



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2019; 7(2): 1296-1299

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Received: 18-01-2019

Accepted: 24-02-2019

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## Seasonal incidence of major sucking pests of Pomegranate and their natural enemies

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### Abstract

The experiment was conducted at Central Horticulture Nursery, Department of Horticulture, VNMKV, Parbhani, during the year 2014-2015 to study seasonal incidence of major sucking pests of pomegranate aphids, thrips, Mealybug and coccinellids was recorded during 1<sup>st</sup> to 52<sup>nd</sup> meteorological weeks of 2014. The data indicated that the sucking pest population was high from first week of January to second week of March (1<sup>st</sup> to 11<sup>th</sup> MW) and third week of October to last week of December (42<sup>nd</sup> to 52<sup>nd</sup> MW). The first peak of aphid population 13.91 aphids/twig Occured during 3<sup>rd</sup> MW. Whereas the first peak of thrips (11.00 thrips/twig) was recorded during 51<sup>st</sup> MW recording considerable incidence during 1<sup>st</sup> to 9<sup>th</sup> MW and 34<sup>th</sup> to 52<sup>nd</sup> MW. The natural enemies population was mostly severe from first week of January to first week of February (1<sup>st</sup> to 6<sup>th</sup> MW), and (42<sup>nd</sup> to 52<sup>nd</sup> MW) indicating positive interaction between major sucking pests and Coccinellids on pomegranate.

**Keywords:** Pomegranate, aphids, thrips, Mealybug, coccinellids

### Introduction

India, with its diverse soil and climate, offers ideal conditions for growing several kinds of fruits. Fruit crops are being grown on an area of about 3.94 million hectares with a total production of 50 million tones. In India, the per cent availability of fruits per head per day is only 55 g, which is far lower than the recommended level of 85 g per head per day by Indian Council of Medical Research (ICMR).

Pomegranate (*Punica granatum* L.) is one of the most adaptable subtropical minor fruit crops, commonly known as *anar*, *dalim* or *dalimbe*. It belongs to one of the smallest families of plant kingdom, Punicaceae. Pomegranate is native to Iran, where it was first cultivated around 2000 BC and spread to the Mediterranean countries that observed by Evereinoff, in 1949. It is extensively cultivated in Spain, Morocco, Egypt, Iran, Afghanistan, Arabia and Baluchistan. Its cultivation spread further to other countries like China, Japan, USA, USSR, Pakistan and India. During 1986, Bose observed that the area under pomegranate cultivation in India was increased due to the introduction of high yielding soft seeded variety “*Ganesh*” in the states of Maharashtra, Karnataka and Gujarat.

Pomegranate cultivation is unique in its own way. Because of its drought tolerant hardy nature, low maintenance cost, steady and good yields, fine table and therapeutic values, better keeping quality and possibilities of throwing the plant into rest during period when irrigation potential is low, especially in the hot semi-arid and desert regions of India, like states of Maharashtra, Uttar Pradesh, Andhra Pradesh, Gujarat, Karnataka and Tamil Nadu; its cultivation has spread extensively. Maharashtra ranks first in area (132.0 thousand ha) and production of pomegranate (1357.0 thousand tone). (Anon. 2013-14) [3]. In Maharashtra area under commercial production of pomegranate is steadily increasing mainly in Solapur, Nashik, Ahmednager, Pune, Sangali, Satara, Aurangabad, Jalna, and Parbhani districts (Anon, 2005) [3]. Several insect pests are known to infest the pomegranate plants (Zirpe, 1966 and Mote *et al.*, 1992) [14]. Based on the experience of last 10 to 15 years, some prominent sap feeder are aphids (*Aphis punicae* Pass.), thrips (*Scirtothrips dorsalis* Hood) and mealy bugs (*Ferissia virgata*).

The species of thrips (*Scirtothrips dorsalis* Hood.) commonly known as chilli thrips is a polyphagous pest known to cause damage to several seasonal field crops, vegetables and fruit crops. Both nymphs and adults lacerate the surface of leaves and developing fruiting parts and cause deformation showing corky appearance on surface of fruits which ultimately deteriorate the quality, fetching low price for fruits in domestic market and not accepted for export.

The species of aphids (*Aphis punicae* Passerine.) infesting pomegranate is a polyphagous pest known to cause damage to several seasonal field crops, vegetables and fruit crops. Both nymphs and adults of aphids feed by sucking type of mouth parts. They lacerate the surface of developing fruiting parts and cause deformation showing corky appearance on surface of fruits which ultimately deteriorate the quality, fetching low price in domestic market and not accepted for export.

