

## 16. Caterpillar Control of Greenhouse Vegetables (HortReport, March 2003)

Caterpillar pests are not usually considered to be major pests in greenhouse vegetables, however they can be a problem in warmer months of the growing season when the adult stage, (moth or butterfly, order Lepidoptera) migrates into the greenhouse to lay eggs. One of the most common species found in tomatoes is the tomato hornworm, however tomato fruitworms, armyworms, and loopers can also infest tomatoes and peppers. If you are introducing natural enemies to control other pests, caterpillars must also be controlled with natural enemies or compatible pesticides.

There are many enemies of caterpillars found in natural populations that will attack caterpillars if you are not using a broad spectrum insecticide program. Examples of these include predators such as assassin bugs, damsel bugs, minute pirate bugs, and parasitic flies and wasps. If populations are not kept in check with indigenous natural enemies consider supplementing with biological controls that can be purchased through a biological control distributor.

### Caterpillar Life Cycle

Caterpillars and moths undergo complete metamorphosis consisting of four stages, egg, caterpillar (larva), pupa and adult. Eggs are laid in groups on leaves. Eggs hatch into larvae that have well developed chewing mouthparts. Larvae eat continuously and can cause damage to foliage and fruit in a short period of time. After several developmental larval stages, the insect transforms into a stage called the pupa or the resting stage. This stage does not feed and is usually inactive. Pupae are often covered by a cocoon or some other kind of protective material. The final stage occurs when the adult butterfly or moth emerges from the cocoon to begin the egg laying process again. Damage symptoms from larvae appear as holes chewed in leaves and/or fruit and large of amounts of excrement may be observed on the foliage.

### Biological Controls

*Trichogramma* spp.

One of the most popular and effective controls for caterpillars is the egg parasitoid, *Trichogramma*. These tiny wasps (.9 mm.) work by laying eggs (parasitizing) in the eggs of many destructive caterpillar pests. A new wasp will emerge from the parasitized egg. If you are going to use this biocontrol, inspect the crop for the presence of eggs since this is the life stage that is attacked.

*Trichogramma* is not effective against the larval stages. Commercially, grain moth eggs parasitized by *Trichogramma* are glued to small cards and shipped to the grower. The cards are then placed throughout the crop where the wasps will emerge to search the plants. Protect the cards from ants since they will feed on the eggs.

The species available from most biocontrol suppliers include *T. brassicae*, *T. minutum* and *T. pretiosum*. Consult suppliers for applications rates and appropriate species needed for the crop and pest.

### Microbial Insecticides

A microbial insecticide such as *Bacillus thuringiensis* (Bt) has a selective mode of action that will target caterpillars but not harm other beneficial organisms. Various subspecies (strains) are commercially available for controlling many common foliage-feeding caterpillars. The most widely used Bt insecticides are formulated from the bacteria *Bacillus thuringiensis* var. *kurstaki* (Dipel®, Javelin®). This isolate is toxic only to the larvae of butterflies and moths. When an insect ingests the Bt, the protein toxin paralyzes and destroys the cells of the gut wall. Insects may die quickly or may stop feeding within 2 to 3 days. Mortality varies with larval size, target species, and the dose consumed. Caterpillars must feed on treated leaves for it to be effective since it is not a contact poison.

### Botanical Insecticides

Azadirachtin (Azatin XL® , Neemix®) is a botanical insect growth regulator derived from kernels of the neem tree. As an insect growth regulator, Azadirachtin blocks the insect's production of

hormones, and interrupts the moulting process, preventing the insect from completing its life cycle. Azadirachtin may also serve as a feeding deterrent for some insects. This compound is compatible with beneficial insects and in addition to controlling caterpillars it will kill/repel a variety of greenhouse pests.

Microbial and biological insecticides are registered by the Environmental Protection Agency. Growers must read and follow the label to determine if the intended use has been approved. Always read the label before using.



Figure 11. Parasitized tomato hornworm.