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Tomato Crop Insects

Tomato Fruitworm

The tomato fruitworm is the most damaging tomato insect pest in South Carolina. Fruitworms occur throughout the Western Hemisphere extending as far north as Canada and as far South as Argentina.

The tomato fruitworm feeds on tomato, corn, and cotton, and is also called the corn earworm or the cotton bollworm. It also attacks soybeans, peppers, tobacco, beans, okra, and eggplant.

The tomato fruitworm moth is usually light yellowish-olive with a single dark spot near the center of each forewing. Eggs are laid singly, usually on the lower sides of terminal leaflets close to the flower or fruits. They are creamy white when laid, but develop a reddish-brown band just prior to hatching. Newly emerged larvae are yellowish-white with a brown head. Color of older larvae varies from greenish-yellow to brown or even black with paler stripes running lengthwise on the body. Larvae grow to a size of about 1½ inches in length. Pupae, about ¾ inch in length, are shiny and reddish brown at first, then become dark brown prior to adult emergence.



Tomato Fruitworm

Fruitworms feed on tomato leaves and fruit. Distorted leaves often result from feeding upon the tips of the leaves in the developing bud. Larvae may also bore into stalks or midribs. When fruit is present, larvae enter it soon after hatching. They prefer green fruit and will enter it usually at the stem end, causing extensive direct damage and promoting decay. The larvae are cannibalistic, so there is rarely more than one larva per fruit. Larvae usually complete development in a single fruit, but when fruits are small they may feed in several.

Fruitworms overwinter as pupae in the top 2 inches of soil. Adults emerge from early May to early June. Tomato fruitworm larvae have five to six instars with the development period averaging 28 days. Fruitworms have 4-5 generations per year in South Carolina.

Cutworms

Cutworms are cosmopolitan in their distribution and are common in the U.S. and Canada. The black cutworm is more abundant in the northern portions of its range while the granulate cutworm is more abundant southward. In South Carolina, cutworms are generally more of a problem in the Coastal Plain.

Cutworms attack many field crops, grasses, and vegetable crops such as tomato, asparagus, bean, crucifers, cucurbits, corn, cowpea, lettuce, onion, pea, pepper, potato, spinach, and sweet potato.

Cutworm eggs are white and usually laid singly or in small clusters. Black cutworm larvae are dark greasy gray to black with a light colored line down the center of the back. They are 1¾ inches long when mature and the skin is covered with smooth black granules. Granulate cutworm larvae are dusty brown with a more roughly granulate skin and up to 1½ inches in length. Cutworm pupae are about ¾ inch in length and dark brown or mahogany in color.



Black Cutworm

Cutworms may injure vegetable seedlings and newly set plants in the field. Larvae hide under clods and in cracks in the soil by day and appear at night, cutting off young plants near the ground. One larva often severs numerous plants in a row during a single night. Small populations can cause considerable injury resulting in the need to replant. Some cutworms climb plants and feed on the leaves.

Cutworms pass the winter as larvae or pupae. In early spring, larvae which have overwintered resume activity and feed until they are mature. Pupation then takes place in the soil. After emergence, females begin depositing eggs at night in clusters on the undersides of leaves. Each female lays hundreds of eggs. Upon hatching, larvae feed for 3 to 4 weeks. Most cutworms complete 3 or 4 generations per year in South Carolina.

Hornworms

The tobacco hornworm ranges from southern Canada to Argentina. The range of the tomato hornworm, however, extends only from southern Canada through the southern U.S. Hornworms feed primarily on solanaceous plants. Their hosts include tobacco, tomato, eggplant, pepper, and some weedy plants. Tobacco and tomato plants are preferred.



Hornworm

Hornworm eggs are smooth, spherical, and about 1/16 inch in diameter. Light green at first, they turn white before hatching. Mature tobacco hornworm larvae usually have green bodies with fine

white hairs and seven diagonal white stripes on each side; the posterior horn is usually curved and red. Tomato hornworm larvae have 8 V-shaped markings on each side; the horn is straight and black. Both species are about 4-4½ inches long when fully grown. Pupae are brown, hard, spindle-shaped, and about 3 inches long.

Hornworms strip leaves from tomato vines. If a heavy infestation develops, caterpillars also feed on developing fruit. Rather than bore into fruit, they feed superficially leaving large open scars. Fruit damage, however, is much less common than defoliation. Hornworm damage usually begins to occur in midsummer and continues throughout the remainder of the growing season.