The demand for export quality pomegranate certainly shows an increasing trend. In order to maintain good quality yield of pomegranate fruits, appropriate package of practices plays important role, in which pest control based on seasonal incidence, critical monitoring of pest stages with their intensity and execution of selected control measures is of high significance. There are three main fruiting seasons in a year which are locally known as *bahars viz. Ambia* (March to June), *Mrig* (July to October) and *Hasta* (November to February). This situation is therefore most favorable to perpetuate the pests throughout the year.

Cultivation of high yielding varieties of pomegranate with intensive care and management in the recent past under irrigated condition with early stage exploitation of plant has led to certain severe pest problems. Among them, infestation by sucking pests like aphids, thrips, mealy bugs, scale insects and mites results in reduction of pomegranate fruit yield and put the growers into hardship. The growers lose the fruits not only in quantity but also in terms of quality. The major constraints in increasing export potential is the quality of fruit in terms of size, colour, freedom from blemishes and pesticide residue levels. To overcome the latter constraint it is necessary to develop eco-friendly management practices for sucking pests. Particularly, the management using the biological control agents will go a long way in stabilizing the quality production without disturbing the pomegranate ecosystem.

The species of aphids (*Aphis punicae* Passerine.) infesting pomegranate is a polyphagous pest known to cause damage to several seasonal field crops, vegetables and fruit crops. Both nymphs and adults suck the cell sap from plant parts including fruits. It is also known affect photosynthetic activity of the plant by attracting sooty mould to grow on the honey dew secretion.

Gilbert (1986) [9] reported that thrips, *Scirtothrips dorsalis* (H.) is one of the most important pests infesting pomegranate crop. It feeds on the foliage as well as fruits deteriorating quality of the fruits. At International level thrips are considered as a potential pest in pomegranate being responsible for deteriorating quality of the fruits (Wang, 1994) [16].

## Materials and Methods

Investigation was undertaken to study the seasonal incidence of major sucking pests of pomegranate and natural enemies were recorded during 1<sup>st</sup> MW to 52<sup>nd</sup> MW of 2014 at Central Horticulture Nursery, Vasantrao Naik Marathwada Krishi Vidyaapeeth, Parbhani, (MS), India. The orchard site was uniform with medium black soil, having high fertility and fairly good drainage. The Interculture operations were adopted as per the recommended package practices.

The seasonal incidence of major sucking pests was studied by selecting four rows in pomegranate field, one plant comprised one treatment and the four twigs of four side directions of plant (*i.e.* East, West, South and North) were observed for the incidence. The live count of nymphs and adults of aphids, thrips and mealy bugs was recorded at weekly interval from

first to last MW (1-52) of 2014. The plants were observed early in the morning. The observations on occurrence of natural enemies per plant were also recorded simultaneously.

## Statistical analysis

The data obtained on population of major sucking pests and natural enemies (mean no. per twig) was compiled. The data obtained were subjected to  $\sqrt{X+0.5}$  transformations before analysis. The analysis of pooled data of two seasons (*Ambia* and *Hasta bahar* 2014) was carried out to ascertain the relative efficacy of the insecticidal treatments against aphid and thrips. Appropriate statistical methods were employed to work out standard error (SE) and critical difference (CD) for deciding the significance of treatments (Gomez and Gomez, 1984) [10].

## Results and Discussion

The results obtained from the present investigation as well as relevant discussion have been summarized under the following heads:

### 1. Seasonal incidence of major sucking pests and their natural enemies

#### 1.1 Seasonal incidence of aphid

The seasonal incidence of Aphids *A. punicae* infesting pomegranate during 2014 is presented in Table 1 and graphically depicted in Fig 1. The data on population of aphids during first MW to last MW- 2014, revealed that the aphid population on pomegranate was ranged from 2.7 to 13.91 aphids/twig. During first week of observation (1<sup>st</sup> MW), the aphid population was 9.91 aphids/twig and recorded peak of 13.91 aphid/twig, at 3<sup>rd</sup> MW (third week of Jan.). Thereafter the population went on decreasing. The second peak of aphid incidence was observed in 52<sup>nd</sup> MW (13 aphids/twig), (last week of Dec.).

Both nymphs and adults of Aphids sucks sap from the tender shoots, leaves, flowers and fruits of pomegranate plant. The infestation resulted in yellowing of leaves and sticky to touch. The occurrence of this pest resulted in disappearing the leaf colour which resulted in loss of quality of fruits and reduction in yield. This specific pest of pomegranate was also recorded by Butani (1976) in India and Balikai (2000) [5] from Northern Karnataka. The maximum incidence of aphids on pomegranate was observed during third week of Feb and March in Tamil Nadu (Karuppunchamy *et al.*, 1998) [11].

Sreedevi and Verghese (2007) found that, aphid population started building up in December on pomegranate at Bangalore which slowly increased and recorded 43.01 and 100.76 aphids per shoot during January and February, respectively. The population declined by second fortnight of March. Moreover, Ananda (2009) [2] suggested that the aphid population on pomegranate initiated at 48 MW and raised slowly upto 52 MW and steadily upto 6 MW and maximum at about 8 MW.

