

*A Farmer's Guide to*

# Harmful and Helpful Insects in Eggplant Fields



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The World Vegetable Center



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### **Other recommended publications:**

- Development of an Integrated Pest Management Strategy for Eggplant Fruit and Shoot Borer in South Asia
- Socio-economic Parameters of Eggplant Pest Control in Jessore District of Bangladesh

# Introduction

Eggplant or brinjal, as it is called in South Asia, is one of the most important vegetables in Asia. It is susceptible to several pests, especially the eggplant fruit and shoot borer, the current control of which entails enormous misuse of pesticides.

This pictorial guide contains information on the major insect and mite pests causing damage to eggplant in South and Southeast Asia. The guide is written for eggplant growers and extension specialists. It gives information on damage symptoms and characteristics of pest insects. We trust this information will help farmers identify pest problems and take suitable control measures. For pest control, we strongly urge farmers to seek the advice of technical professionals.

We have also included pictures and information on natural enemies found in the field. The natural enemies depicted here are readily found but rarely appreciated for their importance in keeping pest insects under check. This information is provided in the hope that farmers will realize the importance of natural enemies and refrain from the unnecessary use of pesticides that will kill them.

This publication is one in a series of tools meant to promote integrated pest management (IPM) of eggplant fruit and shoot borer with minimum or no use of chemical pesticides, a project funded by UK Government's Department for International Development.

# Eggplant fruit and shoot borer

## *Damage symptoms*

Plant shoots wilt and dry. Small holes appear below the calyx of fruits. Fruits are filled with frass.

## *Insect characteristics*

Fully grown larvae are 15–18 mm long, dull white in color turning light pink as it matures. The moth, which is active only at night and hides under plant canopy during day, is white with a pink or bluish tinge and brownish markings on its wings.

## *Where to look*

Look for larvae inside wilting shoots. Fruit damage will not be obvious. The first indication is a small hole just below the calyx where the insect has entered. Cut the fruit near this entry hole and you will find where the larva has tunneled.

## *Life cycle*

Creamy white eggs are laid singly on leaf undersides, stems, flower buds, or the base of the fruit. Newly hatched larva bore into fruits or tender shoots. After feeding, larva pupate in soil among fallen debris. Several overlapping generations occur in warm climates. This pest can survive inside partially dried plant stubble during off-season.

Scientific name: *Leucinodes orbonalis*



**Adult moth**



**Wilted shoot**



**Exit hole  
in shoot**



**Larva and  
internal damage**



**Exit holes  
in fruits**



# Leafhopper

## *Damage symptoms*

Infested leaves curl upwards along the margins. Outer leaf areas appear yellowish or burned. Leaves remain small and show a mosaic pattern of yellowing. Fruit-set may be very low.

## *Insect characteristics*

Leafhoppers infest the lower surface of the leaves. Commonly, if disturbed, they move very rapidly sideways and hop. They are usually 1–3 mm long, greenish yellow with slender, tapered bodies, with two distinct black spots on the posterior end of the wings. Legs have rows of sharp spines.

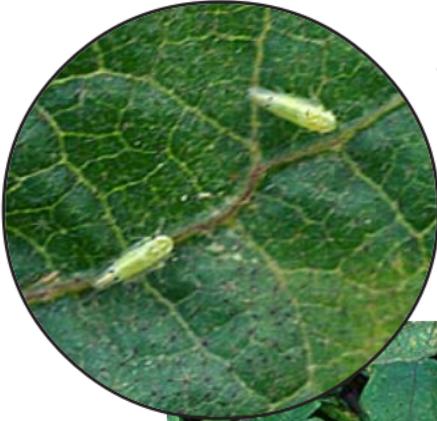
## *Where to look*

Adults and immatures are readily found on the undersides of leaves. Their highly active behavior makes them difficult to catch.

## *Life cycle*

Leafhopper breeds practically throughout the year but are more prevalent during dry periods. Minute eggs are laid in leaf lamina on the underside of leaves. Tiny nymphs feed on the underside of leaves before becoming adults. Total life cycle can last 5–7 weeks and there are overlapping of generations during the season.

Scientific name: *Amrasca biguttula biguttula*



**Adults**

**Damage**



**Close-up of damage**

# Epilachna beetle

## *Damage symptoms*

Leaf tissue is eaten between the veins. The leaves may be completely stripped to the mid-veins, and small areas eaten out and or shallow holes present on the fruit surface.

## *Insect characteristics*

Adults and larvae are often seen living together. Adults look like common lady beetles, but lady beetles do not eat plants. Epilachna beetles are oval-shaped with brownish with black spots on their backs. Larvae are pale yellow and have branched spines covering their backs and sides.

## *Where to look*

Look on both sides of leaves. Adults fall to the ground or fly when you disturb them. The young normally stay in place.

## *Life cycle*

Adult females lay yellow cigar-shaped eggs, mostly on the underside of leaves. Eggs hatch into yellow spiny grubs that feed on the lower epidermis of leaves. They have four larval instars and full-grown larvae are 6 mm long. The pupae are darker and found on the leaves or stems. The life cycle is completed in 15–20 days and there may be several generations in a season.

