

Squash Vine Borer and The Squash Bug Are Two Opponents to Get Serious About

Summer is here and that means that our opponents are in out in full swing. These two are some of our most formidable opponents.

It seems like they are the three amigos with the cucumber beetle set out to destroy cucurbit production. Have no fear, we will go at them with full force. If you read the article on cucumber beetles many things will seem repetitious. Much of the Integrated Pest Management System for these guys is the same.

Squash Bug Life Cycle

Squash bugs are sucking insects. They suck the juice from the plant leaves and then inject a toxin into the leaves which causes the plant to wilt, blacken and die. The squash bug has armed himself with a new disease to put in his arsenal. It is the Cucurbit Yellow Vine Disease (CYVD). Once the plants have started to yellow they are too far gone to restore. This disease is viral and shows up soon after transplanting. It is currently only in a few states right now but expected to spread further. Certain cucurbit species are more susceptible than others.

Adult squash bugs hide away under stones, rocks, leaves, boards and debris in the garden. Once the weather has warmed up they re-emerge and lay eggs in masses of groups of a dozen or more. You will find the eggs near leaf axils and are in neatly ordered rows. They are an orange yellow color and are 1/16 inch in length. They turn to a bronze color just before they hatch. Eggs hatch in 10-14 days. The nymphs pass through 5 instars (stages of maturity in which they molt). The nymphs have a bright orange-red head, antennae and legs with a green abdomen at the first instar. They are very delicate and squish easy. Hand picking at this stage is very easy. As they go through the



Female Squash Vine Borer Moth

instar stages they become grayish-white with dark legs. They are 1/10 to 2/5 of an inch long. The adult squash bug is a mottled brown color or a dark brown, has a hard shell (the reason insecticides do not work on him) and smells horribly when squished.

Adults lay eggs well into the summer and in Texas we observe two generations. Therefore you will see all stages of development at once in the field. Yikes!

Squash Vine Borer Life Cycle

Squash vine borers are chewing insects. They destroy tissue in the plant stem, anything above that is cut off from nourishment and typically goes into a secondary infection and dies, whether a runner or a the stem.

Squash Vine Borers overwinter as larvae or pupae in cocoons in the soil 1 to 3 inches deep. The pupae are 5/8

inch long brown and inside a soil covered 3/4 inch black silk cocoon. In May adult moths emerge. They lay single eggs on stems and leaf petioles in may and June. One adult can lay between 150 to 250 eggs. The eggs hatch in seven to nine days. The larvae then bore into the stems and go to town, eating away for four to six weeks. The larvae are about 1 inch long when full grown. They have a whitish wrinkled body with a brown head, three pairs of short legs and 5 pairs of fleshy prolegs on his abdomen. The larvae are At the site where the larvae enters, a sticky gob of excrement (poop) that looks like wet sawdust is called frass remains. This is your tell tale sign that he is in there. If the secondary infection takes over and kills the plant before the larvae gets to finish his life cycle he will move on to a neighboring plant and finish his life cycle there.

The Basics of Fighting the Squash Bug and the Squash Vine Borer

Then they leave their happy little home and tunnel into the soil and spin a cocoon.

In Texas the new moths emerge two to three weeks later in August for our second generation of plant destroying larvae. The adult moth from the clear-winged moth family and looks much like a wasp. The female is larger and brighter than the male. The moth has a wing spread of 1 1/2 inches and is orange with metallic green and black on it's wings and it's head. It also has black fringed legs and fringe under it's wings. It is a strong flier, it can fly 1/2 mile.

If you look closely in the picture on page 7 of the squash vine borer moth, you can see the fringe on the lower wing in the shade clearly. It is on both wings, her right wing in the sun is just glittering away and it makes it hard to see. What is amazing about this picture is that it is said that squash vine borers come back to their place of birth to lay eggs. So if you plant cucurbits in the same place, wipe out! Now I know for a fact that there were no pupae in this soil. How you may ask? It is a joke that I was digging to China this spring. I think I almost got there at one time! In the area where I had squash I dug out 18 inches of soil and moved it aside. Then I dug down another 6 inches. If there would have seen any pupae I would have seen them when I moved the soil out and when it got put back a little at a time over months it would have killed them. That is where this little beauty stopped and let me take her picture before she met her maker. It is amazing how these creatures can be so beautiful in one stage of their life, and so ugly and

detrimental in another. You have probably just swatted at the males thinking they were wasps, they fly in zig zag patterns. The best time to catch them is at dusk or in the early morning. Just look on the leaves of the plants. If you can stop a female from laying 150 to 250 eggs, could be entire field, even your neighbors will thank you!

