Pest e-alerts

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Vol. 18, No. 28 http://entoplp.okstate.edu/pddl/pdidl **6/14/2019**

Keep an Eye on Tomatoes for Hornworms and Pinworms

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Abundant rainfall has produced some high-quality tomato plants this year, and hornworms and pinworms will reap the rewards if you're not monitoring for them.

Hornworms – *Manduca* spp.

Description

There are two species of hornworms that feed on tomatoes in Oklahoma. Adults of both species are large, robust moths, and gray or brown with a wingspan of 3 to 5 inches. Adults are referred to as hummingbird, sphinx, or hawk moths. There are 5 or 6 pairs of yellow or orange spots on the abdomen. Larvae are large, green caterpillars with white stripes on each side of the body and a horn near the end of the abdomen. They measure at least 3 inches long at maturity.

Tomato hornworm (*Manduca quinquemaculata* Haworth). The adult is mainly gray with a sinuous, black line near the outer margin of the forewings (Figure 1). The hindwings have three black stripes, all of which are well separated. There are usually five pairs of spots on the abdomen. Larvae have white, V-shaped markings on the sides of the body and a black horn (Figure 2).

Figure 1. Adult of tomato hornworm (Photo credit: Wikipedia).

Figure 2. Larva of tomato hornworm (Photo credit: Whitney Cranshaw, Colorado State University, Bugwood.org).

Tobacco hornworm (*Manduca sexta* Linnaeus). The adult is brown with an irregular, somewhat broken sub-terminal line on the forewings. The hindwings have two middle black stripes partially fused. There are usually six pairs of spots on the abdomen. Larvae have white, diagonal lines on the sides of the body and a red horn (Figure 3).

Figure 3. Larva of tobacco hornworm (Photo credit: Whitney Cranshaw, Colorado State University, Bugwood.org).

Life Cycle

Hornworms overwinter as pupae in the soil. Adults begin emerging by late spring in most years. Eggs are deposited on the underside of leaves at night. Each female deposits one to five eggs per plant visit and may lay up to 2,000 eggs in her lifetime. First-generation larvae are present by late May or early June. After feeding for three weeks, larvae burrow into the soil and pupate. First-generation adults may emerge by mid-July and second-generation larvae may be present from early August to early October.

Hosts

Hornworms feed primarily on solanaceous plants, including tobacco, tomato, eggplant, peppers, potato, and certain weeds. Tobacco and tomato plants are preferred for oviposition (egg laying).

Damage

Larvae consume large amounts of foliage and two or three large larvae can virtually defoliate even a large plant. Gardeners will often see plants with many stems and leaf veins, but with the leaf surfaces completely removed. These caterpillars will occasionally feed on the fruit if most of the leaves have been eaten. Rather than boring into the fruit, they feed superficially, leaving large open scars.

Inspection and Control

In small plantings, hornworms can be controlled by picking larvae off the plants. However, they are well camouflaged and this cryptic coloration can make them difficult to find. To assist with monitoring, look for large fecal pellets (frass) deposited by these caterpillars (Figure 4). In some years, hornworms are kept below economically damaging levels by a parasitic wasp (Figure 5). Parasitized hornworms are easily recognized by the small, white, oblong cocoons attached to their backs (Figure 6). Such worms should be left in the garden so the emerging wasps can parasitize other hornworms.

Figure 4. Larva of tobacco hornworm (Photo credit: Whitney Cranshaw, Colorado State University, Bugwood.org).

Larger plantings may need to be treated as larvae and damage begin to appear. A bacterial insecticide, *Bacillus thuringiensis* subsp. *kurstaki*, can be used against these insect pests. For specific recommendations, see the OSU

Extension Agents' Handbook of Insect, Plant Disease and Weed Control (publication E-832) and OSU Extension Fact Sheet EPP-7313.

Figure 5. A tiny braconid wasp that parasitizes hornworms (Photo credit: R.J. Reynolds Tobacco Company, Bugwood.org).

Figure 6. Cocoons of a parasitic wasp attached to a tobacco hornworm (Photo credit: Alton N. Sparks, Jr., University of Georgia, Bugwood.org).

Tomato Pinworm – *Keiferia lycopersicella* Walsingham

Description

The adult is a small, gray moth with reddish-brown markings on the head and thorax (Figure 7). The wingspan is 3/8 to 1/2 inch. The tiny, oval eggs are light yellow when newly deposited, but turn pale orange before hatching. Newly emerged larvae are yellowish gray, but fully grown larvae may be yellow, green, or ash gray with dark purple spots on the body (Figure 8). Larvae measure about 1/4 inch long at maturity.

Figure 7. Adult of tomato pinworm (Photo credit: James Hayden, USDA APHIS PPQ, Bugwood.org).

Figure 8. Larva of tomato pinworm (Photo credit: Alton N. Sparks, Jr., University of Georgia, Bugwood.org).

Life Cycle

The tomato pinworm does not overwinter outdoors in Oklahoma, but it may be active year-round in greenhouses. The eggs are usually deposited on the underside of leaves and hatch in about one week. The larvae mine the leaves for about six days and then fold leaves or bore into fruit for another six days. Mature larvae either remain in folded leaves or drop to the soil to pupate. About 12 days later, a new generation of moths emerges. In summer, a generation can be completed every four to seven weeks. In cooler weather, the life cycle is longer. There can be six to eight overlapping generations per year in greenhouses. Several generations can occur outdoors in the summer, beginning in June and continuing into October or early November.

Hosts

Pinworms feed only on solanaceous plants. Common hosts include tomato, potato, and eggplant. Weeds such as nightshade and horsenettle are also subject to attack.

Figure 9. External damage to tomato from tomato pinworm (Photo credit: Van Waddill, University of Florida).

Damage

First and second instars mine the leaves. Mines are widened gradually into one large blotch. Older larvae fold and web leaves together for protection and feed from within these shelters. Some larvae bore into stems, buds, and fruit, leaving small “pinholes” on the surface (Figure 9). Larvae usually enter the fruit near calyx lobes or the stem. Larvae usually feed just below the skin. Besides the presence of pinholes, injured fruits have discolored blotches.

Inspection and Control

Pheromone traps should be used to monitor adult movement into tomato fields and can be purchased from several commercial sources. A minimum of two traps per acre or location should be used to monitor adult moths. Control should be initiated when more than 10 moths per trap per night are recorded. Sanitation and prevention are good control measures for tomato pinworms. Infestations often result from shipped or locally grown greenhouse transplants. Therefore, close inspection of new plants can prevent serious problems later in the season.

Pinworms are difficult to control when heavy infestations have been allowed to develop. A spray schedule (every three to five days) may be needed to break their life cycle. Specific recommendations can be found in the OSU Extension Agents’ Handbook of Insect, Plant Disease and Weed Control (publication E-832) and OSU Extension Fact Sheet EPP-7313.

Plant Disease and Insect Diagnostic Laboratory

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Director of Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is issued by Oklahoma State University as authorized by the Vice President, Dean, and Director of the Division of Agricultural Sciences and Natural Resources.