

Title: Fresh Market Sweet Corn IPM on Farm Demonstrations

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Cooperator(s): The three cooperating growers that participated in this project.

Abstract:

IPM practices in fresh market sweet corn were demonstrated at three different farms and on 15 fields. For each field, data on pest levels, pesticide use, insect infestation and damage at harvest were collected. Each field was scouted weekly for European corn borer-E (ECB-E), European corn borer-Z (ECB-Z), corn earworm (CEW), fall armyworm (FAW) and western bean cutworm (WBC) as well as other pests and diseases. Growers received weekly scouting reports and treatment recommendations. For all three farms the percent corn damaged at time of harvest from IPM managed fields was equal to or lower than grower managed fields. Total number of insecticide sprays was also lower on IPM managed fields. By following an IPM program growers can reduce the number of sprays while often improving the damage at time of harvest.

Background and justification:

Sweet corn for the fresh and processing markets is an important crop throughout NY. In 2012 fresh market sweet corn was grown on 21,700 acres in New York with a value of 68.4 million dollars. Damage caused by insects or diseases or the presence of insects are highly undesirable to consumers. But the use of pesticides to combat these pests is often viewed just as negatively. Growers producing for wholesale markets are subject to strict standards for pest contamination and damage. Minimizing pest management costs while maintaining high-grade standards is crucial for competing in this market. An accurate and efficient sampling protocol for both insects and diseases is essential to meet the pest management needs of both direct market and wholesale sweet corn growers. A timesaving sequential sampling protocol for lepidopterous insect pests in sweet corn was developed and validated by Mike Hoffman in 1991. This protocol was used to demonstrate IPM practices in growers' fields and compare those results to fields (in prior years or adjacent) that were managed by the grower.

Objectives:

1. Work with CCE field staff to identify 2-3 farmers to host fresh market sweet corn IPM demonstrations.
2. Interview growers.
3. Use either split-field plots, with the farmer following IPM practices on one part of the field and his or her usual practices in the other; or IPM plots where IPM practices will be used in the whole field and results compared with typical practices and damage levels of the previous year.
4. Place one each of ECB-E, ECB-Z, FAW, CEW, and WBC pheromone traps at all demonstrations sites and begin weekly monitoring.
5. For split-field plots, flag the area in which IPM practices will be used

