

# Aphids

## Green peach aphid



**Figure 1.** Green peach aphids

The green peach aphid (*Myzus persicae*) is the most common aphid pest of greenhouse sweet peppers but there are other aphid species that can become a problem in greenhouse peppers. These other aphid species include: the melon aphid (*Aphis gossypii*), the potato aphid (*Macrosiphum euphorbiae*) and the foxglove aphid (*Aulacorthum solani*). Not all aphid biological control agents are equally effective on all aphid species so it is necessary to be sure of the identity of the aphid species in question. All of the species eventually develop winged forms.

Green peach aphids are usually light green in colour, but can be pinkish or yellowish in colour in the fall. The body is about 1.2 to 2.5 millimetres long and egg shaped. The winged forms can have black or brown coloured heads and black markings on the body.

## Melon aphid

The melon aphid adults are usually either black or green when there are just a few aphids present, but as the population grows and the aphids become crowded the colours can range from olive green to yellowish green. Melon aphids are about the same size as green peach aphids: 1 to 3 millimetres long. They can be distinguished from the other aphid species by the dark black cornicles and short antennae.

## Potato aphids

Potato aphids are quite large, 1.7 to 3.6 millimetres long, and the body is wedge-shaped and yellowish green to pink in colour. The head has prominent antennal tubercles that are directed outwards. Potato aphids will drop off the leaves when disturbed.

## Foxglove aphids

Foxglove aphids are smaller than potato aphids but larger than melon and green peach aphids. This aphid is a shiny light yellowish green to dark green in colour with a pear-shaped body. The only markings on the bodies of wingless adults are darkish patches at the base of the cornicles.

## Damage assessment

Aphids can be present in the pepper crop very early, even while the plants are just in the seedling stage. They can come in on the transplants as well. Aphids feed by sucking the plant sap. Symptoms of aphid infestation include the development of sticky honeydew on the leaves and fruit. The presence of honeydew on the fruit requires that the fruit be washed prior to going to market.

Sooty mold is often associated with the aphid honeydew; this mold uses the honeydew as a food source and grows to resemble a layer of 'soot' on the leaves and fruit. The presence of sooty mold on the fruit also makes washing the fruit a necessity. The growing points, young leaves, flowers and young leaves can be damaged and distorted. and in severe infestations flower abortion can occur.

## Biological control

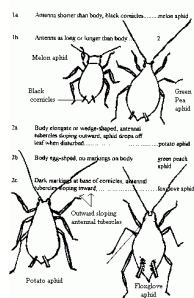
Aphid control should be started in propagation with the introduction of parasitic wasps:

- *Aphidius matricariae* for green peach aphid
- *Aphidius colemani* for the melon aphid and green peach aphid
- *Aphidius ervi* for potato aphid
- *Aphelinus abdominalis* for the potato and foxglove aphid

Parasitized aphids become silvery-brown in colour with a small exit hole at the back when the parasite has emerged. The larvae of the midge *Aphidoletes aphidimyza* feed on most aphid species, but will not feed on gall-forming aphids. Aphid hotspots and population explosions may require introductions of lady beetle species: *Harmonia axyridis*, the Asian lady beetle and large scale introductions of *Hippodamia convergens*.

Introductions of these predators and parasites may have to continue throughout the entire season. For best results, always use a combination of aphid predators and parasites. Consult your local supplier for information and recommendations on release rates.

Key to the wingless forms of the common aphids found in greenhouse peppers



Images: James Calpin, Alberta Agriculture  
Source: Adapted from Howard et al. 1994

**Figure 2.** Key to the wingless forms of the common aphids found in greenhouse peppers



**Figure 3.** White spots on pepper fruit caused by aphid feeding on the fruit bud when it was still young.



**Figure 4.** A lady beetle adult consuming an aphid

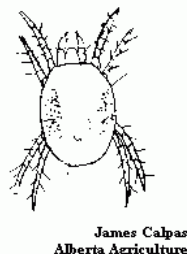


**Figure 5.** Aphidoletes midge larvae feeding on aphids

## Two-spotted spider mite

The two-spotted spider mite (*Tetranychus urticae*) is a common pest of a number of greenhouse crops. Typical symptoms of two-spotted spider mite infestations include speckling of leaves and fine webbing on the underside of affected leaves. As the spider mite population increases, the leaves become brittle and brown in colour, the amount of webbing on the leaves becomes very prominent and the mites can be seen milling about on the webs.

It is very easy for the two-spotted spider mites to be picked-up on clothing and transported throughout the crop by workers. As the season progresses into fall, female two-spotted spider mites develop a bright orange-reddish colour as they prepare for the winter. The female mites seek shelter in crevices throughout the greenhouse and a thorough end of season pressure wash clean-up is necessary to minimize the number of females that survive to the next crop.



