

# SQUASH BUGS IN HOME GARDENS

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The squash bug, *Anasa tristis*, is common throughout the United States. It primarily attacks squash and pumpkins but can also attack other cucurbits, such as cucumbers.

## Identification

Adult squash bugs (fig. 1) are somewhat flattened, large insects, measuring 5/8 inch long and 1/3 inch wide. They are usually dark gray to dark brown. The edges of their abdomens protrude beyond their wings and typically have alternating orangish and brown stripes.

The eggs are elliptical, 1/16 in. long, and yellowish to bronze (fig. 2). The nymphs range in size from 1/10 to 1/2 inch in length as they progress through five stages called instars. The young nymphs when they first hatch have a light green abdomen and black heads and legs (fig. 3). As the nymphs grow larger, they first turn light gray (fig. 4) and then progressively brownish gray (fig. 5), with black legs and antennae.

## Life Cycle

Squash bugs overwinter as adults in sheltered places, such as under plant debris, around buildings, or under rocks. When adults emerge in the spring, they fly to growing cucurbit plants to feed and mate. Female squash bugs lay eggs individually in small clusters of about 20 commonly on the undersides of the leaves, especially between the veins where they form a V (fig. 2). Eggs may also be deposited on stems. The females usually start appearing in gardens in early June and continue to lay eggs through mid-summer.

Eggs hatch in about 10 days. Nymphs require about four to six weeks before maturing into adults. Both adults and nymphs are secretive and quickly scurry for cover when disturbed. One generation develops each year, although it is possible that in some summers there is a partial second generation. The life stages overlap and all of them can be seen at any given time during the growing season. In the fall, especially after the vines have died, the adults, and late instar nymphs often congregate on squash fruits. The nymphs die when the temperatures drop to freezing. The adults gradually fly or crawl to sheltered places to overwinter.



Figure 1. Adult squash bug



Figure 2. Squash bug eggs

## Damage

Squash bugs have piercing-sucking mouthparts that they use to suck the sap out of leaves. Their feeding causes yellow spots that eventually turn brown (fig. 6). The feeding also disrupts the flow of water and nutrients, which can cause wilting. However, unlike cucumber beetles, squash bugs do not vector diseases. Young plants are much more susceptible to damage and may die from extensive feeding. Larger, more vigorous plants are more tolerant of feeding damage, although they can also be injured or killed if they severely attacked.



Figure 3 Newly emerged squash bugs



Figure 4 Squash bug nymphs



Figure 5 Mature squash bug nymph

### Management

The most important times to control squash bugs are when the plants are young seedlings and when they are flowering. Squash bugs are less important to control later in the growing season. Late season or fall feeding is not considered serious. Early detection of nymphs is important, as adult squash bugs are difficult to kill.

### Cultural

Maintain healthy, vigorous plants through proper fertilization and watering to help limit squash bug damage.

### Physical

Remove or knock off and kill nymphs and adults by dropping them into a pail of soapy water. This is particularly effective if only a few plants are affected. This can be challenging because squash bugs hide under leaves and move quickly when disturbed.

Crush eggs that are attached to the undersides and stems of leaves.

Trap squash bugs by laying out boards or pieces of newspaper. Squash bugs will congregate under the boards at night, and then can be collected and destroyed in the morning.

Remove plant debris around the garden during the growing season to reduce the potential harborage where squash bugs may hide. Clean up cucurbits and other plant matter around the garden in the fall to reduce the number of overwintering sites.

### Insecticidal

Insecticides are normally not required to manage squash bugs. However, if cucurbits are found wilting early in the season due to squash bug feeding, then an insecticide application is probably needed to manage the insects. If large numbers of squash bugs are found in the garden later in the summer, it may be necessary to protect your cucurbits with an insecticide. It is not necessary to treat squash bugs found in the garden during late summer or fall regardless of how many are seen.

The best time to apply these insecticides is during minimal bee activity, which is typically early in the morning or late at night. Be sure to get good coverage underneath

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the leaves as this is where most squash bugs are found. Examples of commonly available insecticide active ingredients are provided below:

Common name	Residual*	Notes
carbaryl	medium	contact
permethrin	medium - long	contact
bifenthrin	long	contact
esfenvalerate	long	contact

\* Long residual can persist as long as four weeks. Medium residual can persist as long as 10 - 14 days.

**CAUTION.** Read all label directions very carefully before buying insecticides and again before applying them. Information on the label should be used as the final authority.



Figure 6. Squash bug injury

This publication was modified from a Department of Entomology University Minnesota publication entitled *Squash Bugs* by Genetzky, J. C., Burkness, and W.D. Hutchison.

Photograph by Jeff Hahn

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## Tomato Hornworm

*Manduca quinquemaculata* (Haworth); Family: Sphingidae



Tomato hornworm.

Photo by Whitney Cranshaw,  
Colorado State University, [Bugwood.org](http://Bugwood.org)



Adult moth.

