



# POPULATION DYNAMICS OF SUCKING INSECT PESTS APHID (*APHIS GOSSYPID*) AND THRIPS (*THRIPS TABACI*) IN BT COTTON IN HANUMANGARH DISTRICT RAJASTHAN, INDIA

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## Abstract

The present study was carried out to find the population dynamics of aphid and thrips in Bt cotton agroecosystem in the Hanumangarh district of Rajasthan during the 2022-23, Kharif season. Cotton plants are hosts for various insect pests such as sucking insect pests, bollworms and foliage insect pests. Cotton aphid and thrips are two major sucking insect pests of Bt cotton. They cause deleterious effect on cotton plants and reduced the overall productivity of crop. During kharif 2022-23, aphids infestation starts from the 29<sup>th</sup> SMW and it remains active till 45<sup>th</sup> SMW in transgenic cotton. On the other hand the first activity of thrips was observed during the 31<sup>st</sup> SMW and remained in action till 46<sup>th</sup> SMW. The peak activity of both type of insect pests were recorded during the 39<sup>th</sup> SMW, which was most favourable for thrips as well as for aphids.

Keywords: - Population, Thrips, Aphids, Hanumangarh.

## 1. Introduction

The most significant oil seed and natural fibre crop in the world is cotton, which is an important source of livelihood stability for the Indian agricultural sector. Furthermore, it has a special place in community life and dominates the nation's agricultural and industrial economics. About six million individuals are employed by a wide range of related industries, such as ginning, fabric production, processing fabrics, clothes manufacturing, and their marketing, among others. Additionally, it supplies the textile sector with 65 percent of its raw materials, and it provided 33 percent of India's overall foreign exchange earnings (Nemade et al., 2018). According to Chauhan et al. (2017), it is practised in tropical and subtropical nations like Turkey, Brazil, the United States, China, Iran, Pakistan, Sudan, India, Mexico, Egypt, and Uganda. An indeterminate, deciduous, and perennial semishrub plant, cotton is also referred to as "white gold," "silver fiber," and the "king of fibres" (Kalkal et al., 2018; Pal et al., 2020). According to Nihal et al. (2019) and Sohrab et al. (2021), cotton belongs to the family Malvaceae and the genus *Gossypium*. According to Bishana et al. (2021)

it has been cultivated in India for about 5000 years. Both rainfed and irrigated circumstances can be used to grow cotton, however in India, close to 60% of the crop is grown under rainfed settings. India leads all other nations in both the amount of cotton produced 341.91 lakh bales of 170 kg, and 125.10 lakh hac. area and the production of cotton overall. The three main cotton-growing regions in India are the north zone, the central zone, and the south zone. Rajasthan is located in India's northern cotton-growing regions. In addition, Rajasthan accounted for an overall of 7.56 lakh hac., area and 24.36 lakh bales of 170 kg during 2021–2022, bringing the total area under cotton production in the north zone to 17.08 lakh hac., producing 54.96 lakh bales of 170 kg. (Anonymous, 2023). The damage caused by an infestation of insects is one of the main causes of cotton's low yield. Only 17 of the primary cotton insect pests were recorded out of a total of 148 species of insect pests that were recorded during the cotton growth period (Abbas MA, 2001). Sucking insect pests, bollworms, and foliage insect pests are the three primary subgroups of cotton insect pests. The most hazardous and damaging pests are the sucking insects, such as aphids (*Aphis gossypii*), jassids (*Amrasca biguttula biguttula*), whiteflies (*Bemisia tabaci*), and thrips (*Thrips tabaci*). An overall shift in the sucking pest complex towards thrips, aphids, jassids, white flies, and other sucking pests was noted after the adoption of Bt cotton hybrid. According to Nihal et al. (2019), cotton yield was lost by 8.37 percent as a result of sucking insect pest attacks. Chauhan et al. (2017) reported that the pest insects can reduce production by 20–80%. Insect pests that attack cotton cause output losses of between 10 and 40 percent and poor lint quality, according to Lanjar et al. (2014). According to Chavan et al. (2016), the cotton agroecosystem suffers losses of 52.10 percent due to both bollworms and sucking insect pests together, though each pest alone only contributes to losses of 44.50 and 11.60 percent in the cotton crop. The *Aphis gossypii* is a Hemipteran sucking insect pest, which is commonly known as cotton aphid. It causes a serious damage in cotton plants by secreting honeydew. The main affected area of cotton plants by aphids includes cotton bolls, shoots and leaves (Kataria and Kumar, 2015). *Aphis gossypii* in cotton crops can harm both the vegetative and reproductive stages of the plant. Cotton plant growth is slowed down as a result of nymphs and adults sucking cotton leaf sap. Thrips end their lives by sucking on the cell sap found on the underside of leaves, close to the midribs. The affected leaves look like silvery, and later on, the leaf borders twist upwards so that a structure that resembles a cup develops. These two insect pests cause a lot of damage to the cotton crop, due to which the productivity of the crop is greatly reduced. To control them, a proper field observation is needed so that a proper management strategy can be created. This research work has been conducted to complete this purpose so that an updated information can be obtained about Aphid (*Aphis gossypii*) and Thrips (*Thrips tabaci*).

