

**Project type:** Implementation

**Title:** *Trichogramma ostriniae* start the transition from demonstration to commercialization.

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**Abstract:** Organic sweet corn farmers and those who do not own a high clearance sprayer often have problems with European corn borer (ECB) larvae contaminating the sweet corn ears at harvest. Research has shown that *Trichogramma ostriniae*, a tiny wasp that parasitizes ECB eggs, provides good control when released in sweet corn fields when ECB are laying eggs. The next step is to help farmers learn to use the wasps. We will provide cooperating farmers with wasps and advise them on their use, and also develop a downloadable fact sheet and a web page with information to help farmers use *T. ostriniae* on their own in the future.

**Background and Justification:** A great deal of research effort has been invested in optimizing the use of *Trichogramma ostriniae* for control of European corn borer (ECB) in sweet corn. Previous work has shown that the wasp does not overwinter in New York, ruling out the possibility of establishing it in a classical biological control approach. During the course of a pilot study using an inundative release approach (3 releases per planting at a rate of 120,000 per acre) we found that the wasps are very effective at finding and parasitizing ECB egg masses in sweet corn, and are able to reproduce in the field. This prompted several years of research on the use of inoculative releases (one release per planting at a rate of 30,000/A). We found that the inoculative release approach did not reliably reduce insecticide applications needed for ECB control when integrated with our standard scouting and thresholds. Most recently, we have found that an intermediate approach (2 releases of 30,000 and one release of 60,000 per acre) produces fairly good results (ECB infestation levels averaging between 5 and 20% at harvest) that are acceptable for organic farmers or farmers who have a market for corn grown without insecticides. Both groups mainly direct market their corn to consumers. We have concluded that these growers, as well as growers who are high-level IPM adopters who could regularly scout their fields to detect if supplemental insecticide applications were needed in addition to the *Trichogramma* releases, are the target audience for the use of *T. ostriniae*. The next step is to provide farmers with the information and techniques they need to use *T. ostriniae* on their own.

Through the years of working with growers on projects demonstrating the use of this wasp we have learned that using living organisms for pest management is an unfamiliar concept to many. The release timing is very important for ensuring that both wasps and egg masses are in the field at the same time, wasps must be put in the field immediately after arrival or held under appropriate conditions before release, and field phenology and wasp needs must be forecast at least a week in advance for ordering wasps to arrive at the correct time. All these have proven a little tricky for us to manage in a research and demonstration setting, so we anticipate that farmers will need support as they learn to use this new approach to ECB management.

### **Objectives:**

1. Work closely with growers in the target audience to help them make release timing decisions, order wasps, and monitor parasitism levels in the field.
2. Develop a fact sheet and web site to provide farmers with the information they need to use *T. ostriniae* in the future.
3. Project Evaluation

### **Procedures:**

1. Nine farmers participated in this project. Five are organic, two do not spray their corn, and two are high level IPM adopters. Extension cooperators visited the farms weekly to check on the development of the sweet corn plantings, discuss *Trichogramma* needs, and make plans for releases the following week. Each cooperator then conveyed wasp needs to Seaman who consolidated them and passed them along to the Hoffmann lab. Wasps were shipped directly to each farm, and the growers were responsible for putting them in the field. On six farms the three release approach was followed pretty closely; 30,000 were released at the 6-8 leaf stage, another 30,000 were released one week later, and 60,000 were released at early tassel emergence. On two farms, very small acreages of sequential plantings were located in one field, making it difficult to follow the three release strategy. On one of these farms (Seneca 1), weekly releases of 30,000 wasps per acre (whole planting acreage) continued through the season and release packets were concentrated in areas of the planting likely to have the highest concentration of ECB egg masses (late tassel-green silk stage). On the second farm (Columbia Co.), releases were made based on the acreage of the entire field, and timed according to crop stage and pheromone trap catches.
2. During the course of the season we collect photos and observations to use in the development of a downloadable fact sheet and a web page, which future *Trichogramma* users can use to learn the recommended approach to using the wasps in the field. Several growers were provided with a draft of the fact sheet at the beginning of the season and asked to identify areas that need improvement.
3. Scouting and harvest evaluations were conducted on four farms, where summer assistants were available, but in other cases, fields were not scouted and formal harvest evaluations were not conducted because summer assistants were not available at those locations. Each farmer was surveyed to determine how well they thought the wasps worked, whether they would use *Trichogramma* in the future, if they were confident in using *Trichogramma* on their own, and what resources they would need to be successful.