Photo by Jim Occi, BugPics, [Bugwood.org](http://Bugwood.org)

### Injury

The hornworm caterpillar feeds on the leaves and new stems of the tomato plant. During July and August they also occasionally feed on the tomato fruits. Hornworms are often noticed in the home vegetable garden because of their large size, or because the foliage of the plant just "disappears."

### Description

The tomato hornworm is a large, pale green caterpillar with white and black markings. It reaches 3 1/3 to 4 inches long, when mature. A brown form also occurs, but is usually less common. The name "hornworm" comes from the fact that these caterpillars have a projection or spike on one of the last abdominal segments.

The adult, called a sphinx moth or hawk moth, is a medium to large, heavy-bodied, and has narrow front wings. The body is spindle-shaped, tapering at both ends, and the antennae are fairly thick. The adult is a mottled gray-brown color with yellow spots on the sides of the abdomen. The wing spread is 4 to 5 inches.

### Life History

In late spring, the adult moth lays eggs on the undersides of tomato leaves. The eggs hatch in 6 to 8 days, and the larva passes through 5 or 6 stages, reaching full growth in 3 to 4 weeks. The full-grown larva then burrows into the soil and transforms into the pupal stage. The pupa may remain in the soil all winter, with the adult moth emerging the following spring, or if the weather conditions are suitable, the moth may emerge in 2 to 4 weeks. The emerging moth makes its way to the soil surface and mates, and then females deposit eggs on the tomato plants for the next brood of hornworms.

### Management

There are a number of natural factors that help to control the hornworm. One of the most common parasites in home gardens is a small wasp. Occasionally hornworms are seen with a number of white projections protruding

from their bodies. These are the cocoons of the small parasitic braconid wasps. The wasp larvae feed inside the caterpillar and kill the host upon emergence.

Control is most effective during July and August. Hand picking the hornworms on infested plants in the garden gives good control, and is especially useful in small gardens.

If hornworm caterpillars become too numerous, there are several insecticides registered in New York State for home garden use. Check the product label to make sure that it can be used on tomato, for hornworms. Also check the label for the Days to Harvest, to determine the minimum number of days to wait before picking tomatoes for use, after application. For control using Bt (*Bacillus thuringiensis* ssp. *kurstaki*), apply during the time when caterpillars are still small.

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*Prepared 1977 by Carolyn Klass, Senior Extension Associate, Dept. of Entomology, Cornell University*  
*Updated 2012*

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## Striped Cucumber Beetle

*Acalymma vittatum* (Fabricius); Family: Chrysomelidae



Striped cucumber beetles.

Photo from Clemson University,  
USDA Cooperative Extension Slide Series, [Bugwood.org](http://Bugwood.org)

### Injury

This insect is injurious to cucumber, squash, melon and related plants. It is native to America and can be found wherever its food plants are present except the far west.

Striped cucumber beetles are carriers of bacterial wilt, a serious disease of cucurbits. As they feed they transmit the pathogen from one plant to another, and carry it over the winter when they hibernate. The following spring the beetles may infect new plants with the disease.

The greatest injury done by this insect is to the young plants soon after they come up in the spring. The adults feed on them and may even kill them. The larvae cause injury by burrowing into the stem, both above and below the ground. They may also feed on the underside of fruit when it lies on the ground. Adult beetles will feed on flowers and destroy them by eating off pistils. New broods of beetles may feed on the rinds of ripening fruits.

### Description

The adult beetle is small,  $\frac{1}{4}$  inch in length. The head is black, thorax yellow, and the wing covers are yellow with three longitudinal black stripes. The mature larva is  $\frac{3}{10}$  inch in length, white with a brown head, thorax and anal plates.

### Life History

The adult beetles hibernate under garden debris or if such protection is not available, they will burrow into the soil below the frost line. The adults emerge from April to June, usually before the cucurbit plants are up, and feed for a time on pollen from flowers of apple, horse chestnut, lilac and many others. When squash and cucumbers start to shoot up the beetles quickly congregate on them.

After feeding for some time, the adults mate and the females begin to lay eggs. Eggs are laid wherever the female is feeding, or sometimes are deposited in crevices in the ground. In a week or more the eggs hatch and the larvae work their way to the cucurbit. Here they burrow into the tissue and feed for about a month. The mature larva constructs an earthen cell a few inches below the soil surface and pupates. The adult beetles emerge in late August or September and feed on pollen until heavy killing frosts occur.

## **Management**

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Control of beetles is important to prevent bacterial wilt in cucumbers, but this insect can be difficult to control because the adults attack plants close to or even below ground level. The larvae also attack below the soil surface.

Yellow sticky traps can be used to monitor populations, and also to catch some of the adult beetles. Often the beetles can be seen clustering in the flowers of cucumber and squash, and the beetles may be removed by hand and destroyed.

