



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2018; 6(2): 2659-2662

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Received: 22-01-2018

Accepted: 25-02-2018

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## Insect pests and its natural enemies on marigold in northern hill region of Chhattisgarh

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### Abstract

The sucking pests, aphid and thrips were observed in last week of November to first week of February. Aphid and thrips peak population were observed in second week of January. Mites population was noticed on the crop in the third week of November to first week of February. Mite population observed peak in first week of January. The pod borer, *Helicoverpa armigera* population was observed on fourth week of December to first week of February, larvae population of reached its peak during the fourth week of January. The population of natural enemies on marigold field was observed on the basis of number from third week of November to first week of February 2016-17.

**Keywords:** Insect pests, natural enemies, marigold

### 1. Introduction

Marigold (*Tagetes erecta* L.) is an important loose flower in Chhattisgarh and India. Its native place is central and South America, especially Mexico from where it spreads to different parts of the world during early parts of the 16th century, but it has adopted so well to Indian condition that it is as good as a native to India as well. The marigold rank first of the flower cultivation in Chhattisgarh. The area of marigold is 4007 hectare, production 29270 million tons and productivity 7.30 million tons per hectare respectively in Chhattisgarh (Anonymous 2016). Marigold is one of the most important flower crop grown commercially in different parts of India. In the year 2003-04, the estimated area under marigold in India was 17600 hectare and production 2 lacks metric ton. In marigold a number of insect pests such as aphids, mites, leaf miner, mealy bug, thrips and Heliothis feed on marigold. The genus *Neohydatothrips* John is the largest thrips genus belonging to order Thysanoptera, with 103 described species. *Neohydatothrips* species are all phytophagous, feeding and breeding on leaves. The capitulum borer, *Helicoverpa armigera* is highly polyphagous, with about 181 host plants including important crop plants such as pulses, cotton, vegetables etc. (Manjunath *et al.*, 1985) [4]. Now days marigold uses successful control of the nematodes in vegetable crops such as brinjal, tomato and chilli.

### 1.1 Objectives

- (i) To ascertain the various leaf feeding insect pest in marigold.
- (ii) To study the various sucking insect pests in marigold.

### 2. Materials and Methods

The experiment was undertaken in Marigold cultivar Pusa Narangi was planted on October 23, 2016 to February 06 2017 as winter crops, respectively at farmer's field located in Ajabnagar, Block - Surajpur, Distt. - Surajpur during winter-spring season of 2016-17. It is situated about 5 km away from Raj Mohini Devi College of Agriculture and Research Station, Ambikapur (C.G.) The crop was raised on ridges with 50 cm row to row and 50 cm plant to plant distance was maintained. The fertilizer and other agronomic practices were applied according to the local recommendations.

### 2.1 Method of recording observations

Thrips and aphid populations were recorded by randomly selected 10 plants collecting them on white paper by beating the flower/feet/twig with finger and dropped thrips were counted. Mites were observed in flowers and tender parts of the crop like leaves, developing shoots and fruits.

Ten plants were selected at random and tagged. The leaf samples of 1cm size from top, middle and bottom were collected and observed for the occurrence of mites with the help of microscope, at weekly intervals. *Helicoverpa armigera* larvae was randomly selected 5 plants on total number of larvae recorded on each leaf from top, middle and bottom canopy and capitulum of the observed plants. The pests population was counted and averaged the number of insect pests.

### 3. Results and Discussion

Aphid (*Myzus persicae*) was a serious pest of marigold causing heavy damages to different crops (Table 1 & Fig. 1-4). Shah *et al.*, (2015), had reported that the aphids started in the first week of November with (1.018 aphids/leaf), it increased gradually in the coming weeks till it reached to (1.930 aphids/leaf) in the first week of December. Its populations was noticed on the crop in the third week of November 2016 to first week of February 2017. Then the aphid population gradually increased with maximum (20.67 aphids/10 plants) during the second week of January 2017 and another worker Varmora *et al.* (2009) [3] who recorded the aphid population on cabbage started from 49th standard week (1st week of December). The average population recorded was 10.60 aphids per plant of cabbage. The aphid population increased gradually and attained its peak of 281.20 per plant in 6th standard week (2nd week of February).

Thrips (*Neohydatothrips* sp.) The thrips population was noticed on the crop in third week of November 2016 to first week of February 2017. The population of thrips remained throughout the growth stage being low as early and late stage but high at active vegetative growth stage. Initially the populations observed were (5.73 thrips/10 plants) in the 3<sup>rd</sup> week of November 2016 during the crop season. Then the thrips population gradually increased to maximum (9.67 thrips/10 plants) during the second week of January 2017. The average population of thrips decreased from fourth week of January and its lowest population (8.50/10 plants) were observed during end of flowering at first week of February 2017. Wahab *et al.* 2015, reported the highest average numbers in both periods of survey, from mid-April to late July and from early September to late December 2013 (189.5 and 143.6 individuals/plant, respectively), while the lowest number was recorded for *Thrips tabaci* (4.6 and 5.9 individuals/plant).

