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Thrips in Greenhouses

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Description

Adult thrips are small insects with slender, elongated bodies and two pairs of fringed wings. The body is usually pale yellow (Fig. 1), but sometimes brownish or black (Fig. 2). Some species have bands or other markings. The name "thrips" is used for both the singular or plural form of the insect.

Figure 1. Western flower thrips (Jack T. Reed, Mississippi State University, Bugwood.org).

Life Cycle

The thrips life cycle consists of egg, nymphal, pre-pupal, pupal, and adult stages. Adult females insert eggs in leaf tissue, which hatch in approximately three days. Nymphs feed for four to five days and then drop from the plant to pupate in the soil. Adults emerge after two days of pupation and begin feeding. The exact time required for thrips to complete their life cycle varies with species, temperature, and the host plant. Western flower thrips complete their life cycle from egg to adult in approximately 10 days at 80° F (27° C).

Thrips Identification

Thrips are difficult to identify to species. Some species are easier to distinguish by color and host, but others require identification by a specialist. It is virtually impossible to distinguish flower thrips from western flower thrips in the field.

Figure 2. Adult banded thrips (Patrick Marquez, USDA APHIS PPQ, Bugwood.org).

Feeding Damage

Adult thrips are attracted to flower pollen, but both immatures and adults mostly feed on plant tissue. Thrips use their rasping/sucking mouthparts to extract plant fluids. Feeding results in coarse stippling, flecking, or scarring on the leaf surface. Large populations of thrips cause serious plant damage, which results in a silvery or scratched appearance to leaf surfaces (Fig. 3). Thrips also feed on flower tissue, which causes marginal necrosis and browning of petals.

Figure 3. Leaf damage due to thrips feeding (Chazz Hesselein, Alabama Cooperative Extension, Bugwood.org)

Thrips as Vectors

Thrips pose a serious threat to crops by transmitting tospoviruses, which include the impatiens necrotic spot virus (INSV) and the tomato spotted wilt virus (TSWV). Both INSV and TSWV have a wide host range and are devastating to floriculture crops. Infected plants cannot be cured. Control options for tospoviruses are limited to suppression of thrips populations and eradication of infected plant material where thrips acquire the virus. Symptoms of tospoviruses include necrotic lesions, wilting, yellowing, leaf distortion, and ring spots (Fig. 4). Actual observed symptoms depend on the type of plant infected and the environmental conditions in which it grows. Sometimes infected plants do not exhibit any symptoms but serve as viral reservoirs.

Indicator Plants

To monitor for the presence of tospoviruses, it is a good idea to use indicator plants that are susceptible to infection and express consistent, recognizable symptoms. Fava beans and certain varieties of petunia can be used as indicator plants for tospoviruses.

Plants damaged by thrips will have a scratched or silvery appearance on their leaves (Fig. 3). In addition, the indicator plants will exhibit ring spot lesions on the leaf (Fig. 4) if they are infected with a tospovirus. Indicator plants with symptoms of tospovirus infection should be removed from the greenhouse and destroyed as soon as they are found. All crops in that greenhouse should be closely monitored. A leaf sample from the indicator plant can be submitted to a diagnostic lab to confirm the presence of a virus. Consult the Plant Disease Clinic at Virginia Tech for more information about submitting samples.

Figure 4. Characteristic ring lesions produced by tospovirus (Elizabeth Bush, Virginia Tech, Bugwood.org)

Monitoring Populations

Population levels of thrips can be monitored by placing blue sticky cards throughout the greenhouse and near vents and doors. Treatment thresholds will depend on the type of crop and if tospoviruses are present.

Thrips and Host Plants

Western flower thrips, onion thrips, and **tobacco thrips** are all known to be vectors of tospoviruses and infest many different crops. Differentiating these species is difficult and requires a specialist.

Flower thrips look very similar to the western flower thrips, but are not known to vector tospoviruses.

Cuban laurel thrips have large, black bodies with white wings. They are predominately a greenhouse pest and often cause serious leaf curl on *Ficus benjamina*.

Gladiolus thrips adults are dark with grayish wings. They primarily infest gladiolus, but also iris, lily,

and other plants grown from tubers and bulbs. They also attack chrysanthemum, begonia, and snapdragon. They can overwinter on corms, bulbs, or plants kept in a greenhouse. This is a tropical species and will not survive temperatures colder than 50° F (10° C).

Greenhouse thrips adults are primarily dark-colored with lighter-colored legs and wings. They feed on a number of different greenhouse crops, but are not known to transmit tospoviruses.