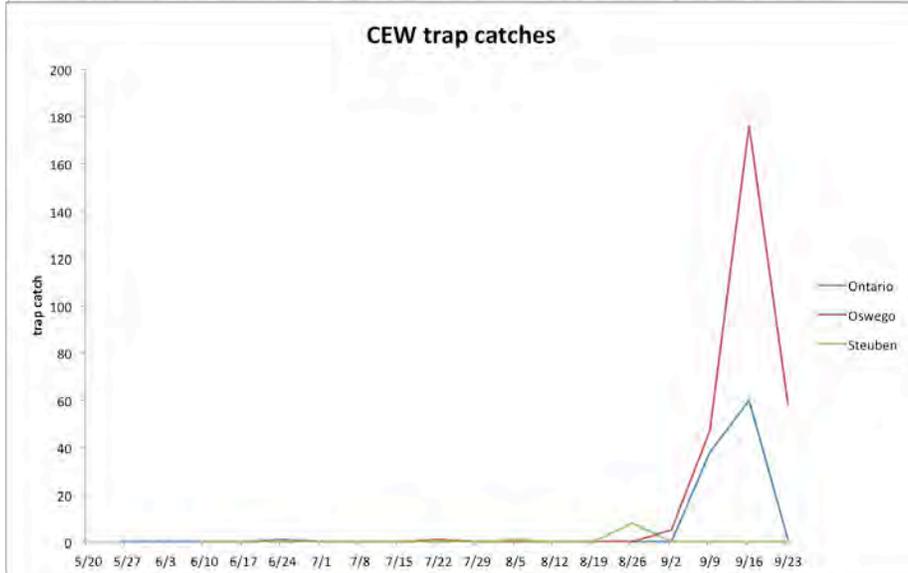
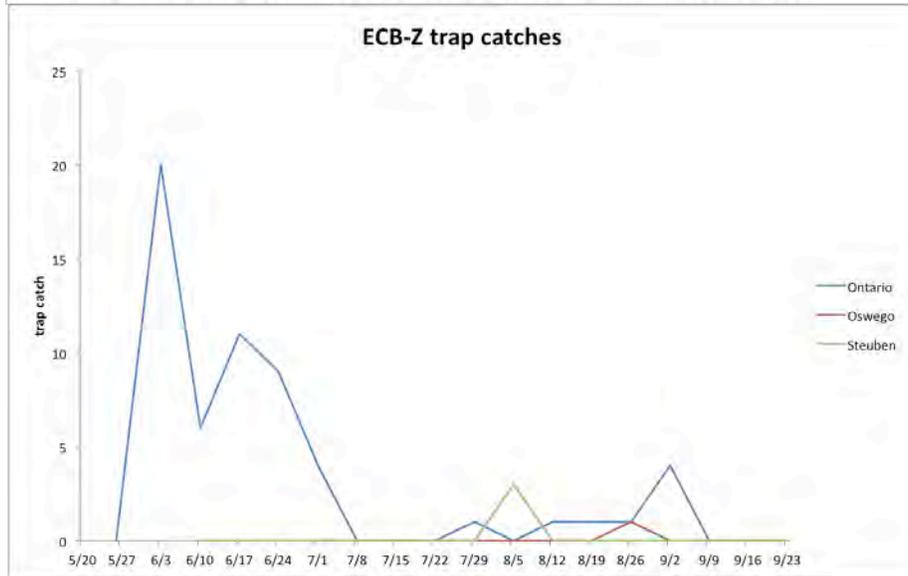
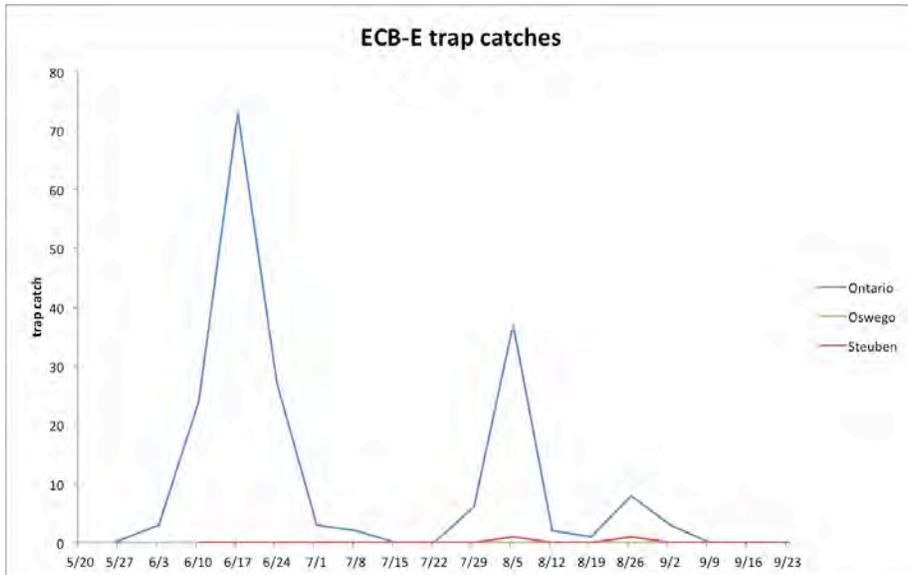
6. Begin weekly scouting in both areas of the field, for split-field sites or the entire field for IPM sites.
7. Provide growers with weekly scouting and trap catch reports along with pest management recommendations and guidance on the use of *Trichogramma ostriniae*, parasitic wasp of ECB, for organic growers.
8. Conduct harvest evaluations at time of harvest.

Procedures:

1. Three growers participated in the demonstrations, one in Ontario County, one in Oswego County, and one in Steuben County.
2. All growers were interviewed prior to the start of the demonstrations to determine their typical pest management practices and pest damage levels.
3. The Ontario County grower was an organic grower that used IPM practices throughout his 5 plantings. The Oswego County grower was a conventional grower where split field plots were established for 6 of his plantings. The Steuben County grower was a conventional grower where IPM practices were used on 3 of his plantings.
4. A set of five pheromone traps were placed at each farm and checked weekly at the Ontario and Oswego site by myself and by the grower at the Steuben site.
5. At time of first spraying the Ontario grower flagged approximately a quarter of each field that was set aside for IPM practices and continued his regular spray schedule on the remaining three quarters.
6. Fields were scouted each week based on recommended protocol (see [Petzoldt and Hoffman 2000](#)) starting at mid to late world, for ECB-E, ECB-Z, FAW, CEW, WBC, corn leaf aphids, western corn rootworm, corn flea beetles, rust, northern corn leaf blight, and beneficials. The sequential sampling plan was used for ECB, CEW, and FAW. The threshold for these worm pests was 15% infested plants before silk stage, and 5% after silking. For WBC a threshold of 1% was used (see [New Pest Alert for Sweet corn: Western Bean Cutworm](#)). For corn leaf aphid a threshold of 50% of plants with a colony of 50 or more aphids was used. A threshold of 10 or more western corn rootworms per plant, a threshold of 6% for corn flea beetle and an 80% threshold for rust was used. Thresholds for northern corn leaf blight have not been established but scouting procedures followed those of rust outlined in Petzoldt and Hoffman.
7. After scouting fields in mid-whorl to just prior to harvest, the scouting forms were given to the growers with recommendations on whether a spray application was necessary based on thresholds. For the organic grower, who conducted *Trichogramma ostriniae* releases to control ECB, additional assistance was given to time the releases correctly.
8. Harvest evaluations were done on 200 ears of corn at time of harvest for all fields. For the split-filed sites, 100 ears came from the grower-managed side and 100 came from the IPM managed side. All ears were evaluated for signs of damage, worms, and aphids.

