Sweet Corn for Processing: Value and Risk of IPM for European corn borer

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Overview

Full-size corn borer

The European corn borer (ECB), *Ostrinia nubilalis*, is a perennial pest in sweet corn throughout much of the U.S. ECB larvae may cause yield losses due to tunneling within the corn stalk, the loss of ears via shank feeding, or most often, direct feeding and tunneling damage on sweet corn ears **(Fig. 1)**. Most processors prefer to maintain a yield goal of at least 95% marketable ears. Consequently, multiple insecticide applications are often applied according to a schedule. The goal of the following economic analysis was to estimate the value of using larval sampling and an economic injury level as part of an IPM program to decide whether to apply an additional insecticide spray, compared to applying one or more additional sprays on a schedule.

IPM Approach

Data from more than 45 insecticide efficacy trials were used to develop an economic model of the effect of IPM for ECB control in processing sweet corn. Data included the average number of larvae/ear for a control (untreated) plot, and plots treated with different insecticides, plus the average percentage of harvested yield marketable for processing. Data for treated plots also included application rates for each insecticide. These data were used to estimate the statistical distribution of the initial (untreated) larval density per ear; the larvae remaining after insecticide applications as a function of the initial larval density and the total amount of insecticide applied; and the percentage of the harvested sweet corn marketable for processing as a function of the remaining larval density **(Fig. 1).**

The final economic model of net returns ($/ac) incorporated variability from random yields (dryland), random initial larval densities, random insecticide efficacy, and random yield loss. Using this model, we calculated the value of IPM as the expected (average) increase in net returns when choosing to apply an additional spray, relative to a scheduled additional spray. We also calculated the effect of IPM on risk as the increase in the standard deviation (SD) of net returns when using IPM versus a scheduled spray.

Sampling sweet corn ears

RESULTS

This analysis confirmed the significant value of the first (scheduled) spray for ECB. Average net returns increase about $125/ac and the standard deviation of net returns decreases over $20/ac when applying Capture® or Warrior® at early silk (e.g., 5-10%; see Flood et al. 2005) versus no insecticide use (data not shown). **Figure 2** shows the value of using IPM to choose additional sprays for ECB larval control in processing sweet corn. The increase in average (expected) net returns ranges from almost $5/ac to more than $7/ac, depending on the insecticide and the number of scheduled sprays. Though the two insecticides have similar efficacies, using IPM for Warrior® is slightly more valuable than for Capture® because the source for the value of IPM is preventing unnecessary insecticide applications and Warrior® is slightly more expensive. IPM also becomes more valuable as the number of sprays increases because it prevents more unnecessary sprays.

Figure 3 shows that using IPM for ECB larval control in processing sweet corn reduces risk, though the decrease in the standard deviation of net returns is generally quite modest. The value of IPM and its effect on risk are fairly modest because of the narrow profit margin for processing sweet corn. In recent years, many of the potential cost saving measures have been applied to these systems so that only small increases in profitability are possible. Hence, for IPM to become valuable for processing sweet corn, its benefits must be spread over more acres. On a per acre basis, IPM is often more valuable and able to reduce risk more for higher value crops (e.g., fresh-market cabbage), but for narrow-margin crops such as processing sweet corn, IPM can generate more total value because crop acreage is larger.

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Fig. 1. Relationship between percentage (%) of marketable ears and ECB larval density for processing sweet corn, based on multiple trials (1990-2003), Midwestern U.S. For example, at only 0.07 larvae/ear, marketable ears are reduced to an average of 95%.

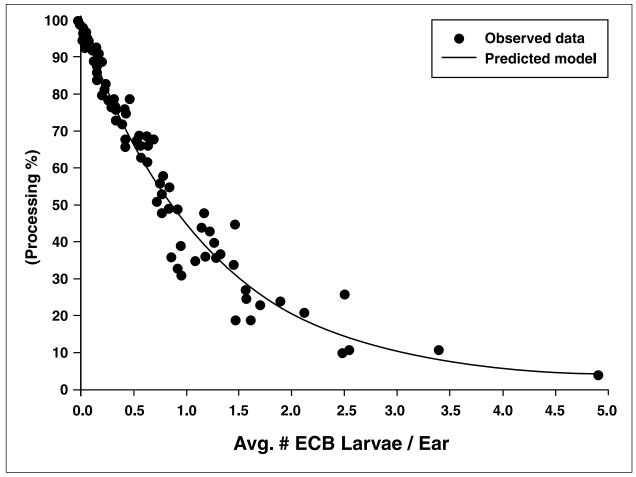


Fig. 2. Average increase in net returns ($/ac) using IPM (scouting and thresholds), versus automatic scheduling of a second, third, or fourth spray of Capture® and Warrior®.

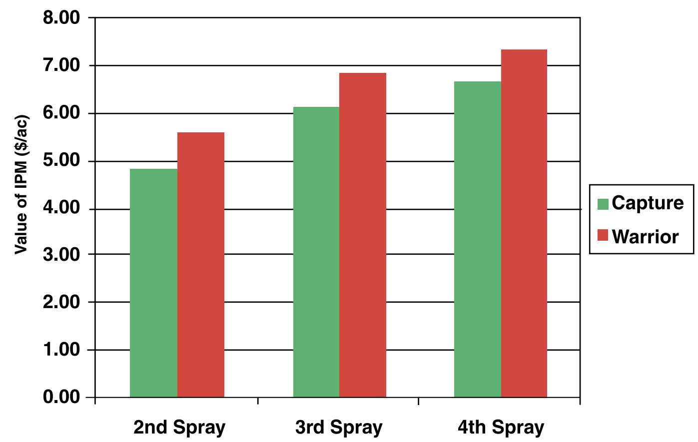
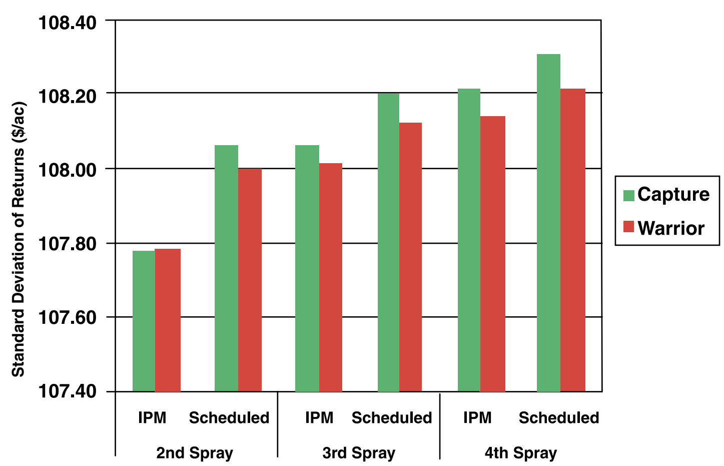


Fig. 3. Average risk in net returns, as measured by standard deviation ($/ac), when using IPM (scouting and thresholds) versus automatic scheduling of a second, third, or fourth spray of Capture® and Warrior®.



Further Reading:
Flood, B. et al. (2005). Sweet corn, *In:* R. Foster & B. Flood (Eds). Vegetable Insect Management, Meister Media Worldwide, Willoughby, OH.

DISCLAIMER

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