



Managing Squash Vine Borer Problems in New Hampshire

Dr. Alan T. Eaton, Extension Specialist, Entomology and
George Hamilton, Extension Field Specialist, Food & Agriculture

Squash vine borer [*Melittia cucurbitae* (Harris)] is a day-flying orange and black moth. The destructive stage is the larva (caterpillar), and it attacks most types of squash and pumpkin.



Squash vine borer. Photo: Alan T. Eaton.

Damage can be severe. Some growers confuse this insect with squash bug. Squash bug nymphs are slightly flattened, gray to light brown, and have no orange or red markings. Squash bug adults are a medium brown color, with no orange or red markings. See photo on right.

Lifecycle

This insect is thought to have just one generation per year in New England. It overwinters in the soil as a larva or pupa, usually about

UNH Cooperative Extension Programs

	Community and Economic Development
	Food and Agriculture ✓
	Natural Resources
	Youth and Family

“Usually the insect bores through the vines, but occasionally they bore into the fruit of hard squash or pumpkin. Fruit damage generally occurs when there is a late flush of moths.”



Squash bug adults and nymph. Photo: Alan T. Eaton

two inches down. In late June the adult moths begin to emerge. They are bright red-orange, with plump bodies and narrow black wings. Body length is about 12 – 14mm (roughly ½ inch). The shape is very wasp-like. The males and females mate, and soon after that the females lay eggs. The females locate squash and pumpkin plants by smell, and lay their eggs singly on the vines, leaf stems, and underside of leaves.

Did You Know?

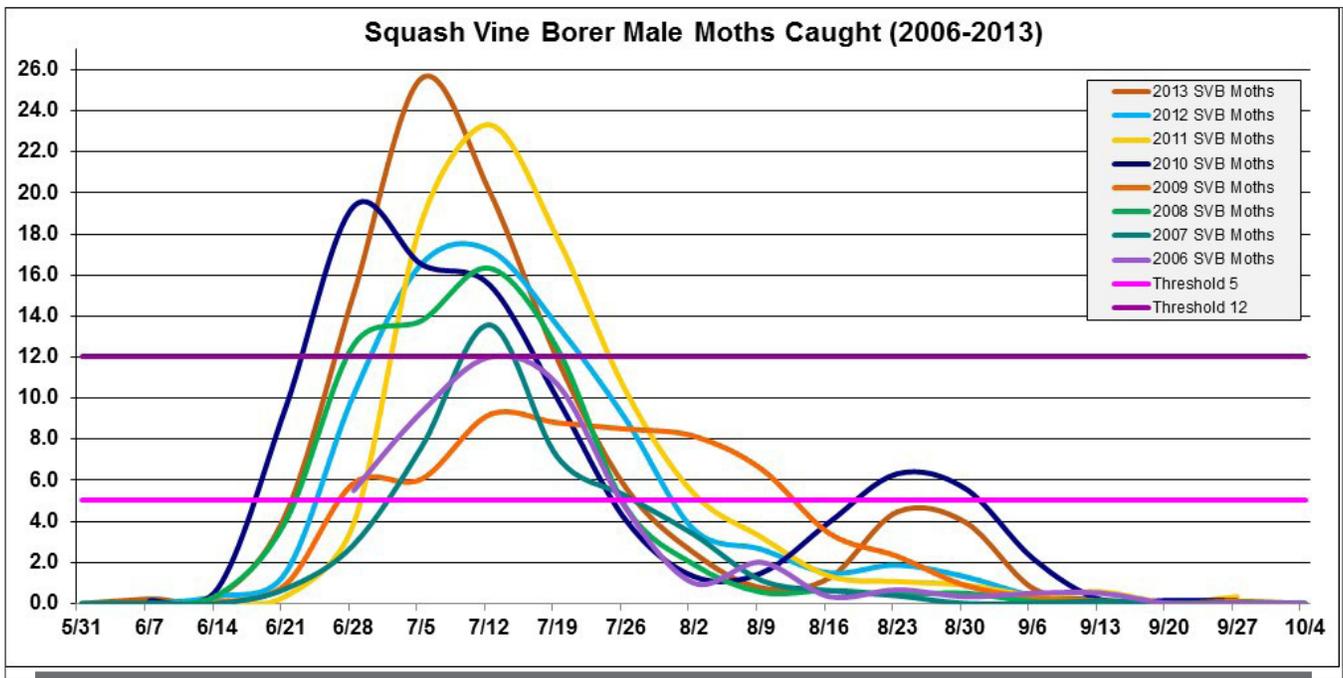
The females locate squash and pumpkin plants by smell, and lay their eggs singly on the vines, leaf stems, and underside of leaves.