Hornworms overwinter in the soil as pupae. Moths of this overwintering generation begin to emerge in early June and may continue to emerge as late as August. Nocturnal in habit, hornworm moths frequently can be seen hovering over plants at dusk. At night, eggs are deposited on the underside of leaves. Each moth deposits 1 to 5 eggs per plant visit.

Hornworms emerge from the eggs about 4 days later, depending upon temperature. After feeding for 3 weeks, hornworms burrow into the soil and spend 4 days as prepupae. In summer, the pupal period lasts 3 weeks after which a new generation of moths emerges. Heavy egg deposition is common in August and early September. At least two generations occur each year in South Carolina.

Tomato Pinworm

This pest lives year round in the warm agricultural areas of Mexico, California, Texas, and Florida. In South Carolina the pinworm cannot overwinter outdoors. Infestations occur only in the fall crop of tomatoes.



Mature Larval Pinworm

The tomato pinworm feeds only on solanaceous plants. Common hosts include crops such as tomato, potato, and eggplant.

The small gray moth lays tiny yellowish-orange oval eggs about 0.4 mm long. The newly hatched larva is yellowish-gray and about 0.8 mm long. The mature larva may be yellow, green, or ash gray and is covered with dark purple spots. Larvae pupate in the soil enclosed in a pupal cell made of loosely woven silk and covered with soil particles.

Blotch-like leaf mines, folded and tied leaves, pinholes in stems and fruit, and fruit blotches can all be caused by pinworms. First and second instar larvae mine leaves in a manner similar to that of serpentine and vegetable leafminers. These mines, however, are widened gradually into one large blotch.

Upon emerging from leaf mines, third instar larvae fold and web leaves to protect themselves and feed from inside these shelters. Some of the larvae bore into stems, buds, and fruit leaving small "pinholes" on the surface. The fruit usually is entered near calyx lobes or the stem. Damage to leaves and vines is of little importance, but injury to the fruit can cause a substantial loss.

In summer, a generation can be completed every 26 to 34 days. In cooler weather, the life cycle is longer. Seven to 8 overlapping generations occur each year in Florida. In South Carolina, several generations may occur in field tomatoes during late summer and fall.

Silverleaf Whitefly

Silverleaf whitefly occurs around the world in tropical and subtropical areas and in greenhouses in temperate areas. It has been reported from all southeastern states. Additionally, it has been reported from Arizona, California, District of Columbia, Maryland, and Texas.

The number of host plants is extensive. The most frequently reported hosts in the southeastern U.S. are poinsettia, gerbera daisy, tomato, squash, cucumbers, melons, and cotton.

The silverleaf whitefly is small (< 1 mm) and whitish yellow. The head is broad at the antennae and



Silverleaf Whitefly

Photo Source: UC Statewide Integrated Pest Management Project

narrow toward the mouth parts. The wings are held roof-like at about a 45 degree angle, whereas other whiteflies usually hold the wings nearly flat over the body. Hence the silverleaf whitefly appears more slender than other common whiteflies. The eggs are inserted on end in

the undersides of new leaves. The eggs are whitish to light beige. The nymphal stage appears glassy to opaque yellow. The body is flattened and scale-like with the margin relatively near the leaf surface. The pupa or fourth nymphal instar will be somewhat darker beige-yellow and opaque. Direct damage is caused by the removal of sap, and indirect damage as a disease vector. The silverleaf whitefly is a vector for several important virus diseases of tomatoes, lettuce, and melons in the southeastern U.S. Both the adult and nymphal stages contribute to direct damage. Chlorotic spots sometimes appear at the feeding sites on leaves, with heavy infestations causing leaf wilting. The excretion of honeydew and the subsequent development of sooty mold fungi also may reduce photosynthesis and other physiological functions of the plant.

The number of eggs laid by each female over her lifetime varies considerably, but appears to be around 80 to 100. "Crawlers" hatch from the eggs and crawl about until they insert thread-like mouthparts into the underside of the leaf to feed. They tuck their legs and antennae underneath and settle down closely to the leaf surface.

Crawlers molt into scale-like nymphs that also suck out sap. Nymphs molt a second and third time. The fourth stage eventually becomes a nonfeeding pupa. The adult whitefly develops within the pupa. Adults emerge from the pupa through a T-shaped slit about a month from the time the egg was laid. Females live about 2 weeks.

Vegetable Leafminer

The vegetable leafminer is found from the tropics into the southeastern and southwestern U.S. It occurs at least as far north as Tennessee and Ohio.

The vegetable leafminer infests a wide variety of plants, including squash, okra, pea, tomato, bean, cabbage, turnip, potato, tobacco, cotton, radish,

spinach, watermelon, beet, pepper, alfalfa, clover, vetch, and plantain.



