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Organic Practices for the Production of Muskmelon

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Introduction

Cucumber beetles provide a unique challenge to growers of muskmelon and other cucurbit crops in the Midwest. Spotted and striped cucumber beetles transmit bacterial wilt by feeding on infected plants. Beetles ingest the bacteria (*Erwinia tracheiphila*) and overwinter in soil. After emerging the following spring, beetles fly to nearby cucurbit crops to feed, continuing to spread bacterial wilt disease from plant to plant.

Cucurbits are most vulnerable to disease and insects at the time of emergence or transplanting. A common practice among organic growers is to apply row covers over seedlings immediately after transplanting. Row covers protect plants from beetles and bacterial wilt, and can reduce insecticide applications. Row covers are typically removed when 50 percent of plants have female flowers, in order to allow for pollination. In previous studies at Iowa State University, row covers have provided excellent control of bacterial wilt, but yield is sometimes reduced due to feeding by picnic and cucumber beetles after row covers are removed, despite application of organic insecticides.

This study combines row cover and insecticide treatments in organic management of muskmelon. Summer 2015 was the second year of a two-year study conducted in Iowa and Ohio.

Materials and Methods

Transitioning organic land was used at the ISU Horticulture Research Station, Ames, Iowa. On May 12, 2015, 16 cubic yards/acre of composted dairy manure was incorporated into the soil. Three-week-old untreated Athena muskmelon seedlings were transplanted on May 27. Seedlings were planted two ft apart in black plastic mulch with drip irrigation and 7-ft row centers. Subplots consisted of 30-ft-long rows with 15 plants. Spunbond polypropylene row covers (Agribon® AG-30) were installed on wire hoops immediately after transplanting. For weed management, six in. of corn stalk mulch was applied between rows before transplanting.

Experimental design was a 3 × 2 factorial of row cover and insecticide treatments in a randomized complete block design with four replications (4 reps × 3 row cover treatments × 2 insecticide treatments) (Table 1). Row cover treatments included: 1) no row covers (NRC), 2) row covers applied at transplant and removed at anthesis (RCA), and 3) row covers applied at transplant with ends opened at anthesis followed by removal 10 days later (DRC). Insecticide treatments included: 1) constant coverage of Surround (Kaolin clay) while plants were unprotected by row covers, and 2) constant coverage of Surround as in the previous treatment but with additional applications of Pyganic EC (pyrethrin) and Trilogy (neem oil) when cucumber beetle thresholds were reached (+). Thresholds were 0.5 beetles/plant from transplant to four-leaf stage and one beetle/plant from four-leaf stage to harvest.

Scouting of striped and spotted cucumber beetles occurred once or twice weekly from transplant until harvest using yellow sticky cards and visual monitoring of three randomly chosen plants/subplot. Incidence of bacterial wilt was monitored weekly with a final count immediately before harvest. Subplots were harvested six times between August 7 and August 20. Number and weight of marketable, insect cull, and other cull melons were recorded for each subplot. Champ WG was applied twice on all subplots for anthracnose. Thuricide was applied twice on all NRC and NRC+ subplots for cutworm. Insecticides were not applied while plants were under row covers.

Results and Discussion

There was no significant difference in marketable yield, insect cull number or weight, bacterial wilt incidence, or total yield between RCA or NRC treatments. Results comparing DRC treatments are not conclusive.

Row cover treatment impacted number, weight, and percentage of insect culls (Table 2), but had no impact on total yield, marketable yield, or bacterial wilt incidence. Insecticide treatment had no impact on total yield, marketable yield, number or weight of insect culls, or bacterial wilt incidence. There was no interaction between row cover treatments and insecticide treatments. Therefore, we combined insecticide treatments with row cover treatments for analysis.

NRC and RCA treatments resulted in lower weight, number, and percentage of insect cull number than DRC treatments. DRC was least effective at reducing the number of culls caused by insect damage.

Acknowledgements

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Table 1. Summary of thresholds and insecticide applications to subplot treatments.

	Subplot treatments[b]					
Week[a]	DRC	DRC +	RCA	RCA +	NRC	NRC +
1	NA-under row cover[c]		NA-under row cover[c]		S	S
2					S	S
3					S	S
4					S	S
5			S	S		
6	S	S				
7	**S**	**S*****	**S**	S	S	S
8						
9				**S+**	**S**	
10						
11	S	S	S	S	S	S
Total Surround applications	3	3	3	4	7	6
Total Pyganic + Trilogy applications	0	0	0	1	0	0

A bold line surrounding boxes indicates threshold was reached.
***Correct treatment (Surround + Pyganic & Trilogy) was not applied due to error in calculations at time of scouting. Only Surround was applied to these subplots.

[a]Subplots were scouted at least once weekly after transplanting. No-row-cover (NRC) treatments served as controls. Spunbond polypropylene row covers (Agribon-30) were applied to DRC and RCA treatments at transplant. Row covers were removed at anthesis on RCA subplots, and row cover ends were lifted at anthesis and removed 10 days later for DRC subplots.
[b]DRC+, RCA+, and NRC+ subplots received insecticide treatments of Surround with Pyganic and Trilogy upon reaching threshold. All subplots received a constant coating of Surround regardless of beetle threshold.
[c]DRC, DRC+, RCA, and RCA+ subplots were not scouted or sprayed while under row covers. Surround was applied immediately after removing row covers.

Table 2. Effects of row cover treatments on insect cull weight and number and insect cull number as a percentage of total harvest, per 30-ft subplot, for organically grown muskmelon cv. Athena in 2015 at ISU Horticultural Research Station.

		Fruit culled due to insect damage		Percent insect-culled fruit[c]
Row cover[a]	**N[b]**	**Weight (lb)[c]**	**Number[c]**	
DRC	8	17.59 a	3.38 a	.076 a
RCA	8	8.91 b	1.75 b	.044 b
NRC	8	6.96 b	1.38 b	.035 b

[a]No-row-cover (NRC) treatments served as controls. Spunbond polypropylene row covers (Agribon-30) were applied to DRC and RCA treatments at transplant. Row covers were removed at anthesis on RCA subplots, and row cover ends were lifted at anthesis and removed 10 days later for DRC subplots.
[b]No significant differences in yield, insect culls or disease were observed among insecticide treatments. Since there was no interaction between insecticide and row cover treatments, treatments were combined for each row cover treatment.
[c]Differing letters in each column significantly differ ($P < 0.05$) based on protected least significant difference critical values.