

Effects of Extended-Duration Row Covers on Muskmelons

Erika Saalau, graduate student
Alicia Owens, undergraduate research assistant
Jean Batzer, assistant scientist
Mark Gleason, professor/Ext. plant pathologist
Department of Plant Pathology

Introduction

Cucurbit crops, especially muskmelon and cucumber, attract cucumber beetles, which vector bacterial wilt, causing significant crop losses. The striped and spotted cucumber beetles are the only reported vectors that transmit bacterial wilt, caused by the bacteria *Erwinia trachephila*. High beetle densities are associated with high bacterial wilt incidence.

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 bumblebees to supplement pollination, it may be possible to extend row cover duration by 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 ISU Muscatine Island Research Farm in Fruitland, IA. 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 bumblebee 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 28) through the end of harvest (August 20) using yellow sticky cards. Beginning 3 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 was also recorded.

Results and Discussion

The delayed removal of row covers had a strong influence on the incidence of bacterial wilt on muskmelons (Figure 1). The removal of row covers at anthesis and the no-row-cover treatment had the highest incidence of bacterial wilt at the end of the growing season. With removal of row covers at anthesis, there was a total of 38% of wilted or dead plants by the beginning of harvest. Similarly, the no-row-cover treatment reached a 35% of wilted or dead plants by the beginning of harvest (June 24). These treatments also had the lowest yields (Figure 2) and number of marketable fruit produced.

The treatments with row covers removed 10 days after anthesis had few plants affected by bacterial wilt, reaching less than 10% of wilted or dead plants by harvest (Figure 1). These treatments also produced the largest number of marketable fruit (Figure 2).

Pollination by the introduced bumblebees increased the number of fruit under the row covered plants. This treatment had the highest number of marketable fruit, followed by the delayed removal of row covers with the ends opened at anthesis.

Acknowledgements

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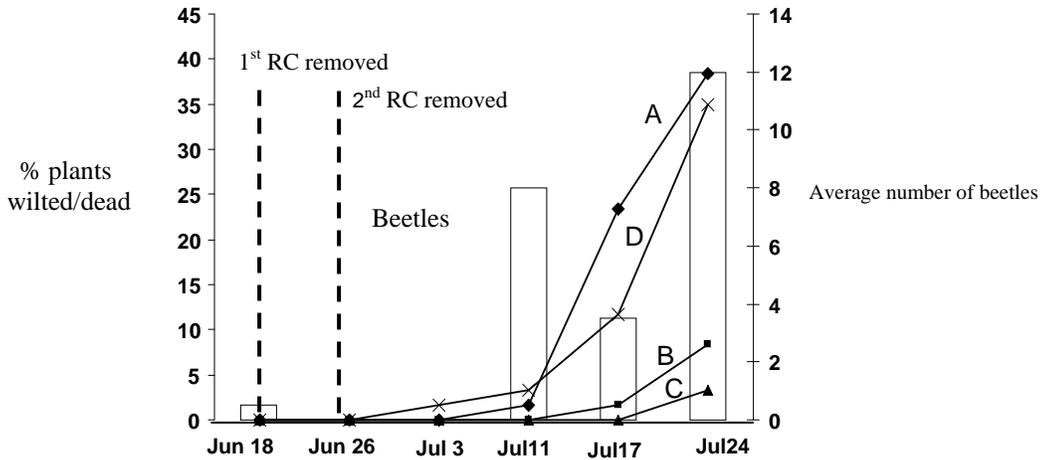


Figure 1. Mean percentage of bacterial wilt symptoms (left axis) for all four treatments. A = row cover removed at anthesis; B = row cover removed 10 days after anthesis, ends opened; C = row cover removed 10 days after anthesis, bees inserted; D = no row cover. Bars and right axis indicate average number of beetles collected each week beginning at transplant.

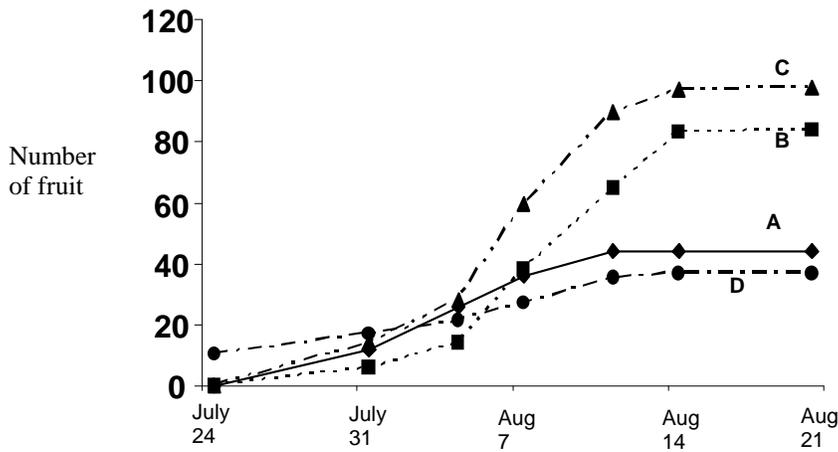


Figure 2. Cumulative number of marketable fruit harvested. A = row cover removed at anthesis; B = row cover removal 10 days after anthesis, ends opened; C = row cover removal 10 days after anthesis, bees inserted; D = no row cover.