Results and discussion:

Trap catch results for the season for each of the worm pests for the three demonstrations sites are given in the graphs below. These graphs indicate that the pest pressure varied greatly among the three sites, with the Ontario site having the greatest ECB-E and Z as well as FAW numbers. Oswego was high in CEW, FAW and WBC, while the Steuben site had low pest pressure overall, with one high trap catch of WBC on August 5th and low levels of FAW throughout the season (see Figure 1).



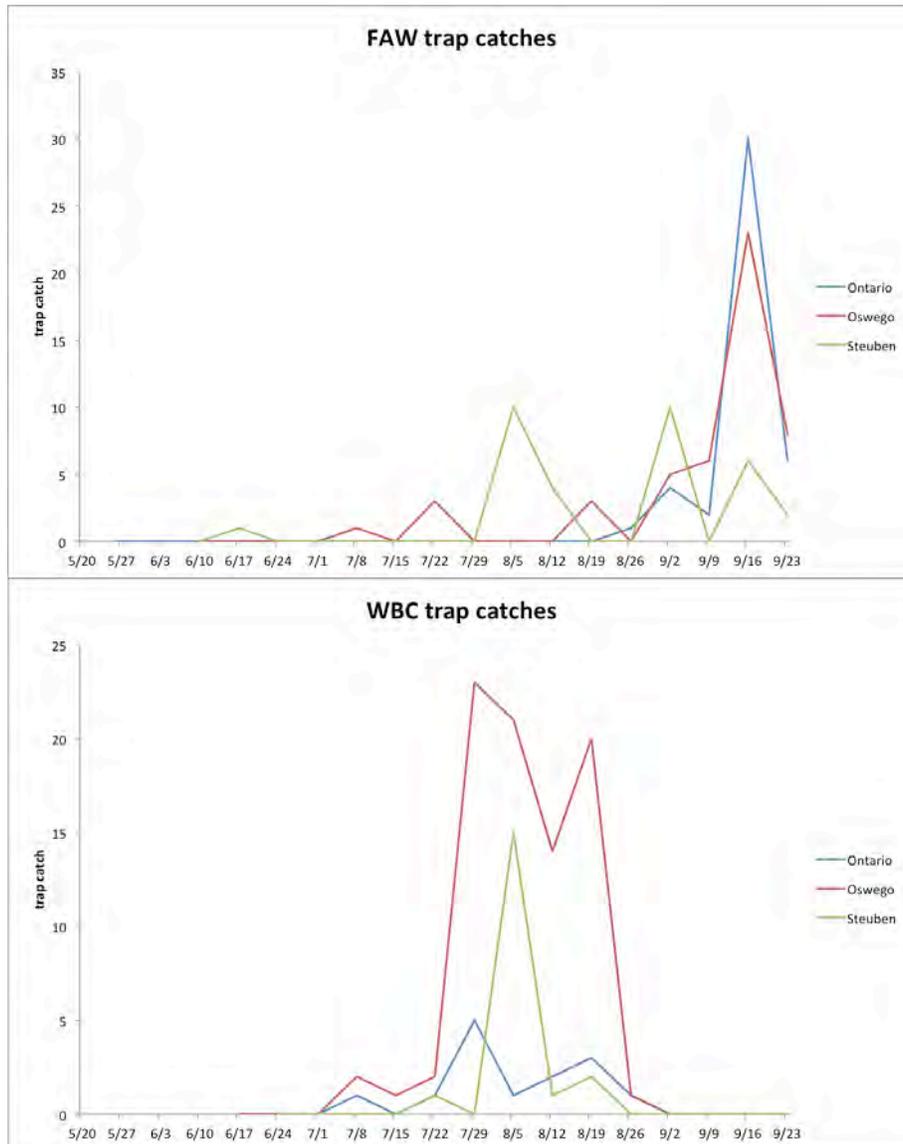


Figure 1. Graphs of the weekly trap catches for the five sweet corn pest, ECB-E, ECB-Z, CEW, FAW, and WBC at Ontario, Oswego and Steuben. Note that the scale along the Y-axis changes among the graphs to allow for visual separation of the three sites.