Scientific name: *Epilachna* spp.



**Beetle (12-spotted) on damaged leaf**



**Beetle (28-spotted)**



**Larvae eating tissue between leaf veins**

# Eggplant leaf roller

## *Damage symptoms*

Young leaves are rolled lengthwise. Rolled leaves are brown and eventually dry. In heavy infestations entire portions of plants appear brown and leaf drop occurs.

## *Insect characteristics*

Caterpillars are purple-brown with many cream-colored hollow bumps and long hairs on the back and sides. The adult is an olive green moth that is active at night.

## *Where to look*

Inspect the young leaves for signs of silken webbing and rolled/leaves. Open these leaves and look for the caterpillar and signs of chewing damage on the leaf surface.

## *Life cycle*

The female adult lays eggs in masses on the young leaves. Each egg mass may have 8–22 eggs. The caterpillar feeds for about four weeks and then pupates inside the rolled leaf. In favorable climates there may be three to four generations each year.

Scientific name: *Eublemma olivacea*



**Rolled leaf  
(larva hidden inside)**



**Exposed larva**



**Severe  
damage**



**Adult  
moths**

# Red spider mite

## *Damage symptoms*

Mite feeding results in large chlorotic patches on leaves. Often these damaged leaves curl when the infestation is concentrated on middle part of lower leaf surface. Severe infestation causes extensive yellowing and browning of entire leaves and eventually leaves drop.

## *Insect characteristics*

Mites are not true insects (for example, they have eight legs, not six), but cause damage similar to many tiny insects such as thrips and whiteflies. They are very tiny red in color and barely seen by the naked eye.

## *Where to look*

Red spider mites are found mainly on lower surface of leaves. Only when the population is very high can you find some individuals crawling on the upper leaf surface or on stems and flowers.

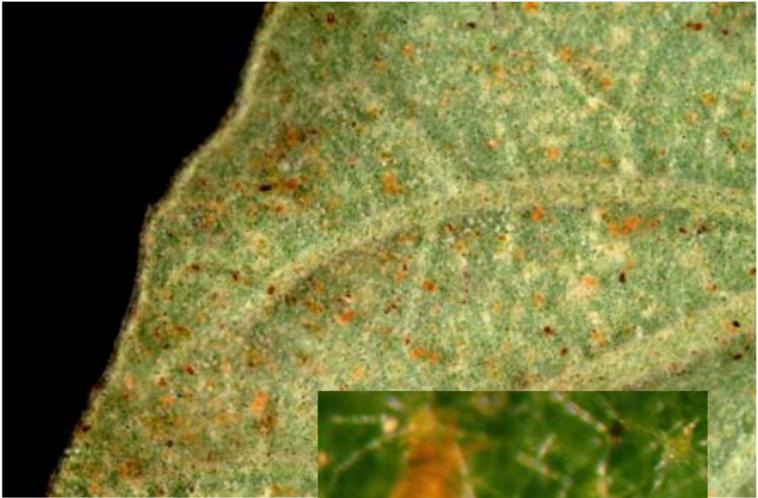
## *Life cycle*

Mites lay very tiny eggs not readily visible by the naked eye on the lower leaf surface. Tiny orange nymphs hatching from these eggs feed on lower surface of eggplant leaves. Within a week, nymphs turn into dark orange to red color adults, which look like tiny spiders crawling on lower surface of leaves.

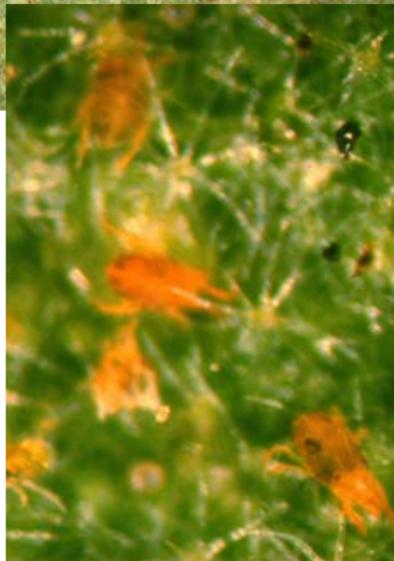
Scientific name: *Tetranychus urticae*



**Damage**



**Mites feeding  
on leaf**



**Close-up  
of mites**

# Thrips

## *Damage symptoms*

Brown, dry areas appear on the underside of lower leaves. In severe cases, the entire leaf dries. Similar damage is seen along the mid-vein on the upper leaf surface.

## *Insect characteristics*

These insects are very small, about the size of a flea, and just visible to the naked eye. Adults are darker yellow with two pairs of narrow fringed wings and two brownish strips down their backs. The young are either yellow or white.

## *Where to look*

Start by looking at the upper surface of the lower leaves, then look along the mid-vein for damage on either side. This is where you should see these tiny insects. Turn the leaf over and carefully look at the sections with healthy tissue that border areas of brown or damaged tissue. If you focus well, you will notice the tiny insects moving.

