



# HIGH TUNNEL INSECT

## A comfy place for plants is also a cozy place for associated pests

*Jeff Edwards*

High tunnels and other structures can significantly lengthen the growing season in Wyoming.

However, while providing protection for plants from the elements, high tunnels also provide optimal growing conditions for pests. Regularly checking for insects, identifying them correctly, understanding their life cycle and habits, and identifying control options are crucial to quick, effective insect control inside these structures.

The goal of any control method is to manage the pest problem to a population where there is no economic loss or to an acceptable level of damage associated with the infestation. Control in many instances does not mean eradication but management of a problem.

### **Knowing What is Out There is Key**

Plant inspection is the most important part of a pest management program. The earlier pests are detected, the more time there is to take control measures before pest populations increase. Regularly inspect plants in all areas of a high tunnel. This will help discover insect population outbreaks just beginning. When examining plants, look at the underneath side of leaves.

Many insects that infest plants' inside structures are small and often

go unnoticed until they've reached high populations, which are harder to control. A 10-30X hand lens can help detect some of these plant pests.

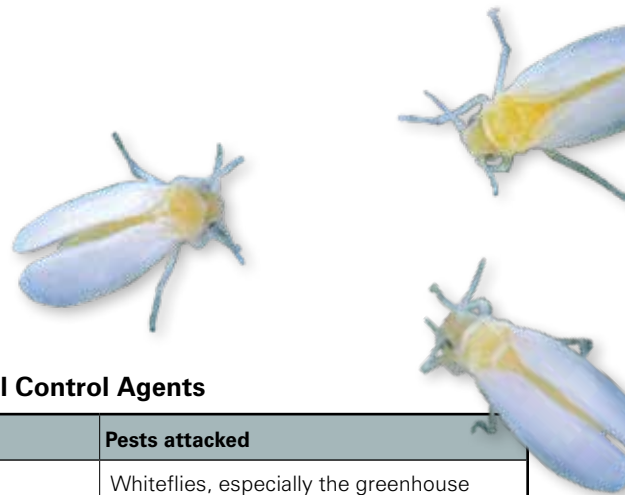
Other tools that can help monitor insect populations in a structure are "sticky traps" (pieces of cardboard coated with "glue"). Yellow sticky traps will catch winged aphids, leafminers, thrips, whiteflies, fungus gnats, and shore flies.

Attach traps to a wooden stake and place vertically in or near a plant at or just above the top of the foliage. Placing the sticky trap just above the soil surface can trap other pests such as fungus gnats, shore flies, thrips, and leafminers. Be sure to place some traps near vents, doors, and other areas where pests may be found. Some growers place traps outside of a high tunnel to help detect insects moving in from outside. A good rule of thumb is to place a minimum of 1 trap per 1,000 square feet of interior high tunnel space.

Visually inspect traps weekly. Captured insects should be identified and counted to determine the infestation level. An exact count is not needed as estimates of pest population densities are usually sufficient to determine if control measures are needed.

Sticky traps will not replace plant inspections as a pest detection method. Whiteflies can occur in localized infestations that traps may

# AND MITE CONTROL



not detect. Non-winged aphids and spider mites are not caught on traps.

## General Control Strategies for Insect Pests

- **Keeping pests out**

Screens can reduce the number of insects that may enter a structure. Whiteflies, leafminers, Lepidoptera (moths), and winged aphids can be excluded relatively easily. Thrips and mites are difficult to exclude because they are smaller than aphids. If considering using screens, make sure you aren't reducing the airflow through the structure. A screen supplier should be able to help determine what is needed to maintain adequate airflow.

- **Utilizing biological controls**

Biological control lets pests' natural enemies (insect, mites, and/or diseases), do the dirty work for you. There are beneficial insects and mites available from commercial sources for control of nearly every major insect or mite pest and are incorporated into pest management strategies worldwide.

Many growers are able to use biological control as their primary pest management method. Other growers will try to integrate pesticides with few or no harmful effects on beneficial insects into their programs or apply pesticides only to localized areas at which pest infestations are above acceptable levels. Care must be taken when combining control strategies as an insecticide application can kill the beneficial insects and disrupt the control strategy.

