High Tunnel Pest Scouting Model
2007

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Objective: To produce quality fruits and vegetables in high tunnels using integrated pest management (IPM) and sustainable pest control strategies. IPM involves using several tactics to minimize crop loss. This includes mechanical control and cultural practices such as appropriate cultivar selection, soil and fertility management, and appropriate plant spacing. It also incorporates scouting in the pest control decision-making process.

Scouting Methods

Sticky traps

Although sticky traps will attract and catch many insect species, the primary task in the high tunnel is to identify the presence of insect pests. Check the traps for whitefly adults and winged aphids.

- Install three sticky traps per high tunnel. Hang them vertically at the height of the top of the crops. Place two in the tomatoes or peppers, one near the entrance and one in the center of the high tunnel in the tomatoes or peppers. Hang one in the raspberries.

- Inspect cards once a week and record findings.

- Change the cards weekly unless there are only a few insects trapped and more frequently if they get dirty from flying dust and random insects. Place new cards in the same areas of the greenhouse to track pest trends.

Plant Inspection

- Inspect plants in the high tunnel once a week. Inspect for: whiteflies, aphids, hornworms (tomatoes and peppers), fruitworms, cutworms and other caterpillars (tomatoes and peppers), stink bugs and damage (tomatoes), spider mites (raspberries), and foliage diseases and/or disorders.

- Count pests in specific locations in the high tunnel and on specific plant parts, depending on the pest and the crop. Record number found, stage of insect growth (egg, immature, adult). Include crop observations (height, leaf color, bud development, symptoms and signs, etc.)
TOMATOES AND PEPPERS

Hornworms and other caterpillars (fruitworms, cabbage loopers, etc.)

Tobacco and tomato hornworm damage usually occurs in midsummer and continues throughout the remainder of the growing season. The large caterpillars quickly defoliate plants and will feed on green and red fruit. Hornworms are often difficult to see because of their protective coloring. They tend to feed on the interior of the plant during the day and are more easily spotted when they move to the outside of the plant at dawn and dusk.

Fruitworm caterpillars vary in color from pale yellow, to red, to green, to brown with pale stripes running lengthwise. After the egg hatches, the larva feeds for a short period of time on the foliage before attacking the fruit. They prefer to feed on green fruit and usually do not enter ripe fruit. Damage consists of deep watery cavities frequently in the stem end of the fruit. During its development, one larva may injure several fruit.

Evidence and damage:
- Frass and excrement on leaves.
- Large, irregular holes in leaves. Cutworms will feed from the margins of the leaves inward.

Method: Inspect tomato planting, checking for frass, damage and caterpillars. Look for fruitworm larvae on the leaves near green fruit and outer edges of the plant and larvae on fruit.

The threshold in the high tunnel is one caterpillar.

Treatment: Handpick caterpillars from plants and destroy them. Depending on infestation, it may be necessary to apply Bacillus Thuringiensis, Bt.

Cutworms

Cutworm damage occurs in early to mid-season. These brown-black caterpillars spend the days in the soil and come out at night to feed on the foliage. They also feed on the stems at the soil line, causing the plant to break off.

Evidence and damage: Cutworm feeding occurs on the margins of the leaves and on the stems at the soil line causing the plants to break off at the soil surface.

Method: Inspect tomato and pepper plants, checking for foliage and stem damage. Carefully dig around base of suspected plants for caterpillars.

Threshold: determine amount of damage, the presence of caterpillars and treat if necessary with Bt.
Whiteflies

Whiteflies are tiny white insects that disperse from the plants when disturbed.

Evidence and damage: They suck the sap from plant leaves and can spread viral diseases. Plants should be inspected for signs of off-color or stunted plants.

Method: Use sticky cards to monitor adults and a hand lens to inspect several plants within a row for the presence of eggs, nymphs or adults. Both the upper and lower leaf surfaces should be inspected. Older immatures are found on the lowermost leaves. Egg-laying adults are found on the uppermost leaves.

The threshold for whiteflies is 0.5 per sticky card early in the season and 2 per card per day as the crop reaches maturity. Use insecticidal soap to manage populations.

Aphids

Winged aphids migrate into the high tunnel from wild hosts and establish colonies on the plants. Two species of aphids are common on tomatoes and peppers, the potato and green peach aphid.

Evidence and damage: Aphids suck sap from the plant causing the leaves to curl under and become deformed. Aphids are also vectors of certain plant viruses. The major damage caused by green peach aphid is through transmission of plant viruses. Dense populations of aphids feeding on young plant tissue cause water stress, wilting, and reduce growth rate of the plant.

Method: Rely on plant inspection, not sticky cards. Winged adults are found on cards when aphid colonies enter the high tunnel in the spring and when colonies on nearby weeds and crops become overcrowded.

The threshold for aphids is when they appear on the young leaves. Use insecticidal soap to control.

Stink Bugs

Adult stink bugs migrate from weedy areas into tomato plantings late in the season.

Evidence and damage: On green fruit, Stink bugs feed with piercing-sucking mouthparts and the damage appears as a pin prick, surrounded by a light discolored area. This may turn yellow or remain green on ripe fruit and the tissue below these spots is corky.

Method: Inspect plants for stink bugs after the fruit sets on.

The threshold in the high tunnel is one stink bug. The threshold in outdoor field plots is .25 stinkbugs per 10 plants.
Treatment: Handpick pests and destroy them.

**RASPBERRIES AND BLACKBERRIES**

**Spider mites**

Spider mites are very tiny pests – about .5 mm long. Severe spider mite damage will result in early defoliation in the fall which may induce early development of fruiting buds, reduce yields and even cause plant death.

**Evidence and damage:** Spider mites damage the foliage by sucking the sap from the leaves resulting in tiny yellow spots, giving the foliage a speckled appearance. Another telltale symptom of spider mites is their fine webs visible on the underside of the leaves. Eggs, webs, cast skins, and all stages of the spider mite can be observed on the underside of an infested leaf with a hand lens.

**Method:** Inspect plants for signs of webbing and discoloration. Spider mites can be detected by holding a sheet of paper under the foliage and lightly tapping the top of leaves. Spider mites will appear on the paper as small moving speck. Beneficial predatory mites may also be present.

**Treatment:** Begin treatment when symptoms appear. Use insecticidal soap.

**Diseases**

When scouting for insect pests, watch for symptoms of diseases and physiological disorders. For identification and control strategies, refer to:

PM 1266, *Tomato Diseases and Disorders*
IDEA 2, *Small Fruits: Insect and Disease Management for Backyard Fruit Growers in the Midwest*

**References:**


