

Greenhouse Crops and Floriculture

Fact Sheets

Pest Management

Managing Aphids

Identification

About 30 different species of aphids can be found in greenhouses, depending on the crop. Aphids are generally less than 1/8 inch long, soft-bodied insects with long legs, long antennae and a pair of tube-like structures called cornicles projecting from the posterior end. Aphids may occur in large colonies on new growth, the base of buds, or the undersides of mature leaves. There are many species of aphids which range in color from greenish-yellow to very dark green, dark brown to black and even pink. Some have wings, which are transparent with very few veins and are held vertically over the body when not in use.

Damage

Aphids are sucking insects that remove plant sap and cause distorted growth. Aphids void waste as a sugar-rich liquid called honeydew, which attracts ants and promotes growth of black-colored fungi called sooty mold. In addition, some aphids also transmit viral plant diseases.

Biology

Many aphid species reproduce sexually only under specific environmental conditions, often those associated with the onset of winter. During spring and summer, reproduction is asexual, with unmated adult female aphids giving birth directly to live young, all of which are female. This process, coupled with the high fecundity of many aphids (some species giving birth to as many as 60 to 100 young nymphs over a period of 20 to 30 days) and the quick maturation of aphids (as little as 7-10 days between generations) allows populations of aphids to increase quickly. At high densities, winged females may appear in aphid colonies. These winged individuals then move to new, less crowded host plants. Outdoors, many aphid species pass the winter in the egg stage. In greenhouses, aphids may continue to reproduce asexually, via live birth, indefinitely. Many species are found on only one, or at most, a few host plants. On ornamental crops, the most common aphid species are green peach aphid, (*Myzus persicae*), melon/cotton aphid (*Aphis gossypii*), chrysanthemum aphid (*Macrosiphoniella sanborni*), rose aphid (*Amacrosiphum rosae*), potato aphid (*Macrosiphum euphorbiae*), foxglove aphid (*Acyrtosiphon solani*), and leaf-curling plum aphid (*Brachycaudus helichrysi*).

The green peach aphid is mentioned most often because of its worldwide distribution, very wide host plant range (more than 400 host plants), virus disease transmission (vectors more than 150 virus strains) and difficulty of control.

Detection and Monitoring

Sanitation is an important part of aphid control. To prevent the introduction of new aphid species into your greenhouse, carefully inspect all new plants before placing them in the growing areas. Eliminating all weeds in or near the greenhouse can be useful because it will help suppress potential reservoirs from which aphids might enter the crop. Winged aphids can easily move from the outdoors into greenhouses through open vents and establish on crop plants. To detect aphids early, several plants on each bench throughout the greenhouse should be checked on a weekly basis, particularly those species of plants that most often host aphids. Inspect the young growing tips, stems and buds of aphid prone plants and note which cultivars are the most susceptible. Look for honeydew and white cast skins. Using yellow sticky cards can help detect entrance of winged aphids into the greenhouse in spring or early summer. Yellow cards will not, however, allow you to monitor aphids within the crop, as most of these aphids will be wingless. Direct examination of plants will be needed. Young aphids of some species may reside between scales of leaf buds or in flowers. This reduces their contact with nonsystemic pesticides and repeated applications may be needed for control. Coverage of plant parts with wettable or soluble powder formulations may be improved by the use of surfactants. Fumigation may provide better control than contact foliar sprays and thus be more effective, especially for plant species or crop densities in which good coverage is hard to achieve. Fumigation also has the advantage of being less phytotoxic to many plants than liquid sprays. In some cases, insecticidal soaps and highly refined horticultural oils can provide effective aphid control. These materials, however, kill exclusively by contact and thorough coverage is crucial.

Preventive Strategies

- Practice good sanitation, such as removing discarded plant material and eliminating weeds around plant production areas. Weed host plants often serve as reservoirs for migrating or ant carried aphids.
- Avoid excessive amounts of nitrogen fertilizer which promote soft plant tissue. New, soft plant tissue promote higher aphid populations.
- Use physical control methods if appropriate. These include screens or other barriers. Screens are especially important in stock plant production areas to reduce the threat of virus transmission.
- Thoroughly inspect all incoming plant material and spot treat if necessary.