Vegetable Leafminer

Photo Source: UC Statewide Integrated Pest Management Project

The adult is a shiny black fly with variable yellow markings and is 1.0 to 1.8 mm long. The white oval egg, about 0.2 mm long, sometimes is visible through the upper epidermis of the leaf. The fully grown maggot, about 3.0 mm long, has a bright yellow, translucent body, and black mouthparts. Each maggot has a slightly pointed head and a more rounded abdomen. The flattened, segmented pupa is bright yellow at first but gradually turns brown. It is oblong-oval in shape and slightly less than 2 mm long.

Vegetable leafminers create lightly colored, irregularly winding mines in leaves. The mines are generally S-shaped and may be enlarged at one end. Infested leaves are favorable habitats for invading bacterial and fungal plant pathogens. Also, since heavily mined leaves may have nearly 100% of their mesophyll removed, photosynthetic efficiency is greatly reduced.

Severe infestations may cause the foliage to turn brown and appear burned. Damaging infestations are most likely to occur after crops have been treated weekly with broad spectrum insecticides. These pesticides kill the parasitic wasps which normally keep leafminer populations at acceptable levels.

Vegetable leafminers feed and breed year round in the southern areas of Florida and Texas. In South Carolina they overwinter in soil as pupae. Generally, adult flies which emerge in April or May live only 4 to 10 days. After mating, females insert eggs into leaf tissue from the underside of the leaf. Three to 8 days later, eggs hatch and young larvae begin feeding, each one creating its own mine. The leafmining stage may last up to 12 days, but is usually completed in 4 or 5 days during summer. Larvae pupate for about 10 days (longer in spring and fall) at the enlarged ends of the mines or in the soil. A new generation is produced approximately every 23 days. At least 5 generations occur each year in southern states.

Western Flower Thrips

The distribution of Western flower thrips was thought to be limited to west of the Mississippi River before 1980. However, this thrips has become a prevalent species throughout the southeast.

This thrips feeds on almost any flowering plant, with peppers and tomatoes the major vegetable host plants.



Western Flower Thrips

Photo Source: UC Statewide Integrated Pest Management Project

Western flower thrips are about 1 mm long. The female varies from yellow to dark brown, and has a rounded abdomen. The male is always pale yellow and has a narrow abdomen.

Yellowish eggs cannot be seen because they are laid into the plant tissue. Larvae develop through two stages and are distinctly yellow. The pupa is a yellowish, quiescent nonfeeding stage.

The western flower thrips feeds on flowers and foliage by inserting its modified left mandible into the tissue, and sucking the fluids from cells. Egg laying and feeding scars reduce the aesthetic quality and marketability of some plants. When thrips feed on developing tissues, affected cells are unable to expand, and mature leaves and petals are distorted. When thrips feed on expanded tissue, affected cells become filled with air, which imparts a silvery appearance. This thrips also is an important vector of tomato spotted wilt virus.

Females lay eggs in tender plant tissue. The eggs hatch in 2 to 14 days, depending on temperature. Larvae feed on plant tissue, usually in flowers. Late in the second instar they stop feeding and move down the plant to pupate. Thrips develop through two quiescent, nonfeeding pupal stages in the soil, plant litter, or in a protected area on the plant. Adults emerge and resume feeding on flowers, buds, and terminal foliage. The entire life cycle from egg to adult emergence can take 12 days in hot weather to 44 days in cool weather.

Potato Aphid

Potato aphids occur throughout North America. They are common visitors to home vegetable gardens in South Carolina.

This soft-bodied, pear-shaped insect may be solid pink, green and pink mottled, or light green with a dark stripe. Usually wingless, it is about 2.5 to 3.5

mm long and has a pair of long, slender tailpipe-like appendages known as cornicles. The egg stage does not occur in South Carolina. Adult females give birth to live young. Although slightly smaller than the adult, the nymph is similar in color and shape.

Potato aphids infest a wide range of host plants. Some important cultivated hosts include potato, tomato, eggplant, sunflower, pepper, pea, bean, apple, turnip, corn, sweet potato, asparagus, clover, and rose. Weeds such as ragweed, lambs quarters, jimsonweed, pigweed, shepherds purse, and wild lettuce are also common food plants.



