Entomology

# Insect pest status of vegetable crops in Meerut district of Western Uttar Pradesh

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**Abstract**

In order to evaluate agricultural pests and predators on vegetable crops, the study was carried out in the Meerut district of Uttar Pradesh between August 2024 and May 2025. A variety of insects impact all crops and just feed on vegetable crops. Depending on the plant variety, cropping season, geographic location, and possibility for insect damage, crop losses in vegetables can vary significantly. Vegetable crops are especially susceptible to diseases and insect pests because they are softer, more delicate, and have a shorter lifespan than other crops.

The number of existing small pests is increasing along with the introduction of new ones, such as mealybugs, fruit flies, stem borers, diamondback moths among phytophagous insects, and red spider mites among acarines. Harvests of tomatoes and chilies have suffered significant harm due to recent infestations including South American tomato pinworm and chili black blossom thrips.

In the Meerut district of Uttar Pradesh, the pest status of vegetable crops. Among the herbivores, insect pests include 13 species of the order Lepidotera, including *Erias vitella, Euzopheraperticella, Etiella zinckenella, Hellula undalis, Helicoverpa armigera, Leucinodes orbonalis, Pectinophora gossypiella, Phthorimaea operculella, Pieris brassicae, Plutella xylostella, Spilosoma obliqua, Spodoptera litura, and Thysanoplusia orichalcea; seven species of Hemiptera, including Aphis gossypii, Bemisia tabaci, Brevicoryne brassicae, Bagrada cruciferarum, Dysdercus cingulatus, Lipaphis erysimi, and Myzus persicae.*

During our field investigation in this area, we found that three species of the order Coleoptera *Epilachna vigintiocto punctata, Holotrichia consanguinea, and Raphidopalpa foveicollis* and one species of the order Diptera *Dacus cucurbitae* damaged various vegetable crops.

**Keywords:** Vegetable pests, Hemiptera, Lepidotera, Coleoptera, Diptera

## 1. Introduction

The Meerut district of Uttar Pradesh is home to nearly every kind of vegetable crop, including leafy, pulse, cucurbit, cole, and tuber crops. All of these vegetable crops are attacked by several insect pests, and the severity of these attacks varies throughout time and space.

In order to develop effective management measures, the current studies were carried out to determine the prevalence and condition of various insect pests on the region's vegetable crops. Study area location: Uttar Pradesh's Meerut district is an administrative geographical unit.

In general, the most significant dendrophagous groups in the sphere of agriculture are Lepidoptera, Hymenoptera, and Coleoptera. The Lepidoptera and Coleoptera are mostly known for their bud, twig, and terminal feeders. The most significant seed feeders are found in these two groups, as well as the Hymenoptera and Diptera. The Lepidoptera, Hymenoptera, Coleoptera, Diptera, and Orthoptera are all home to species that feed on foliage. The main species that bore bark are those of the Coleoptera, Lepidoptera, and few Diptera. The Coleoptera, Hymenoptera, and Lepidoptera are the main groups of wood borers, while the Coleoptera are the main group of species that feed on roots. The feeding activity known as "tissue mining" damages the tissues of leaves, needles, stems, or buds. The mesophyll layer of the leaf is often consumed by leaf miners, who do not feed on the upper or lower leaf layers. Roots, seeds, stems, branches, and twigs are the food sources for wood and bark borers. In addition to scoring the wood, their feeding causes emerging holes to appear all over the surface. When the outer bark is destroyed, inner-bark feeders like bark beetles and certain wood borers form galleries that consume the xylem.

Vegetable crops are currently facing significant pests from sucking insects like mealybugs, whiteflies, and black thrips, as well as defoliators and foliage feeders like leaf miners, hadda beetle, tortoise beetle, white plume moth, and fruit borer like melon weevil. Climate change, improper use of agrochemicals, and changes in cropping patterns, ecosystems, and habitat have all contributed to the evolution of vegetable pest issues over time and place.

Chemical insecticides have been used far more frequently over the past 50 years, which has led to a number of major issues, including pollution of the air and water, health risks, the death

of beneficial organisms, the disruption of the ecological cycle and natural balance, pest resistance, pest resurgence, secondary pest outbreaks, etc. Among these, synthetic pesticides have been in use for a long time, although they have significant disadvantages (Sharaby, 1988) [1] and have an impact on the environment and non-target creatures (Islam *et al.,* 2003)[2]. This clearly suggests that there is an urgent need of substitute for chemical insecticides.