Squash vine borer egg. Photo: Alan T. Eaton.

Eggs are reddish-brown and oval, and about 1mm long. Each female can lay 150 to 200 eggs, and the moths are fairly strong fliers. Eggs hatch in 10 – 15 days, and the tiny caterpillars bore into the vines. The larvae take four to six weeks to mature. When fully grown, they are about an inch long, cream colored, with dark brown heads. They leave the vine and bore into the soil to build a cocoon and pupate. They rest there until the following summer, when the adult moths emerge.

In the southern United States, there are two generations of this insect each year. Here in New England there is supposed to be only one. New Hampshire trapping data indicated a very late peak (Aug 22 – 30) of moths in 2010 and 2013, that might represent a second generation. The data showed a second generation again, on a single farm in 2012. The degree day data show that 2010 and 2013 had a higher degree day accumulation [more heat] than usual, and the moths also started flying earlier than usual (mid-June). Usually the first moths appear in traps about June 20th and the peak is July 10 to 15th. In most years, the catch is back below threshold by about August first. Limited trapping in Grafton and Sullivan Counties shows a peak at the same time as in southern sites, but total numbers vary considerably, from very low to very high.



Damage

Usually the insect bores through the vines, but occasionally they bore into the fruit of hard squash or pumpkin. Fruit damage generally occurs when there is a late flush of moths. Attacked plants frequently show yellowish-orange frass being pushed out of the vines, where the larvae bored in. When that occurs, the vines have already incurred considerable injury. Smaller plantings often suffer more injury and damage than extensive plantings, because eggs are concentrated on fewer plants.

Did You Know?

Attacked plants frequently show yellowish-orange frass being pushed out of the vines, where the larvae bored in.



Vine cut open to show larva. Photo: Alan T. Eaton.

Varietal Differences

Zucchini and summer squash [*Cucurbita pepo*] are **very susceptible** to attack. Pumpkins are the same species, but because they produce roots along the vines, they suffer less damage than summer squash. Giant pumpkins, Kubocha squash, and Blue Hubbard [*Cucurbita maxima*] are susceptible. The moths do not like to lay eggs on Butternut squash [*Cucurbita moschata*], and larvae that do attack it don't survive well, so we call it "resistant". Usually, plantings of this species do not require any SVB protection. Similarly, melons and cucumbers don't require protection here. **Bush-type** varieties seem to suffer more than **vine-types**, within the same group. Vine-type plants often root at the nodes, and this may lessen the effect of the larvae boring in the stems.

Did You Know?

Plantings of **butternut squash** do not require protection or treatment for squash vine borer.

Management Options

Rotation can help reduce problems with this pest. Moving cucurbits to different fields year-to-year can reduce problems, especially if the fields are far apart. In a backyard situation, the space is so small, moving the crop a few feet doesn't help prevent damage next year. One option is to skip a year: don't grow any (susceptible types of) squash or pumpkins next year if you had significant damage this year. If your neighbor grows them just a few feet away, that defeats the purpose of this technique. If skipping a full year is too difficult for your market, consider growing less susceptible types, or just a single very early planting of summer squash. Deep tillage after harvest or before planting in the spring may kill a number of the larvae/pupae in the soil. It can reduce SVB numbers, but in a heavy infestation it won't make much of a difference in crop damage.

Perimeter trap cropping (PTC) can work if borer populations are low, but usually requires too much effort to be practical. It can reduce SVB attack in a field if no cucurbits were grown there the previous year. You plant a wide border of highly preferred variety (Blue Hubbard squash) completely surrounding the field of summer squash, **then spray the Blue Hubbard squash plants when borers are flying**. More details on PTC can be found on the UConn IPM Web Site at www.ipm.uconn.edu.

