APHIDS

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Aphids in the greenhouse can affect crop appearance and marketability. They can damage plants through direct feeding, the excretion of honeydew, and transmission of viruses. In addition, aphids have become resistant to many insecticides. Aphids 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) moving with 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 slender mouthparts into the phloem tissue of plants and sucking out sap. This 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 unsightly. 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.

BIOLOGY

Aphids are soft-bodied insects that possess tubes (cornicles) on the hind end of their abdomens. Male aphids are usually absent from the greenhouse and females can give birth to live female offspring that can start producing their own young (nymphs) in 7 to 10 days. Each of these females in turn can give birth to 60 to 100 live young per day for a period of 20 to 30 days. This quick reproduction rate can create tremendous population explosions within a short period of time. Aphid reproduction depends on plant quality and nutrition. Adult aphids may be winged or wingless. Nymphs develop into wingless adults unless the host becomes crowded in which case the nymphs develop into winged forms, this allows them to move to other sites in the greenhouse.

TYPES

Green Peach Aphid (*Myzus persicae*)

The adult green peach aphid is small (2 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 (tail pipes) 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 where temperatures are between 68 and 77°F. Females can produce

between 28 to 51 live nymphs during each generation. Nymphal development is about 8 days. Green peach aphid feeds on over 400 plant species and is resistant to many insecticides. It has been reported to transmit more than 150 plant viruses.

Melon Aphid (*Aphis gossypii*)

The adult 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 during each generation. The melon aphid attacks leaves, developing buds, and flowers of many ornamental and vegetable crops. It also has shown to be resistant to organophosphate and carbamate insecticides. The melon aphid is usually better adapted to 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 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 Management. Avoid high levels of nitrogen. Aphids can thrive on plants whose growth has been stimulated by excessive rates of nitrogen.

D. Screening. Screen all openings (ridge vents, side vents, sidewalls, and entryways) to prevent aphid migration into the greenhouse.

E. Yellow Clothing. Workers should not be allowed to wear yellow clothing. Aphids are attracted to this color and may be carried on clothing to non-infested areas.

2. Monitoring/Scouting

Yellow sticky traps can be used to attract winged adults, but remember that not all aphids are winged. Place 1 trap per 1,000 square feet and hang it about 4 to 6 inches above the crop. Yellow sticky traps detect the movement of winged adults into or within the greenhouse. Inspect traps at least once per week, twice a week may be necessary if high numbers of aphids are found. The best way to scout for aphids is to randomly inspect plants around the greenhouse. 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.

3. Chemical

The management of aphids using insecticides is a viable option, but can be a problem for several reasons. First, aphids a have 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 populations is widespread.

The following is a list of insecticides registered for aphid control:

ORGANOPHOSPHATES

•Dursban (chlorpyrifos)
•Plantfume 103 (sulfotepp)
•Knox Out (diazinon)

•Orthene (acephate)

•Malathion (malathion)

CARBAMATES

•Dycarb, Ficam (bendicarb)
•Grandslam (methiocarb)
•Oxamyl G (oxamyl)

PYRETHROIDS

•Mavrik (fluvalinate)
•Tempo, Decathlon (cyfluthrin)
•Pyrenone (pyrethrin)
•Talstar (bifenthrin)
•Tame (fenpropathrin)

CHLORINATED HYDROCARBON

•Thiodan (endosulfan)

INSECT GROWTH REGULATOR

•Enstar (kinoprene)

OIL

•Sunspray Ultra-Fine Spray Oil (horticultural oil)

SOAP

•M-Pede (insecticidal soap)

OTHER

•Nicotine Sulfate

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 control. Be sure to spray leaf undersides, leaf whorls, and developing flower buds.

• Systemic insecticides (acephate and oxamyl) 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 monitoring of aphid populations is essential for identifying aphid species, detecting aphid population growth trends, 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 aphidomyza*, *Chrysoperla spp.*, and

Aphidius matricariae.

Aphidoletes aphidomyza 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 larvae 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.

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 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. They are most effective from September through March. They are also most effective against low aphid populations.

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

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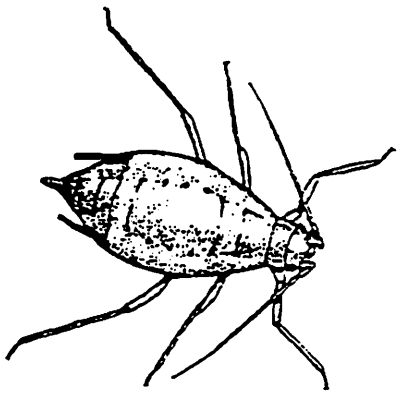

Figure 1. A wingless green peach aphid.

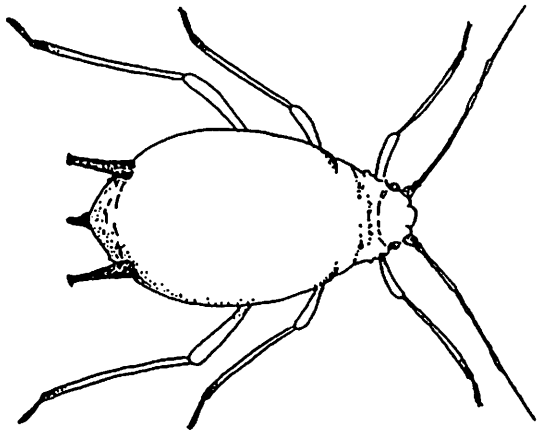

Figure 2. An adult wingless melon aphid.

(Figure source: NCFGB, Vol. 37, No.2.)