Mites (*Tetranychus urticae*) The mites population was noticed on the crop in the third week of November 2016 to first week of February 2017. Initially the population observed was (2.67 mites / 10 plant) in the 4<sup>th</sup> week of November 2016 during the crop season. Then the mites population gradually increased its maximum (3.67 mites / 10 plants) during the 1<sup>st</sup> week of January 2017. The mites average population decreased from 3<sup>rd</sup> week of January and its lowest population (3.00 mites / 10 plants) were observed during end of flowering at 1<sup>st</sup> week of February 2017. Ahmed *et al.*, (2015) [2, 6] reported the maximum mite population (4.15 mites / leaf) was observed during 3<sup>rd</sup> week of May and the minimum population (0.30 mites / leaf) was observed in 1<sup>st</sup> week of March. The

minimum mite population was observed in the 1<sup>st</sup> week of March which increased significantly during different weeks but decreased during 4<sup>th</sup> week of April and then increased up to 3<sup>rd</sup> week of May and at last decreased gradually reaching to last week of June.

*Helicoverpa armigera* The *Helicoverpa armigera* population was noticed on the crop in the 4<sup>th</sup> week of December 2016 to 1<sup>st</sup> week of February 2017. The population of larvae remained active on the flowering stage of crop during the season. Initially the population of *H. armigera* larvae was observed (1.66 larvae / 5 plant) in the 4<sup>th</sup> week of December. Then the larvae population gradually increased (2.66 larvae / 5 plant) of 2<sup>nd</sup> week of January. The larvae population of reached its peak during the 4<sup>th</sup> week of January 2017 (4.33 larvae / 5 plant). Patel *et al.* 2015 who reported that during the first year (2013-14), the activity of *H. armigera* on chickpea crop was commenced from 46<sup>th</sup> standard week (second week of November), which was gradually increased up to 50<sup>th</sup> standard week (third week of December). The maximum larval population (2.24 larvae / 5 plants) was observed in 49<sup>th</sup> and 50<sup>th</sup> standard week (first and second week of December), whereas it was minimum (0.08 larvae / 5 plants) in 9<sup>th</sup> standard week (fourth week of February). Thus, larval population during the entire period ranged from 0.08 to 2.24 larvae / 5 plants.

#### 3.1 Natural Enemies

During the course of investigation various natural enemies of marigold insect pests depicted (Table 2 and Fig.5) were also recorded *viz.*, lady bird beetle (*Coccinella sexmaculata*) *Canthoconodia forcelata*, syrphid fly (*Syrphus confractor*). The population of natural enemies on marigold field was observed on the basis of number from 3<sup>rd</sup> week of November to 1<sup>st</sup> week of February 2016-17. The lady bird beetle population was observed on the crop in the (0.02 - 0.20 beetle / 10 plants) 3<sup>rd</sup> week of December 2016 to 1<sup>st</sup> week of February. The maximum lady bird beetle population (0.20 beetle / 10 plants) was counted in 3<sup>rd</sup> week of January 2017. The predatory bug population was noticed (0.04 – 0.14 bug / 10 plants) during 2<sup>nd</sup> week of January 2017 to 1<sup>st</sup> week of February 2017. The maximum predatory bug population (0.20 predatory bug / 10 plants) was observed in 2<sup>nd</sup> week of January 2017. The syrphid fly population was observed (0.02 – 0.33 fly / 10 plants) from 1<sup>st</sup> week of January to 1<sup>st</sup> week of February. The maximum syrphid fly population (0.33 syrphid fly / 10 plants) was observed in 3<sup>rd</sup> week of January. These findings are according with those of Joshi *et al.* 2009 reported that the population of coccinellid beetles ranged from 1.60 to 15.30 per five plants. The coccinellid beetles started from 1<sup>st</sup> standard week (1<sup>st</sup> week of January), with an average population of 1.60 beetles per five plants of cabbage and population increased gradually to the peak of 15.30 per five plants in 6<sup>th</sup> standard week (2<sup>nd</sup> week of February). This finding are according with those of Varshney *et al.*, (2017) [7] highest syrphid population (2.80 syrphids/plant) on PSB-1 was observed during 9<sup>th</sup> SW while CCN-06- 1 and sheetal exhibited highest syrphid population (1.60 and 1.53 syrphids/plant) in 10<sup>th</sup> SW.

