

## Diversity of Insect Pest of Cotton Species (*Gossypium hirsutum*) near Mungoli, Tahsil-Wani, District- Yavatmal, Maharashtra, India

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### Abstract

Cotton accounts for 40% of total global fibre production. India is a major contributor to the cotton market globally in terms of area and production. Nearly 500 species of natural enemies related to cotton pest have been reported by many researchers. The present study carried out for a period of June 2024 to May 2025. The survey conducted in cotton field near Matholi, Jugad and Shivni area, Tahsil Wani, District Yavatmal, Maharashtra. The state the area is located between the latitude 19.887° and the longitude 79.12779°. In the present investigation, total 19 harmful cotton pest species were recorded which damages the leaves, flowers, boll and the stem of cotton plant which affects the production and the quality of cotton fibres. The aim of the study is to collect baseline data of insect pest on cotton plant species.

**Keywords:** cotton pest, diversity of insect pest, pest species, *Gossypium hirsutum*.

### Introduction

Cotton which is often referred as 'white gold', is the most prominent natural fibres since ancient times. It has been closely associated with expansion of human civilizations [1] and [2]. It stands as the most significant natural fibre source globally, contributing nearly 40% to the total production worldwide. The extensive history of cotton and its cultivation is intricately associated with the growth of human societies [3]. The cotton plant is known to support approximately 1326 species of insects [4]. In India, more than 166 insect species have been documented as pests affecting cotton crops [5],[6],[7] and [8], with sap feeders, foliar and flower feeders, as well as fruit and stem borers predominating in the fields during each growing season. Cotton pests are responsible for 84% of the total agricultural losses attributed to this crop. The study of cotton pests is very important, because cotton is an economically important crop worldwide [9]. The study found that aphids, jassids, and whiteflies were the most common pests and caused major losses in cotton production. Cotton crops are seriously affected by several sucking insect pests. One of the most harmful pests is the Jassid (*Amrasca biguttula*) which can reduce cotton yield by up to about

18.78% [10]. It feeds on plant sap and also releases harmful substances into the leaves, which causes the leaves to burn, dry up, and fall off. Whiteflies (*Bemisia tabaci*) are another major problem causing pest because they attack cotton plants throughout the growing season. They not only damage the plants by sucking sap but also spread dangerous diseases, especially cotton leaf curl virus disease (CLCuD). Aphids (*Aphis gossypii*) are also very damaging pests that remain present during the entire season and lead to heavy yield losses. Aphids can attack not just cotton but many different plants, making them especially difficult to control. To manage these pests effectively, it is important to know which insects appear at different stages of cotton growth, such as germination, vegetative growth, flowering, and boll formation.

Moderate precipitation, appropriate temperatures, and relative humidity are recognized to enhance the availability of adequate food resources, enabling insects to flourish while facilitating successful reproduction and survival [11]. Conversely, cotton plants undergo various growth stages, each characterized by distinct physiological transformations.

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These stages include germination, vegetative growth, flowering, and boll formation, which collectively define the life cycle of cotton crops. Reduced rainfall, even when correlated with a higher prevalence of insect pests, particularly those that suck [12]. Prior research has indicated that the dynamics of insect pests are not consistent throughout the plant's life cycle [13] and [14]. The physiological changes in cotton plants, including modifications in secondary metabolites and biochemical processes that transpire during the third growth stage, influence the attractiveness of cotton plants to a wide array of insect species, potentially contributing to the noted increase in pest abundance and diversity [15].

Understanding the occurrence of pests throughout the cropping season and their potential fluctuations is essential for developing effective pest management strategies [16]. This study primarily aims to survey the predominant insect pests affecting cotton in the Mungoli area (comprising Matholi, Jugad, and Shivni villages) within the Wani region of District Yavatmal. The geographical coordinates of this area are approximately 19.887° latitude and 79.12779° longitude. Key findings will focus on the diversity of insect pests and the implementation of integrated pest management strategies, including biological control measures. Limited research [17] and [18] has examined the impact of early and late season rainfall on cotton yields. Additionally, [19] investigates the estimation of cotton yield in relation to weather conditions in Maharashtra. According to [20], relative humidity is a crucial weather factor that influences the infestation of sucking pests. Research by [21] indicates that the yield of cotton crops is directly impacted by the region's weather conditions. The interplay of rainfall and temperature affects relative humidity, creating a favorable environment for insect and pest infestations, leading to the conclusion that erratic or delayed monsoons adversely affect crop physiology and yield due to variations in other climatic factors.

