

Ohio Vegetable & Small Fruit Research & Development Program

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final report 12/31/2020

Project Title: Squash vine borer management in zucchini by a trap crop

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Introduction: Squash vine borer is a key pest of summer squash that can cause plant death in mid-summer. It can be controlled by insecticide sprays, but as many as six sprays are needed for complete control, and it can be challenging to apply the sprays without negatively impacting pollinating bees. The trap crop tactic has the potential to reduce the infestation of borers in the cash crop by 70%. If a trap crop is found to be effective, there will be fewer plants that die in mid-summer and there will be reduced need for repeated insecticide sprays. We had seen evidence in previous trials in small plots that border rows of zucchini that are planted earlier than the main crop, and never harvested, might be effective as a trap crop, but this has not been evaluated in larger plots that would be typical of a commercial farm. The objective of this project was to use large plots to evaluate the effectiveness of border rows of a trap crop for protection of zucchini against infestation by squash vine borer.

Methods: A field trial was established at OSU's Waterman Farm in Columbus. The experimental design was randomized complete block, with four blocked replicates of two treatments: 1) cash crop of zucchini with a border trap crop, and 2) cash crop of zucchini with no border trap crop. Plots were separated by 70-ft wide strips of soybean, which is a non-host of squash vine borer. The cash crop was main-season zucchini, 'Spineless Supreme', transplanted into black plastic mulch on 8 June. Each of the eight plots had five rows of zucchini, 50-feet long, with 2-foot plant spacing, for a total of 125 plants per plot. The trap crop was border rows of early-planted 'Spineless Supreme' zucchini, transplanted on 29 May, with one row on each of two sides of the five-row cash crop plot. These planting dates were three weeks later than planned due to frequent rains that prevented timely field preparation. Seedlings in plug trays were treated with Admire Pro insecticide on the day before transplanting, for systemic control of cucumber beetles. No other insecticides were applied for the remainder of the season. The cash crop was harvested three or four times per week for a total of 24 harvests from 2 July until 10 August, with data recorded on the number and weight of fruit harvested from each row. The trap crop was never harvested, to maximize its attractiveness to squash vine borer. The trial was terminated on 10-12 August, when the main stem of all plants was cut to evaluate the presence of squash vine borer or borer injury inside the stem.

Results: The site had a large population of squash vine borer, which made for a rigorous trial. The plants produced marketable fruit throughout the six-week harvest period. Yield was not different between the two treatments (Table 1). Evaluation of the stems after the final harvest (Table 2) showed that significantly fewer plants (54%) were damaged by borers in the trap crop treatment than in never-harvested trap crop border plants (71%), and the no-trap crop treatment was intermediate (64%). The percentage of plants that died was significantly higher (19.5%) in the border trap crop plants than in either the trap crop treatment (8.2%) or the no-trap crop treatment (8.6%).

Conclusions: Zucchini within the border trap crop plots did not show a benefit of greater yield or fewer dead plants than zucchini with no border trap crop. The greater damage in the border trap crop plants showed that the trap crop did exert some influence on the infestation. Although the plots were separated by soybeans, it is possible that the no-trap crop plots were benefiting from the presence of trap crop plants in the same general area. It is likely that the trap crop would be more effective if placed farther away from the cash crop rather than immediately next to it.

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Table 1: Yield of zucchini plants per plot in field trial on squash vine borer management by a trap crop of early-planted, never-harvested border rows of zucchini; sum of 24 harvests between 2 July and 10 August 2020, mean of 4 blocked replicates with 125 plants per plot.

Treatment	Block	Number of fruit ¹	Weight of fruit (kg) ¹
Cash crop with trap crop	1	1427	514
	2	1054	347
	3	1137	406
	4	970	324
	mean	1147 A	398 A
Cash crop with no trap crop	1	1262	437
	2	1066	379
	3	1306	472
	4	989	326
	mean	1156 A	404 A
ANOVA, treatment effect		P = 0.91	P = 0.87

¹Within a column, means followed by the same letter are not significantly different (P > 0.05).

Table 2. Infestation by squash vine borer in zucchini plants in field trial on squash vine borer management by a trap crop of early-planted, never-harvested border rows of zucchini, Columbus OH, 10-12 August 2020:

Treatment	Block	% of plants infested or damaged by SVB ¹	Number of SVB larvae per damaged plant ¹	% of plants dead ¹
Cash crop with trap crop	1	61	0.9	6
	2	48	0.8	9
	3	52	0.7	10
	4	55	0.9	8
	mean	54 B	0.81 A	8.2 B
Cash crop with no trap crop	1	64	0.8	2
	2	60	0.7	11
	3	65	0.9	9
	4	66	0.8	12
	mean	64 AB	0.84 A	8.6 B
Trap crop (edge rows next to cash crop)	1	84	1.1	18
	2	58	0.6	18
	3	76	0.5	24
	4	66	0.7	18
	mean	71 A	0.75 A	19.5 A
ANOVA, treatment effect		P = 0.0176	P = 0.72	P = 0.0163

¹ Within a column, means followed by the same letter are not significantly different (P > 0.05). For percentage data, ANOVA based on arcsine square-root transformed data but means shown are actual percentages.

Acknowledgements: Technical help from Brittany Heigley, Brooke Friend, and Madeline Fox, and plot maintenance by Glenn Mills, Kevin Schrock, Matt Simmons, Anna Marconi, and Jason Hollick were greatly appreciated.

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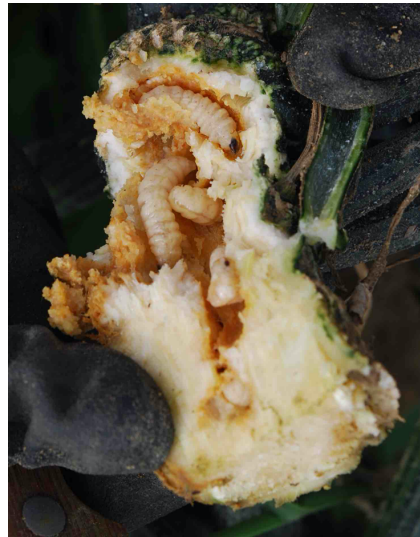
Figure 1. Site of field trial on squash vine borer management at OSU's Waterman Farm, Columbus, Ohio, showing zucchini in black plastic mulch with plot separation by swaths of soybeans, as of 26 June 2020.



Figure 2. Row of early-planted zucchini (center) as border row adjacent to plot of cash-crop zucchini (to the right) and adjacent to soybean buffer swath (to the left), as of 26 June 2020.



A.



B.

Figure 3. Symptoms of squash vine borer infestation in zucchini as found on 12 August 2020: A) Frass exuding from entry hole in stem of zucchini plant; B) Larvae of squash vine borer inside stem of zucchini, as revealed by cutting the stem.