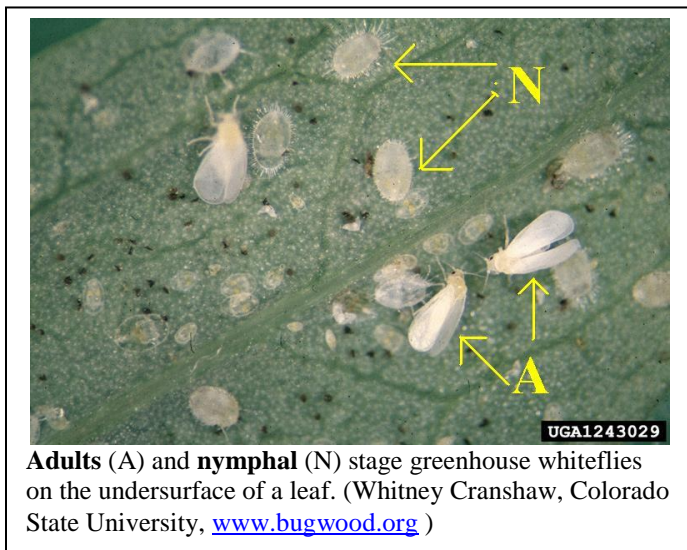




## Whiteflies



Adults (A) and nymphal (N) stage greenhouse whiteflies on the undersurface of a leaf. (Whitney Cranshaw, Colorado State University, [www.bugwood.org](http://www.bugwood.org))

**Description:** Adult whiteflies are small insects, approximately 1/16<sup>th</sup> inch (1.5 mm) in length, with four powdery white wings. When heavily infested plants are disturbed, one may notice a “cloud” of tiny white insects rising above it. The immature stages (eggs, crawlers, scales and pupae) are all yellowish and found primarily on the undersides of leaves.

**Injury:** Whiteflies are sucking insects, feeding on plant sap. As a result plants are weakened, may exhibit symptoms of stunting or wilting, and may have large amounts of honeydew on them. In New York State, the greenhouse whitefly is the most common species. It feeds on over 60 host plants. It usually does not survive our winters out of doors to cause new infestations, but is brought in anew each year.

**Life History:** The whitefly has a complex life history. It undergoes five distinct stages of development. Eggs are laid

on the undersides of the leaves, and are at first pale yellow, but turn gray before hatching in five to seven days. The crawler is a small, translucent, mobile stage that actively searches for a feeding site. Within a few days, crawlers settle down and begin feeding, soon transforming to the sedentary scale stage. The scale is a highly modified sucking insect, and its outer covering thickens after it feeds giving it added protection. Adult development (pupation) occurs within the scale cover. Four days later, adults emerge. The life cycle takes about 40 days, depending on temperature.

**Management:** This insect is difficult to manage. The five distinct stages of the life cycle all differ in their tolerances to insecticides. Eggs are resistant to most insecticides, as are the scale and pupal stages. The crawler and adult stages are susceptible to insecticides especially contact materials. All stages, however, can coexist. A single application of a particular insecticide only affects the susceptible stages present at the time of treatment or shortly thereafter. Other stages will survive and ultimately reproduce again continuing the cycle. Therefore, when sprays are recommended, they are usually applied covering the 40-day period that it takes for completion of the life cycle. Missing even one application would allow the pest to continue to develop and possibly reinfest the area. When using insecticides good coverage of leaf undersides is important for control. Repeat sprays may be needed.

**There are some practices that one can employ to help prevent whiteflies on most all types of plants:** 1) prevent whiteflies from entering the growing areas—when new plants are brought home, isolate them for about one month to allow you to monitor the newcomer(s) for development of pests; do not purchase infested transplants; 2) learn to recognize the various stages of the whitefly; 3) isolate and treat infestations (or discard plants) early before the insects have a chance to spread.

**Biological Control—Parasites and Predators:** A number of beneficial insects attack whiteflies, i.e., lady beetles, green lacewings and various predaceous bugs. The tiny parasitic wasp, *Encarsia formosa* can be effective against the greenhouse whitefly. These natural enemies do not remove the whiteflies but they can reduce their numbers so that little damage results. Further research is needed to make this method a practical alternative to chemical control methods, at least in commercial greenhouses.