[22] emphasizes that precise identification of pests is a critical step in making informed pest management decisions; when pests are accurately identified, relevant thresholds can be established, allowing for appropriate management actions. [23] asserts that cotton is the most significant fibre crop in Maharashtra and India, playing a crucial role in the Indian economy. Furthermore, [24] concludes that the study offers valuable insights into the abundance, diversity, distribution, and species richness of cotton insect pests in regions subjected to continuous crop production.

### Material and Methods

The duration of the study was from June 2024 to May 2025. Sampling of insect pests began with the cultivation of crop plants. Nine plants from five spots at each site were selected and tagged, and observed weekly. Handpicking of cotton pests were carried out carefully during the morning and afternoon hours. The pests encountered were collected using forceps and a brush and then transferred to glass bottles containing diluted formalin solution.

Very small pests were picked up using a brush dipped in ethyl alcohol. The insect pests were permanently preserved in 70% alcohol in glass bottles, and their photographs were captured using a Nikon D-850 camera. Identification of insect pests was carried out using standard literature [25], [26] and [27] and various published research articles.

### Results and Discussion

The observation from study conducted from June 2024 to May 2025 revealed that 19 species of Insect pest were recorded, belonging to 17 genera (*Amrasca*, *Aphis*, *Bemisia*, *Dysdercus*, *Oxycarenus*, *Eurybrachys*, *Phenacoccus*, *Euoroctis*, *Pectinophora*, *Helicoverpa*, *Cyrtacanthacris*, *Earias*, *Spodoptera*, *Myloccerus*, *Mylabris*, *Scirtothrips*, *Hierodula*) and 16 families (Cicadellidae, Aphididae, Aleyrodidae, Pyrrhocoridae, Lygaeidae, Eurybrachidae, Pseudococcidae, Lymantriidae, Gelechiidae, Noctuidae, Acrididae, Nolidae, Curculionidae, Meloidae, Thripidae, Mantidae).



Fig 1. *Amrasca biguttula*



Fig 2. *Aphis gossypii*



Fig 3. *Bemisia tabaci*



Fig 4. *Dysdercus cingulatus*



Fig 8. *Myllocerus undecimpustulatus*



Fig 5. *Oxycarenus hyalinipennis*



Fig 9. *Pectinophora gossypiella*



Fig 6. *Eurybrachys tomentosa*

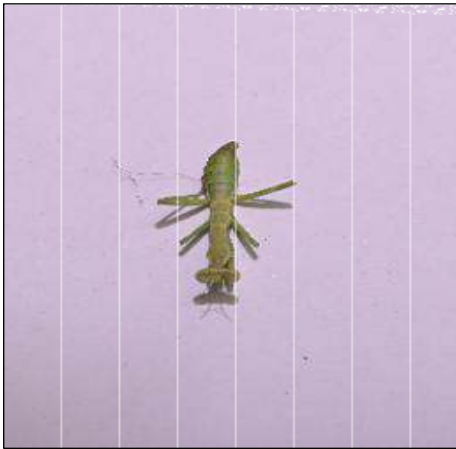


Fig 10. *Hierodula patellifera*



Fig 7. *Phenacoccus Solenopsis*

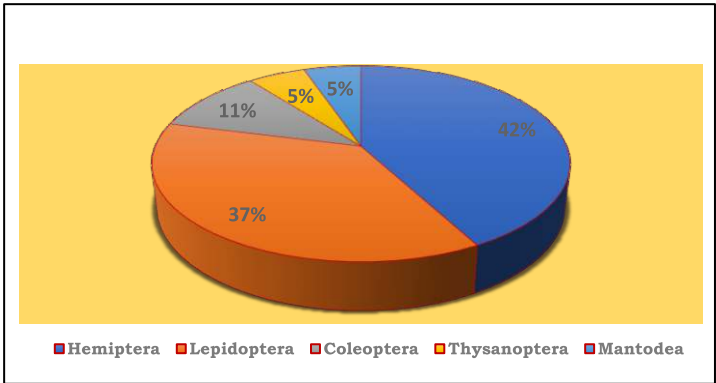


Figure 1.1 Percentage of order of identified Cotton Pest near Mungoli, Tahsil-Wani, District- Yavatmal, Maharashtra, India