## 2. Materials and Methods

**The study area:** From August 2024 to May 2025, field sites in the Meerut region documented insect pests and their natural enemies on cole crops. Pests and their predators on vegetable crops were the main focus of the study. Between August 2024 and May 2025, the insects and predators were surveyed and gathered. Field sites were surveyed for the survey. Sweep nets were used to catch bugs. The insect pests of the main crops grown for vegetables were noted. Using the appropriate methods, the juvenile stage of insect pests that appeared on vegetable crops during the period from planting to harvest were gathered.

The Department of Entomology of Smpggpg College in Meerut, Uttar Pradesh, assisted in sorting and confirming the insects.

The immature was raised on the host from whom it was taken in order to emerge as an adult in a laboratory. The predators and pests gathered using the afore mentioned technique were moved to killing bottles, where they were killed and stored. Pre-pupae, pupae, and caterpillars were gathered from the field. For identification purposes, adults were killed and stored (Mathur and Upadhayay 1996; Kumar and Nigam 1997) [3, 4].

## 3. Results and Discussion

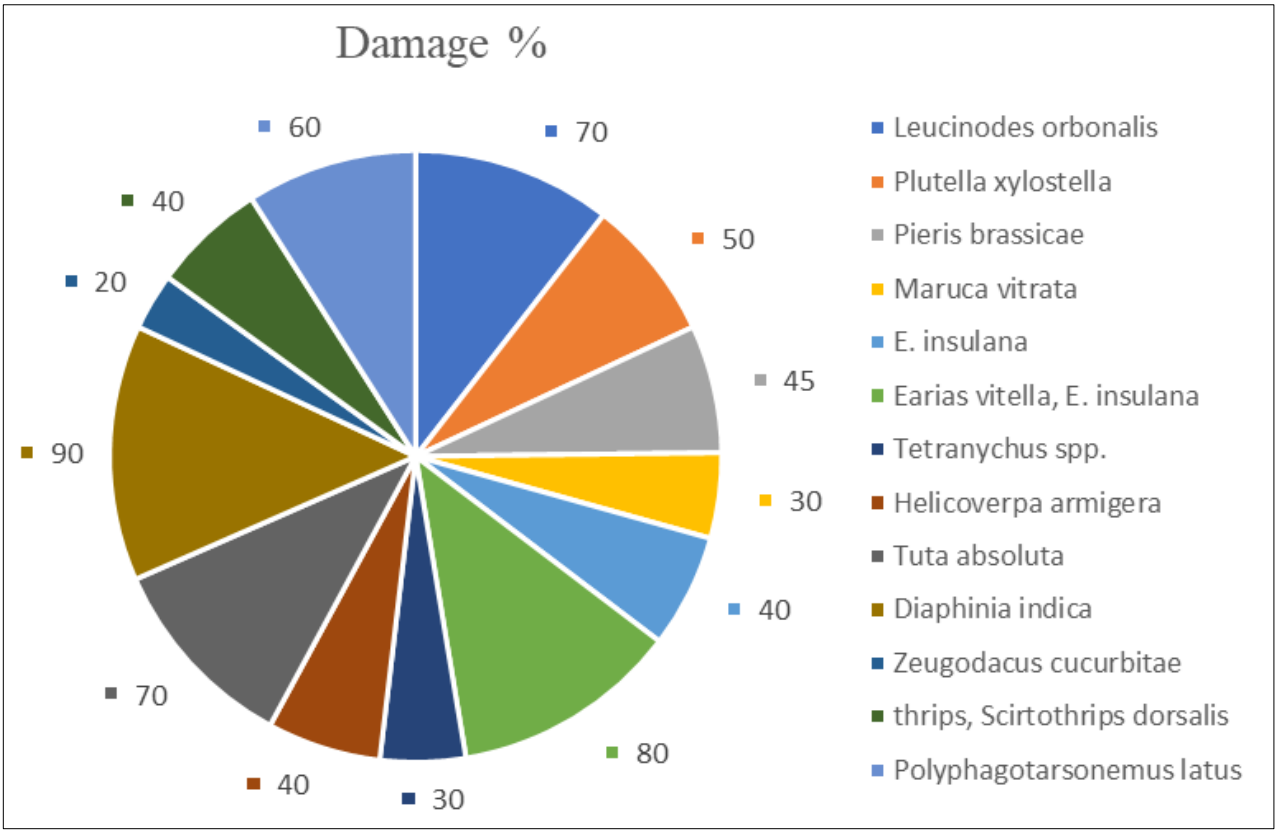
During the survey, data was collected regarding the prevalence of several insect pests on various crops. Most fields surveyed were managed as commercial processing vegetables and treated with conventional two were managed organically. Two pest species (*Lipaphis erysimi and Pieris brassicae*) and three predator species (*Coccinella septumpunctata, Chrysoperla carnea*, and fire ant) from four orders were found in the Meerut region's various locations in relation to the cole crops of cabbage and cauliflower (Table 1).