Methods To Get The Upper Hand

Systems Based Practices -Level 1

1. Timing of Plantings - Delayed plantings will send the pest searching else where. If there are no squash to be found then they have no place to lay their offspring! Then you will have a crop! It is a good choice to also have staggered plantings that way you are not putting all of your eggs in one basket, so to speak.

2. Choice of Cultivars - Try to pick varieties that they do not like as well. Both pests have particular tastes. There are three in the market today that do not seem to be affected very little by either the squash bug or the squash vine borer and they are the white cushaw white squash, thai kang kob squash, and tatume squash. Acorn and C. moschatas are also fairly tolerant. The most favored squashes are blue hubbard, cocozelle zucchini, yellow straightneck and crookneck, black zucchini,

3. Field Sanitation Practices

A. Removal of Plant Residue, Old Boards, Overwintering Sites - As soon as the squash season is over the vines must be destroyed by either burning or high heat composting to destroy any remaining squash vine borer larvae.

Old boards must be removed from the fields as well as weeds stones leaves and anything that the squash vine borer and squash bug can overwinter under. This is of utmost importance to practice good sanitation in the fields. They love to hide under branches, leaves and anything on the ground so clean up. If there is no place for them to hide they will die off in the elements, so don't give them a fighting chance!

B. Mulches - Mulches of wood harbor the squash bug. The method of mulching to use is newspaper with straw on top. This method also encourages the beneficial spiders as a predator.

C. Tillage - After Crop Removal disturbs pupae and expose them for the bird to eat and for them to be exposed to the cold elements. They also get buried too deep to tunnel out of. Leaving fields bare is not a method consistent with organic farming, therefore cover cropping is preferred.

D. Cover Crops - Winter cover crops are necessary to keep the squash vine borer and squash bug from hiding under any stones or debris and resurfacing next spring. It also keeps you from losing your soil due to soil erosion.

E. Crop Rotation - Rotate cucurbit crop fields to a non cucurbit field. This is very important just in case you may have missed a pupae. Crop rotation is also necessary for optimal nutrient balance of plants as well. This way you are not depleting your soil, and your plants will be healthier.

Let's Get Down to Business and Get Rid of the Dreaded Squash Vine Borer

4. **No Wild Cucurbits to Serve as Hosts** - Clear away any wild cucurbits from surrounding areas that could be serving as hosts for your unwanted guests. Remember that the squash vine borers are strong fliers and can fly 1/2 mile. If you have a field on the back 40 you are not using take a stroll through it and compost those wild cucurbits.

Mechanical and Physical Practices Level 2

5. **Barriers** - Out of all of the preventative treatments this is by far the easiest and the most effective. Floating row covers in combination of newspaper and straw mulch were the most effective. You do not have to worry about weeding or moisture retention either. It is a win win situation all around. Floating row covers are sold under a number of names, Reemay, Agribon, Turfbell, and Agriforce. The key is to make sure that the row covers are fastened securely. When you purchase them make sure to buy the fasteners for them the ones for turf will also work.
- b. **Non-Synthetic Lures And Traps - Perimeter Trap Cropping** First you plant a trap crop of blue hubbard around the circumference of your entire squash patch making sure to have no breaks in it. This will work in garden of as little as 20 x 20. Then hang a synthetic lure over the hubbard squash. This is your monitoring lure. It will tell you when to spray your trap crop. When you have 5 squash vine borers in your trap then it is time to spray. Spray the hubbard squash with rotenone or pyrethrin, this



EXCISING SQUASH VINE BORER

- keeps the moths from traveling inward towards your prime crop.
6. **Repellents** - Kaolin Clay is a particle film barrier that offers some protection for the organic grower. Kaolin clay is an anti-caking agent used in toothpaste and other ingredients. It was accepted onto the OMRI list in 2000. It acts as a barrier between the pest and the plant by forming a film making it difficult for the insect to get to the plant. The insects do not like to lay eggs or feed on the surface. Kaolin clay has a white color and that is not what the pests are looking for so it makes it hard to find their host plant. Then the clay sticks to them and they get so busy cleaning it off they forget why they were there in the first place! Kaolin is marketed as Surround for the garden. It comes in a powder, you just mix it with water and spray it on. Great stuff! But it does disrupt beneficials and hurt them too, aww, not perfect yet!
7. **Developing Habitat for Predators and Parasites** - Planting windrows for beneficials is your first line of defense. Planting an area that is not disturbed lets the beneficial over winter and be ready for work in the spring; If you do not

have room for a windrow, make a row and just leave it there. Borage, dill, chervil, cilantro, any herbs, carrots left to flower, among other are great choices. Here is a link with many more good herbs and flowers [Beneficial Borders](#)

