

Insects in Processing Sweet Corn: Changing Trends and the Need for New Management Strategies

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Corn earworm (CEW), *Helicoverpa zea* (Boddie), is a caterpillar pest of sweet corn in New York that originates from moths that migrate annually from the south into the northeastern United States. Management of this insect has traditionally relied on the use of pyrethroid insecticides to prevent feeding damage to developing corn ears. In recent years, however, it has become more difficult to control CEW, and this is due to several factors.

Female CEW moths are highly attracted to plant odors emitted by fresh silks that emerge from developing ears. They may lay one or more eggs on a silk bunch, and a single female CEW may deposit > 1,200 viable eggs during her lifetime. After hatching, new larvae move quickly down the silks into the ear tip. As a result, the potential for infestation is high, even at low CEW densities, unless insecticides are applied at frequent intervals before newly hatched caterpillars move into the ear.

The New York State Integrated Pest Management Program maintains a network of CEW pheromone traps across Western New York State. Data from these traps, maintained since the mid-1990's, indicate that CEW populations are increasing, and that they are being detected nearly eight weeks earlier in the growing season, as of 2012. These population trends, plus the increased damage we have seen over the last several years, indicate the need to modify our existing recommendations.

CEW pyrethroid resistance is becoming a concern in the northern areas of the US. CEW overwinter in southern states and in the spring attack a series of host crops, including cotton, where they are heavily treated with pyrethroids. Some of these insects migrate to the northeast in the summer where they infest many crops, including sweet corn. Since Southern regions have historically high levels of pyrethroid resistance in CEW, we evaluated adult moths in 2010 and 2011 at sites in the Finger Lakes and on Long Island to determine their susceptibility to pyrethroids. Our results showed levels of resistance across sites and years ranging from 10.8% to 40.9%. This should serve as a warning about the need for other insecticides.

Other questions remain. For many years, Cornell University has provided a decision-making framework for treatment of CEW with insecticides, published annually in the Cornell Guidelines. These recommendations use average pheromone trap catches of male CEW moths as the basis for frequency of insecticide applications. Our recent work suggests these guidelines should be re-evaluated. A key is that the present guidelines use insect trap catch starting at "silk stage" as the only decision-making factor to determine frequency of insecticide application, without considering plant developmental stage. Our 2012 fieldwork suggests, however, that starting a spray program at "silk stage" may

predispose a proportion of plants to almost certain damage in the presence of CEW adults, due to the efficiency of egg-laying by females and their keen ability to locate very early silking corn. Most young CEW caterpillars were found exclusively in early green silk, and none were found in silks already drying down, meaning that eggs were laid when silks were very young. By the time insecticides are applied using green silk as a starting point, developing caterpillars have already moved down into the ear where there is more protection from treatment.

In 2013, we will evaluate a new series of treatments that use trap catch data in combination with insecticide treatments starting at tassel instead of silk. The objective of this approach is to answer three questions: 1) Will one or two sprays applied at first tassel be more effective than the current Cornell Guidelines based on pheromone catches? 2) Will sprays applied at first tassel be effective even after sprays are discontinued as the silk stage progresses? 3) Will some insecticides applied at first tassel be more effective than others?

It is only with this on-going research into pest management options for sweet corn insects that growers will be able to avoid losses, reduce unnecessary sprays, maximize their profits, and produce quality sweet corn in New York.