



Whiteflies

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Description

Whiteflies are white insects with pale yellow bodies that are approximately 2 mm long. They belong to the order Homoptera and are close relatives of aphids, scales, mealybugs, hoppers and cicadas.

Life Cycle

The life cycle consists of an egg, 4 nymphal instars, a pupal and an adult stage. Depending on the species and environmental conditions, eggs require 10-12 days to hatch, and completion of life cycle from egg to adult takes 30-40 days. Nymphal instars behave in a manner similar to scale insects. The first nymphal instars are active and they are sometimes called crawlers. The remaining nymphal instars are sedentary and may mimic immature scales.

Damage

Whitefly feed by extracting plant fluids with sucking mouth parts. Feeding damage appears as yellow, stunted growth and, in severe cases, honeydew and sooty mold can develop. Sooty mold is a black fungus that grows on honeydew. Honeydew and sooty mold can reduce photosynthesis and crop value. Plant death can occur if large populations of whitefly are left untreated.

Identification and Host Plants

Whitefly species identification can be made most easily on the pupal stage. The pupae have species-specific shape, color pattern and wax filament arrangement. Adults can be identified, but identifying species according to pupal stages is more accurate.

Whitefly in Greenhouses

When infested plant material is installed in the landscape, whitefly species that infest greenhouse crops can become pests in the landscape. Some examples of susceptible greenhouse crops include gerbera daisy, poinsettia, lantana, fuschia, geraniums (*Pelargonium*), rue and belles of Ireland.

Three common species found in greenhouse environments:

- **Greenhouse whitefly** adults hold their wings flat over the abdomen. Pupae are opaque white, with numerous fringes along their sides. When viewed from the side, pupae appear block shaped and do not taper like silver leaf whitefly. They infest primarily greenhouse crops but can infest ash, dogwood, sycamore, sweetgum, honey locust, black locust and red bud in the landscape as well.
- **Silverleaf Whitefly** (Sweet potato whitefly Strain B) adults hold their wings in a roof like position over their yellow body. The pupae are yellow with two red eye spots. When viewed from the side, pupae taper to a point at one end, with one point being sharper than the other. There are no visible fringes like those found in the greenhouse whitefly.
- **Banded-winged whitefly** adults hold their wings rooflike over their bodies and the wings have gray bands. Pupae are light brown with small fringes around the outside. Preferred hosts include hibiscus, petunia, geranium (*Pelargonium*) and poinsettia. This species is usually less common than the two previously mentioned species.

Whitefly in the Landscape

Typically, whitefly infestations are most serious in greenhouse environments, but there are some whitefly species that can be pests in the landscape. Unlike infestations in greenhouses, most species that occur in the landscape are usually not major pests. In the landscape, beneficial insects usually keep whitefly populations below damaging levels. However, certain species are more problematic than others.

- **Azalea whitefly** pupae are yellow, lack fringes, and will only infest azaleas. They are primarily outdoor pests of *Rhododendron indicum* and other species of azaleas with hairy leaves. Populations occasionally become large enough to cause minor leaf yellowing and sooty mold. Whiteflies that infest rhododendrons are a different species and commonly named rhododendron whitefly.

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- **Mulberry whitefly** adults look similar to banded-winged whitefly, but they have a faint spot at the base and tip of each wing. Pupae are all black with a white fringe around the edge. They can infest mulberry, Mt. laurel, Norway maple, red maple, boxelder, American holly, Virginia sweet spire, flowering dogwood, and wax myrtle.
- **Ash whitefly** adults look similar to the greenhouse whitefly, but their wings have a dusted appearance. The pupae are clear to yellowish with white wax filaments running down the center of the back or dorsum. This has become a pest of Bradford pear in some areas of the country and it has been known to infest other ornamentals.

Monitoring

Whitefly adults can be monitored by placing yellow sticky cards in greenhouse environments. Sticky cards should be placed near doors and vents to monitor incoming adults from the outdoors. This is especially important in fall when outside air temperatures begin to cool. Gently tapping plants will disturb whitefly resting on the leaves which will allow you to see them. Periodically inspect the undersides of leaves for the presence of pupae and adults. Look for yellowing or stunted plants. Counting adults weekly on sticky cards will help you monitor outbreaks. Thresholds vary depending on the crop.

Control Options

Suppressing whitefly populations before they reach large numbers is essential to prevent plant damage. Once high-density populations become established they are difficult to suppress.

Chemical Control

Marathon (Imidacloprid), Orthene (Acephate), Diazinon, pyrethroids and other labeled products can be used to control populations. Complete coverage is essential for suppression and it is better to use a systemic or a product with a long residual in environments with high-density populations.

Additional Chemicals

Astro	Precision
Avid	Resmethrin
Azadirachtin	Sanmite
Decathlon	Scimitar
Dursban	Topcide
Joust	Triact
Marathon	Thiodan
Mavrik	

Alternative Pesticides

Horticultural oil and insecticidal soaps may provide control of low-density populations in the landscape, but they may not provide adequate control in greenhouse situations if beneficial insects may be absent. Insect growth regulators (IGR) can be used for suppression of populations, but they will not kill adults. IGR pesticides must be applied more frequently, especially in situations where adults are abundant.

IGRs for Whitefly:

Enstar
Distance
Precision
Preclude.

Biological Control

Beneficial Insects

Suppression of greenhouse whitefly populations with beneficial insects has been very successful in greenhouses fitted with insect screening on the vents. Insect screening keeps beneficial insects in and pest insects out of the greenhouse. Periodic releases of the parasitic wasp *Encarsia formosa* have suppressed greenhouse whitefly very well for many growers. *Eretmocerus californicus* is another parasitic wasp that is known to parasitize sweet potato and greenhouse whitefly, but it has not been as successful as *Encarsia*. Finally, there is a predatory beetle, *Delphastus pusillus*, which is commercially available. *Delphastus* has been used less frequently by growers.

Microbial Insecticides

A microbial insecticide that contains the entomopathogenic fungus, *Beauveria bassiana*, is commercially available for whitefly suppression. Two products that contain *Beauveria* are BotaniGuard and Naturalis-O. These products require a moderate humidity level to infect insects and they must be applied more frequently than conventional insecticides. It is important to date the product container because these products have a shorter shelf life than most conventional insecticides.

Cultural Control

Insect screening can be retro-fitted over greenhouses to prevent whiteflies from entering. **Note: Installing screening over greenhouse vents changes static pressure and ventilation capacity.** Ventilation openings must be adjusted to ensure adequate air circulation and prevent damage to ventilation equipment.

Weeds can often harbor whiteflies and they should be removed from greenhouse floors and outside greenhouses near vents and doors.

References

- 1 Johnson, W T. and Lyon, H. H. 1991. Insects that feed on trees and shrubs. Comstock Publishing, Cornell University Press. Ithaca, NY.
- 2 Gill, R.J. Color-photo and host keys to California whiteflies. State of California. Department of Food and Agriculture, Environmental Monitoring and Pest Management. Sacramento, California.
- 3 Gill, S. and Sanderson, J. 1998. Ball identification guide to greenhouse pests and beneficials. Ball Publishing, Batavia, Illinois.