**Table 1:** Average insect pests populations on marigold during 2016 – 17

Date of Observation	Standard Week No.	Aphid	Thrips	Mites	<i>Helicoverpa armigera</i>
21/11/2016	47	15.40	5.73	3.50	0.00
28/11/2016	48	17.27	8.07	2.67	0.00
05/12/2016	49	17.57	7.37	3.10	0.00
12/12/2016	50	19.34	8.50	3.45	0.00

19/12/2016	51	19.50	8.47	2.80	0.00
26/12/2016	52	20.43	9.47	3.53	1.66
02/01/2017	1	20.60	9.57	3.67	1.66
09/01/2017	2	20.67	9.67	3.67	2.66
16/01/2017	3	20.10	9.30	3.60	2.33
23/01/2017	4	19.45	9.00	3.40	3.00
30/01/2017	5	18.50	8.80	3.14	4.33
06/02/2017	6	17.60	8.50	3.00	3.33

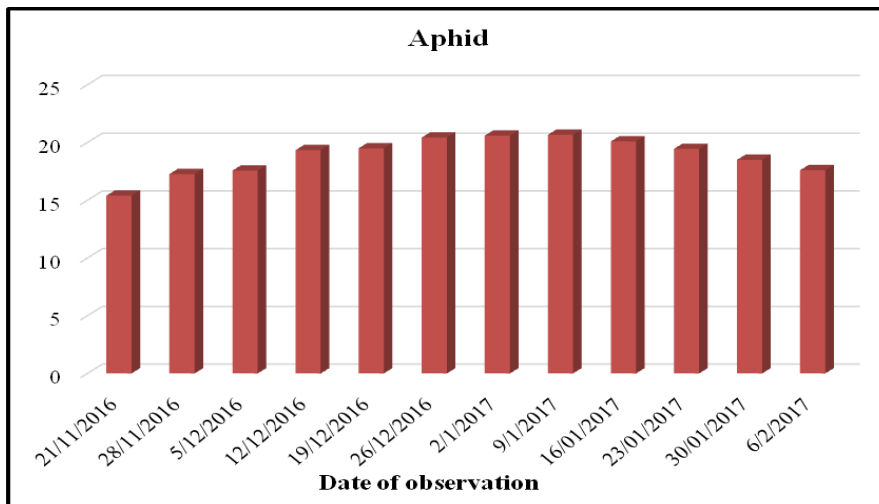


Fig 1: Average aphid populations on marigold crop during 2016 - 17

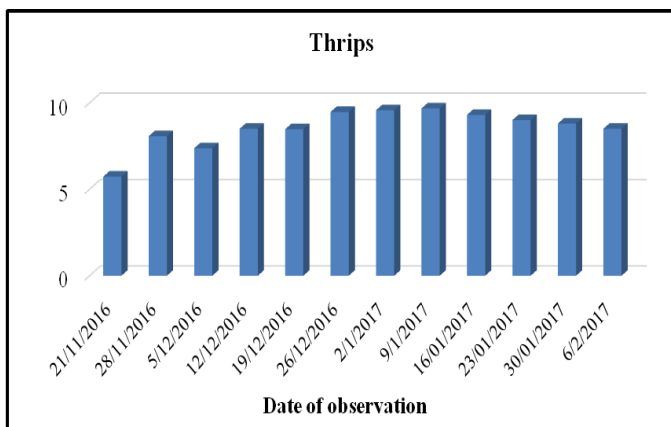


Fig 2: Average thrips populations on marigold crop during 2016 – 17

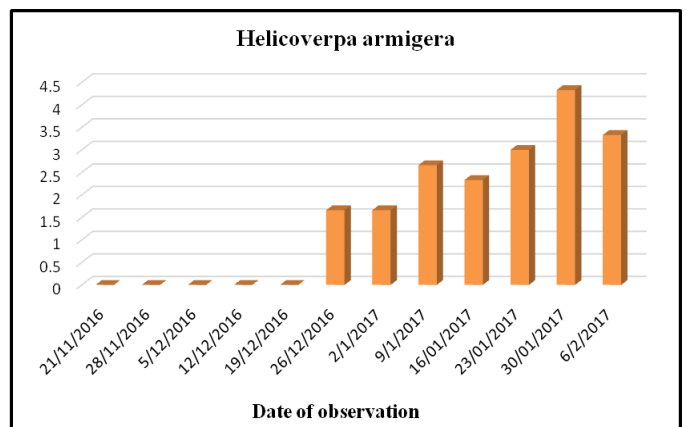


Fig 4: Average *Helicoverpa armigera* populations on marigold crop during 2016 – 17