Moderate damage was caused by low to medium quantities of all three pests. Numerous pests have been observed to prey on them (Mathur *et al.,* 2001 and Tripathi *et al.,* 1988) [5, 6]. As shown in Graph 2, the increased use of pesticides increases resistance to only one species of predator (*Coccinella septumpunctata*) and insect pests (*Plutella xylostella and Lipaphis erysimi*) in the months of October, November, and December on other agricultural sites of cabbage and cauliflower crops in four different sites of Meerut. In the Meerut region of Uttar Pradesh, the predominant species of *Plutella xylostella* showed signs of being the most dangerous major pest of cole crops. The unsprayed plot appeared to have a more varied ecology when comparing the pests and predators of the four sites. The various insect species communities found in this study may help improve pest control techniques in places where cole crops are grown and provide a deeper knowledge of the interactions between insect biodiversity.

The careless application of chemical pesticides to improve vegetable yields may disturb natural control systems, raise the possibility of farm environment contamination, leave pesticide residues in fresh product, and endanger consumer health. This emphasizes how crucial it is to find and promote low-risk, safer substitutes for manufactured items. Some farmers reported using no specific control measures, even though pest knowledge was high. It is particularly noteworthy that none of the farmers were aware of biological control or host plant resistance. Governments and non-governmental organizations must raise awareness among farmers and other stakeholders in addition to strictly enforcing rules pertaining to the use of pesticides (Dwivedi and Sheth, 2008) [7]. According to Chamber *et al.* (2001) and Ngowi *et al.* (2007) [8, 9], the majority of pesticides used are strong poisons, and their extensive usage may be hazardous to people, animals, and the environment. A review of the literature shows that a lot of effort has been done on the survey of cole crop pests and predators in the Meerut region thus far. A thorough survey of predators is required in India. Research on the various facets of pests and predators in India has countless opportunities.

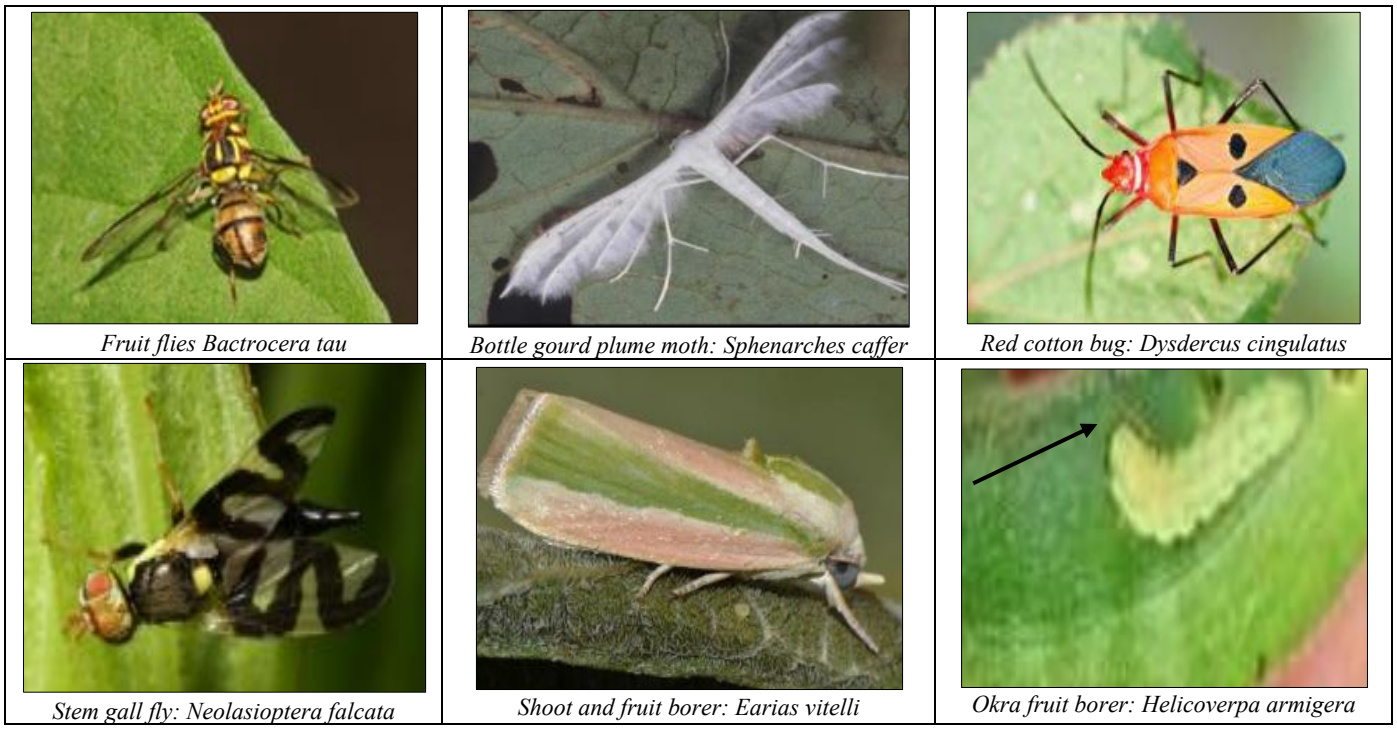
**Table 1:** List of insect-pests found on vegetables crops in Meerut district of Uttar Pradesh, India.

