

2010

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Recommended Citation

Saalau Rojas, Erika; Batzer, Jean C.; and Gleason, Mark L., "Effects of Extended-duration Row Covers on Muskmelons" (2010). *Iowa State Research Farm Progress Reports*. 377.

http://lib.dr.iastate.edu/farms_reports/377

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Abstract

Cucurbit crops, especially muskmelon and cucumber, attract cucumber beetles, which spread bacterial wilt, causing major crop losses. Striped and spotted cucumber beetles are the only reported insects that transmit bacterial wilt, caused by the bacteria *Erwinia trachephila*. High beetle densities are associated with high bacterial wilt incidence, which usually occurs during the first stages of plant establishment.

Keywords

RFR A9021, Plant Pathology

Disciplines

Agricultural Science | Agriculture | Plant Pathology

Effects of Extended-duration Row Covers on Muskmelons

RFR-A9021

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Introduction

Cucurbit crops, especially muskmelon and cucumber, attract cucumber beetles, which spread bacterial wilt, causing major crop losses. Striped and spotted cucumber beetles are the only reported insects that transmit bacterial wilt, caused by the bacteria *Erwinia tracheiphila*. High beetle densities are associated with high bacterial wilt incidence, which usually occurs during the first stages of plant establishment.

Row covers have traditionally been used to increase crop earliness, leading to earlier harvest dates and higher market prices. Row covers are usually deployed from transplant until anthesis (start of flowering), then removed to allow insect pollination. By using hives of bumble bees to supplement pollination, it may be possible to extend row cover protection approximately 10 days beyond anthesis. Extending row cover protection may shield muskmelon crops from the first emergence of wilt-vectoring cucumber beetles, leading to a healthier crop and a greater yield.

Materials and Methods

Thirty-foot-long rows of 15 Athena muskmelon seedlings were planted into black plastic mulch at the Muscatine Island Research Farm, Fruitland, IA (Figure 1). Single-row treatments using polymer row covers (Agribon AG-30) on wire hoops, with edges buried in soil, were compared in a Latin square design, including four replications (rows) of four treatments, as follows:

- A) Row covers removed at anthesis.
- B) Row covers removed 10 days after anthesis. At anthesis, both ends of row covers were opened to allow pollination.
- C) Row covers removed 10 days after anthesis. At anthesis, a bumble bee hive (Koppert, Inc.) was inserted under one end of the row cover, and the end was re-sealed.
- D) No row covers.

Striped and spotted cucumber beetle numbers were monitored weekly from transplanting (May 21) through the end of harvest (August 13) using yellow sticky cards. Beginning three weeks after transplant, the number of healthy, wilted, or dead plants in each row was assessed weekly. The number and weight of marketable and cull melons harvested from each row also was recorded.

Results and Discussion

Bacterial wilt was not detected in this trial, since the number of cucumber beetles was much lower, and their appearance was considerably later than in 2007 and 2008—presumably due to beetle mortality as a result of exceptionally cold temperatures in January 2009. Since row cover treatments could not be evaluated for bacterial wilt control, the trial was instead used to assess the effect of row cover treatments on pollination and yield.

Row covers removed at anthesis resulted in the highest yield per plot (Table 1). However, average fruit weight and average number of fruit per plant did not differ among treatments. This study suggests that if natural pollinators are present in the area, inserting bees under the row covers may not be necessary for fruit pollination during the first 10 days of flowering. Previous years have shown that this

10-day period is essential to reduce bacterial wilt infection when cucumber beetles are present (unlike years such as 2009).

Acknowledgements

Thanks to Mark Sigourney of Syngenta Seeds for the donation of seed, Vince Lawson, the Muscatine Island Research Farm crew, and the 312 Bessey field crew for crop planting, maintenance, and harvest.

Table 1. Yield comparisons of muskmelon from four row cover treatments.

Comparison	Row cover treatment				LSD*
	A	B	C	D	
Average number of fruit per plot	36.8 a	34.8 a	33.5 a	31.5 a	8.5
Average fruit weight (lb)	5.4 a	5.3 a	5.5 a	5.0 a	0.5
Average plot yield (lb)	210.0 a	171.0 b	159.4 b	167.5 b	35.4
First date of harvest (days from transplant)	67	70	70	60	

A) Row covers removed at anthesis.

B) Row covers removed 10 days after anthesis. At anthesis, both ends of row covers were opened.

C) Row covers removed 10 days after anthesis. At anthesis, a bumble bee hive was inserted under one end of the row cover.

D) No row covers.

*Means followed by the same letter are not significantly different within row ($P \leq 0.05$).



Figure 1. Seedlings were planted into black plastic mulch then immediately covered with polymer row covers on wire hoops to protect plants from feeding by cucumber beetles.