8. **Companion Planting** - Planting repellent plants to discourage the pests is said to help. Plant beebalm, catnip, nasturtiums, marigolds, mint, radishes, and tansy
2. **a. Handpicking Pests Boards** - Lay down boards next to your cucurbits at night and in the morning the squash vine borer larvae will be underneath them. Handpick and destroy the larvae.
- b. Moths** - The moths will be on the plants in the early mornings and at dusk, remember they fly in a zig zag pattern and can lay 150 - 250 eggs. Fill a yellow bowl with water and the squash vine borer moths will be floating in the water for you in the morning.
- c. Squash Bug Nymphs** - The easiest time to kill these guys in their entire life cycle is when they are nymphs. you will find them feeding in the early morning hours. They run fast so be prepared for a race. They are delicate when in the early instars and squish easy.
- d. Excising Squash Vine Borers** - Now here is a fun job for you! I can just like that because I just got done doing it, how do you think I got the pictures, yuck! First of all if there has been a decline in production, suspect something. You may not always notice the frass first because when the squash vine borer is small they do not make a lot of poop. They are also on the underside of the plant stem many times.

Physical Practices to Get Rid of Your Pests

One other thing when excising I want you to remember for the rest of your life **for every entry hole there is a squash vine borer larvae.** That means 3 holes, guess what you are fishing for 3 larvae! Now the only exception to the rule is when a plant gets too sick from a secondary infection and dies he will high tail it out of there and go to a neighboring plant. The photo here shows that this guy attacked a tiny crookneck plant and killed it. Then he went next door to another squash plant which was way too full, so he just entered in the squash instead! I took 5 out of my butternut vine! 1 at each branch of each vine. You can see the stems look kind of yellowish where they are, little buggers! To excise take a sharp paring knife or a box cutter and slit a hole vertically next to the hole. Be careful not to put your hand underneath. Take a pair of tweezers and remove the larvae and destroy him. After removing the borer from the plant, fertilize it and put a few inches of moist soil on it then water it.

10. Apply Soil For Root Growth - Apply a shovel full of soil on different locations of the vine to encourage root growth. If the squash vine borer attacks your plant at the main stem your plant will be safe from the point at where the new roots have formed.

11. Wrap Bottom of Vine - Wrap cheesecloth or nylon hose around the bottom three feet of the vine. You can also use aluminum foil which is said to confuse them and make them think they are looking at the sky, only use the bottom 10 inches for foil. This will protect it from the squash vine borer from laying eggs and the larvae from entering

Material - Level 3

Strategies using Biologicals and botanicals

1. **Bt Injections** - A little bit squeamish about removing the squash vine borer larvae from the stem of your squash then here is another method for you. Get a 3 cc hypodermic needle from the pharmacy and inject B.t. into stem. Inject it about 1 1/2 inches above the soil line. You can also inject it about an inch above the entrance site of the larvae. Reapply in 1 week. Clean needle in a bleach solution afterwards so that you do not spread disease. *Bacillus thuringiensis* is a soil bacterium that occurs naturally. It is only effective on the larvae stage. They ingest it and the spore of B.t. paralyzes the cells in the gut. It is in essence a stomach poison. The larvae has no more desire to eat the host plant. B.t. continues to invade the insects other body tissues multiplying in the blood, eventually leading to death. It may take hours or a few weeks, all depending on how much B.t. the insect ate and what species it is.

2. **Hot Pepper Sprays** - Spray the plants with a hot pepper spray 2 weeks before the moths are supposed to emerge. This is supposed to discourage the moths. Reapply weekly.



3. **Diatomaceous Earth** - Sprinkle around the base of the plant as a barrier for the larvae, and on the plant to discourage the moth from laying eggs. Diatomaceous Earth is made from a fossilized hard shell algae. Diatomaceous Earth are sharp and pierce soft bodied insects.



Brown Stink Bug

(cirrus image)

4. **Nematodes** - Apply beneficial nematodes at the beginning of the season.
5. **Tachinid Fly** - The tachinid fly parasitizes the squash vine borer eggs. They have found to be very helpful in controlling the population of squash bugs. They have about an 80% control rate. This is achieved by interplanting with buckwheat. When you do this you cannot use any insecticides or it will kill the flies.
6. **Sabodilla and Neem Oil** - The only time that insecticides are effective against the squash bug is in the early instar stages. Once the squash bug has developed his hard shell he is in penetrable. The findings are that the cost of insecticides are high and the effectiveness is marginal at best. the other thing you have to take under consideration is that even though they make be organic and made from natural products, they still kill beneficial insects. The best defense against the squash vine borer is beneficial insects and predators. The parasitic wasps were found to greatly reduce the numbers of the squash vine borer.