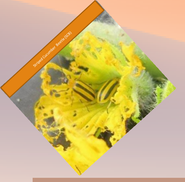

Timing Early Season Cucumber Beetle Control to Manage Bacterial Wilt in Muskmelon

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Introduction

Muskmelon (*Cucumis melo var. reticulatus*), is one of the most important vegetable crops in the United States. It is grown throughout the US, and Indiana ranked 3rd in production after California and Arizona with 2,088 Mg in 2013. Bacterial wilt (*Erwinia tracheiphila*) is one of the most serious diseases of melon in the United States. It is vectored by striped cucumber beetle (SCB, *Acalymma vittatum*), causes plant wilting and death, and reduces melon yield from 30% to 100%. The primary method for managing bacterial wilt is controlling the striped cucumber beetle before it can infect the plant. However, it is not known whether there is a critical stage during early plant growth when muskmelon plants are more susceptible to infection and therefore control of striped cucumber beetle is especially important. The main objective of this study is to determine when melons are most susceptible to bacterial wilt during the first three weeks after transplanting.

Methods

Field experiments were carried out at the Purdue Meigs Farm for Horticultural and Specialty Crop Research, Lafayette, Indiana, in summer 2013 and 2014. The experiment was laid out in RCBD with 5 treatments and 4 replications. Seedlings were transplanted (6/5/2013 and 5/28/2014) 4 feet apart on raised beds 3 feet wide, 40 feet long and 8 feet on center (10 plants per experimental unit). Plastic mulch and drip irrigation were used to maintain the beds moist, warm and free of weeds. Row covers and insecticide were used to control when beetles fed on seedlings (Table 1). In treatments RCB0, RCB7 AND RCB14 beetles were released under the row cover at different times and killed with insecticide 7 days later (Figs. 1-4). In treatment C, without row cover, beetles were allowed to feed for 21 days. In treatment RC plants were under row covers but no beetles were added. To permit pollination all row covers were removed on day 21. After that the entire plot was sprayed weekly with Warrior® (lambda-cyhalothrin) insecticide to control SCBs until a few weeks prior to harvest.

Table 1. Treatment Description

Treatments	Row cover	Beetles added	Beetles killed
C	No	No beetles added	Day 21
RCB0	Yes	Day 0 (200 SCBs)	Day 7
RCB7	Yes	Day 7 (200 SCBs)	Day 14
RCB14	Yes	Day 14 (200 SCBs)	Day 21
RC	Yes	No beetles added	Day 21

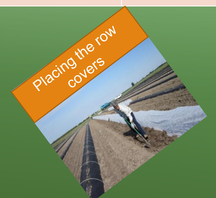


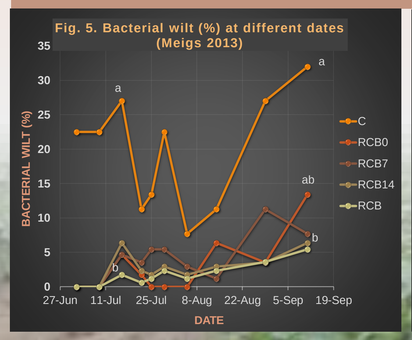
Fig. 1. Collecting SCBs from squash plants which were planted two weeks earlier than melons in order to attract beetles.

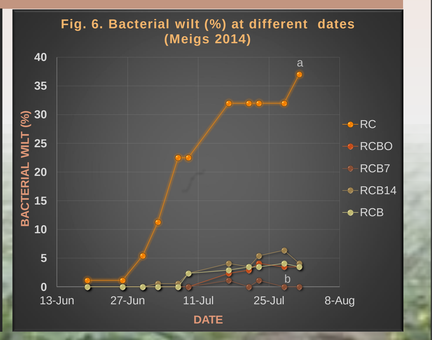
Fig. 2. Collected SCBs

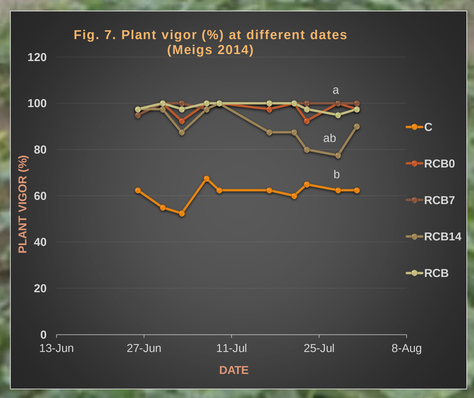
Fig. 3. Releasing SCBs under row covers

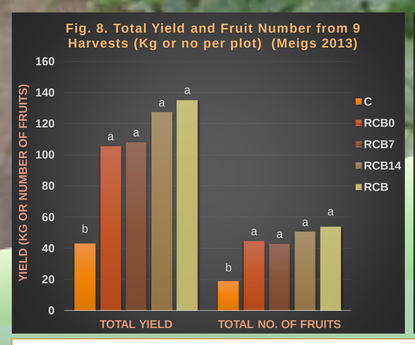
Fig. 4. Spraying insecticide on the entire plot

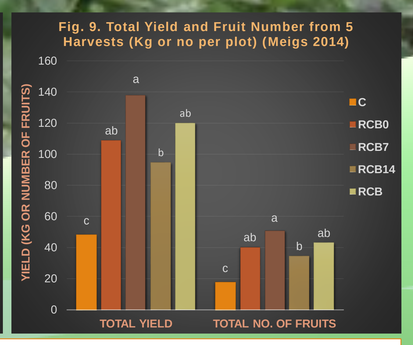
Results











Legend: C RCB0 RCB7 RCB14 RC

Results and Discussion

The percentage of bacterial wilt was significantly different between treatments with row covers and no row cover on most dates (Figs. 5, 6). This could be because of greater vigor of plants under row covers (Fig. 7) or greater duration of beetle feeding with no row cover. The period beetles were permitted to feed on plants (0-7, 7-14, or 14-21 DAT) had little effect on percentage of bacterial wilt (Figs. 5, 6). Yield and number of fruits were greater in treatments with row cover than without row cover (Figs. 8, 9).

In conclusion, we could not determine a period during the first three weeks after transplanting when seedlings are more susceptible to bacterial wilt. Row covers left on the plants 21 DAT enhanced the plant vigor and increased yield.

In other related studies we found:

- Using row covers with and without soil drench with insecticide (thiamethoxam) or seed treated with insecticide (thiamethoxam) significantly reduced beetle feeding and amount of bacterial wilt, and increased the number of marketable fruits and total yield.
- The length of time row covers were left on the plants (for 7, 14, or 21 days after transplanting, DAT) did not significantly influence bacterial wilt or yield in a consistent manner.
- The time when beetles began to feed on plants (0, 7 or 14 DAT) did not significantly influence bacterial wilt or yield in a consistent manner.

Summary:

Managing bacterial wilt requires practicing one or more strategies at the appropriate time. BW can be managed by controlling the SCBs and/or protecting plants from feeding of beetles with row covers. The results of these studies show the period the beetles were allowed to feed on the plants and the length of time row covers were left on the plants did not significantly influence disease or yield consistently. However, these studies indicate that row covers significantly increased plant vigor, number of fruits, and total yield.

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