**Figure 6.** Two-spotted spider mite

### Biological control

Effective biological control of the two-spotted spider mite is obtained by introducing the predatory mite *Phytoseiulus persimilis* as soon as two-spotted spider mites are detected in the crop. *P. persimilis* does well in the pepper canopy, and once established throughout the greenhouse it controls the spider mite population for the remainder of the season.

The mites *Amblyseius fallacis* and *Amblyseius californicus* are closely related to *P. persimilis*. They establish well and give better control under low density mite situations, but should be used along with *P. persimilis*.

## Thrips



**Figure 7.** Thrip

Two species of thrips are common pests in greenhouse vegetable crops:

- western flower thrips (*Frankliniella occidentalis*)
- onion thrips (*Thrips tabaci*)

Thrips feed by opening wounds on the plant surface and sucking out the contents of the plant cells. The feeding results in small whitish streaks on the leaves and fruit and can cause distortions in the young developing fruit.

The adult thrips congregate in the flowers and regular monitoring of the flowers will allow for the early detection of thrips. Yellow or blue sticky traps placed throughout the crop will help in the early detection of thrips infestations, as with other insect pests. Avoid using yellow traps if *Apidius sp.* are being used for the control of aphids in the crop.

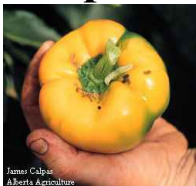
In addition to causing direct feeding damage and resultant yield loss, both thrips species are vectors of Tomato Spotted Wilt Virus (TSWV) which can be a serious disease problem in peppers and tomatoes (Howard et al 1994, Portree 1996). One of the main control measures for minimizing the spread and infection of TSWV within the crop is to control the thrips vectors.

## Biological control

A number of predators are available for biological control of thrips:

- **Predatory mites:** *Amblyseius degenerans*, *Amblyseius cucumeris*, *Hypoaspis miles* and *Hypoaspis aculeifer*
- **Predatory bugs:** *Orius insidiosus* and other *Orius species*

## Loopers and caterpillars



**Figure 8.** Looper on a pepper fruit

At least 2 species of loopers have been associated with problems in greenhouse pepper crops, the cabbage looper, *Trichoplusia ni*, is the most common, with the alfalfa looper *Autographa californica* being an occasional problem. The damage is caused by the larval stages which can reach 2.5 to 3.5 centimetres in length depending on the species. The cabbage looper is the larger the two species in the final larval stage. The larva are a light green in colour with whitish stripes along the length of their bodies.

The larvae feed on foliage and fruit, fruit damage consists of holes in the fruit, accompanied by frass on and around the calyx. As the loopers reach their mature size, the amount of feeding damage can be considerable.

Loopers generally enter the greenhouse through vents and other openings as adult moths which then lay eggs on the plants. The eggs hatch and the larval or looper stages begin feeding and complete their life cycle in about 20 days. As a result, a number of generations can be completed in the crop if control measures are not taken. Loopers overwinter as pupae, and can overwinter inside the greenhouse.

When the greenhouse enters the new production cycle, the moths emerge, mate and begin egg-laying in the new crop.



**Figure 9.** Looper feeding damage on a pepper fruit



**Figure 10.** Looper feeding injury on pepper leaves

## Biological control

Screening intake vents will help prevent adult looper moths from entering the greenhouse. Pheromone traps can be used to detect the presence of adult moths in and around the greenhouse, and acts as an indicator for when to introduce biocontrol agents. Ultra-violet light traps are also used to catch adult moths.

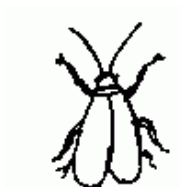
The egg parasite *Trichogramma brassicae* should be released as soon as adults are detected.

The parasite *Cotesia magriniventris* should also be introduced; this parasite prefers to attack young loopers.

*Bacillus thuringiensis* (B.T.) can also be used as part of the biocontrol program. B.T. is a microbial biocontrol agent which is activated once the loopers consume plant material which has been sprayed with B.T.

Since the loopers are quite large, they can be removed by hand when they are found in the crop.

## Whitefly



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**Figure 11.** Greenhouse whitefly

The greenhouse whitefly (*Trialeurodes vaporariorum*) is a common and serious pest in greenhouse crops in Canada. However, it is rarely a problem on greenhouse sweet pepper. A second whitefly species, the sweet potato whitefly (*Bemisia tabaci*) has been found in some greenhouses in British Columbia. Of the 2 whitefly species, the sweet potato whitefly is more difficult to control.

Greenhouse whitefly adults are about 2 millimetres long and congregate on the undersides of the leaves. They usually fly short distances when disturbed. The whitefly nymphs are clear, flattened scales about 1.0 millimetre long at their largest size, and are also found on the underside of the leaves. The sweet potato whitefly is smaller than the greenhouse whitefly and is more yellowish in colour.