Where the garden is small enough to make it practicable, mechanical protectors which exclude the beetles can be used, such as floating row covers, or wire or cloth screen protectors made in the form of cones or hemispheres. The plants should be covered with these protectors from the moment they appear through the ground. Remove these protection devices when the plants start to flower, to allow pollination.

Insecticides, if necessary, may be applied when beetles are excessive, and weekly if needed (check product label).

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## Colorado Potato Beetle

*Leptinotarsa decemlineata* (Say); Family: Chrysomelidae



Mating adults (each about 3/8 inch long).

Photo by Whitney Cranshaw,  
Colorado State University, [Bugwood.org](http://Bugwood.org)



Larvae (1/2 inch long when full grown).

Photo from USDA APHIS PPQ Archive,  
USDA APHIS PPQ, [Bugwood.org](http://Bugwood.org)

### Injury

Larvae and adults feed on the foliage of potato, eggplant, tomato, and pepper plants. They may reach large numbers and strip all the foliage from the plant as well as spoil the fruit by eating into it. They are especially destructive to small plantings.

### Description

The Colorado potato beetle was first described in 1824 from the upper Missouri River Valley, where it fed on a weed called buffalo bur or sand bur. When early settlers first began to plant potatoes, the beetles discovered a new food plant.

Adult Colorado potato beetles are yellow and have ten longitudinal dark stripes on their wing covers. They are about 3/8 inch in length, round to oval-shaped.

The larvae (or slugs as they are sometimes called) are brick red in color, hump-backed, soft bodied, and 1/2 inch in length when full grown. Larvae have two rows of black spots on either side of the body. Eggs are orange-yellow and laid in clusters on the underside of the leaves.

### Life History

Adult beetles overwinter several inches below the soil surface, near the summer's crop plants. Adults emerge from their overwintering sites in the spring: mid-May on Long Island; about 7 to 10 days later in central New York State. As soon as potato plants are up, females begin laying eggs on the undersides of leaves. Eggs are laid in clusters of 20 or more. Larvae feed on foliage, grow rapidly, and complete their development in 18 to 21 days. The full-grown larva burrows into the ground and changes to the pupa (resting state). After about 10 days, the adult beetle emerges from the pupa, crawls up out of the ground, and after a short period of feeding, mated females lay eggs for a second generation in the same season.

## Management

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The Colorado potato beetle has become increasingly difficult to control with insecticides, because it has developed resistance to many chemicals. Management strategies should begin when the first beetles of the season are seen, or earlier.

- a. Hand picking is possible, especially for small gardens. The beetles are relatively large, showy and slow moving. Aim to inspect plants twice a week. Drop beetles and larvae into a container of soapy water.
- b. Trap cropping using eggplant transplants as living bait for the beetles prior to emergence of the potatoes has been suggested. Beetles and eggs on the eggplants need to be periodically removed and crushed or dropped into a container of soapy water.
- c. Lightweight floating row cover can be placed over plants as a barrier. Be sure to secure the edges when using this material. Potatoes do not need to be pollinated, so covers can remain in place for the growing season. However, other crops do require pollination, and covers on those should be removed when flowering begins.
- d. Crop rotation is often suggested for larger growing areas. Do not plant susceptible crops in the same area year after year – the farther away the better.
- e. Enhance habitat for natural enemies. General predators such as lady beetles, spiders, and lacewings may provide some control, but do not completely control the Colorado potato beetle. There are also some fly parasites, and a small wasp that parasitizes the eggs, but they are usually not abundant enough to give control.

Pesticides may be applied if necessary, but the insects may be resistant to some chemicals. Check that the label states that the product can be used for Colorado potato beetle, and on the kind of vegetable plant that is infested. Applications should begin as soon as egg hatch starts, to control the young larvae. Spray or dust weekly if needed.

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## Flea Beetles

(various species, in the Family Chrysomelidae)



*Spinach  
flea beetle*



*Potato  
flea beetle*



*Leaf damage and beetles on a potato leaf.*

Photo by Whitney Cranshaw, Colorado State University, [Bugwood.org](http://Bugwood.org)

### Injury

Adult flea beetles feed on the leaves of cabbage, tomato, tobacco, potato, cucumber, melon, grape, spinach, eggplant and related crops. In most cases different kinds of flea beetles attack only closely related plants, but some are general feeders.

The adults chew many holes in the leaves, and a heavily infested plant may look as if small shots had been fired into it. Feeding attacks occur at the cotyledon stage, seedling stage, and/or mature plant. The foliage may be so badly eaten on many garden plants that the plants die.

Larvae feed on the roots and tubers of host plants.

### Description

There are many species of flea beetles. A general description follows: the adult flea beetle is small -- 1/16 inch to 1/5 inch long, oval in shape, and it varies in color from blue-green to black, or may be striped or have other patterns on its wing covers. These small jumping beetles have the top portion of hind leg enlarged, enabling them to be powerful jumpers.