#### 1.2 Seasonal incidence of thrips

The data on population of thrips *S. dorsalis* infesting pomegranate during first MW to last MW 2014, showed that thrips population was ranged from 1.14 (17 MW) to 11 (51 MW) thrips/twig on pomegranate.

During first week of observation (1<sup>st</sup> MW) the population was 7.47 thrips/twig which increased up to 8.29 thrips/twig in next (2<sup>nd</sup> MW) and then after population slowly declined upto 26<sup>th</sup> MW (0.00 thrips/twig). On 30<sup>th</sup> MW (5.20 thrips/twig) the incidence was again noticed. There after population fluctuated within narrow range and reached maximum at 51<sup>th</sup> MW (11.00 thrips/twig).

**Table 1:** Seasonal incidence of major sucking pests and natural enemies

Duration	MW	Aphids	Thrips	Mealybug	Coccinelids
01-07 Jan.	1	9.91	7.47	0.00	<b>3.05</b>
08-14 Jan.	2	13.66	7.56	0.00	2.83
15-21 Jan.	3	13.91	8.29	0.00	2.50
22-28 Jan.	4	10.45	7.12	0.00	2.66
29-04 Feb.	5	10.41	6.83	0.00	1.75
05-11 Feb.	6	9.81	6.10	0.00	1.50
12-18 Feb.	7	10.35	5.79	0.00	1.40
19-25 Feb.	8	9.54	5.50	0.00	1.10
26-04 Mar.	9	8.58	5.16	0.00	1.50
05-11 Mar.	10	8.56	4.60	0.00	1.30
12-18 Mar.	11	7.80	4.00	0.00	1.10
19-25 Mar.	12	6.90	2.80	0.00	1.00
26-01 Apr.	13	7.00	3.10	0.00	0.00
02-08 Apr.	14	5.40	2.10	0.00	1.30
09-15 Apr.	15	2.70	1.60	2.90	1.60
16-22 Apr.	16	3.14	1.50	3.20	1.00
23-29 Apr.	17	3.00	1.14	2.04	0.00
30-06 May	18	3.06	3.40	2.81	0.00
07-13 May	19	3.37	2.50	3.04	0.00
14-20 May	20	2.45	1.41	4.40	0.00
21-27 May	21	2.78	1.89	<b>5.05</b>	0.00
28-03 June	22	3.50	2.47	3.04	0.00
04-10 June	23	3.79	0.00	2.00	0.00
11-17 June	24	3.56	0.00	2.50	0.00
18-24 June	25	3.08	0.00	2.30	0.00
25-01 July	26	0.00	0.00	1.10	0.00
02-08 July	27	0.00	0.00	0.00	0.00
09-15 July	28	0.00	0.00	0.00	0.00
16-22 July	29	3.25	0.00	0.00	0.00
23-29 July	30	5.79	5.20	0.00	1.50
30-05 Aug	31	5.55	4.10	0.00	1.70
06-12 Aug	32	6.60	2.63	0.00	1.10
13-19 Aug	33	7.83	4.00	0.00	1.50
20-26 Aug	34	8.01	5.67	0.00	1.33
27-02 Sept	35	8.03	5.70	0.00	1.30
03-09 Sep	36	8.72	6.85	0.00	1.50
10-16 Sep	37	8.75	7.00	0.00	2.00
17-23 Sep	38	9.00	7.25	0.00	2.10
24-30 Sep	39	9.20	7.50	0.00	2.00
01-07 Oct.	40	9.75	7.75	0.00	1.20
08-14 Oct.	41	8.75	8.39	0.00	0.20
15-21 Oct.	42	9.66	8.75	0.00	0.80
22-28 Oct.	43	9.75	9.00	0.00	1.02
29-04 Nov.	44	10.25	9.50	0.00	1.75
05-11 Nov.	45	10.75	8.23	0.00	1.50
12-18 Nov.	46	11.50	8.70	0.00	2.00
19-25 Nov.	47	11.75	9.00	0.00	2.60
26-02 Dec.	48	12.00	9.20	0.00	1.75
03-09 Dec.	49	12.25	9.50	0.00	2.75
10-16 Dec.	50	8.50	9.50	0.00	1.76
17-23 Dec.	51	9.00	11.00	0.00	2.50
24-31 Dec.	52	13.00	10.00	0.00	2.83

The nymphs and adults of thrips (*S. dorsalis*) were seen on the under surface of the leaves, on fruits and flowers. The lacerating and sucking type of feeding by the thrips resulted in shriveling of leaves and fruits. Scarring of rind was also observed on fruits due to desapping, resulting in decreased marketability of fruits. The similar results were also reported by Balikai (2000) [5] from Northern Karnataka which corroborate with the present findings. The incidence of thrips on grapes was observed during June to Sept (Shibao, 1990) [15], on mango during Mar to April and Sept to Oct (Kumar *et al.*, 1995). Whereas Bagale (1993) [4] observed that maximum population of pomegranate thrips during June to August.

