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TOMATO AND TOBACCO HORNWORM (*Manduca* spp., Family Sphingidae)

'Hornworm' is the colloquial name for the caterpillar stage of the Sphingids, or sphinx moths. The name describes a prominent horn-shaped structure on the caterpillar's last abdominal segment. While this family of moths is diverse and feeds on a variety of food plants, two species are pests of Connecticut tomato gardens. They are the five-spotted hawk moth/tomato hornworm (*Manduca quinquemaculatus*) and the Carolina sphinx/tobacco hornworm (*Manduca sexta*).

Both species are essentially identical in appearance, feeding habits, and life cycles. Both feed on a variety of solanaceous plants including tomato, tobacco, pepper, eggplant, and jimsonweed.



Fig. 1: Hornworm caterpillar

Description and Life Cycle:

In the northeast there are generally two generations per year. Underground



Fig. 2: Hornworm adult (sphinx moth)

overwintering pupae emerge as first-generation adult moths in the spring. Adults are large-bodied brownish-gray moths with a 4 ½ inch wingspan. The adults are strong nighttime fliers and will nectar at horn shaped flowers such as Japanese honeysuckle, moonflower, and petunia. Eggs are laid singly on host plants. After hatching, the caterpillars develop rapidly. They feed on all parts of host plants, though primarily on the leaves. Fruit can also be consumed. Hornworms will usually remain with the host plant they hatched on. Stripping their host plants of foliage will cause them to leave. Mature caterpillars are very heavy-bodied and 3 inches long. The hornworms are very well camouflaged despite their size. They incorporate the pigment of their host plants as

coloration. When fed on a pigment free laboratory diet, the caterpillars are blue. Most hornworms in the wild will be a shade of green, with thin white and black chevron lines running along the sides. The horn on its 'tail end' can be either reddish to black, depending on species. Tomato hornworms have black horns, while tobacco hornworms have red horns. The horn is ornamental and used as a bluff against predators. The horns are not venomous. Once the caterpillars reach maturity, they will leave their host plants and burrow underground to pupate. The pupa is shiny brown, about 2 inches long, and has a distinctive curved 'jug handle' loop that is actually the developing moth's proboscis. Second-generation adults emerge, mate, and oviposit (lay eggs) on foodplants. The second-generation hornworm caterpillars will develop similarly to the first and then pupate underground. They remain underground to overwinter, and then emerge the following spring.

Control:

The standard methods for caterpillar control are also effective in controlling hornworms – the hardest part is detecting them. Check tomato and other solanaceous plants carefully for signs of the caterpillars (chewed or missing leaves, round pellet-shaped caterpillar feces, etc.) Handpick caterpillars when found. Bt (*Bacillus thuringiensis*) is an organic insecticide that is especially effective on young caterpillars. If planting tomatoes or other solanaceous plants in the same bed as the previous year, roto-tilling the soil in the spring prior to fertilizing and planting digs up and destroys overwintering pupae.

Often, discovered hornworm caterpillars will have already been neutralized by parasitoid wasps. These tiny braconid wasps lay their eggs inside the bodies of feeding caterpillars. As the hornworms mature, the wasp larvae developing inside will emerge to pupate,

leaving the back of the caterpillar riddled with what are often described as white rice-shaped 'eggs.' These are actually the pupal cocoons of the wasps. It is recommended to leave these parasitized caterpillars in place. They will die before they pupate, and the wasps that emerge from them will disperse to parasitize other hornworms.



Fig. 3: Parasitized hornworm