

## **APHIDS: BIOLOGY AND MANAGEMENT**

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Aphids in the greenhouse can affect the appearance and marketability of your crop. They attack a wide range of horticultural crops including bedding plants, potted plants, and perennials. Aphids damage plants through direct feeding, the excretion of honeydew, and transmission of viruses. In addition, aphids have become resistant to many insecticides. Aphids can enter the greenhouse by 1) migrating into the greenhouse from the outside; thus infecting the crop, 2) moving onto a crop from weeds or adjacent infected crops within the greenhouse, or 3) they are on a crop when it is introduced into the greenhouse. The two most common aphids found in greenhouses are the green peach aphid and the melon aphid.

### **DAMAGE**

Aphids feed by inserting their piercing-sucking mouthparts into plant tissues and removing sap. Their feeding on new growth causes young leaves to appear crinkled or curled. Heavy infestations cause plants to wilt, yellow, or become stunted. Aphids also excrete honeydew, a sticky substance that covers leaf surfaces as they feed. Honeydew serves as an excellent medium for black sooty mold fungus that can cover leaves and make plants un-sightly. Aphids have the potential to transmit

plant viruses which render a crop unsaleable. In addition, the presence of cast-off aphid skins reduces the aesthetic quality of a crop.

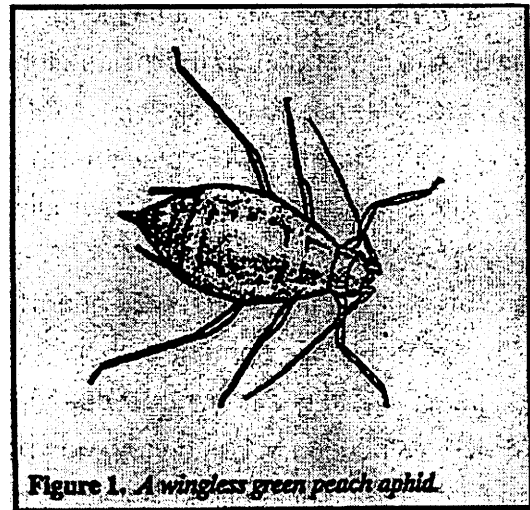


Figure 1. *A wingless green peach aphid.*

### **BIOLOGY**

Aphids are soft-bodied insects that possess tubes (cornicles) on the hind end of their abdomens. Male aphids are usually absent and females can give birth to live female offspring (parthenogenesis). These females in turn already contain developing offspring when they emerge from the mother and can give birth to 60 to 100 live young (nymphs) per day for a period of 20 to 30 days. These newly born nymphs can reproduce in about 7 to 10 days. This type of reproduction eliminates the time for eggs to hatch and can create tremendous population explosions within a short period of time. Aphid reproduction depends on host plant quality and nutri-

tion. Adult aphids may be winged or wingless, this depends on the density of the population and/or host plant condition.

## TYPES

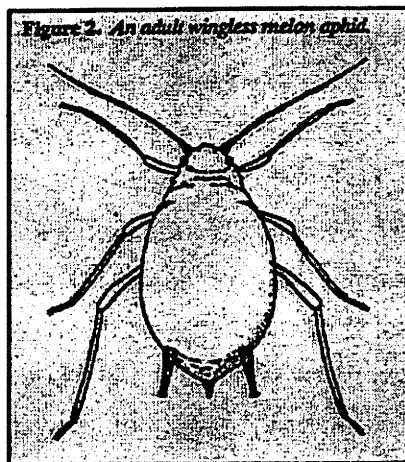
### Green Peach Aphid (*Myzus persicae*)

The green peach aphid is small (2.0 to 2.4 mm long), usually pale green to yellow green. When temperatures become cooler, it may take on a pinkish color. It has long cornicles and tiny knobs on the inside of the base of the antennae which slant inward (Fig. 1). The winged forms have a black patch on the top of the abdomen. It rapidly reproduces at temperatures between 68 and 77°F. Females can give birth to between 28 and 51 live young. Nymphal development is about 8 days. Green peach aphid is a major pest due to its worldwide distribution, it has a very wide host range (over 400 plant species), it vectors more than 150 viruses, and is resistant to many insecticides.