| S. No. | Scientific Name | Common Name | Vegetable Crops | Order | Family | Occurrence |
|---|---|---|---|---|---|---|
| 1 | *Aphis gossypii* | Cotton aphid, | Chilli, Tomato and Okra Melon, Brinjal, Cucurbits | Hemiptera | Aphididae | Regular |
| 2 | *Bemisia tabaci* | White fly | Brinjal, Cucurbits, Chilli, Okra and Tomato | Hemiptera | Aleyrodidae | Regular |
| 3 | *Brevicoryne brassicae* | Cabbage aphid | Cole crops | Hemiptera | Aphididae | Regular |
| 4 | *Bagrada cruciferarum* | Painted bug | Cole crops | Hemiptera | Pentatomidae | Occasional |
| 5 | *Dacus cucurbitae* | Fruit fly | Cucurbits | Diptera | Tephritidae | Regular |
| 6 | *Dysdercus cingulatus* | Red cotton bug | Okra | Hemiptera | Pyrrhocoridae | Regular |
| 7 | *Erias vitella* | Spotted boll worm | Okra | Lepidoptera | Noctuidae | Regular |
| 8 | *Epilachna vigintiocto punctata* | Hadda beetle | Brinjal | Coleoptera | Coccinellidae | Regular |
| 9 | *Euzophera perticella* | Stem borer | Brinjal, Cucurbits | Lepidoptera | Pyralidae | Regular |
| 10 | *Etiella zinckenella* | Pod borer | Pea | Lepidoptera | Pyralidae | Regular |
| 11 | *Hellula undalis* | Cabbage borer | Cole crops | Lepidoptera | Crambidae | Regular |
| 12 | *Helicoverpa or Heliothis armigera* | Pod borer, Fruit borer | Pea, Gram Tomato | Lepidoptera | Noctuidae | Occasional |
| 13 | *Holotrichia consanguinea* | White grub | Chilli | Coleoptera | Scarabaeidae | Occasional |
| 14 | *Leucinodes orbonalis* | Shoot and fruit borer | Brinjal, Tomato, Potato | Lepidoptera | Crambidae | Regular |
| 15 | *Lipaphis erysimi* | Mustard aphid | Cole crops | Hemiptera | Aphididae | Regular |
| 16 | *Myzus persicae* | Green peach aphid | Brinjal, Cole crops, Tomato | Hemiptera | Aphididae | Regular |
| 17 | *Pectinophora gossypiella* | Cotton pink boll | Worm Okra | Lepidoptera | Gelechiidae | Regular |
| 18 | *Phthorimaea operculella* | Potato tuber moth | Brinjal, Potato and Tomato | Lepidoptera | Gelechiidae | Regular |
| 19 | *Pieris brassicae* | Cabbage butterfly | Cole crops | Lepidoptera | Pieridae | Regular |
| 20 | *Plutella xylostella* | Diamond back moth | Cole crops | Lepidoptera | Plutellidae | Regular |
| 21 | *Raphidopalpa foveicollis* | Red pumpkin beetle | Cucurbits | Coleoptera | Chrysomelidae | Regular |
| 22 | *Spilosoma obliqua* | Bihar hairy caterpillar | Cole crops | Lepidoptera | Erebidae | Occasional |
| 23 | *Spodoptera litura* | Leaf caterpillar | Tomato | Lepidoptera | Noctuidae | Regular |
| 24 | *Thysanoplusia orichalcea* | Green semilooper | Cole crops | Lepidoptera | Noctuidae | Regular |