Some backyard growers report success by physically removing borers from the vines. Growers who have tried this look for frass being pushed out of the vines, which appears as orange-yellow pellets (see photo next page). They carefully make a small lengthwise cut in the vine (at the point where frass is being pushed out), and remove the borers. There could be several larvae in one spot. Then they gently wrap the cut together and/or cover the vine at that spot with soil, which can encourage rooting. Manual borer removal is too labor-intensive for most commercial growers.



Frass (orange-yellow) being pushed out of an infested squash vine.
Photo: Alan T. Eaton.

Remove dying vines. If you remove and thoroughly destroy vines that are heavily attacked and dying, this prevents the larvae inside from completing their development, and emerging as moths next year.

Spun-bonded row covers or netting can completely exclude the moths from laying eggs, but they also exclude pollinating insects. Covering the plants during bloom results in no fruit setting during that period. One Hillsborough county organic grower uses the trapping data on his farm (see graph on page 3) to time when he removes the row covers. He waits until he has passed the peak of borer flight, before uncovering his susceptible cucurbits. This leaves the covers on for a little longer than he would, otherwise. That means some loss of early fruit, but it also avoids most borer infestation and injury.

Did You Know?

Spun-bonded row covers or netting can completely exclude the moths from laying eggs, but also exclude pollinators during the period they cover the plants.



Spun-bonded row covers can exclude moths. This photo is from a backyard garden. Photo: Alan T. Eaton.

It is possible to control the borers by injecting the insect-attacking nematodes *Steinernema carpocapsae* into damaged vines. This can be accomplished with a medicine dropper or similar device. This is an impractical procedure for larger plantings, and determining how to deliver the proper dose is a problem.

Traps to Monitor Timing and Numbers

Research shows that shallow pans painted yellow and filled with water can attract and capture the moths. Commercially-available pheromone traps and lures are much more reliable for monitoring than pan traps. The most effective are white dacron net traps originally designed for corn earworm (once in the genus *Heliothis*). They are baited with a lure that releases a sex pheromone which attracts the male SVB moths. Although bucket-type traps are offered by supply companies to monitor SVB, New Hampshire and Connecticut tests have found they catch far fewer SVB moths than the *Heliothis* net traps, so we do not recommend them. The net traps can be used for two seasons or longer, if they are removed from the field in mid- or late August, and stored away from sunlight until they are needed again. Exposure to sunlight slowly makes the mesh brittle, allowing the fabric to tear.

The photo below shows trap placement. If a conduit pipe is used for support, add duct tape over the tie points to prevent the trap from sliding downwards. The bracing line that goes to a stake in the ground should be slightly slack. It just provides some support for windy conditions. Distance from the ground to the trap bottom should be about two feet, or just above the crop canopy. Traps may need to be raised occasionally as the crop grows, to keep them just above the crop canopy. In our photo, the bottom of the trap needs to be raised slightly. The trap should go in the squash or pumpkin field, with leaves below (but not blocking) the opening. Select a spot where it will not interfere with farm equipment.



Squash vine borer trap. Photo: Alan T. Eaton.

Place the pheromone lure in the middle of the opening, and level with the bottom of the trap — not hanging several inches below or above the opening.

Several devices are available for securing lures in the proper position: safety pins, clothes pins, and small binder clips. The important thing is that the lure stay in the correct position despite wind and weather, and that it be easy to change lures.

Lures: The lures are manufactured by Pacific Biocontrol, and are available from Great Lakes IPM [called PB-SVB lures]. They are individually wrapped. Store them in the freezer until ready for use. Once unwrapped and placed in the trap, they release the scent for four weeks before requiring replacement.

Thresholds

The number of moths captured (using the *Heliothis* net traps described above) can be used to decide whether or not an insecticide treatment is required. For bush-type summer squash and pumpkins (including giant pumpkins), the recommended threshold (point where insecticide treatment is worthwhile) is 5 SVB moths per trap per week. For vining-type squash or pumpkins, we suggest a threshold of 12 moths per trap per week. The difference is because vine-type cucurbits root at each node along the vine, and thus can tolerate more injury than plants that do not do this.

Insecticides

Insecticides can be very effective in controlling this pest, but they must be applied right when pollinators are also visiting the plants. There's not much that can be done about this, except to limit pesticide use to situations where it is really needed (usually not on butternut squash for example), and try to avoid using insecticides that are especially hazardous to bees.