## 2. Materials and Methods

A field experiment was conducted in four separate villages (7DBL, 8DBL, 5AG, and Rampuriya) of Tibbi tehsil of Hanumangarh district, Rajasthan, during the kharif season of the years 2022–2023 to examine the population dynamics of aphids and thrips. At each of the chosen locations, 10m x 10m quadrates were created. To gather precise information on population dynamics, three replicates of Bt cotton plants were made at the chosen site. Five plants were randomly selected from each quadrant, and tags made of fiber cloth were used to mark the plants. Aphid and thrips, which are sucking insect pests, were observed at a regular interval (once in a week). Each plant's top, middle, and bottom leaves were selected to count the number of aphids and thrips. During each metrological week, five randomly selected plants per plot were observed every evening between 4 and 6 pm.

### 3. Results and Discussion

#### 3.1 Population dynamics of aphid (*Aphis gossypii*) in bt cotton-

The data collected for population dynamics is represented in table-1, for kharif season 2022-23. The infestation of aphid population was starting from the 29<sup>th</sup> SMW in bt cotton. The population of aphids ranging between 0.00-30.04 aphids per 3 leaves and a peak of 30.04 aphids per 3 leaves was recorded during the 39<sup>th</sup> SMW. The initial infestation was recorded in July month is 2.31 aphids per 3 leaves, after that its number gradually increased till 35<sup>th</sup> SMW. During the 36<sup>th</sup> SMW a slight fluctuation (declining in number) in aphid population was noticed but after that it continuously increased till 39<sup>th</sup> SMW and during this period highest number of aphids was recorded in Bt cotton. After achieving the peak population again its number declined till 45<sup>th</sup> SMW. Akhila et al., (2020) reported 34<sup>th</sup>, 35<sup>th</sup>, 36<sup>th</sup>, 51<sup>st</sup>, and 52<sup>nd</sup> were the extremely favourable meteorological week for aphid incidence. However, Divya et al., (2020) observed the peak incidence of aphids during the 36<sup>th</sup>, 28<sup>th</sup>, 40<sup>th</sup>, and 38<sup>th</sup> SMW. Soujanya et al., (2010) reported that the initial incidence of aphids was observed during the 34<sup>th</sup> standard week and it reached the peak from the 39<sup>th</sup>-46<sup>th</sup> SMW.

#### 3.2 Population dynamics of thrips in bt cotton-

The data obtained from the field observations is represented in table-1 and its clearly revealed that the infestation of thrips population was started from the 31<sup>st</sup> SMW (0.63 thrips per 3 leaves) and it reached at the peak during the 39<sup>th</sup> SMW (14.22 thrips per 3 leaves). The population range of thrips lie between 0.00- 14.22 thrips per 3 leaves during kharif season 2022-23 in Bt cotton. After achieved the peak population (during 39<sup>th</sup> SMW), thrips gradually declined till 46<sup>th</sup> SMW and thereafter no thrips was observed in Bt cotton plants. Panwar et al., (2015) observed the first incidence of thrips during the 31<sup>st</sup> SMW, which is similar with our findings. Soujanya et al., (2010) reported that the peak incidence of thrips was on 35<sup>th</sup>-37<sup>th</sup> SMW.

### 4. Conclusion

The present study clearly showed that the activity of aphids and thrips were noticed during 29<sup>th</sup> SMW to 46<sup>th</sup> SMW in Bt cotton during kharif season 2022-23. The most favourable conditions for aphid and thrip population were recorded during 37<sup>th</sup>-39<sup>th</sup> SMW, when it reached at peak. 24<sup>th</sup>-28<sup>th</sup> SMW were less suitable for both type of sucking insect pests because during this period no insect pest was reported on Bt cotton plants.

