Squash Vine Borer Control with Cotton Row Cover

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In the 1998 growing season we researched the use of cotton row covers on summer squash (*Cucurbita pepo*) with monitoring of Squash Vine Borer (*Melittia satyriniformis* [Hubner]). Our study was aimed at determining the best planting dates of summer squash, as well as evaluating the effectiveness of the row cover in excluding SVB. The study was conducted at our farm in Lebanon, Connecticut where there has been consistently heavy damage to the squash crop by SVB. This is likely due to a large amount of commercial pumpkin growing in the area.

The 1998 growing season was very good for us. We are slowly expanding our vegetable and fruit production to about three acres and things are looking good for further expansion next year. Demand for organically grown fresh local food is very high here and production in the area is not nearly keeping up. The farm is organically managed, production is high and the soil is good and getting better. Every year we improve farm techniques. This research has no doubt improved our squash production permanently.

Robert Durgy from the University of Connecticut Cooperative Extension System was my technical advisor on the project. He and the extension system provided me with much technical information, consultation and materials like the monitor traps. Robert put in constant attention to this project and it was a pleasure to work with him. He is also disseminating this study's results through the Extension System.

The project consisted of six planting dates (May 6th, May 25th, June 3rd, June 15th, July 1st and July 15th). Each planting included a covered and an uncovered section. The cotton row cover was held above the plants on wire hoops and fastened to the ground with wire staples until

the squash flowered, at which time it was removed. The row cover excluded SVB and other insects until this time. Th row cover was seven feet three inches wide and the hoops were made of #9 galvanized wire. The squash were planted on three-foot wide beds and twelve-inch in-row spacing. The beds were seventy feet long. Yields, in pounds, were recorded to evaluate the most productive planting.

On May 6th we started the first group inside a greenhouse in soil blocks. The spring was cold and wet so we waited until May 25th to set them out in the first row. We also direct seeded the second group on the same day. The covered portions were covered immediately. By June 1st the second row had germinated and we were busy picking striped cucumber beetle (SCB) off the first groups uncovered portion. On June 3rd we planted the third group and realized that we were going to have to control SCB by daily hand picking if the uncovered plots were to survive at all! On June 8th we set two heliothis monitor traps with pheromone for SVB. Daily handpicking of the SCB and squash bugs off the uncovered plots continued while covered rows remained undamaged and faster growth was observed. On June 15th we planted the forth row of squash and there were many SCB requiring several hours of hand picking daily for the uncovered plots. We hand hoed the rows and hand picked SCB and squash bugs through the end of June. On June 26th the row cover was removed from the first row because of flowering. The first SVB was caught in the monitor trap. July 1st we planted the fifth row. July 3rd the cover was removed from the second row because of flowering. July 7th the first harvest of the first row was done. July 8th the third row cover was removed. July 15th the final planting was done. Two more SVB were caught in the monitor traps. There was a lack of bees for pollinating so many fruit fell off. Hoeing and hand picking of insects continued. By this time the SCB became more interested in the flowers than the new uncovered seedling and hand picking stopped. Vine borers were

trapped through August 21st. Rows one and two were yielding heavily at this time. Rain was heavy throughout the summer so the plants required hardly any irrigation and the straw mulch normally used for weed control was never applied for fear of keeping the soil too wet. July 24th the first signs of SVB damage was observed in the stalks of the first row both covered and uncovered. The covered plants were consistently larger in each planting. July 31st the row cover was removed from row five. Daily harvesting of squash continued. By August 4th wilting was observed in the squash and many SVB were found in the first four rows. By mid August yields were reduced in all the rows and many plants had died from disease. The vines were heavily infested with SVB. The final row had the cover removed on August 12th. By August 26th most of the plants had died except for the first and second rows which continued to yield lightly and the last row which just started to yield. They quickly became infested and all squash stopped yielding by Sept 8th.

Table 1. Yield

Planting	1-C	1-UC	2-C	2-UC	3-C	3-UC	4-C	4-UC	5-C	5-UC	6-C	6-UC
Planting Date	5/6	5/6	5/25	5/25	6/3	6/3	6/15	6/15	7/1	7/1	7/15	7/15
Yield Start	7/7	7/7	7/10	7/13	7/15	7/22	8/6	8/4	8/10	8/10	8/26	8/26
Yield End	9/1	9/1	9/1	8/26	8/26	8/26	8/26	8/26	8/26	8/22	9/8	9/8
Total Yield (lbs./100 row feet)	384	320	228	255	94	58	25	50	85	40	20	25

C-Covered, UC-Uncovered
Total yield from 600 feet of row:
Covered-836 lbs.
Uncovered-748 lbs.

Higher yield with less labor was achieved through the use of cotton row cover. Though the yield is not that much greater in the covered rows, the labor required to hand pick SCB and squash bugs in the uncovered plots was very high. Basically the first through forth rows would have been destroyed by SCB. The July plantings had reduced SCB pressure but it was at this time when the SVB pressure was the greatest. Yields were reduced in these rows due to this

pressure regardless of whether the covers were used or not. It also seemed obvious that early plantings in combination with the use of row cover yielded the best due the fact that the plants were very large by the time SVB burrowed into them. The larger plants could withstand this damage better compared to the younger plants. The first planting had the longest duration of continuous yielding.

The row cover was very effective at excluding the SCB, squash bugs and SVB. When the covers were removed the plants were infested immediately. The SVB did the most damage to these plants compared to SCB and squash bugs. The plants with covers grew faster and were healthier but yields were still reduced in later plantings. The material itself was a pleasure to work with for several reasons and here are some examples:

1. Excellent light, air and water penetration.
2. No trouble with wind blowing or ripping it. We found it adhered to the ground and hoops without need for fastening which is better for the reuse of this material.
3. Slightly earlier yielding crops.
4. Exclusion of target pests as well as larger pests such as deer and groundhogs.
5. Improved microclimate under the cover.
6. Compostable, so disposal is easier.

The material does need to be handled carefully and kept from decomposing where it comes in contact with the ground if it is to be used more than once.

At about thirty dollars for 100 feet of row, it seems economically wise to use this product on early squash plantings. The labor involved with hand picking insects is much higher than this in an early squash crop. The material can be used more than once, perhaps many times if treated carefully, and it doesn't require much labor to set up.

Next year we plan to put most of our squash in by June 1st using covers and maybe try an August 1st planting. We are discussing with a local pumpkin grower how he may better control SVB thus helping us but for now we will plant lots, early. We have found the cover useful on many other crops also. We will try it with winter squash next year. The late planting date puts the SVB and the young winter squash in direct competition. I am highly recommending cotton row cover to other growers with specific information on how to use it, and it's effectiveness with early summer squash plantings. In addition to talking with other growers I have submitted articles for both the NOFA/CT newsletter and *The Grower*, a Cooperative Extension publication. I am also giving a presentation on this research at the NOFA/CT Farmer/Scientist Conference on December 6th in New Haven.

Early season planting showing covered and uncovered portions. The first row is uncovered to show the difference in plant size. The covered section starts with my mother.

This is the entire planting area and the Heliothis monitor trap. The earlier plantings have their covers removed while the later plantings are still covered.