## Commercially Available Biological Control Agents

Common name	Scientific name	Pests attacked
Whitefly parasitoid	<i>Encarsia formosa</i>	Whiteflies, especially the greenhouse whitefly
Whitefly predator	<i>Amblyseius swirskii</i>	Whiteflies, greenhouse and silverleaf whitefly, thrips
Leaf miner parasitoids	<i>Diglyphus</i> spp., <i>Dacnusa</i> spp.	Leafminers
Aphid midge	<i>Aphidoletes aphidimyza</i>	Aphids
Aphid parasitoid	<i>Aphidius colemani</i>	Green peach and melon aphids
Aphid parasitoid	<i>Aphidius ervi</i> , <i>Aphelinus abdominalis</i>	Potato aphids
Soil insects predator	<i>Atheta coriaria</i>	Fungus gnat larvae, shore fly larvae, western flower thrips pupae
Entomopathogenic nematodes for fungus gnats	<i>Steinernema feltiae</i> , plus others	Fungus gnat larvae
Fungus gnat and thrips predatory mite	<i>Hypoaspis miles</i>	Fungus gnat larvae, thrips prepupae, shore fly larvae
Spider mite predator	<i>Phytoseiulus persimilis</i> , other phytoseiids <i>Amblyseius californicus</i>	Spider mites
Green lacewings	<i>Chrysoperla</i> sp.	Aphids, whiteflies, mites, caterpillars
Minute pirate bug	<i>Onus insidiosus</i>	Thrips, other pests
Thrips predator	<i>Neoseiulus cucumeris</i> , <i>Amblyseius degenerans</i> <i>Amblyseius cucumeris</i>	Thrips
Moth parasitoid	<i>Trichogramma brassicae</i>	Moth eggs



Green lacewing

Joseph Berger, Bugwood.org

Most insecticides are harmful to beneficial insects. These harmful effects can last for weeks following application and should not be used for at least 30 days before beginning a biological control program. Do not use them anywhere in the high tunnel after beginning a biological control program. Local or "spot" applications generally are less harmful to natural enemies than treating the entire high tunnel.

## Integrating Pesticides with Biological Control

Some registered pesticides are "soft" on beneficial insects and mites. These include *Bacillus thuringiensis*, which is a bacterium specific for controlling the pest species. Insecticidal soaps, an insect-specific fungus *Beauveria bassiana*, azadirachtin (extract from seeds of the neem tree), and pyrethrum and/or rotenone, tend to be less harmful than conventional materials. This does not mean these materials are harmless but that natural enemies can be reintroduced soon after an application without



*Aphid midges*

deleterious effects. Read, understand, and follow the product label; when in doubt, be conservative.

The number of registered pesticides for use in Wyoming to control insect and mite pests inside greenhouses (and high tunnels) is highly limited. For greater details concerning the insects found in greenhouse/high tunnel production, consult the ATTRA (Appropriate Technology Transfer for Rural Areas) publications concerning control of aphids, whiteflies, or thrips. These publications can be found at the following Web locations:

- [www.attra.org/attra-pub/gh-aphid.html](http://www.attra.org/attra-pub/gh-aphid.html)

- [www.attra.org/attra-pub/gh-whitefly.html](http://www.attra.org/attra-pub/gh-whitefly.html)
- [attra.ncat.org/attra-pub/gh-thrips.html](http://attra.ncat.org/attra-pub/gh-thrips.html)

Finally – high tunnel housekeeping helps avoid problems.

Destroy crop residues (old tomato plants, etc.) promptly after harvest. The longer these plants remain in the structure, the greater the chances are for increased pest problems. Compost any plant material away from the structure. Pests may survive in the compost area and fly back inside the structure if the compost is too close. Vegetable gardens planted or field crops near a high tunnel can also become sources for recurring pest infestations.

Pest control inside protected environments such as high tunnels, hoop houses, or greenhouses, can be challenging. Educate yourself about pests and their control options, check plants regularly for problems, develop a control plan, and take quick action. A strategy such as this will help keep pests under control. For more information, contact your local UW Extension office.

Whitney Cranshaw, Colorado State University, Bugwood.org

Joseph Berger, Bugwood.org

## INFORMATION SOURCES CONCERNING BIOLOGICAL CONTROL

- [http://www.cdpr.ca.gov/docs/ipminov/ben\\_supp/ben\\_sup2.htm](http://www.cdpr.ca.gov/docs/ipminov/ben_supp/ben_sup2.htm)  
(California Environmental Protection Agency. )
- <http://www.nysaes.cornell.edu/ent/biocontrol/>  
(Cornell University's site for general information on biological control)
- <http://www.koppert.nl/e005.shtml>  
(Website of the Koppert Company, a major supplier of beneficial insects, nematodes, and mites)
- <http://www.anbp.org/>  
(Association of Natural Biological Control Producers)
- <http://www.ipmlabs.com>  
(Website of IPM Laboratories, a major supplier of beneficial insects and mites)
- <http://www.biobest.be/>  
(Website of Biobest Company, a major supplier of beneficial insects, nematodes, and mites)



*Leaf miner parasitoid*

**Jeff Edwards** knows his pests, whether they are inside a high tunnel or being nuisances in fields or gardens. He's the UW Extension pesticide coordinator and can be reached at (307) 837-2000 or at [jedward4@uwyo.edu](mailto:jedward4@uwyo.edu).

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