

## THE GREENHOUSE WHITEFLY

*The Editors\**

The greenhouse whitefly, Trialeurodes vaporariorum Westwood, is a universal pest of greenhouse plants. By many it is considered the most important pest of greenhouse crops. Its small size, rapid rate of multiplication and complex life history all contribute to make it extremely difficult to control.

### Life History

It passes through five distinct stages during its development. Eggs are laid on the underside of plant leaves and are attached by a stalk which is inserted into the plant tissue and cemented there. Eggs are light in color when first deposited, but turn black as they develop. They hatch within 10 days. Eggs are resistant to all but a very few insecticides.

A small crawler hatches from the egg and moves about freely for a few hours before it settles down to feed. Because of its mobility, the crawler is quite susceptible to contact insecticides. Once the crawler inserts its mouthparts into the plant and begins to feed, it transforms into a scale-like sedentary stage and is a highly efficient feeding machine. Whitefly scales are resistant to most contact insecticides, but because they are sucking insects they are susceptible to some systemic insecticides.

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\*This article was prepared in cooperation with Dr. Dennis Dunbar, Connecticut Agricultural Experiment Station, New Haven, Connecticut.

The scale feeds for some time (10-20 days) and after undergoing three molts enters the pupal stage. Like the egg, this stage is immobile, nonfeeding and is not susceptible to insecticides. Adults emerge from pupae in about six days and fly around from plant to plant seeking sites to lay eggs. An adult female may lay up to 200 eggs at the rate of about 25 eggs per day. Development from eggs to egg-laying adults takes from 21-36 days depending on temperature. Adults are most easily controlled with a fumigant although contact insecticides are also effective.

### Susceptible Plants and Nature of Damage

The list of host plants on which whiteflies can live is extensive. It includes such common vegetables as cucumber, squash, potato, tomato, bean, lettuce and others. Ornamentals commonly infested with whiteflies include ageratum, lantana, aster, zinnia, geranium, fuchsia, coleus, snapdragons, chrysanthemums, poinsettia, salvia, phlox, rose and many others. Tobacco is also a favorite host plant.

Damage results from whitefly feeding and is shown by spotting and chlorosis of the foliage. In addition to the damage directly caused to the leaves, the immature stages secrete a sticky substance called honeydew which covers leaves and interferes with photosynthesis. Honeydew is frequently covered with a black fungus called sooty mold. A number of virus diseases of plants can also be transmitted by these insects.

### Methods of Control

Cultural--Whiteflies infest greenhouse plants by three common means:

1. By introducing infested plants from other ranges.
2. By migrating from infested weeds or crop plants in the greenhouse.
3. By migration from weeds outside of the greenhouse through vents and doors.

The change of whitefly infestation can then be reduced by making sure that any plant that is brought into the greenhouse is free of all stages of whiteflies. All weeds and extraneous host plant material inside and outside of the greenhouse should be removed. This is probably the most common source of infestation.

Chemical--Control of an established infestation of whiteflies in the greenhouse depends on timely application of insecticides. Listed below in order of increasing mammalian toxicity are insecticides available for whitefly control. The toxicity class and acute oral LD<sub>50</sub> value (in parentheses) is given for each material.

Low Toxicity (LD<sub>50</sub> 500-5000 mg/kg)

resmethrin (SBP1382) (Approx. 3000)  
malathion (1188)

Moderately Toxic (LD<sub>50</sub> 50-500 mg/kg)

dimethoate (Cygon or De-Fend) (215)  
nicotine sulfate (Black Leaf 40) (83)  
oxydemetonmethyl (Meta-Systox-R) (70)  
dichlorvos (Vapona, DDVP) (68)

Highly Toxic (LD<sub>50</sub> 0-50 mg/kg)

- endosulfan (Thiodan) (31)
- azinphosmethyl (Guthion) (12)
- parathion (Parathion) (8.3)
- demeton (Systox) (4)
- dithio (Sulfotepp) (1.5)
- aldicarb (Temik) (1)

**Insecticide  
& Formulation**

<u>Per Gallon</u>	<u>Remarks</u>
<b><u>SPRAYS</u></b>	
malathion 25% WP (2 Tbsp)	Causes injury to Boston fern, maidenhair fern, crassula, orchids, sweet peas, violets, petunia, gloxinia, some carnation and some roses.
oxydemetonmethyl (Meta-Systox-R) 25% EC (1 1/2 tsp)	Injures some chrysanthemums and Easter lily.
dimethoate (Cygon) 30.5% EC (1 1/2 tsp)	Use as a soil drench for longer control. See below.
endosulfan (Thiodan) 25% WP (1 Tbsp)	May injure geranium. Emulsion has injured some chrysanthemums.
azinphosmethyl (Guthion) 50% WP (1 Tbsp)	Causes injury to poinsettia bracts.