Biological Control

Aphids have many natural enemies and several groups have been studied as potential biological control agents for release in greenhouse crops.

Predators of aphids sold commercially include ladybird beetles (Coleoptera: Coccinellidae), lacewings (Neuroptera: Chrysopidae) (Scopes 1969), flower flies (Diptera: Syrphidae), and predaceous midges (Diptera: Cecidomyiidae, *Aphidoletes aphidimyza*).

Parasites of aphids include various braconid wasps, such as species of *Aphidius*.

Several species of pathogenic fungi, such as *Beauveria bassiana* cause disease in aphids and some species are available for use as bioinsecticides.

References

Lindquist R. Attacking Aphids. *Greenhouse Grower*. August 1998 144-153.

Lyons S. and Van Driesche R. *New England Greenhouse Pest Control and Growth Regulator Recommendations 2001-2002*. Section B, Insect and Mite Management. New England Floriculture Inc.

Updated 7/00 Tina Smith, Floriculture Program, Extension Floriculture Program, Dept. Plant & Soil Sciences, University of Massachusetts

Treatments

Table 1. Some insecticides registered for aphid control in greenhouses, listed by chemical class.		
Pesticide Class	Trade Name/ Common Name	Comment
Organophosphate	DuraGuard ME (chlorpyrifos)	Microencapsulated, extended release formula. Two sprays at 7-day intervals.
	Knox-Out GH (diazinon)	See label for plant safety.
	Dibrom 8E (naled)	Vapor. See label for plant safety.
	Dithio (sulfotepp)	Smoke. Apply when foliage is dry.
	PT1300 Orthene TR (acephate) Orthene TT&O (acephate) Orthene TT&O 97 (acephate)	Use alone, or combine with a pyrethroid insecticide. See label for plant safety.
	Fulex DDVP (dichlorvos)	Smoke. Apply when foliage is dry.
Carbamate	Closure 76 WP (bendiocarb)	See label for plant safety.
	Mesurol 75-W (methiocarb)	Do not apply with oil.
Pyrethroid	Talstar GH (bifenthrin)	
	Attain TR (bifenthrin)	

	<p>Mavrik Aquaflow (fluvalinate)</p> <p>Decathlon (cyfluthrin)</p> <p>Tame 2.4 EC (fenpropathrin)</p> <p>Pyrenone (pyrethrins)</p> <p>1100 Pyrethrum TR (pyrethrins)</p> <p>Astro (permethrin)</p>	<p>Can be used alone, but seems to work best when combined with other products.</p>
Chlorinated Hydrocarbon	<p>Thiodan 50 WP (endosulfan)</p> <p>Thiodan 3 EC (endosulfan)</p> <p>Phaser 3 EC (endosulfan)</p> <p>Fulex Thiodan (endosulfan)</p>	<p>Sometimes combined with a pyrethroid product.</p>
Botanical	<p>Fulex Nicotine (nicotine)</p> <p>Azatin XL (azadirachtin)</p> <p>Neemazad 0.25 EC (azadirachtin)</p> <p>Neemazad 4.5 EC (azadirachtin)</p> <p>Ornazin 3% EC (azadirachtin)</p> <p>Cinnamite (cinnamaldehyde)</p>	<p>One of the very old products, but still effective against aphids.</p> <p>Very good aphid control when combined with a pyrethroid insecticide or with the <i>Beauveria bassiana</i> mycoinsecticides listed.</p> <p>Contact insecticide. Thorough coverage needed.</p>
Insect Growth Regulators	<p>Enstar II (kinoprene)</p> <p>Preclude TR (fenoxycarb)</p> <p>Distance (pyriproxyfen)</p>	<p>Used combined with other pesticides such as pyrethroid product.</p> <p>Total release.</p> <p>For aphid suppression. See label for plant safety.</p>
Soaps and Oils	<p>M-Pede (insecticidal soap)</p> <p>Insecticidal Soap 49.52 (insecticidal soap)</p>	<p>Soaps and oils kill by contact so thorough coverage is needed.</p>