## *Life cycle*

Adults lay eggs within leaf tissues and the young hatch after several days. Adults are excitable and fly if disturbed. Pupation occurs in the soil usually at the base of the plant. This pest also damages watermelon, muskmelon, bottle gourd, cucumber, chili pepper, tomato, and potato crops.

Scientific name: *Thrips palmi*



**Adult**



**Damage  
to leaf**



**Damage to fruit**

# Aphid

## **Damage symptoms**

Aphids attack eggplant during the cool dry season. Initially, damaged leaves show general yellowing. Young leaves become curled when aphids are numerous. Plants become covered with a black sooty mold and remain stunted.

## **Insect characteristics**

Aphids are tiny soft-bodied insects, 1.0–1.5 mm in length. They are yellowish and have two tubes projecting from their abdomens. Aphids pierce through the leaf surface and suck the plant's juice. They secrete a sugary substance, which falls on leaves and on which a sooty black mold fungus grows. Older aphids sometimes develop wings.

## **Where to look**

Look on the lower surface of leaves. Initially they are always on lower leaf surfaces, but if the population increases rapidly they can move to upper leaf surfaces, stems, and flowers.

## **Life cycle**

Unlike most insects, aphids do not lay eggs. They give birth directly to tiny aphids of which all are females, at least temporarily. These baby aphids become adults in a week's time and start producing a new generation. Aphids feed on numerous crops including tomato, bell pepper, and cotton.

Scientific name: *Aphis gossypii*



**Sooty mold  
damage  
symptom**



**Close-up of  
adults**



**Adults on  
leaves**



# Whitefly

## *Damage symptoms*

Whitefly feeding causes chlorotic spots on leaves. If the insect population is high, these chlorotic spots coalesce until the leaf appears yellow with green veins. Nymphs secrete a sticky honeydew substance when feeding, which covers leaf surfaces and flowers. Plant growth is stunted.

## *Insect characteristics*

Adults live on the lower leaf surface, flying short distances when disturbed. Minute circular eggs hatch into flat oval scale-like nymphs, which are stationary when feeding. Nymphs are less than 1 mm long and adults slightly over 1 mm long.

## *Where to look*

The easiest way to find whiteflies is to brush or shake the leaves and look for the whitefly adults that fly off. Inspect the undersides of the leaves for the stationary immatures.

## *Life cycle*

Eggs are laid on the lower leaf surface usually in groups. Eggs hatch into nymphs, which feed by sucking plant sap. Female adults may lay up to 160 eggs each, leading to a rapid increase in population, especially since each generation is completed in only 10–15 days. There may be up to 15 generations per cropping season.

Scientific name: *Bemisia tabaci*



**Whiteflies on leaves**



**Nymphs and winged adult**

# Natural enemies

In nature, insects are plagued by numerous living organisms that feed upon them. These are called *natural enemies* or *beneficials* and are of great value to eggplant growers. Natural enemies include predators such as mantids, lady beetles, earwig, green lacewing, and spiders. These beneficials can be seen during the day feasting on a wide variety of pests and other insects in the field. In addition, there are tiny wasps called parasitoids, the larvae of which feed on the pest insect and kill it from within. Many natural enemies look similar to insect pests and they should not be mistaken.

Care should be taken to allow beneficials to thrive whenever possible. Chemical pesticides used in killing pest insects will also kill most beneficial insects. Sometimes natural enemy populations build up slowly and a resurgence of the pest after a pesticide application can occur. In addition, when the natural balance between the beneficial and pest complexes is disrupted, a different, previously minor, pest species can unexpectedly cause major damage. Therefore, utmost care should be taken to use a pesticide that targets the pest insect and does not harm the natural enemies, if possible.

Bacteria, fungi, nematodes, viruses, and protozoans also kill insect pests. Each of these is an important component of the natural biological control system.



**Ladybird beetle larva and adult**



**Mantid**

**Predatory bug**

**Earwig**



**Spider**



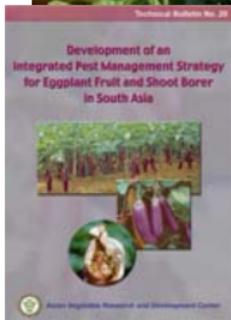
***Trathala  
flavo-orbitalis***

# How to control insect pests of eggplant

Eggplant fruit and shoot borer (EFSB) is by far the most destructive pest of eggplant in South and Southeast Asia. The combination of weekly cutting and destruction of pest-damaged shoots, using sex pheromone-baited traps, and withholding the use of chemical pesticides has proven to be a very effective and economical strategy in controlling this pest on a sustainable basis. For more information, refer to AVRDC publication “Controlling eggplant fruit and shoot borer” or visit our website at <[www.avrdc.org](http://www.avrdc.org)>. For the control of other eggplant insect pests, please read and follow local government recommendations in your area.



**Removing infested shoots**



**Publication on control of EFSB**



**Pheromone trap**

# Pest control notes

