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Thrips

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Description: Adult thrips are small, pale-yellow insects (occasionally black) with elongated bodies, and fringed wings.

Life Cycle: Their life cycle consists of an egg, nymph, pre-pupa, pupa and an adult. 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. Adults 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.

Feeding Damage: Thrips are attracted to flower pollen, but both immatures and adults feed mostly on plant tissue. Thrips feed by using rasping/sucking mouthparts to extract plant fluids. Feeding injury appears as coarse stippling on the leaf surface. Large populations of thrips cause serious plant injury, which results in a silvery or scratchy appearance on leaf surfaces. Thrips also feed on flower tissue, which causes marginal necrosis of petals and petal browning.

Thrips as Vectors: Thrips also pose a serious threat to crops by **virus transmission**. Thrips can transmit TOSPO viruses. The TOSPO viruses include the impatiens necrotic spot virus **(INSV)** and the tomato spotted wilt virus **(TSWV)**. Both viruses can be fatal to floriculture crops and once a plant is infected it cannot be cured. Control options for TOSPO viruses are limited to suppression of vector populations (thrips) and eradication of infected plant material to reduce inoculum. Symptoms of TOSPO viruses include necrotic lesions, wilting, yellowing, leaf distortion and ring spots. However, symptom expression depends on the type of plant infected and the environmental conditions of the growing area. In some situations infected plants may not exhibit any symptoms but can act as reservoirs.

Indicator Plants: To monitor for the presence of TOSPO viruses, it is a good idea to use indicator plants that are susceptible and express consistent, recognizable symptoms. Fava beans can be used as indicator plants for TOSPO viruses. Cultivar Little Toto is the most susceptible fava bean, but its availability is scarce. However, all fava beans are susceptible to the virus and will work as indicator plants. Certain varieties of petunias can also be used as indicator plants, but they are much more expensive and difficult to propagate.

Placement of Indicator Plants: Fava beans should be placed in greenhouse areas suspected of having thrips infestations. Blue sticky cards attract thrips better than yellow sticky cards, and should be placed directly next to fava beans. This will attract thrips to the fava beans and increase the chance of thrips feeding on them. Flowers on fava beans should be removed to encourage thrips to feed on the leaves instead of the flowers. Plants should be left in the greenhouse for three to four weeks.

Symptoms of Indicator Plants: Plants that have suffered feeding damage will have a scratchy appearance on their leaves. If virus has been transmitted to the fava beans, the plants will exhibit small, brown, ring spot lesions

near the edge of the leaf. If symptoms are observed, indicator plants should be removed from the greenhouse and all crops should be closely monitored. A leaf sample from the indicator plant should be submitted to a diagnostic lab to confirm the presence of the virus.

Monitoring Population Levels: Thrips can be monitored by placing blue sticky cards throughout the greenhouse. Sticky cards should be placed near vents, doors, and periodically throughout the greenhouse. Treatment thresholds will depend on the type of crop and the presence of TOSPO viruses.

Thrips Identification: Thrips identification is a difficult task. Some species are easy 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.

Thrips and Host Plants

Western Flower Thrips, Onion Thrips, and Tobacco Thrips are all known to be vectors of TOSPO viruses. Differentiating these species is difficult and requires a specialist. They infest many different crops.

Flower Thrips look very similar to the western flower thrips but are not known to be vectors of TOSPO viruses.

Cuban Laurel Thrips have a large, black body with white wings. They are predominately a greenhouse pest and often infest *Ficus benjamina* and cause serious leaf curl.

Gladiolus Thrips adults are black with grayish wings. They primarily infest gladiolus and can overwinter on corms. Gladiolus thrips are a tropical species and will not survive temperatures colder than 50° F.

Greenhouse Thrips adults are primarily black with a small white area at the ends of their wings. They feed on a number of different greenhouse crops but are not known to transmit TOSPO viruses.

Pear Thrips adults are slender and brownish in color. 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 black bodies with stripes across their abdomen, and white wings with two black stripes across them. 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 can develop pesticide resistance. Growers should use a combination of cultural, chemical and biological control strategies to manage thrips populations. Pesticides should be rotated to avoid resistance. Plants infected with TOSPO viruses should be discarded to reduce the chance of virus transmission. Consult the most recent edition of the Virginia Pest Management Guide for current information on registered insecticides.

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

Spinosads are compounds derived from a bacteria called Saccropolysporospinosa. They provide good suppression of thrips populations. Example: **Conserve**.

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

IGRs (insect growth regulators) are synthetic pesticides that prevent immature insects from becoming adults. Most are considered safer for the environment than many conventional insecticides. IGRs suppress pest populations at a slower rate than other insecticides. IGR's 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. Some examples are Precision and Preclude.

Biological Control - Microbial Insecticides:
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. Example: BotaniGuard
Beneficial Arthropods: Releases of beneficial arthropods may not adequately reduce high-density populations.
***Orius* sp.** (pirate bugs) are fast-moving, 'true bugs' that feed on thrips and other insects. They are often seen on flowers in outdoor environments during summer. Optimum conditions for Orius are temperatures greater than 59° F and relative humidity greater than 60%. Orius will diapause under short day conditions. Keep photoperiods at a minimum of 14 hours to keep Orius active in greenhouse environments.
Amblyseius cucumeris is a predatory mite that feeds on pollen and thrips. They will occasionally feed on tarsonemid mites (cyclamen and broad mites). Optimum conditions for *Amblyseius cucumeris* are temperatures of 68-77° F and 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, twospotted spider mites and pollen. This species is not known to diapause.
Hypoaspis miles is a predatory mite that feeds primarily on fungus gnat larvae in soil, but it occasionally feeds on thrips pupae. It is not a primary control agent for thrips.
Chyrsoperla (lacewings) are generalist predatory insects that will feed on thrips and other predatory 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
Screening can be retrofitted to vents to exclude thrips from greenhouses. The type of screening used should be a fine mesh that is proven to exclude thrips. 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 will prevent most insects, including beneficial insects, from entering the greenhouse. It will also keep pest and beneficial insects inside greenhouses.
Reduce Breeding Area: Avoid excess soil on floors or gravel in benches. These situations 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: Control weeds inside and immediately outside greenhouses. Many weeds can harbor thrips, which can infest valuable crops.
Reflective Material Around Vents: Research has shown that reflective material such as aluminum foil placed around vents will repel thrips. This practice is still in its experimental phase and it is not widely used.

Sources and Additional Information

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