



**TUSKEGEE UNIVERSITY
COOPERATIVE EXTENSION PROGRAM**



**Publication No. TUCED - MANAGEMENT OF TOMATO HORN WORMS IN ORGANIC
TOMATO PRODUCTION IN ALABAMA**

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Tomato Hornworm: *Manduca quinquemaculata* (Haworth) (Insecta: Lepidoptera: Sphingidae)



Tomato hornworm.



Tomato hornworm damage: Defoliation

Photos: Leslie Grill & Anitha Chitturi, Tuskegee University

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 hornworm is reported to be uncommon in the Southeastern region of the United States, reports of hornworm incidence and damage are common on tomato farms in Alabama during the first two weeks in June.

Identification: Tomato hornworms are large pale green caterpillars which are about 3.5 to 4-inches long, have 5 pairs of prolegs and a large projection or horn on the last abdominal segment; this horn is the reason for the name “hornworm.” Tomato hornworm can be identified by the characteristic V-shaped yellow-white markings on the body with a black horn on the last abdominal segment. Adults are large bodied moths, predominantly grey or grey brown with

lighter markings. Moths have a wing span of 4-5 inches, with remarkable 5 pairs of orange yellow spots on hairy robust abdomen.

Biology and Life history

In early summer, adult female moths lay green to yellow-green eggs with 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 stages of larval instars for 3-4 weeks until they pupate deep in the soil. Larvae pupate 3-4 weeks in the soil and adults can emerge in about 3 weeks.

Injury: In the southern parts of Alabama, hornworm damage usually starts within the first few weeks after transplanting (i.e. in mid- summer and continues throughout the growing season. Damage to the tomato plants is caused by the caterpillars which feed on leaves and new stems. Caterpillars do less damage during the early stages when they; feed on the upper portions of leaves. This caterpillar's green coloration is similar to the leaves and stems of tomato plants and this allows the insect to camouflage itself by lying along leaf veins or stems. The ability to camouflage itself enables the hornworm caterpillar to go unnoticed until complete defoliation of the tomato host. Hornworms are aggressive feeders and one caterpillar can cause rapid damage to the plant in the form of severe defoliation. Caterpillars cause damage on the outside of the tomato fruit, and leave large, open scars on the fruit as they feed. Caterpillars are also known to feed on green developing tomato fruits resulting in poor maturity and unmarketable fruits. Most of the hornworm's leaf consumption occurs during the last week of feeding of the late instar which results in the destruction of most of the leaves and fruits.

Management: Tomato hornworms are easy to manage through regular scouting and visual examination of plants for the presence of caterpillars, defoliation and fruit damage at least 2-3 times per week during summer. Tomato hornworms are fairly large in size and blend within the leaves and might not be noticed until the damage is done. The presence of hornworm droppings is indicative of the incidence of this pest. Fresh hornworm droppings show areas of current hornworm activity and can provide information on sections of the farm that need to be treated. On small tomato farms, handpicking and dropping of hornworms in a bucket of soapy water is one of the quickest and most effective management methods. Cultural control methods for tomato hornworm include crop rotation with non-solanaceous crops (i.e. crops outside the night shade family), management of weed hosts in the night shade family and promotion of natural enemy populations. Trellising of tomatoes (especially indeterminate/vining varieties) helps to allow the free flow of air and makes pesticide applications easier. It is easier to achieve better pesticide coverage of tomatoes that are trellised relative to those that are not trellised. Many beneficial predatory insects like ladybird beetles and green lacewings prey on the hornworm eggs and young caterpillars. Tomato hornworms are also parasitized by wasps, which appear as white cocoon-like projections from the hornworms body. When such projections are observed growers should leave the infested hornworms on the tomato farm so that the adult wasps have 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, however, if all the above management tactics are not effective, use of Organic Materials Review Institute (OMRI)-approved insecticides is recommended. Spinosad, Pyrethrin and Azadirachtin (i.e. neem extract) are recommended for the management of hornworms in the production of organic tomatoes. These products are most effective when aimed at newly hatched or younger larvae; they perform poorly against larger/older caterpillars. Growers should consider spot treating the infested sections of tomato fields where hornworm damage is observed as it is unusual for an entire field to become infested. Microbial pesticides such as *Bacillus thuringiensis* (Bt) products are

effective against small/young caterpillars but not against large/older caterpillars. Effective monitoring and early detection are therefore critical to early application of these pesticides. It is generally recommended that pyrethrins are sprayed either early morning or late in the evening to avoid targeting natural predators and pollinator populations. Spraying in the evening or late afternoons is actually preferred pyrethrum breaks down into less effective products in the presence of sunlight. Spraying in the evening or late afternoon reduces exposure to sunlight and allows the product to remain effective overnight. Bio pesticide rotations are recommended to prevent the development of insecticide resistance by tomato hornworms. 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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