Table 1. List of Identified Cotton Pest near Mungoli, Tahsil -Wani, District- Yavatmal

| S.N. | CLASS   | ORDER        | FAMILY         | GENUS                  | SPECIES                  | COMMON NAME        |
|------|---------|--------------|----------------|------------------------|--------------------------|--------------------|
| 1.   | Insecta | Hemiptera    | Cicadellidae   | <i>Amrasca</i>         | <i>biguttula</i>         | Cotton jassid      |
| 2.   |         |              | Aphididae      | <i>Aphis</i>           | <i>gossypii</i>          | Cotton aphids      |
| 3.   |         |              | Aleyrodidae    | <i>Bemisia</i>         | <i>tabaci</i>            | White fly          |
| 4.   |         |              | Pyrrhocoridae  | <i>Dysdercus</i>       | <i>cingulatus</i>        | Red cotton bug     |
| 5.   |         |              |                |                        | <i>koenigii</i>          | Red cotton bug     |
| 6.   |         |              | Lygaeidae      | <i>Oxycarenus</i>      | <i>hyalinipennis</i>     | Dusky cotton bug   |
| 7.   |         |              | Eurybrachidae  | <i>Eurybrachys</i>     | <i>tomentosa</i>         | Squathopper        |
| 8.   |         |              | Pseudococcidae | <i>Phenacoccus</i>     | <i>solenopsis</i>        | Cotton Mealy bug   |
| 9.   |         | Lepidoptera  | Lymantriidae   | <i>Euorotis</i>        | <i>fraterna</i>          | Hairy caterpillar  |
| 10.  |         |              | Gelechiidae    | <i>Pectinophora</i>    | <i>gossypiella</i>       | Pink bollworm      |
| 11.  |         |              | Noctuidae      | <i>Helicoverpa</i>     | <i>armigera</i>          | American bollworm  |
| 12.  |         |              |                | <i>Spodoptera</i>      | <i>Litura</i>            | Leaf worm          |
| 13.  |         |              | Acrididae      | <i>Cyrtacanthacris</i> | <i>tatarica</i>          | Cotton grasshopper |
| 14.  |         |              | Nolidae        | <i>Earias</i>          | <i>vitella</i>           | Spotted bollworm   |
| 15.  |         |              |                |                        | <i>insulana</i>          | Spiny bollworm     |
| 16.  |         | Coleoptera   | Curculionidae  | <i>Myllocerus</i>      | <i>undecimpustulatus</i> | Cotton Grey weevil |
| 17.  |         |              | Meloidae       | <i>Mylabris</i>        | <i>pustulata</i>         | Blister beetle     |
| 18.  |         | Thysanoptera | Thripidae      | <i>Scirtothrips</i>    | <i>dorsalis</i>          | Thrips             |
| 19.  |         | Mantodea     | Mantidae       | <i>Hierodula</i>       | <i>patellifera</i>       | Asian mantis       |

Throughout the study period, approximately nineteen species of significant cotton insect pests from five different orders and sixteen families were documented (Table 1.1). The identified orders include Hemiptera, Lepidoptera, Coleoptera, Thysanoptera, and Mantodea. The order Hemiptera was predominant on cotton plants, comprising 08 species, while the order Lepidoptera followed with 07 species. The order Coleoptera with 02 species and least abundance was recorded for order Thysanoptera and Mantodea, with one species each. The percentage composition of insect pest in cotton was 42% for Hemiptera, 37% for Lepidoptera, 11% for Coleoptera, 5% each for Thysanoptera and Mantodea.

The findings of the present investigation are well supported by earlier studies reported from various regions of India. An initial assessment of insect pests within the cotton ecosystem identified around twenty species of significant cotton pests, categorized into five orders and sixteen families [28], which is consistent with the present observations. Previous studies have also reported the dominance of Hemiptera and Lepidoptera as major pest groups in cotton agroecosystems. Related observations were reported by [29], who examined the diversity of Indian insect fauna with particular emphasis on aphids (Homoptera: Aphididae). The effectiveness of various pesticides in controlling major insect pests of Bt cotton was assessed by [30]. The population dynamics of *Bemisia tabaci* and *Thrips tabaci* on both Bt and non-Bt cotton genotypes were assessed by [31]. Crop losses attributed to insect pests in both global and Indian contexts were recorded by [32]. Aphid species linked to shrubs, herbaceous plants, and cultivated crops within the Maltese Archipelago (Hemiptera: Aphidoidea) were examined by [33]. The diversity of predatory insect fauna in the primary kharif crop agro-ecosystems of Akola, Maharashtra (India), was documented by [34].

## Conclusion

The findings in the recent study, a total of 19 species of pests were identified was dominated by Hemiptera and then followed by lepidoptera. These results will be helpful in planning effective pest management strategies and controlling key insect pest that cause significant damage and directly affect the production of the cotton crop.

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