The larvae are delicate, whitish, slender cylindrical worms, not over 1/3 inch long, with brownish heads and long legs. Many feed on rootlets underground and are seldom seen.

### Life History

After mating in the late spring, the female beetle enters the soil near the base of the food plant to lay her eggs. The eggs hatch in 5 to 8 days. The larvae feed on the roots for 2 to 3 weeks. Adults emerge and a second generation begins, sometimes even a third. The insects overwinter as adults in the soil and emerge again in May or June to begin feeding on the next season's crops.

## Management

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When the weather is cool and beetles are less active, such as early morning, if flea beetles are on just a few garden plants, you may be able to brush them off the leaves into a large bowl or bucket containing water and a generous squirt of dish detergent, which prevents the beetles from floating or jumping out.

Physical barriers such as row covers may help to protect plants from early damage. Row covers should be put in place when transplants are set or seeds are sown. Row covers should be removed before temperatures get too hot in mid-summer (often after 4 to 6 weeks).

Keeping down weeds on which the flea beetles may live, in and around the garden, can help keep them in check.

Before using any pesticide, be sure to *check the label* to see if the crop you want to treat and the pest you want to treat for are listed. *If not, do not use the product.* If using an insecticide, begin application when the first flea beetle appears. Be sure to follow manufacturers' directions, and note if the product should not be used within a certain number of days before harvest.

**KEEP CHEMICALS AND PESTICIDES OUT OF THE REACH OF CHILDREN AND PETS.**

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*Prepared 1972 by Carolyn Klass, Senior Extension Associate, Dept. of Entomology, Cornell University*  
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## Imported Cabbageworm (Cabbage White Butterfly)

*Pieris rapae* (Linnaeus); Family: Pieridae



Adult: "Cabbage white" butterfly.



Egg and young larva



Mature larvae on broccoli.



Pupa

### Injury

The imported cabbageworm is the common velvety green caterpillar seen on the leaves of cabbage, cauliflower, broccoli and other crucifers. The young caterpillars feed on the leaves; older, larger larvae move about freely on the plant and eat out irregular holes on the larger leaves and often penetrate the head of the cabbage, or get into the developing flower (edible part) of broccoli or cauliflower. Early-grown cabbage is seldom severely injured because it reaches maturity before the imported cabbageworm populations have built up significantly. Late-grown cabbage is very susceptible to injury from this insect, however. From about mid-July on, this insect is like to be a pest of some importance.

### Description



Imported cabbageworm;  
larva of the Cabbage white.

Photo by Russ Ottens,  
Univ. of Georgia, [Bugwood.org](http://Bugwood.org)

The adult of the imported cabbageworm is a common white butterfly with black spots on the wings that may be seen flying about in the field from early spring to late fall. The eggs are deposited singly on the leaves of the host plant and are an off-white color. Small larvae are pale green to green in color. The full grown larva is about 1 1/4 inches long and velvety green in color. The mature larvae attach themselves by a silken thread to a leaf of

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the host plant when they are ready to pupate. The pupa (chrysalis) is a light green color, gradually turning to light brown just before adult emergence.

## Life History

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The adult butterflies are present from early spring through late fall. They will begin depositing eggs singly on the undersides of the host (crucifer) plant leaves. The eggs hatch in 3 to 7 days and the young larvae begin feeding on the undersides of the leaves. In about 2 to 3 weeks the larvae become full grown and attach themselves to plant leaves by a silken thread then transform into the pupa.

In New York State there are usually three, sometimes four or five, generations annually. That translates to pest pressure through much of the growing season, especially from July on, when populations are greater.

## Management

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Scout the crop regularly to check for presence of larvae. Look for the larvae themselves, or find them by finding fresh feeding damage or fresh green frass piles, then searching plant nearby for the presence of the larva.

Grow cabbage as an early crop, as early-grown cabbage is seldom severely injured because it reaches maturity before the imported cabbageworm populations have built up significantly. Late-grown cabbage is very susceptible to injury from this insect. From about mid-July on, this insect is like to be a pest of some importance if control measures are not taken.

There are some natural enemies of this caterpillar that the home gardener may encounter. Occasionally one may see the results of parasitism: light yellowish masses containing cocoons of a small beneficial braconid wasp may be present on the leaf next to the dead caterpillar. The cocoons will soon hatch and another generation of adult parasites will emerge and begin laying eggs on other caterpillars. There is also a small wasp that parasitizes the pupal stage. Occasionally caterpillars are attacked by predaceous bugs, and also by diseases caused by virus or bacteria.

Hand picking larvae can be effective for small or large gardens. Row covers are sometimes used to prevent the butterflies from having access to the plants to lay eggs on.

