo, C.H. (1986)**. Studies on *Chrysopa boninensis* in Guangzhou. *Acta Entomologica Sinica*, **29**(2):174-180.

\*\*\*\*\*