**Mechanical Methods:** Yellow sticky boards (Fig. 1, next page) have been used with some success in the control of adult whiteflies. This method may be most useful in a home greenhouse. Whiteflies have a natural attraction to the color yellow, and if yellow boards are painted with a sticky material, whiteflies will fly to them and adhere. The yellow color used in USDA experiments with success was RustOleum 659\* yellow; however, other deep orange-yellow paints would

also be effective. Of the sticky substances tried, Tack trap, a commercial insect trapping compound worked the best. The USDA research also used heavy motor oil (SAE 90) successfully on the boards to trap whiteflies and found the oil easier to wash off the boards than the sticky trapping materials. A combination of the use of sticky yellow boards and the parasite *E. formosa* in some cases provided almost complete control of the whitefly in commercial greenhouses. \*The products mentioned above are only mentioned as part of the research and are not recommended by USDA or Cornell University over other products.



**Fig. 1** - A yellow stick trap being used to catch insects in a potted houseplant.

**Insecticide Control:** When using insecticides (below) good coverage of leaf undersides is important for control. Repeat applications may be needed.

### Houseplants

- Consider removing infested leaves or discarding infested plants rather than treating with a toxic substance.
- *Check all pesticide labels carefully.* Products may not be registered on all varieties or may not be tested on all rare or unusual varieties. If the host and pest are not listed on the label, do not use the pesticide.
- **If houseplants need to be sprayed, remove them from the living space for treatment.** If weather allows, take the plants out of doors or into a garage to make the application. Bring plants back indoors when dry.

*Begonia:* Wash plants with soapy water and a soft brush or cloth to remove insects. Use 2 tsp. of mild dish detergent in 1 gallon of water. A jet of clean water can also be used to knock insects off. If needed treat with insecticidal soap (potassium salts of fatty acids), hydrophobic neem oil, or permethrin. Good coverage of leaf undersides is important for control. Repeat sprays may be needed.

*Citrus:* Wash plant. If needed Treat with insecticidal soap (potassium salts of fatty acids), hydrophobic neem oil, permethrin, or pyrethrins with insecticidal soap. Good coverage of leaf undersides is important for control. Repeat applications may be needed.

*Coleus:* See *begonia* for information on washing. If needed treat with insecticidal soap (potassium salts of fatty acids), hydrophobic neem oil, permethrin, or pyrethrins with insecticidal soap. Good coverage of leaf undersides is important for control. Repeat sprays may be needed.

*Fuchsia:* Rogue plant: remove and destroy or discard entire infected plant and potting soil. Or see *begonia* for information on washing. If needed use insecticidal soap (potassium salts of fatty acids) or permethrin. Some product labels recommend testing on a small area first. Good coverage of leaf undersides is important for control. Repeat sprays may be needed.

*Gardenia:* Wash plant. If needed treat with horticultural oil, insecticidal soap\*, pyrethrins with insecticidal soap\*, or hydrophobic neem oil. Good coverage of leaf undersides is important for control. Repeat applications may be needed. **\*Note:** Some formulations containing insecticidal soap should not be used on gardenias. Some varieties have shown sensitivity to it. Read label directions carefully before using.

*Geranium:* See *begonia* for information on washing. If needed treat with insecticidal soap (potassium salts of fatty acids), hydrophobic neem oil, or pyrethrins with insecticidal soap. Good coverage of leaf undersides is important for control. Repeat sprays may be needed.

*Poinsettia:* See *begonia* for information on washing. Discard infested plant to avoid spread of whiteflies to other plants, or isolate and treat with insecticidal soap (potassium salts of fatty acids) or hydrophobic neem oil.

### Annual and Perennial Herbaceous Plants (in the outdoor landscape)

- Out of doors whitefly populations are usually not sufficiently damaging to make treatment necessary.
- Occasionally, however, populations build up to damaging numbers.

*Ageratum:* Do not purchase infested plants. Rogue infested plants. Apply as necessary: acephate, insecticidal soap (potassium salts of fatty acids), lambda-cyhalothrin, neem oil, or permethrin.

