

Management of the Tomato Hornworm in Organic Tomato Production in Alabama

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Tomato Hornworm:

Manduca quinquemaculata (Haworth)
(Insecta: Lepidoptera: Sphingidae)

Introduction:

The tomato hornworm, *Manduca quinquemaculata* (Haworth), is the most common insect pest of plants in the Solanaceae family, which are also referred to as nightshade plants. Tomatoes appear to be the most preferred host but the insect also infests other nightshade plants such as peppers, eggplants, and potatoes. The tomato hornworm is native to North America and is commonly seen in most tomato growing regions. Even though the tomato hornworm is reported to be uncommon in the southeastern region of the United States, reports of the hornworm incidence and damage are common on tomato farms in Alabama during the first two weeks in June.

Identification: The tomato hornworm only feeds on plants during the caterpillar phase of its development. The large pale green caterpillar is about 3.5 to 4-inches long and has 5 pairs of legs as well as a large black projection or horn on the last abdominal segment; this horn is the reason for the name “hornworm.” The tomato hornworm can be identified by its characteristic V-shaped yellow-white markings on the worm’s body and its black horn. Adults are large bodied moths, predominantly grey or grey brown with lighter markings. Moths have a wingspan of 4-5 inches, with remarkable 5 pairs of orange-yellow spots on their hairy full-bodied abdomen.

Biology and life history: In early summer, female moths lay green to yellow-green eggs with a pearly appearance; eggs are laid singly on the underside of tomato leaves. Eggs usually hatch in 6 to 7 days and the caterpillars develop through five larval stages for 3-4 weeks until they pupate deep in the soil. The pupal stage lasts 3-4 weeks in the soil and adults can emerge in about 3 weeks.

Injury: In the southern parts of Alabama, damage caused by the tomato hornworms usually start within the first few weeks after transplanting tomato (i.e. in mid- summer) and continues throughout the growing season. Caterpillars feed on leaves and new stems, and they cause damage to tomato plants. Caterpillars do less damage during their early developmental stages when they feed on the upper portions of leaves. The similarity in the green colorations of tomato leaves and the hornworm caterpillar makes it possible for the insect to camouflage itself by laying along leaf veins or stems. This enables the hornworm caterpillar to go unnoticed, thus giving it enough time to cause complete leaf loss of the tomato host plant. The tomato hornworms are aggressive plant feeders; just one caterpillar can cause rapid damage to the plant in the form of severe leaf loss. Caterpillars cause damage on the outside of the tomato fruit, leaving behind large, open scars on the fruit as they feed. Feeding activity on green developing tomato fruits results in poor maturity and



Tomato hornworm



Tomato hornworm damage: Defoliation

Photos: Leslie Grill & Anitha Chitturi

unmarketable fruits.

Late larval stage tomato hornworm caterpillars do most consumption of tomato leaves and fruits during their last week of feeding, which results in destruction of most of the tomato leaves and fruits.

Management: Management of the tomato hornworms begins with visual scouting of plants 2-3 times per week for the presence of caterpillars, leaf loss, and fruit damage. Presence of the tomato hornworms on plants may not be easily noticed until they cause damage because their body color easily blends with tomato leaves. Droppings by the tomato hornworms is indicative of the presence of this pest.

Locations of fresh droppings indicate areas of current hornworm activity and can provide information on sections of the farm that need to be treated. On small tomato farms, handpicking of hornworms and placing them in a bucket of soapy water is one of the quickest and most effective management strategies. Cultural control methods for the tomato hornworm include crop rotation with crops outside the family of night shade, and management of its hosts in the night shade family. Promotion of natural enemy populations is also encouraged. Trellising tomato plants (especially indeterminate/vining varieties) allows free flow of air and makes pesticide applications easier. Many beneficial predatory insects like ladybird beetles and green lacewings prey on the tomato hornworm eggs and young caterpillars. Wasps that appear as white cocoon-like projections from the body of the tomato hornworms parasitize the hornworms. When such projections are sighted on tomato hornworms, growers should leave the infested hornworms undisturbed on tomato farms to afford wasps ample time to develop, emerge from cocoons, and parasitize other hornworms. The economic threshold for hornworms is one or more healthy

larvae per ten plants. If none of the above management tactics is effective, we recommend the use of Organic Materials Review Institute (OMRI)-approved insecticides. Organic insecticides with the following active ingredients: spinosad, pyrethrin and azadirachtin (i.e. neem extract) and *Bacillus thuringiensis* (Bt) are recommended for the management of tomato hornworms in the production of organic tomatoes. These products are most effective when aimed at newly hatched or younger larvae; however, they perform poorly against larger/older caterpillars. Growers should consider spot-treating infested sections of tomato fields where the hornworm damage is observed, as it is unusual for an entire

field to become fully infested. Microbial pesticides such as Bt products are effective against small/young caterpillars but not against large/older caterpillars. Therefore, effective monitoring and early detection are critical to the efficiency of these pesticides. It is generally recommended that pyrethrins be sprayed either early in the morning or late in the evening to avoid spraying non-targets such as natural predators and pollinators. Spraying in the evening or late afternoons is actually preferred because pyrethrum breaks down into less effective products in the presence of sunlight. Thus, spraying in the evening or late afternoon reduces exposure to sunlight and allows the product to remain effective overnight. Biopesticide rotations are recommended to prevent the development of insecticide

resistance by the tomato hornworm. Certified organic tomato producers must use OMRI-listed insecticides or check with their certifying organizations prior to using organic insecticides that are not OMRI-listed. Also, contact your local extension agent for more information on recommended/approved insecticides for your area.

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For more information, contact your county Extension office.

Visit <https://www.tuskegee.edu/extension>

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