Pear thrips adults are brownish, slender insects. They emerge in mid-spring just as foliage begins to emerge from the buds of certain shade trees. There is one generation per year, but they can cause leaf curl and deformity on the new growth of maple, birch, ash, beech, pear, plum and cherry.

Privet thrips adults have dark bodies with lighter-colored stripes across their abdomen and white wings with two black stripes across their width. They infest California and regel privet and are one of the few thrips species that is specifically a landscape pest.

Control Options

Controlling thrips is important because they are potential disease vectors. Total eradication is usually not possible, especially since thrips populations do develop pesticide resistance. Pesticide classes should be rotated to avoid resistance. Growers should use a combination of cultural, chemical, and biological control strategies to manage thrips populations. Plants infected with tospoviruses should be destroyed to reduce the chance of virus transmission.

Consult the most recent edition of the Virginia Pest Management Guide for current information on registered insecticides labeled for thrips. Commercial growers should consult the section appropriate for their specific crop in Horticultural and Forest Crops (VCE 456-017) or in Mid-Atlantic Commercial Vegetable Recommendations (VCE 456-420). Homeowners should see “thrips” in Home Grounds and Animals (VCE 456-018).

Biorational Pesticides

Azadirachtins and neem products are derived from the neem tree (*Azadirachtica indica*). These products can be composed of either neem oil or azadirachtin, the active ingredient in neem oil. Neem-based products have insecticidal and repellent properties.

Spinosad is derived from compounds produced by the bacterium *Saccropolyspora spinosa*. Spinosad provides good suppression of thrips populations.

Garlic oil is available in concentrated formulations. It repels thrips, aphids, leafhoppers and other insects, and has some insecticidal activity.

Insect growth regulators (IGRs) are synthetic pesticides that prevent immature insects from reaching the adult stage. Most are considered safer for the environment than many conventional insecticides. IGRs suppress pest populations at a slower rate than other insecticides. IGRs should be used for small, low-density populations. They are good components for management plans that use chemical rotation to prevent the development of pesticide resistance.

Microbial Pesticides

Beauvaria bassiana is a fungal pathogen of insects. Several formulations are available that can be used for thrips control. *Beauvaria bassiana* must be applied more frequently than conventional pesticides and works best when relative humidity levels are high.

Beneficial Arthropods

Releases of beneficial arthropods are more effective when thrips populations are low, but they may not adequately reduce high densities of thrips.

Orius spp. (pirate bugs) are fast-moving predatory true bugs that feed on thrips and other insects. They often occur on flowers outdoors during summer. Optimum conditions for *Orius* spp. are temperatures greater than 59° F (15° C) and a relative humidity greater than 60%. *Orius* spp. diapause under short day conditions; keep photoperiods at a minimum of 14 hours to keep these predators active in greenhouse environments.

Amblyseius cucumeris is a predatory mite that feeds on pollen and thrips. They occasionally feed on tarsonemid mites (cyclamen and broad mites). Optimum conditions for *A. cucumeris* are

temperatures of 68-77° F (20-25° C) and a relative humidity of 65-70%. Photoperiods greater than 12.5 hours are necessary to avoid reproductive diapause.

Iphiseius degenerans is a predatory mite that feeds on thrips, two-spotted spider mites, and pollen. This species is not known to diapause.

Stratiolaelaps scimitus (formerly *Hypoaspis miles*) is a predatory mite that feeds primarily on fungus gnat larvae in soil, but occasionally feeds on thrips pupae. It is not a primary control agent for thrips.

Chrysoperla spp. (green lacewings) are generalist predatory insects whose larvae feed on thrips and other soft-bodied insects. They occasionally feed on their own species. Lacewings are not primary control agents for thrips, but in some cases reduce thrips populations.

Cultural Control

A fine mesh proven to exclude thrips can be retrofitted to vents to exclude thrips from greenhouses. However, fine meshed screening dramatically reduces the rate of ventilation in a greenhouse. The size of vent openings must be adjusted to allow adequate ventilation and prevent damage to fan motors. Manufacturers and retailers should be able to supply specific information. Thrips screening needs occasional cleaning to maintain adequate airflow. Screening of this size will prevent most insects, including beneficial insects, from entering the greenhouse. It will also keep pest and beneficial insects inside greenhouses.

Avoid excess soil on floors or gravel in benches as it can provide a place for thrips to pupate. Greenhouses with concrete floors tend to have fewer thrips problems because they have reduced breeding areas. Control weeds inside and outside greenhouses. Many weeds can harbor thrips, which can infest valuable crops, or carry tospoviruses, which the thrips acquire and transmit to crops.

Additional Information

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