### Melon Aphid (*Aphis gossypii*)

The melon aphid is smaller than the green peach aphid being 1.0 to 1.8 mm long. It is yellow to dark green, somewhat pear-shaped, and has short-dark cornicles. It has no knobs on the inside base of the antennae (Fig. 2). Females can produce an average of 84 nymphs. Nymphs develop into wingless adults unless the host becomes crowded in which case the nymphs develop into winged forms. The melon aphid attacks leaves, developing buds, and flowers of many ornamental and vegetable crops. It is resistant to many

organophosphate and carbamate insecticides. The melon aphid usually does better on chrysanthemums than the green peach aphid. It usually develops larger populations which are more evenly distributed over the plant as compared to the green peach aphid.



## MANAGEMENT

### 1. Cultural

A. Quarantine. Thoroughly inspect/examine all new incoming plant material before it enters the greenhouse.

B. Sanitation. Remove all weeds and plant debris in and around the greenhouse. Weeds can provide places for aphids to hide during insecticide applications, these aphids then can be a source of re-infestation.

C. Fertilizer/Water Management. Avoid high levels of nitrogen. Aphids can thrive on plants whose growth has been stimulated by excessive rates of nitrogen. Avoid overwatering plants as too much moisture can produce succulent plant growth that is easy for aphids to feed on. Maintain adequate moisture levels to avoid stressing plants.

D. Screening. If possible, screen all openings (ridge vents, side vents, sidewalls,

and entryways) to prevent aphid migration into the greenhouse.

## 2. Scouting

The best way to scout for aphids is to inspect plants. You should examine new shoots, terminal growth, and flowers before they open; these are areas aphids are most likely to be found. In addition to scouting for actual aphids, look for white aphid cast-off skeletons and small spots of shiny honeydew. Yellow sticky cards can be used to attract winged adults, but remember that not all aphids are winged. The presence of winged aphids on yellow sticky cards may indicate that aphid numbers are building up. Place 1 trap per 1,000 square feet about 2 to 3 inches above the crop canopy. Yellow sticky cards should be placed near openings (i. e. vents and doors) where winged aphids can migrate into the greenhouse. Inspect traps at least once per week, twice a week may be necessary if high numbers of aphids are found.

## 3. Chemical

The management of aphids using insecticides is a viable option, but can be a problem for several reasons. First, aphids have a high reproductive capacity, which means more frequent applications may be necessary. Second, aphids are often found on the lower leaf surfaces deep within plant canopies or in flowers, this means that thorough coverage is essential to contact aphids. Finally, insecticide resistance, especially among green peach aphid and melon aphid popula-

tions is widespread.

The following is a list of insecticides used for aphid management:

### Organophosphates:

- Acephate (Orthene/Pinpoint)
- Chlorpyrifos (Duraguard)
- Diazinon (Knox Out)
- Sulfotepp (Plantfume 103)

### Carbamates:

- Bendiocarb (Dycarb/Turcam)
- Methiocarb (Mesuro)

### Pyrethroids:

- Bifenthrin (Talstar)
- Cyfluthrin (Decathlon)
- Fenpropathrin (Tame)
- Fluvalinate (Mavrik)
- Lambda-Cyhalothrin (Topcide)
- Permethrin (Astro)

### Chlorinated Hydrocarbons:

- Endosulfan (Endosulfan 3EC)

### Chloronicotinyls:

- Imidacloprid (Marathon)

### Insect Growth Regulators:

- Azadirachtin (Azatin/Neemazad)
- Fenoxycarb (Preclude)
- Kinoprene (Enstar II)

### Biologicals:

- *Beauveria bassiana* (Naturalis-O/  
Botaniguard)

### Others:

- Cyfluthrin + Chlorpyrifos (Duraplex)
- Horticultural oil (Sunspray Ultrafine  
Spray Oil)
- Insecticidal soap (M-Pede/Insecticidal

Soap)

Below is a list of suggestions to assist growers when using insecticides against aphids.