**Graph 1:** Yield losses due to major, invasive and emerging insect pests in vegetable crops.


**Plate 1:** Insect Pest of Tomato, Okra, shoot and fruit borer.



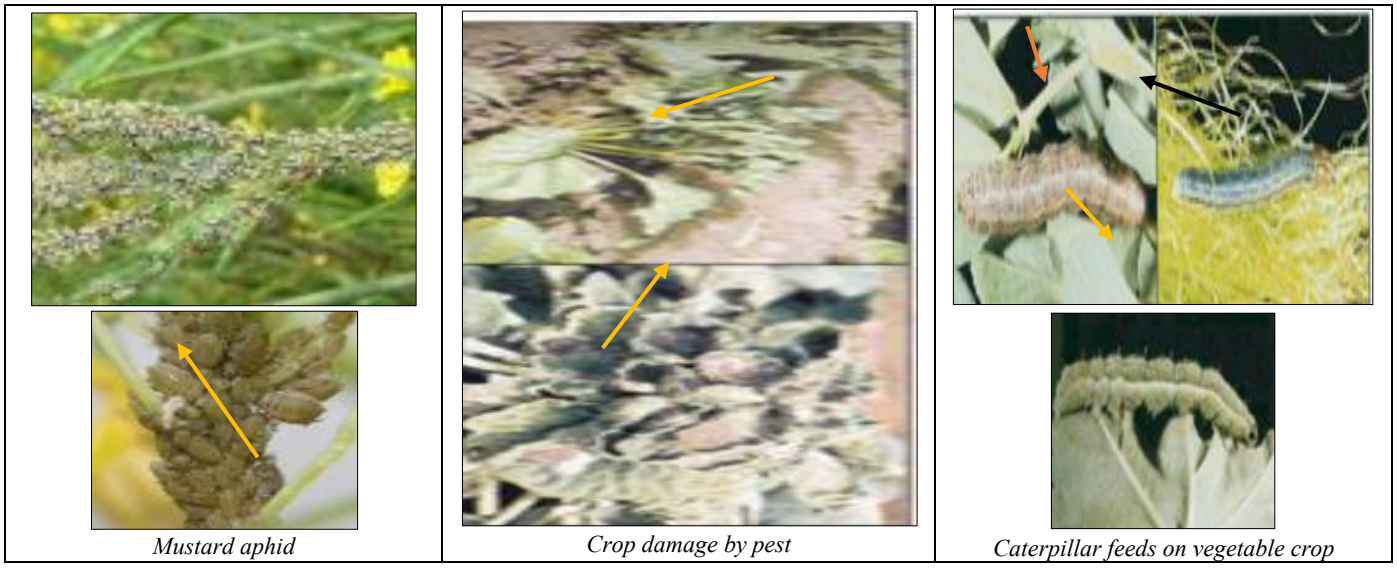



**Plate 2:** Insect Pest of Bottle gourd, Okra, shoot and fruit borer.

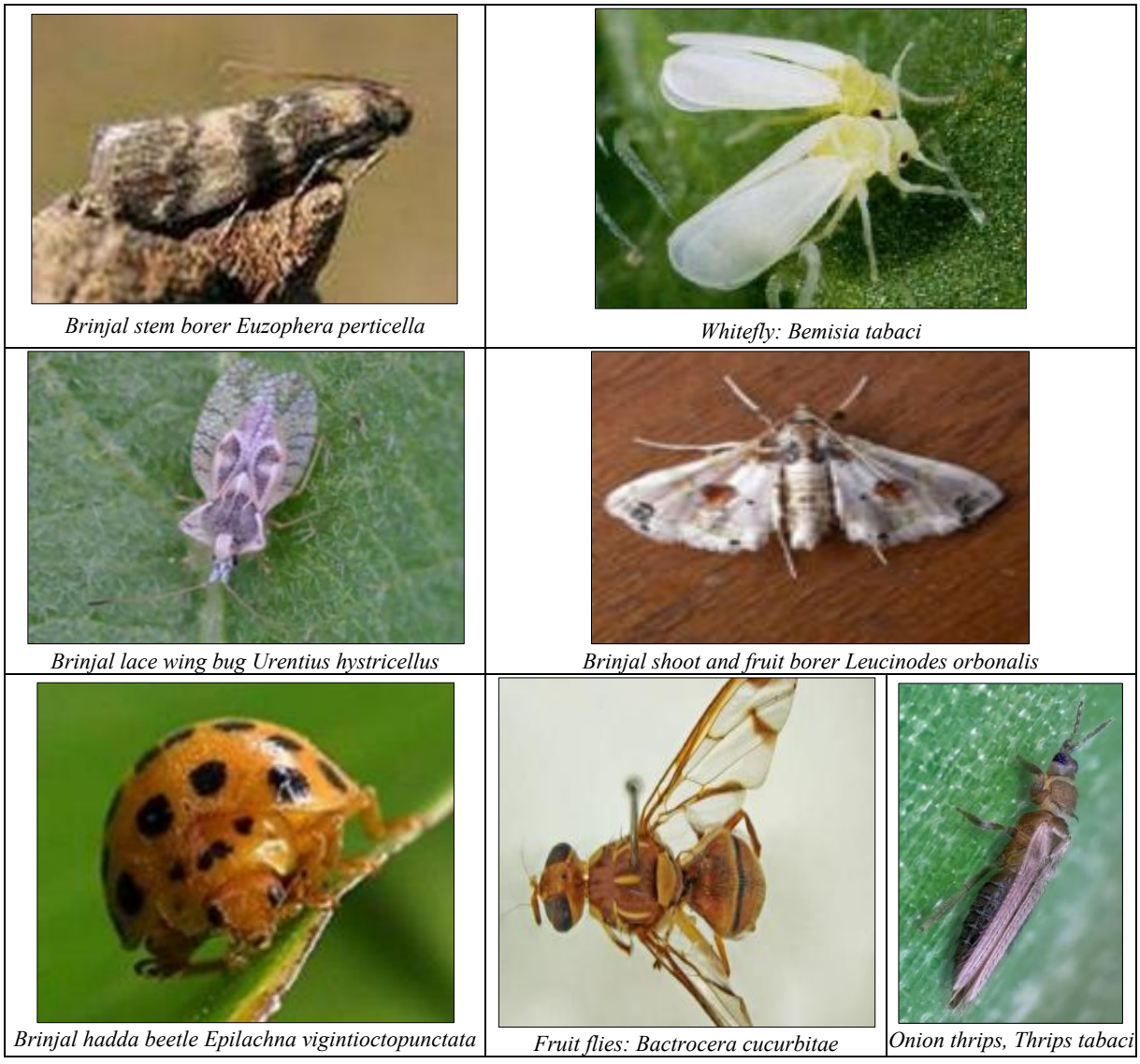



**Plate 3:** Insect Pest of Brinjal, onion, tobacco, shoot and fruit borer

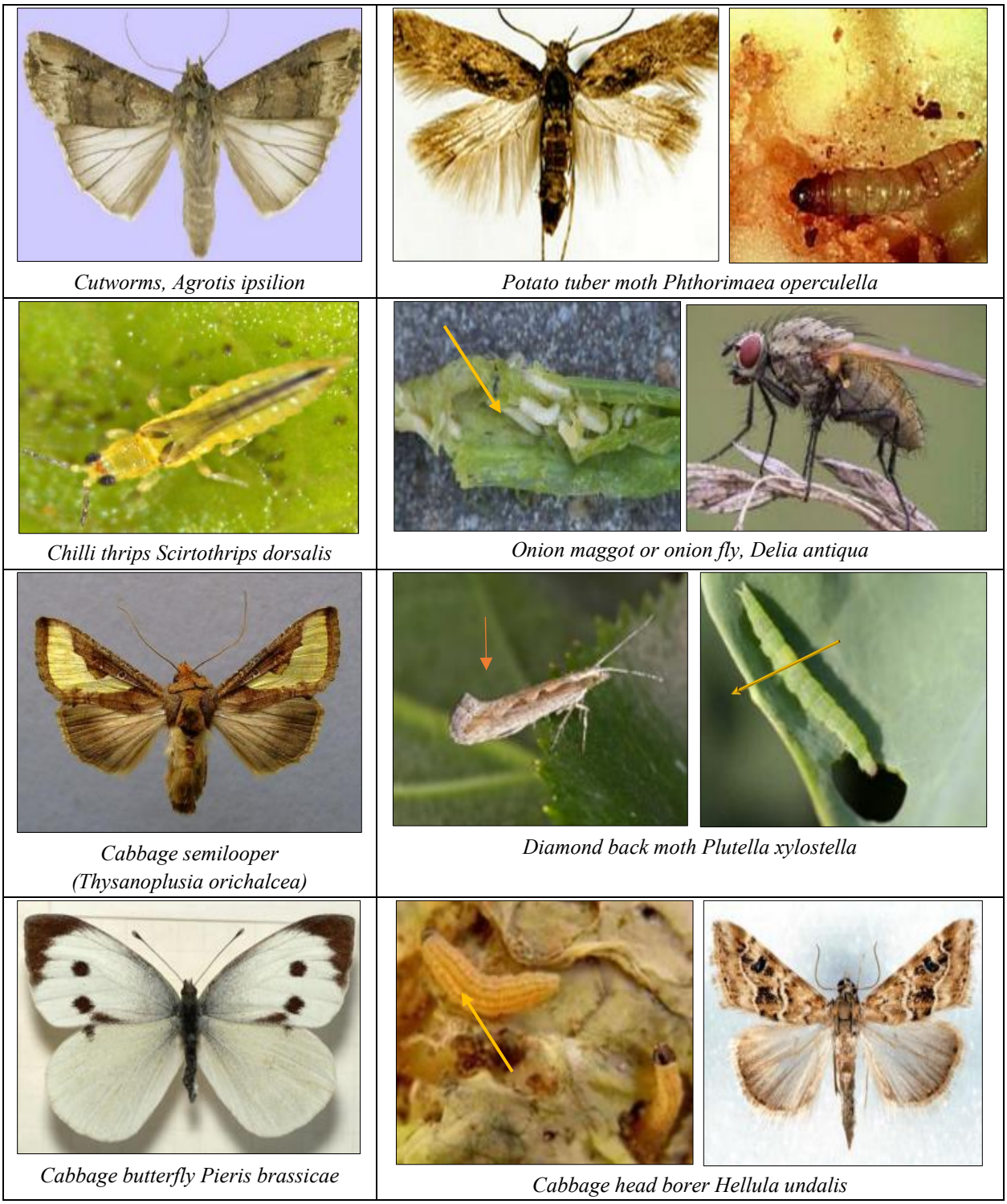



**Plate 4:** Insect Pest of Potato, Cabbage, onion, chilli shoot and fruit borer.

Twenty-four insect pest species were linked to vegetable crops, according to field surveys (Table 1). There are 13 species of insect pests from the order Lepidoptera, 7 species from Hemiptera, 3 species from Coleoptera, and 1 species from Diptera that attack vegetables (Plate 1,2,3,4). Vegetable crops are susceptible to insect pests, such as *Aphis gossypii,* which harms both nymphs and adults and feeds on plant sap. Both nymphs and adults of *Bemisia tabaci* can harm brinjal, cucurbits, chilli, tomato, and okara plants by sucking their sap. The upper and lower leaf surfaces were both covered in *Brevicoryne brassicae*. By sucking the sap from their cole crops, infested seedlings may become stunted and distorted, and if they continue to feed on mature plants, they may wilt, yellow, and generally stunt the plants. *Bagrada cruciferarum* nymphs and adults cause damage to the cole crops by sucking the sap from the leaves, stems, and tender parts of the plants, making the attacked plants appear sickly and drying up or possibly stunted in growth.

The black fungus is attracted to the feeding location, causing brown or black stains to emerge on the leaves; the pulp of the taroi, kaddu, karela, and lauki fruits is consumed by *Dacus cucurbitae* maggot larvae.