In large gardens or farms and where hand methods are not the option chosen by the grower, there are some pesticides available for control of the imported cabbageworm. Insecticides registered in 2009 in New York State for use in the home garden include: Bt (*Bacillus thuringiensis* ssp. *kurstaki*), insecticidal soap (potassium salts of fatty acids), and other pesticides. Bt is a least toxic choice that gives excellent control when used against young larvae, and is compatible with natural enemies. No matter what your choice, follow the manufacturer's recommendations for rates and timing of applications and the days to wait before harvesting. Treatment should start when the first cabbageworms are noticed. Monitor the population and repeat (following manufacturer's directions) only if needed

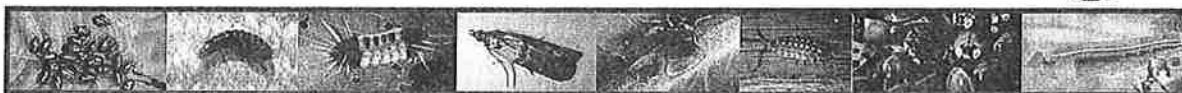
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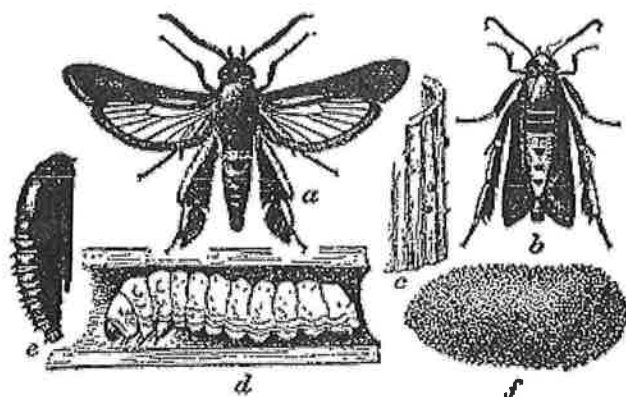
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## Squash Vine Borer

*Melittia cucurbitae* (Harris); Family: Sesiidae



### Life stages of the Squash Vine Borer

- a = male moth (wingspan about 1 inch)
- b = female (with wings folded at rest)
- c = eggs on a bit of plant stem
- d = full-grown larva (about 1 inch long)  
inside vine
- e = pupa
- f = pupal cell

### Injury

The larvae bore into the stems of squashes, pumpkins, gourds, cucumbers and muskmelons. Winter squash (in particular Hubbard), pumpkins, and zucchini are quite susceptible to borer damage. Infested vines at first exhibit wilting, and later may be completely girdled, causing the the leaves and stem beyond the point of attack to rot. This pest often causes damage in home gardens. It has been considered a sporadic pest in commercial plantings of cucurbits, with more damage observed in some years.

The problem often goes undetected until the larvae begin to feed within the vines of squash and pumpkins in July and August. Larval feeding destroys the vascular system, causing the vines to wilt and die. If damage has been seen in the garden in the past, it is possible more problems can be expected.

An infestation may be detected by the presence of coarse, yellowish grains of frass (fecal matter from the feeding larva) that collect at the base of stems or on the ground under the vines. Later the frass becomes moist and shiny, and may be seen oozing from holes in the stems.

### Description

The adult of the squash vine borer is a wasp-like moth having a 1 to 1½ inch wingspan, with metallic green forewings. The mature larva or caterpillar is a thick, white wrinkled worm with a brown head, and is about 1 inch in length. The eggs are dull red, 1/25th inch in diameter, and are found glued to the leafstalks and stems of squash vines. The pupa is dark brown, 5/8 inch long, and found in an earthen cell in the soil.

### Life History

Adult moths emerge from the pupae about the time vine crops come up. In New York State this is usually during the latter part of June. The moths are active daytime flyers, and are often mistaken for wasps. Eggs are laid singly, and glued to stems and leafstalks near the base of the plant. The young borers enter the plant about two weeks later, and begin feeding on the inner tissues. The larvae feed for about one month. If an infected vine is split open, it will be hollowed out and partially filled with frass. Late in the season, borers may be found

throughout the plant stem and in the fruits. When fully mature, the larvae leave the stems and make cocoons in the soil. The larvae usually overwinter in the cocoons, changing to pupae the following spring.

## Management

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Some varieties are known to be resistant to the squash vine borer, such as Waltham butternut. Wherever possible, look for resistant or tolerant varieties if this insect is a problem in your area. The order of preference from most preferred to least is: winter squash (including Hubbard squash), summer squash, pumpkin, gourd, cucumber, and muskmelon.

Lightweight row covers can be used to protect plants until the vines come into flower. Row covers used to prevent insects from reaching the crop must be anchored down on all sides or the moths will crawl under. Remove covers at bloom time to allow for pollination.