Scouting and Harvest Evaluation

Ontario

The Ontario site was an organic site for which harvest evaluations from 2014 were compared to yield and approximate damage levels, based on grower's observations, from 2013 (Table 2). In 2013 the grower reports spraying fields every 4-7 days. There were only three fields planted in 2013 and all had worm damage levels of 20% or more.

In 2014 the grower released *Trichogramma ostrinae*, a parasitic wasp to control ECB and sprays dropped to between 1-3 sprays per field. The yield increase between 2013 and 2014 rose significantly for the three fields. The number of beneficials was high in all fields and higher than

at any of the other two farms. Corn flea beetle, corn leaf aphid, western corn rootworm, rust and northern corn leaf blight were present at all fields but remained below threshold levels for the duration of the season.

2013			2014			
planting	yield (doz. ears)	% damage ^a	planting	yield (doz. ears)	% damage	yield increase %
1	484	30	1	892	4	85
2	448	25	2	714	3	59
3	346	20	3	604	1	75
.	.	.	4	509	3	.
.	.	.	5 ^b	115	8	.

Table 2. Harvest evaluation for 2014 **Ontario** site compared to 2013 information from grower.

^a. Percent damage based on growers on observations from 2013.

^b. Yield for planting 5 low because demand after Labor Day dropped.

Oswego

The Oswego site was the only split field site where both grower and IPM managed fields could be compared for the same year. The six grower managed fields scouted above threshold for worm pests (ECB-E, ECB-Z, CEW, FAW, and WBC) a total of five times while the six IPM managed fields scouted above threshold for worm pests nine times. Low levels of corn leaf aphids and rust were observed in both sides of the field but remained below threshold throughout the season.

The average percent damage at harvest for all six fields was the same for the grower managed and IPM managed portions of the field at 1% (see Table 1). However, the total number of sprays was reduced by 60% in the IPM managed portion even though the IPM side scouted over threshold more than the grower managed side. By scouting, timing of sprays was improved making each spray more effective against the pest. The number of aphids at time of harvest was also lower in the IPM managed side. This was most likely due to the higher level of beneficials observed in the IPM side at weekly scoutings, again most likely due to reduced insecticide applications.

Grower Managed						IPM Managed				
Field	Date of Harvest	# Scouting over threshold	# Sprays	% damage at harvest	% ears w/ aphids	Date of Harvest	# Scouting over threshold	# Sprays	% damage at harvest	% ears w/ aphids
Oswego 1	8/4/14	0	3	0.5	1.5	8/4/14	0	0	0	0.5
Oswego 2	8/11/14	1	4	0	0	8/11/14	0	0	1.5	0
Oswego 3	8/11/14	0	3	0	0	8/11/14	1	1	3.5	0
Oswego 4	8/25/14	0	3	0.5	4.5	8/25/14	1	1	0.5	5
Oswego 5	9/8/14	2	5	2	6.5	9/8/14	4	4	1	8.5
Oswego 6	9/8/14	2	5	0.5	15	9/8/14	3	3	0	3.5
Average		.83	3.8	.58	4.6		1.5	1.5	1.08	2.9

Table 1. Table of the total number of sprays and percent damage at harvest for each of the six fields at the **Oswego** site for both the conventional or grower managed side as compared to the IPM practiced portion of the field.

Steuben

No data from the 2013 season was available from the Steuben grower. In a post harvest interview the grower stated that the yield was greater than in 2013 based on his own personal observations and that he had an easier time harvesting corn, since there was noticeably fewer damaged ears than in the previous year. He did not spray in 2013.

In 2014 each of the growers fields scouted over threshold once and therefore received one spray application. At time of harvest all fields had less than 5% damage and very low aphid numbers (Table 3). As compared to 2013, the number of spray applications did increase from zero per field to one per field, but the amount of damage at harvest was noted to have improved between the two years. Without having yield data from 2013 it is difficult to compare the two years. In addition to the worm pests, this site also had minor rust and northern corn leaf blight, all below threshold.

Field	Date of Harvest	# Scouting over threshold	# Sprays	% damage at harvest	% ears w/ aphids
Steuben 1	8/7/14	1	1	4	1
Steuben 3	8/21/14	1	1	4.5	0.5
Steuben 2	8/28/14	1	1	2.5	1

Table 3. Table of the total number of sprays and percent damage at harvest for each of the three fields at the **Steuben**.

Twilight meetings will be held in 2015 at both the Oswego and Steuben site to inform other growers of results and to demonstrate scouting techniques.

Project location(s): Ontario County, Oswego County and Steuben County, NY