*Dysdercus cingulatus* nymphs and adults sipping the sap of the okra trees; the infected fruit begins to decay and eventually

falls; *Spilachna vigintiocto* punctata is a major pest of brinjal, although it also enjoys potatoes and tomatoes. Okra's early shoots and fruits are what *Earias vitella* eats. The adults and grubs scuttle out and consume the green leaf tissues, skeletonizing them before they dry up; Larvae of *Euzophera perticella* burrow into the closest tendril, stalk, blossom, and fruit of cucurbit and brinjal plants; *Etiella zinckenella* caterpillars consume the flowers, freshly formed pods, and seeds inside the pea plant's developing pods. Young plants are severely harmed by *Hellula undalis* caterpillars, which can stunt or kill cole crops. Because Heliothis armigera larvae consume tomato, pea, and gram blossoms and fruits, they cause significant economic harm; The *Consanguinean holotrichia* adults and nymps harm crops, causing stunted leaves to fall from attacked plants, brittle new buds, and chilli plant drop-downs; The larvae of *Leucinodes orbonalis* eat the fruits and shoots of tomato, potato, and brinjal plants. As a result of *Lipaphis erysimi* nymphs and adults sucking the sap from leaves, buds, and pods, cole plants stay stunted, sooty molds develop on the honey dew the insects excrete, and infected leaves may curl. *Myzus persicae* aphids feed on the sap of brinjal, tomatoes, and cole crops, infecting their hosts with cast skins and honey dew.

The spread of plant viruses is the main way that green peach aphids inflict damage; In addition to attacking okra and other malvaceous plants, *Pectinophora gossypiella* is a significant pest of cotton. In younger crops, its larvae pierce delicate squares and eat inside, causing the terminal shoots to dry out; Larvae of *Phthorimaea operculella* consume potato leaves, stems, and petioles. They also burrow tunnels in tubers and deposit their excrement, rendering the tubers unfit for human consumption.

The caterpillars of *Pieris brassicae* skeletonize cole plants by feeding on their leaf surfaces. In the tissues of cole plants, Plutella xylostella larvae create tunnels that inflict damage. Sometimes, irregular patches remain undamaged, resulting in a windowing effect; *Raphidopalpa foveicollis* larvae and adults consume cucurbit leaves, flowers, and fruits; they cause big holes in plant tissues that stunt growth and ultimately kill the plant; On cole crops, *Spilosoma obliqua* larvae feed gregariously on chlorophyll, primarily on the underside of the leaves, giving the leaves a brownish-yellow hue and giving the impression of a net or web. In the Devipatan division of Uttar Pradesh, *Spodoptera litura* larvae feed on the chlorophyll on tomato leaves, giving the appearance of a whitish-yellow web; *Thysanoplusia orichalcea* larvae feed on the lower surface of cole crop leaves, giving the leaves windows (Sarwar, 2014) [10]. In India, seven bug species were linked to these crops, according to Butani and Jotwani (1984) [11]. According to reports, the main pests of these crops in India are pod borer, stem fly, leaf minor, and aphids (Prasad *et al.,* 1984; Mahobe, 1986; Atwal and Dhaliwal, 2002) [12,13,14]. Ahmed *et al.* (1987) [15] also noted similar things. According to Nair (1986) [16], the most dangerous insect pests were Lepidoptera, which were present on the crops during the growing season while Hemiptera second affected crops in this area. Although the Hadda beetle was discovered to infest all cucurbits, its occurrence was determined to be most severe on better gourds, while fruit flies at the fruit development stage and red pumpkin beetle and *Raphidopalpa foveicollis* at the leaf stage were the most serious.

Similar discoveries were also made by Butani and Jotwani (1984) and Nair (1986) [11, 16].

It was discovered that the borer, Leucinodes orbonalis, was the most hazardous pest of brinjal. *Leucinodes orbonalis* and *Euzophera perticella* were identified by Nair (1986) [16] as the two main insect pests of crops.

Along with other insect species including *Bemisia tabaci, Aphis gossypii,* and *Myzus persicae,* the fruit borer (*Helicoverpa armigera*) was the most devastating pest known to infest tomatoes. In contrast to previous reports that showed more than 25 insect species infesting South East Asian chilli leaves and fruits (Butani and Jotwani, 1984)[11]. A further look at Table 1 shows that while many bug species have been linked to various vegetable crops in this area, there are relatively few significant insect pests that result in significant financial losses. Additionally, it was discovered that favourable climatic circumstances have a significant influence on the severity of various insect pests; as a result, appropriate management techniques must be developed with the severity of the insect pests in mind.

## 5. Conclusions

The Meerut district of Uttar Pradesh produces vegetables all year long. Diseases and insect pests are significant obstacles to the production of vegetables. One of the biggest challenges in vegetable production systems is knowledge of vegetable crop diseases.

Additionally, research in important areas such as genetically modified bioagents/biopesticides and pest-resistant transgenic crops needs to be accelerated. The study's conclusions will help to clarify the obstacles farmers face when implementing the suggested management practices for the main insect pests of vegetables.

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