### **Results and Discussion**

#### Parasitism levels

Fields were scouted on five of the eight participating farms. Seven fields of those scouted had enough egg masses to estimate parasitism levels, which ranged from 25-100% and averaged 56%.

## Harvest evaluations

Harvest evaluations were conducted on four of the cooperating farms. Infestation levels at harvest in fields receiving only *Trichogramma* for ECB control ranged between 2 and 37%, and averaged 13% (Table 1). This is higher than the 5% or less level of infestation that is our goal for conventional farmers using scouting and thresholds. On one organic farm that is not set up for spraying, ECB populations and infestation levels were very high, with 55% of the plants infested with larvae or egg masses in one planting, and 24% infested in the second. The average level of infestation at harvest for both plantings was 22% (CSA members reported back on infestation levels in the corn in their share). On another organic farm, *Trichogramma* releases were backed up by scouting and applications of Entrust. Each field received one application. The level of infestation on that farm ranged between 0 and 4%. On a third organic farm, on which releases of 30,000 per acre were placed in the most attractive section of corn in a larger field, infestation levels at harvest ranged between 2 and 37%. This farmer felt that infestation levels of 10% or less were acceptable, and there were several harvests below that level. If we tried that release approach again we would use a release rate of 60,000 per acre rather than 30,000. This farmer is interested in learning to scout and use Entrust as a backup to the *Trichogramma*. Other participating farmers commented on the effectiveness of ECB control when responding to the grower surveys. Both growers classified as high-level IPM adopters thought the level of control was comparable to what they achieved with insecticides. An organic farmer who relied exclusively on *Trichogramma* for ECB control reported finding 1-2 infested ears for every 100 harvested.

**Table 1.** ECB infestation at harvest

| Location      | Field     | % Infestation at Harvest |
|---------------|-----------|--------------------------|
| Dutchess Co.  | 1*        | 4.0                      |
|               | 2*        | 0                        |
|               | 3*        | 1.0                      |
| Schoharie Co. | 1         | 4.0                      |
| Seneca Co.    | 2         | 7                        |
|               | 3         | 8                        |
|               | 4         | 13                       |
|               | 5         | 17                       |
|               | 6         | 37                       |
|               | 7         | 6                        |
|               | 8         | 2                        |
|               | 9         | 19                       |
|               | Wayne Co. | 1&2                      |

\* *Trichogramma* releases backed up by scouting and Entrust applications

## Customer surveys

CSA members at one organic farm that used only *Trichogramma* for ECB control were surveyed and asked to report the level of infestation in the corn they received in their share, and their satisfaction with that level of infestation. The infestation level at harvest on this farm averaged 22.3% (range 0-83%). Seventy six members returned survey postcards. Eighty eight percent found the level of infestation acceptable. The 12% who found the infestation level

unacceptable received corn with an average infestation level of 55% (range 33-83%). Those who were satisfied with the level of infestation received corn with an average infestation level of 18% (range 0-75%).

#### Grower surveys

Eight participating growers were surveyed to determine their satisfaction with the level of ECB infestation they saw at harvest, whether they would use *Trichogramma* again, if they felt confident using it on their own, and what resources they would need to be successful. Seven indicated that they were happy with the level of ECB infestation at harvest. One indicated that about half the plantings had infestation levels higher than he found acceptable. All indicated that they would try *Trichogramma* again. Six of the farmers indicated that they felt confident using *Trichogramma* on their own in the future. Five of those had participated in one or more years of *Trichogramma* demonstrations in the past. Resources they needed to be successful included written guidelines, additional training on scouting sweet corn, training on setting up and maintaining pheromone traps, and a chart or other mechanism for keeping track of releases in sequential plantings. Three farmers who were trying *Trichogramma* on their own for the first time this year indicated that they would like to participate in another year of trials to build their confidence before using them on their own.

#### Fact sheet

Several farmers have commented on the draft fact sheet, which was revised and has been circulated for comment. The finished fact sheet will be posted at:  
[http://nysipm.cornell.edu/factsheets/vegetables/swcorn/trich\\_ost.pdf](http://nysipm.cornell.edu/factsheets/vegetables/swcorn/trich_ost.pdf)

#### Commercialization

The Hoffmann lab has helped launch a Tost colony at IPM Laboratories, ([www.ipmlabs.com](http://www.ipmlabs.com)), a commercial insectary and supplier of natural enemies in Locke, NY. They had been making wasps reared by the Hoffmann lab commercially available, and will now be selling wasps reared at their facility.