Spray two or more times at five-day intervals. Good coverage of leaf undersides is important for control. Repeat spraying only if necessary

*Lupine*: Do not purchase infested plants. Rogue heavily infested plants. Apply as necessary: insecticidal soap (potassium salts of fatty acids), or neem oil. Good coverage of leaf undersides is important for control. Repeat spraying may be necessary.

*Sweet alyssum*: Do not purchase infested plants. Rogue heavily infested plants. Apply as necessary: insecticidal soap (potassium salts of fatty acids), or neem oil. Good coverage of leaf undersides is important for control. Repeat spraying may be necessary.

### Woody Trees and Shrubs (in the outdoor landscape)

*Azalea*: Plant resistant azalea varieties. Large populations may require the use of insecticides. Treat in early June (448–700 GDD), mid-July, and mid-August (1250–1500 GDD). Apply to undersides of leaves. Use acephate, cyfluthrin, horticultural oil, insecticidal soap (potassium salts of fatty acids), lambda-cyhalothrin, malathion, or neem oil. Or use a systemic applied to the soil in early spring: disulfoton.

*Holly*: Apply acephate, cyfluthrin, horticultural oil, insecticidal soap (potassium salts of fatty acids), lambda-cyhalothrin, malathion, or neem oil. Or use a systemic: disulfoton.

*Honeysuckle*: Large populations may require the use of insecticides. Treat undersides of leaves in early June (448–700 GDD), mid-July, and mid-August (1250–1500 GDD). Use acephate, cyfluthrin, horticultural oil, insecticidal soap (potassium salts of fatty acids), lambda-cyhalothrin, malathion, or neem oil. Or use a systemic: disulfoton.

*Mountain laurel (Kalmia spp.)*: Large populations may require the use of insecticides. In early June (448–700 GDD), mid-July, and mid-August (1250–1500 GDD), treat undersides of leaves with cyfluthrin, horticultural oil, insecticidal soap (potassium salts of fatty acids), lambda-cyhalothrin, or malathion. Or use a systemic: disulfoton.

GDD = growing degree days. For information on using GDD for insect pest management refer to the Cornell Cooperative Extension – Suffolk County leaflet titled [\*Using GDD for Insect Pest Management\*](#).

### Home Vegetable Garden Plants

*Always check the pesticide label to make sure both the crop and the pest are listed, and to check for the minimum number of days to wait between application and picking the crop (“Days to Harvest”).*

*Tomato*: Do not purchase whitefly-infested transplants; inspect plants carefully before purchasing. If needed apply horticultural oil, insecticidal soap (potassium salts of fatty acids), malathion, neem oil, or pyrethrins with other ingredients and are labeled for whitefly control on tomato.

Reprinted from *Whiteflies* prepared by Carolyn Klass, Senior Extension Associate, Department of Entomology, Cornell University. 2/74. 9/96 revised.

Pesticide/Management recommendations obtained from: *Part I Guide to Pest Management Around the Home, Cultural Methods* and *Part II -- Pest Management Around the Home, 2009-2010 Pesticide Guidelines*, Miscellaneous Bulletins 139S74I and 139S74II, Cornell Cooperative Extension Publications. Online versions of these publications are available at <http://ipmguidelines.org/Home/>.

The Pesticide Management Education Program (PMEP), in cooperation with the New York State Department of Environmental Conservation (NYSDEC), maintains a web site with a searchable database for pesticide products currently registered in New York State. Homeowners who have Internet access can locate currently registered products at <http://pims.psur.cornell.edu/>. Several different queries are available that will produce a summary for the product(s) that the system locates. If the system fails to locate the product in question, then that product is not currently registered in New York State. The database also provides a summary of important information related to every product currently registered. Two data fields “Status” and “Expiration Date” are provided in each summary. Products with a status of “Registered - Discontinued” are currently registered but will probably be discontinued for use, sale, and distribution in New York State after the date noted in the “Expiration Date” field.

**This publication contains pesticide recommendations. Changes in pesticide regulations occur constantly and human errors are still possible. Some materials mentioned may no longer be available, and some uses may no longer be legal. All pesticides distributed, sold or applied in New York State must be registered with the New York State Department of Environmental Conservation (DEC). Questions concerning the legality and/or registration status for pesticide use in New York State should be directed to the appropriate Cornell Cooperative Extension Specialist or your regional DEC office. Read the label before applying any pesticide.**

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