### 1.3 Seasonal incidence of mealy bug

The seasonal incidence of mealy bug *Ferrisa virgata* infesting pomegranate during 2014 is presented in Table 1 and graphically depicted in Fig 1. The data on population of mealy bug *F. virgata* infesting pomegranate during first MW to last MW 2014, showed that mealy bug population was ranged from 2.00 to 5.05 mealy bugs/twig on pomegranate. The occurrence of mealy bug started from 15<sup>th</sup> MW (2.90 mealy bugs/twig). The maximum incidence of 5.05 mealy bugs/twig was observed during 21<sup>st</sup> MW.

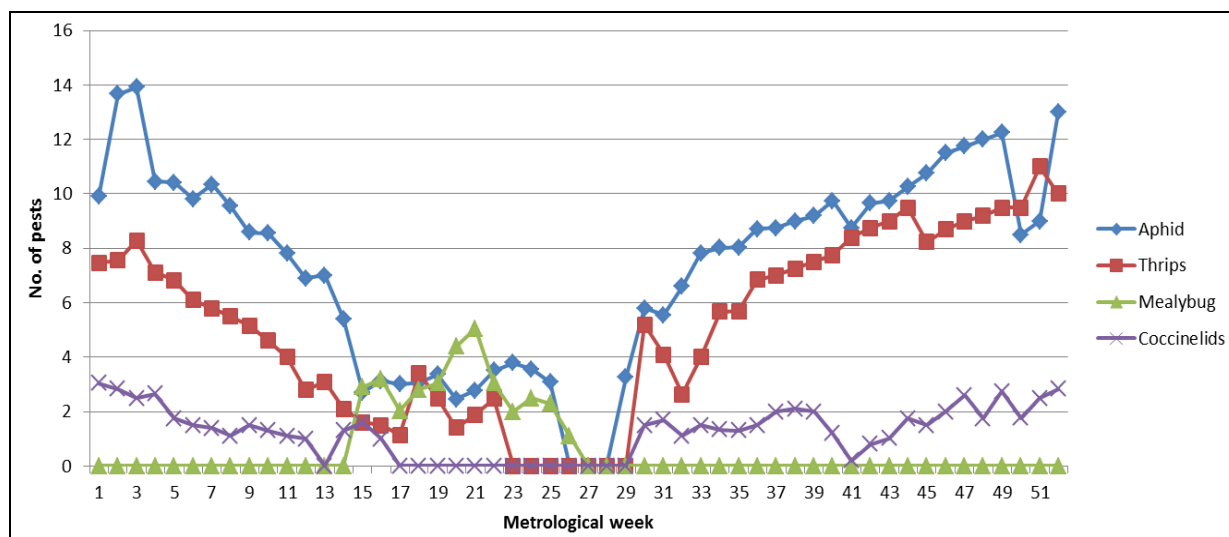


Fig 1: Seasonal incidence of sucking pests and their natural enemies

This species of mealy bug was seen attacking fruits and their stalk on pomegranate plant. Both nymphs and adults of the mealy bugs caused considerable damage to pomegranate by sucking the sap from the leaves, flowers and fruits, which resulted in yellowing of leaves and shedding of flowers and tender fruits. The market value of such fruits reduced considerably. Similar trend of seasonal incidence was also reported by Balikai (2000) [5] from Northern Karnataka. Their results are in conformity with Mani and Krishnamoorthy (1990) [13] who stated that mealy bug infestation was more pronounced during *Summer* months and less in winter. Dadmal *et al.*, (2013) [7] noticed the incidence of papaya mealy bug during March and April.

#### 1.4 Seasonal incidence of coccinellids

The data on population dynamics of coccinellids during first MW to last MW 2014 are presented in Table 1 and graphically depicted in Fig 1. The coccinellids population range between 0.20 (41<sup>th</sup> MW) and 3.05 (1<sup>st</sup> MW) beetles/twig on pomegranate.

The occurrence of coccinellids started from 30<sup>th</sup> MW (1.5 beetles /twig). The first peak was observed during 1<sup>st</sup> MW (3.05 beetles /twig) showing positive trophic interaction between the pest and predator relationship. These results are in conformity with Amin (2002) [1] who collected twelve species of natural enemies from the colonies of pomegranate aphids, out of which eleven were coccinellids.

#### Conclusions

Pomegranate crop is prone to attack by many insect pests particularly, aphids, *Aphis punicae* and Thrips, *Scirtothrips dorsalis* (H.). These pests not only reduce the yield but also deteriorates the quality of fruits.

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