Begin scouting the garden in June. Sites heavily infested last year are more likely to have infestations this year. Look for borer eggs near the base of the stem, and remove them before they hatch. Also look for small holes near the stem base, with frass (castings) or ooze coming from the stem. If holes or other damage are seen, cut that area on the stem partly open, lengthwise, to confirm the presence of borer larvae, and destroy and remove any found. Or a sharpened wire may be used to seek out and kill each tunneling larva within the stem. After larvae are killed or removed, press the stem back together and cover with soil. In many cases the plant will heal and survive the injury if damage is not too extensive.

Moist soil heaped over the stem joints will allow new roots to grow along the vine, to help the plant survive even if the main stem base is damaged.

Entomophagous nematodes, of the type used against stem borers (rather than specifically against lawn grubs), are not widely available but can be used to control larvae of the squash vine borer. Inject into the squash plant stem, following directions on the product label.

One insecticide registered for home garden use in New York State for squash vine borer suppression is kaolin clay. It is important to control larvae before they enter the stem, because once they enter the stem, insecticides have little effect. Direct the spray to the stems of the plants near the base. Begin prior to infestation (starting about June 20 for most of New York State) and apply every 5 to 7 days as per label instructions.

To reduce the number of borers for the next year, destroy crop residue after harvest, and rotate planting sites.

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## Mexican Bean Beetle

*Epilachna varivestis* Mulsant; Family: Coccinellidae



Adult with summer coloration on a bean leaf.

Photos by Whitney Cranshaw, Colorado State University, from [Bugwood.org](http://Bugwood.org)



Larva and feeding damage on a bean leaf.



Pupa on a bean leaf that was damaged by larval feeding.

### Injury

The Mexican bean beetle, formerly called the bean ladybird, is one of the most destructive insect pests of beans in New York State. The beetle feeds on the leaves of almost all types of beans, including snap, lima, pinto, navy, kidney, and soybeans. With snap beans, bush varieties seem to be attacked more readily than pole varieties.

Most of the damage from the Mexican bean beetle occurs during July and August. Both the adult and the larval stages feed on the foliage, chewing out holes in the leaves. They usually feed on the undersides of the leaves, and sometimes will attack young pods and stems. As a result of feeding, only the veins are left, giving the leaves a lacy appearance. Yield may be greatly reduced and the entire planting may be destroyed in severe infestations.

### Description

The Mexican bean beetle is a convex beetle, about 1/3 inch long, and pale yellow to copper in color, with 16 black spots on its back. The beetles are pale yellow when they first emerge from the pupal stage, but as they age, they develop the typical copper color.

The eggs are yellow, and found in irregular clusters of 40 or more. The larvae are also yellow, and have branched spines on their body, giving them a fuzzy appearance.

### Life History

The adult beetles overwinter in sheltered locations. They leave the overwintering sites when the weather warms up in mid-to-late spring. The females deposit their yellow eggs in clusters on the undersides of the bean leaves. In 5-14 days the young larvae hatch and begin to feed, passing through four molts before reaching the mature size of about 1/3 inch in 3 to 5 weeks. The mature larvae attach themselves to the undersides of the bean leaves

and transform into the pupal stage. The pupal stage is the resting stage and does not feed. In 3 to 7 days the adult beetle emerges. In the fall when cold weather approaches, the adults migrate to sheltered areas in which they will spend the winter.

## **Management**

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Hand picking and crushing of the beetles and the eggs will provide limited control. Planting the heaviest crop of beans for canning and freezing early in the season may also be helpful in eliminating some of the beetle damage, because the beetle populations are heaviest during the mid-to-late summer period.

If necessary, control can be obtained if one treats with an insecticide when the first Mexican bean beetles and/or their damage is seen. Check the Days to Harvest on the label and make sure to wait a sufficient number of days after application, before picking beans for use

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*Prepared 1978 by Carolyn Klass & Prof. Arthur A. Muka, Dept. of Entomology, Cornell University  
Updated 2012*

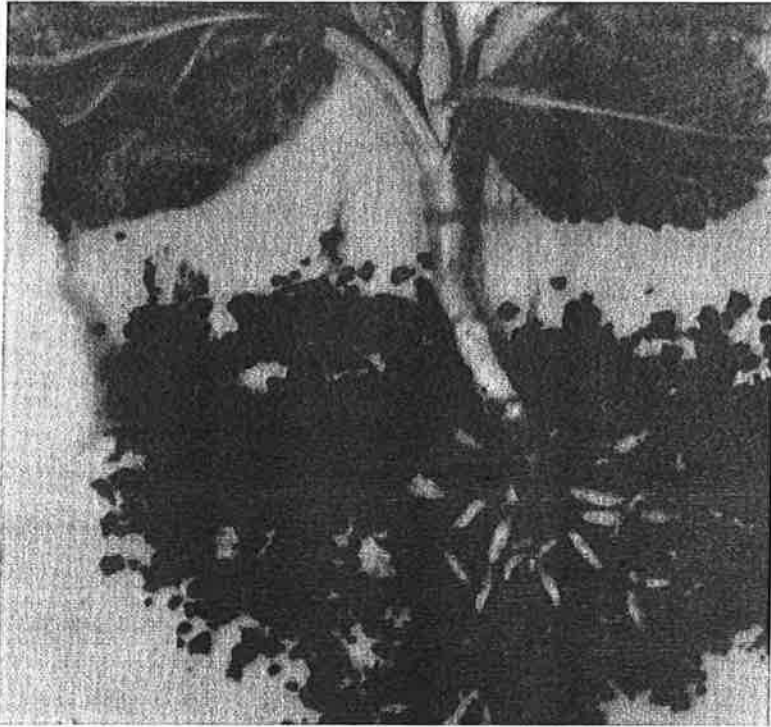
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<http://www.entomology.cornell.edu/cals/entomology/extension/idl/idlfactsheetlist.cfm>