Potato Aphid

Photo Source: UC Statewide Integrated Pest Management Project

Sporadic in occurrence, potato aphid infestations are rarely severe enough to kill plants. Aphids pierce veins, stems, growing tips, and blossoms with their needle-like mouthparts. As a result, blossoms are shed and yield is reduced. New growth becomes stunted and curled. Heavily infested plants turn brown and die from the top down. Aphids tend to spread rapidly from field to field transmitting a number of viral diseases. These include various mosaics, leaf roll, spindle tuber, and unmottled curly dwarf.

In South Carolina, female potato aphids feed and reproduce year round. No eggs or males are produced. Without mating, wingless females give birth to about 50 live nymphs. During warm weather, each of these nymphs matures in 2 or 3 weeks. The life cycle continues in this manner until overcrowding occurs or food becomes scarce. At these times nymphs develop into winged adults and migrate to new host plants. Once settled these aphids begin reproducing and the life cycle continues as before. During winter, however, feeding and reproduction occur at a much slower rate. Many generations are produced each year.

Stink Bugs and Leaf-footed Bugs

Several species of stink bugs as well as leaf-footed bugs are serious pests of tomatoes and various other vegetable crops in South Carolina. Brown and green stink bugs have been reported as far north as Quebec; however, in the United States, they are more often injurious in the South. Although more common in the South, leaf-footed bugs occur as far west as Arizona.

All adult stink bugs are shield shaped. About 14 to 19 mm long, green stink bugs are bright green with a narrow orange-yellow line bordering the major body regions. Brown stink bugs are dull grayish yellow in color and 12 to 15 mm long.



Brown Stink Bug

Leaffooted bugs are about 20 mm long, have dark brown bodies, a narrow cream colored stripe across the back, and flattened, leaf-like hind legs.



Leaffooted bug

When first laid, the barrel-shaped eggs of the green stink bug are yellow to green, later turning pink to gray. The white kettle-shaped eggs of the brown stink bug are slightly smaller than those of the green stink bug. Leaffooted bug eggs are slightly keg shaped.

Nymphs of all three bugs are smaller than, yet similar in shape to the adults. Green stink bug nymphs are predominantly black when small, but as they mature, they become green with orange and black markings. Nymphs of the brown species are light green. Leaffooted bug nymphs are bright red.

Stink bugs feed on over 52 plants, including native and ornamental trees, shrubs, vines, weeds, and many cultivated crops. The preferred hosts are nearly all wild plants. Stink bugs build up on these hosts and move to cultivated hosts as their preferred food becomes unpalatable. Among vegetable crops, stink bugs attack bean and cowpea seeds, okra pods, ripening tomato fruit, and stems of melons and asparagus. Bean, cowpea, sorghum, eggplant, potato, tomato, peach, strawberry, okra, and watermelon are only a few of the leaffooted bug's many host plants. Nymphs and adults of both kinds of bugs pierce plants with their needle-like mouthparts and suck sap from pods, buds, blossoms, and seeds. The degree of damage depends, to some extent, on the developmental stage of the plant when it is pierced by the stink bug. Immature fruits and pods punctured by bugs become deformed as they develop. Seeds are often flattened and shriveled, and germination is reduced.

Stink bugs overwinter as adults in ditch banks, along fence rows, on roadsides, and in other similar places. They become active in spring when temperatures rise above 70°F. Each female deposits up to several hundred eggs, usually in mid- or late June. These eggs are laid in clusters, primarily on leaves and stems, but also on pods. Nymphs hatch

from these eggs and pass through five instars before becoming adults. Approximately 5 weeks elapse between hatching and adult emergence. Two generations per year occur in South Carolina. Stink bugs usually reach high population levels in July through early October.

The biology of leaffooted bugs is not well documented. They overwinter as adults and have been collected all months of the year. However, they are most common from May onward into the fall months.

Control of Insect Pests of Home Grown Tomatoes

Cultural practices are helpful in avoiding many insect infestations. Tomatoes should be planted in well-prepared, fertile seedbeds, mulched, and properly watered to promote vigorous growth. Stressed plants tend to attract more insect pests than healthy plants. Beneficial insects are very helpful in controlling insects such as aphids, leafminers, and hornworms. Use insecticides only when necessary to preserve these beneficials.

Insecticides are effective in controlling stink bugs, leaffooted bugs, aphids, and fruitworms, control cutworms, fruitworms and hornworms, although not every insecticide will be effective on all of these insect pests. Insecticidal soap, such as M-PEDE, is a less toxic option for control of aphids and to some extent, whiteflies. Check with your local County Extension Agent for specific insecticide recommendations.

Reference

Sorensen, K.A. and J.R. Baker. 1983. Insects and related pests of vegetables. The North Carolina Agricultural Extension Service. Publication AG-295, 173 pp.

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