Spraying very late in the day after squash blossoms close may reduce the risk to honey bees. But honey bees are not the only ones affected. Squash bee and various bumble bees frequently outnumber honeybees in cucurbit flowers in New Hampshire. It is common for them to rest inside the blossoms at night, while honeybees return to their hives before dusk. Squash bees are the same size as honeybees, but with very long antennae, and relatively dark body color. Target the vines and the bases of the plants while spraying, rather than the foliage.

Did You Know?

The number of moths captured can be used to decide whether or not an insecticide treatment is required.



Squash bee. Photo: Alan T. Eaton.

If you are a commercial grower who specializes in squash or pumpkins, you may wish to set up commercial traps and apply insecticide according to the trap catch (see section above on thresholds). An alternative to time insecticides is to follow the general pattern: in Southern NH, protection may be needed from June 25 for 4 or 5 weeks. In the lakes region and farther north, it may be from June 28 through July 28, but some sites have such low numbers, it is not worth spraying. This underlines the value of using traps.

The current New England Vegetable Production Guide lists the insecticide choices, which are subject to change. One application of Assail, Radiant, Entrust, or most of the synthetic pyrethroids should control the insects for 1 week, possibly longer. Products with the aizawai strain of *Bacillus thuringiensis* (like Agree or XenTari) or insecticidal soaps may require two or more applications per week to control moderate to high populations. Entrust, B.t. aizawai or insecticidal soap may be among the most effective organic insecticide options. Pyrenone's effect may last only 2-3 days. Neem and Pyganic are so weak on this pest, we would not expect them to help very much.

Squash vine borer is not on the label for many of these organic products, but they are registered for use on squash and pumpkins. In some cases the label language allows for use on this pest by giving examples ["for use on caterpillars like, but not restricted to..."]. Anyone with a NH private pesticide applicator's license is allowed to use a pesticide for a pest not specifically mentioned on the label, **if the site/crop is listed on the label.**

Backyard growers do not have many good insecticide choices. Most of the synthetic pyrethroids are not sold in backyard-sized units, or they are so heavily diluted that they would not have much effect. In general, backyard growers must rely on the non-chemical methods or the organic products we covered above.

Stop! *Read the label on every pesticide container each time before using the material. Pesticides must be applied only as directed on the label to be in compliance with the law. All pesticides listed in this publication are contingent upon continued registration. Contact the Division of Pesticide Control at (603) 271-3550 to check registration status. Dispose of empty containers safely, according to NH regulations.*

Sources of Lures and Traps

Great Lakes IPM
www.greatlakesipm.com
800-235-0285

This supplier has the net traps and SVB lures.

Gempler's
www.gemplers.com
800-382-8473

This supplier has the traps, but not the SVB lures. There may be other suppliers as well.

Acknowledgements

All photos are by Alan Eaton.

This work was supported in part by Integrated Pest Management grants from the National Institute for Food and Agriculture, and the New Hampshire Department of Agriculture, Markets and Food.

Created: July 2014
Reformatted: July 2017

Visit our website:
<http://extension.unh.edu>

UNH Cooperative Extension brings information and education into the communities of the Granite State to help make New Hampshire's individuals, businesses, and communities more successful and its natural resources healthy and productive. For 100 years, our specialists have been tailoring contemporary, practical education to regional needs, helping create a well-informed citizenry while strengthening key economic sectors.

The University of New Hampshire Cooperative Extension is an equal opportunity educator and employer. University of New Hampshire, U.S. Department of Agriculture and N.H. counties cooperating.

About the Authors

Dr. Alan T. Eaton, is an Extension Specialist in Entomology and an Extension Professor at the University of New Hampshire. Much of his work is on management of fruit pests and ticks.

George Hamilton is a Extension Field Specialist in Food & Agriculture, housed in Hillsborough County.

George and Alan have worked together on management of fruit and vegetable pests for over 20 years.

For More Information

State Office

Taylor Hall
59 College Rd.
Durham, NH 03824
<http://extension.unh.edu>

Education Center and Infoline

answers@unh.edu
1-877-EXT-GROW
(1-877-398-4769)
9 a.m. to 2 p.m. M-F
extension.unh.edu/askunhex-tension