## Cabbage Maggot

*Delia radicum* (Linnaeus); Family: Anthomyiidae



*Cabbage maggots infesting the roots.*

### Injury

The cabbage maggot can seriously injure cabbage, cauliflower, turnip, radish, and related crucifer crops. Early planted crucifers, or seedbeds of late ones, are more likely to be attacked.

The young maggot begins feeding on the tender rootlets and then rasps out a channel in the main root of the plant. An early indication of attack to the cabbage plant is the symptom of the plant wilting badly during the heat of the day. The plants may take on a bluish cast. The plant either dies in a few days or persists in a sickly condition for some time. In cases where the plant dies quickly, there usually are a large number of maggots that riddle the root, making way for decay organisms to get in and take over quickly.

If such a plant is dug up, one should be able to see the whitish maggots, which may at first resemble a grain of rice, in the soil around the roots of the injured plants. Brown tunnels in stems or roots of older plants are also evident.

### Description

Cabbage maggots are true flies (Diptera), closely related to the seed corn maggot. The adults are gray, long-legged flies a little smaller than the common house fly. Home gardeners seldom see them. The larvae (maggots) are white, legless, tapered toward the head, and have hook-shaped black mouthparts that curve downward, for rasping plant tissue. The root maggot grows to 1/4 to 1/3 inch in length. The mature larvae develop into pupae, reddish or tan capsules resembling grains of wheat, in the soil near the plant. From these, the adult flies later emerge.

1-h

## Life History

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The adult flies emerge from the soil where they overwintered as pupae, at about the time the first crucifer plants are set in the garden. The females either tuck the eggs down between the plant stem and the soil of transplants, or lay eggs in a recently planted field so that the young plant is attacked at emergence. Soils with high organic matter content are preferred by the flies.

Eggs hatch in 4 to 10 days, and in about 3 weeks maggots are full-grown. The pupal stage lasts 12-18 days before adults emerge.

In New York State, there may be four broods of cabbage maggot each year. Plant phenological indicators as well as approximate calendar dates are indicators of brood occurrence. The first brood occurs in late April through May when Yellow Rocket is flowering, depending on location in the state. The second brood appears in late June to mid-July when Daylily is blooming; the third in mid-August when Canada Thistle and Goldenrod are in flower, and the fourth, in the fall when New England Aster flowers. Generally the first brood is the most destructive in upstate New York; however, on Long Island the trouble occurs for a longer period.

## Management

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Crop rotation will help to reduce cabbage root maggot populations. Crucifer crop debris should be destroyed right after harvest. The early broods are the most important ones, because plants (transplants and direct seeded) are small, and very susceptible to attack. Older plants are more tolerant of injury. Radishes in home gardens can be grown in successive plantings, seeding at weekly intervals -- in this way some will avoid damage. Infested radishes act as a trap crop and should be pulled and destroyed (not composted) as soon as noticed.

The best control is to prevent the flies from laying eggs in the first place. Barriers such as lightweight row cover fabric can be used. Row covers work well, but be sure to bury the edges, otherwise flies may emerge under the cover and damage the crop. Allow the cover to be loose enough so plants have room to grow. They can be effective as long as 1) there are no gaps or tears in the material; 2) the material is placed over the crop before or immediately upon crop emergence or transplanting; and 3) crops are rotated, so no hosts of the pests were grown on that site the previous year.

Ground shields constructed of tarpaper or old carpeting may also be used. The shield will serve as an egg-laying barrier to adult flies. The shields are cut into 6-inch squares or 10-inch circles with a small hole in the center and a slit is cut to the center. These are placed around the base of the transplant. Press them against the soil so adult flies cannot crawl underneath.

No pesticides are recommended for home garden use. Entomophagous nematodes (of the type used against soil grubs) may be used according to package directions, but are not widely available. Often by the time the injury is noticed, the plants will not recover, and discarding plants may be the best option.