## 5.Acknowledgment

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Table.1. Population of aphid and thrips in Bt cotton during 2022-23

SMW	Period	Mean population per 3 leaves	
		Aphid	Thrips
24	11 June-17 June	0.00	0.00
25	18 June-24 June	0.00	0.00
26	25 June- 1 July	0.00	0.00
27	2 July-8 July	0.00	0.00
28	9 July-15 July	0.00	0.00
29	16 July-22 July	2.31	0.00
30	23 July-29 July	3.36	0.00
31	30 July- 4 Aug.	5.47	0.63
32	5 Aug.-11 Aug.	6.29	1.84
33	12 Aug.-18 Aug.	8.84	3.02
34	19 Aug.-25 Aug.	12.02	4.00
35	26 Aug.-1 Sept.	14.68	6.63
36	2 Sept.-8 Sept.	8.04	8.87
37	9 Sept.-15 Sept.	20.18	12.54
38	16 Sept.-22 Sept.	26.58	12.87
39	23 Sept.-29 Sept.	30.04	14.22
40	30 Sept-6 Oct.	24.09	11.49
41	7 Oct.-13 Oct.	25.00	9.03
42	14 Oct.-20 Oct.	19.68	5.88
43	21 Oct.-27 Oct.	10.88	3.09
44	28 Oct-3 Nov.	5.13	4.96
45	4 Nov.-10 Nov.	1.68	2.23
46	11 Nov.-17 Nov.	0.00	1.14
47	18 Nov.-24 Nov.	0.00	0.00
48	25 Nov.-1 Dec.	0.00	0.00

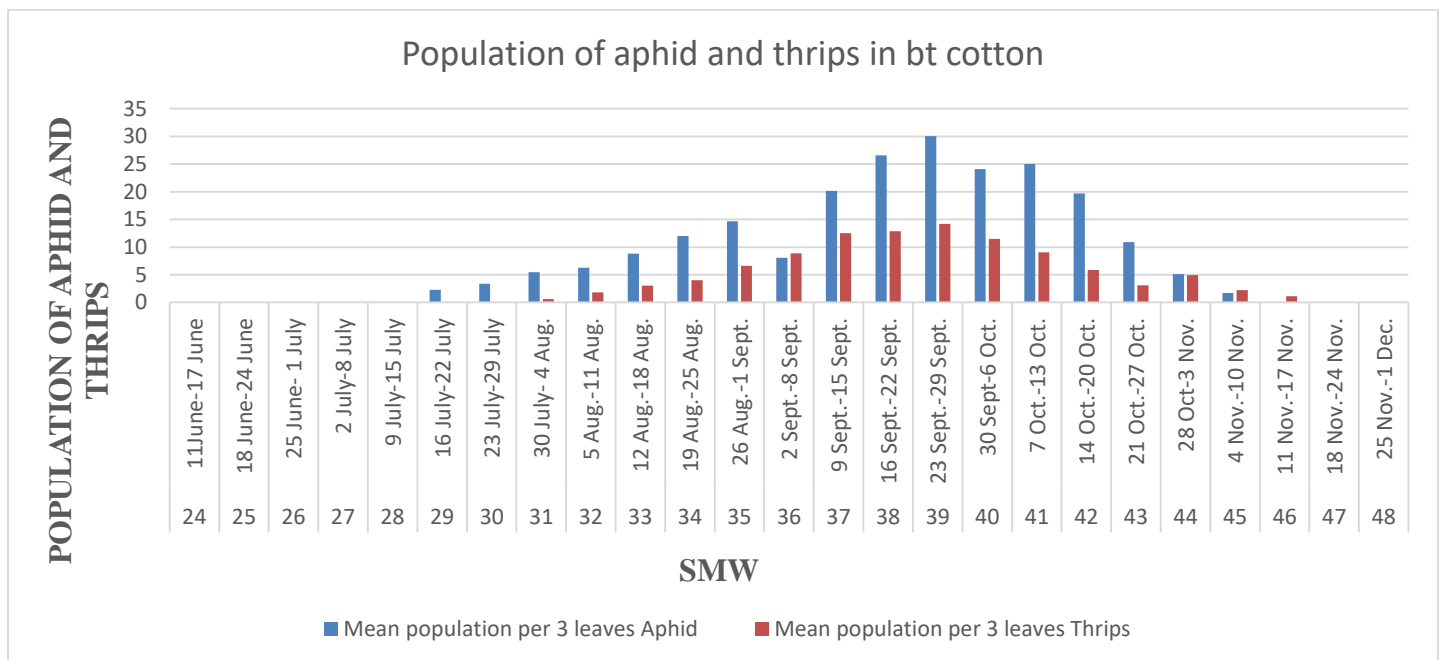


Fig.1. Population of aphid and thrips in Bt cotton during 2022-23

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