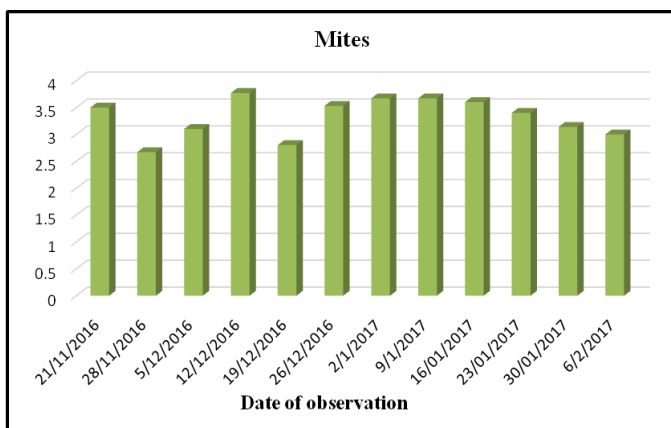
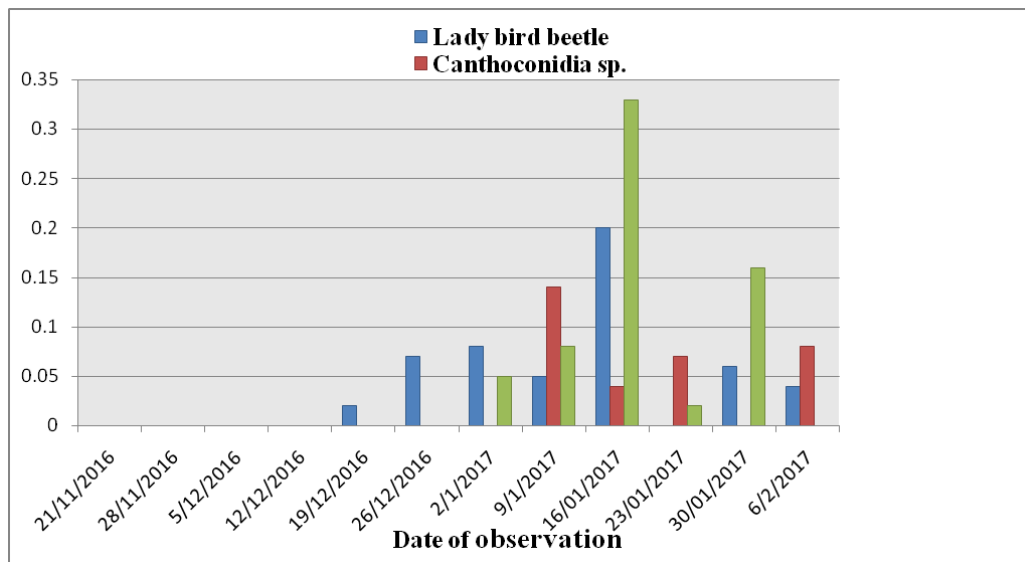


Fig 3: Average mites populations on marigold crop during 2016 – 17

Table 2: Average population of various natural enemies recorded on marigold during 2016-17

Dateof observations	Lady bird beetle	Canthoconidia sp.	Syrphid fly
21/11/2016	0.00	0.00	0.00
28/11/2016	0.00	0.00	0.00
05/12/2016	0.00	0.00	0.00
12/12/2016	0.00	0.00	0.00
19/12/2016	0.02	0.00	0.00
26/12/2016	0.07	0.00	0.00
02/01/2017	0.08	0.00	0.05
09/01/2017	0.05	0.14	0.08
16/01/2017	0.20	0.04	0.33
23/01/2017	0.00	0.07	0.02
30/01/2017	0.06	0.00	0.16
06/02/2017	0.04	0.08	0.00



**Fig 5:** Average population of various natural enemies recorded on marigold during 2016-17

#### 4. Conclusion

Various insect-pests like aphid (*Myzus persicae*), Thrips (*Neohydatothrips* sp.), mites (*Tetranychus urticae*) and *Helicoverpa armigera* were found damaging on marigold crop. The population of natural enemies on marigold like lady birdbeetle, Canthoconidia sp and Syrphid fly were observed on the basis of number from third week of November to first week of February 2016-17.

#### 5. Acknowledgement

The authors are highly thankful to Director Instructions, IGKV, Raipur for giving the instructions and so many good suggestions for working on marigold insect-pests and also thankful to Horticulture Section of Raj Mohini Devi College of Agriculture & Research Station, Ambikapur for helping during the study.

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