	Ultra-fine Oil (refined petroleum distillate) Golden Natur'l Spray Oil (soybean oil) Triact 70 (neem oil)	See label for information on plant safety.
Mycoinsecticides	BotaniGard ES, WP (<i>Beauveria bassiana</i>) Naturalis-O	Most effective against aphids when combined with other insecticides.
Other	Avid (abamectin) Marathon II (imidacloprid) Marathon 1% Granular (imidacloprid) Marathon 60 WP (imidacloprid) Endeavor (pymetrozine)	To suppress, young immatures must be contacted. Marathon II, foliar application only. Long-residual systemic insecticide. Control may not be apparent for 1-2 weeks after application, but if applied correctly should last for 8 weeks. Good root system needed. Aphids in open flowers are not controlled. Aphids stop feeding and drop off plants.

Rotate insecticides from classes with different modes of action. Use an insecticide class for at least the time required for one to two generations of aphids to be produced (probably 14 to 21 days, depending on temperature). Avoid the use of tank mixes, if possible.

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Revised July 2000 by Tina Smith
 UMass Extension Floriculture Program
 Dept. Plant & Soil Sciences

University of Massachusetts
Amherst, MA 01003

Links to Further Resources on the Web

- **Appropriate Technology Transfer for Rural Areas (ATTRA)** has an excellent series of articles on IPM. Their factsheet on [Greenhouse IPM: Sustainable Aphid Control](#) gives the clearest and most complete summary available of the options for growing both vegetable and ornamental crops with minimal use of pesticides. Focus is on monitoring for aphids, sanitation, biological controls, biorational pesticides and insect growth regulators. Excellent tables include information on the newest of these products, along with lists of suppliers, further reading suggestions, etc.
 - (Background and General IPM from **ATTRA**) The above Aphid article is part of an excellent ATTRA series on basic IPM. See also [Fundamentals of IPM](#), which includes strategies such as Monitoring, Tools for Pest and Weed Management, Useful Resources, and an appendix of Microbial Pesticide Manufacturers and Suppliers.
 - [Integrated Pest Management for Greenhouse Crops](#) . Another **ATTRA** publication covers IPM specifically for greenhouse crops, both vegetable and ornamental. Monitoring, sanitation, biological controls, biorational pesticides, insect growth regulators, and disease control methods are discussed. Tables include information on the newest biorational pesticides and biological control organisms. Excellent appendices list suppliers, techniques for monitoring and scouting, beneficial organisms, biorational pesticides.
 - The **University of Connecticut's IPM Program's** factsheet on [Managing Aphids in the Greenhouse](#), includes paragraphs on identification and life cycle, feeding damage and aphids' transmission of viruses and management options such as prevention, predator and parasitoid insects and pathogenic fungi.
 - The **Ohio State University Extension** has an article on [Managing Fungus Aphids](#), with 11 photos.
 - **North Carolina State University's** factsheet on [Aphids in the Greenhouse](#) includes descriptions and diagrams of three of the most common greenhouse aphids, Chrysanthemum Aphid, Green Peach Aphid and Melon or Cotton Aphid . (also published on a web-page of the Mid-Florida Research and Education Center.)
 - The **University of California's** Pest Management Guidelines for [Aphids -- Home & Landscape](#). Although this factsheet does not deal with species found in New England greenhouses (such as the green peach aphid -- *Myzus persicae* or the melon or cotton aphid -- *Aphis gossypii*) it does have general information which would be of use to Massachusetts flower growers, as well as many magnificent photos.
 - The **University of New Hampshire's** brief factsheet on [Greenhouse & Nursery Aphids](#) gives descriptions and life cycle. Control method focuses exclusively on the use of pesticides. In PDF Format.
 - **McGill University** publishes a factsheet called [A Guide to the Biological Control of Greenhouse Aphids](#) with lifecycle diagrams.
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