Insecticide  
& Formulation  
Per Gallon

Remarks

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parathion 15% WP  
(1 1/2 Tbsp)

Causes leathery leaves on gardenia, yellow areas on aster, and severe burn on white-flowered cyclamen. Foliage plants and succulents are often injured. Causes leaf drop on roses in presence of sulfur and bleaches open mum flowers.

resmethrin  
(SBP1382) 24 EC  
(1-1 1/2 tsp)

See Conn. Greenhouse Newsletter No. 51, page 12, for information on phytotoxicity.

AEROSOLS AND SMOKES

dichlorvos (DDVP  
or Vapona) Aerosol  
bombs or smoker.  
(label directions)

Use only the greenhouse formulation for fumigation. Causes injury on some ornamentals including chrysanthemums.

nicotine (Nicofume)  
(label directions)

Causes injury on young chrysanthemums and Easter lily.

dithio (Sulfotepp)  
Aerosol bomb or smoker  
(label directions)

Follow all precautions.

SOIL DRENCH

oxydemetonmethyl  
(Meta-Systox-R)  
25% EC (1 1/2 tsp)

Max. of 4 fl. oz./6" pot.  
Injures some mums and  
Easter lily.

Insecticide  
& Formulation

Per Gallon

Remarks

dimethoate (Cygon) 30.5% EC (1 1/2 tsp)	Do not use on chrysanthemums, Chinese holly, Easter lily or <u>Prunus</u> sp. Damage to fern, <u>gloxinia</u> , hydrangea, and Saint-paulia have been reported.
demeton (Systox) 28.5% EC (1 tsp)	Use only 4 oz. per 6" pot. 100 gallons treats 1000 sq. ft. of bench. May cause leaf scorch on Easter lily.

GRANULAR

aldicarb (Temik) 10 G (30-40 oz./1000 sq. ft. of bench or closely packed pots)	Labelled for use only on carnation, chrysanthemums, lilies, gerbera, orchids, poinsettia, roses, snaps.
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Sprays are generally more effective than aerosols and smokes, but it is important to obtain good coverage of the undersides of leaves when applying sprays. Generally, two or more applications at weekly intervals are required to control the whitefly population.

SBP1382 is a new synthetic pyrethroid that has recently received label clearance for use against whiteflies on greenhouse crops. It has been shown to be highly effective against all stages of the whitefly. This is one of the few materials that has activity against whitefly eggs as well as all other life stages. It is low in mammalian toxicity. It has been shown to be phytotoxic to only a few plants.

Aerosols and smokes should be applied every 3 to 4 days to prevent emerging adults from laying eggs. Up to 10 applications may be required to eliminate a heavy whitefly population.

Two to four applications of the soil drench as listed above with each application two weeks apart will give good control. Temik is a new granular systemic insecticide with long residual activity. Generally one application will provide effective control for up to 8 weeks. It is a highly toxic insecticide that should be used with utmost care. Proper use of Temik was reviewed in the Conn. Greenhouse Newsletter 53:18-24.

Other Control Means--The whitefly parasite, *Encarsia formosa* Gahan, has been shown to give satisfactory whitefly control on some crops when combined with the insecticide spray, exythioquinox (Morestan). Morestan has moderate effectiveness against whitefly, but has little effect on the parasite.

Vapona strips (Shell Strips) appear to give satisfactory control of light infestations of whiteflies in small greenhouses. Initially, it is important to reduce the population by application of another insecticide and then use the vapona strips to maintain the population at low levels.

### Pesticide Safety Tips

Read the label on each pesticide container before each use. Follow instructions, heed all warnings and precautions. Avoid inhaling sprays or dusts. Store pesticides under lock and key. Dispose of empty containers safely.