- Spot treat localized regions of greenhouses instead of spraying the entire range. Thorough inspections will detect "hot" spots that need treatment.

- In most cases, two applications spaced five to seven days apart will result in adequate aphid management.

- Thorough coverage with contact insecticides is critical for aphid management. Be sure to spray leaf undersides, leaf whorls, and developing flower buds.

- Systemic insecticides are particularly effective because aphids ingest large amounts of plant sap. Be sure to apply systemics before plants flower.

- Use the lowest label rate that will provide adequate control to minimize the potential for resistance.

- Rotate insecticides from different classes and with different modes of action. Use an insecticide class for at least the time required for one to two generations to be produced (14 to 21 days, depending on temperatures).

#### 4. Biological

Biological control of aphids requires more than simply releasing predators and parasites. Regular scouting of aphid populations is essential for identifying aphid species, detecting aphid population increases, determining release rates of beneficials, and

modifying biological control efforts. Once aphid populations explode and reach damaging levels it is too late to utilize biological control. Possible biological control agents are *Aphidoletes aphidimyza*, *Chrysoperla spp.*, *Aphidius matricariae*, *Aphidius colemani*, and *Aphidius ervi*.

*Aphidoletes aphidimyza* is a predator effective against over 60 species of aphids, including the green peach aphid. The adult is a midge that looks similar to a fungus gnat adult. It lives for about 10 days and after mating can lay between 100 to 200 eggs on the underside of leaves close to aphid colonies. Eggs hatch in 2 to 3 days. The larvae are bright orange-yellow and kill aphids by biting their knee joints, injecting a paralyzing toxin, and sucking out the body fluids. Each larva has the potential to kill up to 65 aphids during its 3 to 5 day developmental period. The larvae then drop to the ground where they build cocoons about 1 inch below the soil surface. After pupating, adults emerge in 10 to 14 days. *A. aphidimyza* goes into diapause during the winter months.

*Chrysoperla spp.* or green lacewings are effective predators on many aphid species. Adults are slender insects around 15 mm long, with hair-like antennae, and net-veined wings. Adult females can lay between 10 to 30 eggs per day. Adults require nectar and pollen to reproduce, and they generally do not feed on aphids. The larvae, which are voracious feeders, are alligator-like, with long flattened bodies, and have sickle-shaped mandibles. The larvae injects a paralyzing

venom into aphids and draws out the body fluids. They can consume between 200 to 300 aphids during their 1 to 3 week developmental period.

*Aphidius matricariae* is a tiny parasitic wasp that lays eggs in aphids, turning them into hard brown shells (aphid mummies) that are stuck to leaf surfaces. The larvae mature inside the aphid over a period of 2 weeks at 70°F.

*A. matricariae* does not diapause under winter greenhouse conditions. They are most effective against low aphid populations. *A. matricariae* is effective against green peach aphid, but not cotton or potato aphid. Adult wasps are attracted to yellow sticky cards, so be sure to remove yellow sticky cards prior to making releases.

*Aphidius colemani* is a small parasitic wasp that is similar in appearance and development to *Aphidius matricariae*. It is effective against green peach aphid and melon aphid, but not the potato aphid. *A. colemani* has a high reproductive potential and short developmental time which allows it to control aphids during the entire growing season.

*Aphidius ervi* is another parasitic wasp that is effective against potato and foxglove aphid. It turns aphids into gray or brown mummies. Like all parasitic wasps, it is most effective when released before aphid numbers are high.

Consult suppliers or supplier catalogs for release rates as they will vary depending on the crop production system.