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*Prepared 1975 by Carolyn Klass, Senior Extension Associate, Dept. of Entomology, Cornell University  
Updated 2012*

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2-h





## Managing Home Vegetable Garden Pests

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There are a number of mechanical and/or cultural practices that may be used to help reduce insect pests in home vegetable gardens. Some are more practical than others, and the success will depend in part on your willingness to work at them. An integrated approach to pest management (combining a number of strategies) is often best.

One of the most important strategies in dealing with insects is to learn about them - which ones are pests, learn about the habitat they live in, their life cycle, what they will feed on and a little about their behavior. This information will help you decide what to do. Many insects found in the garden are not pests, and some are beneficial insects.

1. Maintain vigorous, healthy plants -- there is some evidence to suggest that plants growing under stressful conditions are more likely to be attacked and to suffer serious damage. Fertilization, liming, too little or too much water, and planting too close together can all adversely affect plants. *Check the fertility and pH* of soil regularly and make adjustments as needed. *Thin plants* to the recommended spacing.
2. Planting the same crop in the same place year after year may cause pest buildup. *Rotate* crops, especially where soil insects (such as grubs, wireworms and maggots) are a problem. Do not plant crops susceptible to grubs or wireworms where grass grew the previous year.
3. Choose *recommended varieties* for your area, and where available, resistant varieties to pests known to occur in your area. An example -- butternut squash is listed as being resistant to the squash vine borer.
4. *Sanitation* in and around the garden is very important. Many vegetable pests overwinter in weeds or plant debris in or near the garden. *Remove weeds* and/or organic mulches, which can provide ideal places for insects, slugs and snails to reside. Where mulches cannot be removed, at least collect and destroy the pests before setting out transplants or sowing seed.
5. *Avoid bringing insect infested plants into the garden.* Carefully check transplants for the presence of insects before purchasing and planting.
6. *Consider time of planting* -- could the pest be avoided by earlier or later planting?
7. *Handpicking* -- removing the pest by taking them off the plants and destroying them. Placing them in a bucket of soapy water (or water with dish detergent) kills most insects.
8. *Physical barriers* placed around plants can control some insects, including such things as:
  - a. Cardboard *collars* (or roofing paper), four inches high, placed around young transplants to prevent cutworms from cutting the stems, and squares of tar paper or carpeting placed securely around the stems of young cabbage family crops to prevent the cabbage maggot fly from depositing eggs at the base of the plants.
  - b. *Row covers* placed over plants until either the pest is gone or the plants are large enough to need the covers removed. All covers should be removed about four to six weeks into the season as temperatures during mid-summer get too hot. Some plants need to be insect pollinated or they will not yield a crop such as cucumbers, melons and squash. There are commercial polypropylene, polyester and polyvinyl alcohol covers available, but cheesecloth or screening can also be used. All of these let in light and water and allow continued plant growth. Even ventilated plastic row covers help to keep out many pests.

9. *Mulches*: some research has shown that certain mulching materials such as aluminum foil may repel aphids, thrips and other insects. Although this material is expensive, it may be practical on the small scale.
10. *Traps* such as yellow sticky boards can be used to help monitor insect populations, but they are seldom sufficient to give control. They do help, however, to maintain whitefly populations at a low level as long as sticky material is replaced periodically when insects cover the boards.
11. *Biological control* by the introduction of predators, parasites or diseases is becoming more practical as we learn more about managing the pest system. Remember when introducing or maintaining predators or parasites, if there are insufficient hosts for them to feed on, the beneficial insects will move elsewhere.
12. Pesticides may also be used as a part of the pest management program. Be sure to use only the amount you need, and to treat only the crops that need treating. Spot treatments are effective and may be practical for home gardens. Before using any pesticide check the label – the crop you want to treat, and the pest you are treating, must both be listed on the label. If not, do not use the pesticide.
  - a. It is important to note that just because a *pesticide* may be *botanical* in origin, it does not mean that it is non-toxic. Some botanical insecticides are more toxic than some of the commonly available synthetic chemicals.
  - b. *Biological pesticides*, such as *Bacillus thuringiensis* (B.t.), a bacterium that attacks caterpillars, are an alternative to some chemical pesticides.
  - c. *Insecticidal soaps* are also an alternative to some chemical pesticides and may be useful for certain pests, especially aphids, in the home garden.
  - d. *Diatomaceous earth* (silicon dioxide) a desiccant, is sometimes used for control of insects, slugs and snails. Once it gets wet and compacted, however, it loses effectiveness.

No matter which methods you choose, try to keep a record of what you did and whether it was successful. Such a record should be a great help in the future when you are faced with similar pest management decisions.

For further reading, see Cornell's publication **Pest Management Around the Home**, especially "Vegetable Pest Management" (Chapter 12 in Part 1; Chapter 13 in Part 2).

<http://ipmguidelines.org/Home/>

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*Prepared 1988 by Carolyn Klass, Senior Extension Associate, Dept. of Entomology, Cornell University*  
*Updated 2009; Link up to date as of March 2012*

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