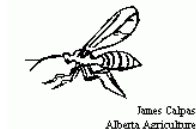
Whitefly damage the plant by sucking sap from the leaves. Large infestations can cause leaf yellowing and a general decline in the plant. Sooty mold is commonly found in association with whitefly. As with aphids, whitefly feeding also results in honeydew formation which can reduce fruit quality. The presence of the honeydew and sooty mold can necessitate that the fruit be washed prior to going to market. The presence of sooty mold on the leaves can reduce the productivity of the leaf by reducing the amount of light reaching the leaf surface.

## Biological control

The parasitic wasps, *Encarsia formosa* and *Eretmocerus eremicus*, are effective against whitefly. Parasitized whitefly scale becoming yellow or black in colour, depending on the parasite. Scale parasitized by *E. formosa* is black in colour.

*Delphastus pusillus* is a small beetle that feeds on whitefly eggs and is ideal for complementing *Encarsia* and *Eretmocerus*.

## Fungus gnats



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**Figure 12.** Fungus gnat

Fungus gnats are found in practically all greenhouse crops. Fungus gnats are an indicator of moist conditions in the greenhouse. Populations generally grow to be quite large early in the year or whenever there is pooling of water on the greenhouse floor. Adult fungus gnats range from 2 to 3 millimetres in length, while the larvae are 4 to 5 millimetres long. The larvae of the fungus gnats are the damaging stage and feed on the roots. They are generally not a problem in greenhouse tomato and pepper, but can be a serious in cucumbers, especially young plants. Affected plants develop slowly and may eventually collapse if too much of the root system has been damaged.

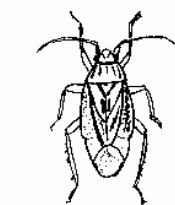
There is evidence that fungus gnat adults may transport root rot fungi such as *Pythium sp.* and *Fusarium sp.* from plant to plant, contributing to the spread of disease caused by these fungi. Fungus gnats are often confused with shore flies, as both are common in the greenhouse under wet conditions. Shore flies are slightly larger than fungus gnats, and look like scaled-down versions of house flies, while fungus gnats look more like tiny mosquitos that don't bite.

## Biological control

Biological control of fungus gnats is obtained through the use of predatory mites *Hypoaspis miles* and most recently *Hypoaspis aculeifer*. Both of these predatory mites also have activity against thrips larvae that move to the base of the plants to pupate.

Nematode parasites in the genus *Steinernema* are applied as a drench to the root zone and kill the fungus gnat larvae by penetrating the larvae and consume them from the inside.

## Lygus bugs



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**Figure 13.** Lygus bug

Lygus bugs (*Lygus spp.*) are common pests of field crops in Alberta, particularly alfalfa and canola, and have become increasingly important in greenhouse vegetable crops. A number of species within the genus can become pests in the greenhouse, including *Lygus lineolaris*. When nearby alfalfa or canola fields are cut or harvested,

large numbers of Lygus bugs can be displaced and move into the greenhouse. Lygus bugs can enter the greenhouse through unscreened vents.

Adult Lygus bugs can reach 5 to 6 mm in length and can range in colour from green to brown with mottled black markings. Once in the greenhouse, Lygus bugs can continue their life cycle and establish a population within the greenhouse. Both the adults and nymphs feed on plant juices through piercing and sucking mouthparts. The bugs like to feed on the plants at the growing points and can damage the developing flower bud that in-turn results in malformed fruit.

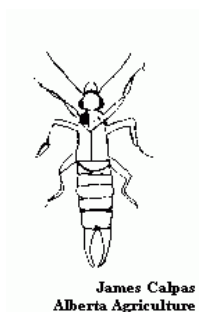


**Figure 14.** Malformed fruit caused by lygus bug feeding injury when the fruit was in the very young bud stage

## Biological control

Lygus bugs are relatively large, fast-moving insects which can be difficult to control with biologicals. *Orius* and *Deraeocoris* will feed on Lygus bugs. Preventing the entry of Lygus bugs into the greenhouse by screening the vents offers the best prospect for controlling this pest.

## Earwigs



**Figure 15.** Earwig

The European earwig (*Forficula auricularia*) can be quite common in greenhouses. These insects are brown in colour and about 10 to 15 millimetres long. They are easily identified by the presence of distinctive ‘cerci’, or appendages, located at the back end of the insect. In the male earwigs, the cerci resemble pincers, the cerci are almost straight on female earwigs. Earwigs are often found under the sawdust bags or rockwool slabs or hiding in other dark, moist, protected areas. Earwigs are nocturnal and feed on a variety of things, including plants and other insects.

Earwigs have occasionally become a problem in greenhouse sweet pepper crops by moving into the crop canopy and damaging pepper fruit located up to one meter off the floor. The earwigs burrow into the fruit at the calyx, the damage resembling that caused by loopers. Cutting the fruit open often reveals a mature earwig. The holes in the fruit and the associated frass renders the fruit unfit for market.

## Biological control

Control of these insects is obtained by trapping them when they are still on the greenhouse floor, before they move into the canopy. Commercial traps and baits are available.