

Cornell University



Using *Trichogramma ostriniae* to help manage European corn borer in sweet corn, peppers, and potatoes

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Introduction

Beneficial insects such as *Trichogramma ostriniae* can be used as part of an integrated management program for European corn borer or on their own to reduce ECB damage. Releasing beneficial insects is an approved practice for certified organic production.

Trichogramma ostriniae (aka T.ost) is a tiny wasp that's smaller than this comma, but it can tackle much larger prey. T.ost can help you manage European corn borer in sweet corn, peppers, and potatoes.

European corn borer overwinters in the Northeast and is a pest throughout the growing season. In much of upstate NY, corn borer is the only worm pest that you need to manage in sweet corn until migratory fall armyworms and corn earworms arrive, usually in mid- to late summer.

We don't recommend T.ost for corn earworm or fall armyworm. T.ost will parasitize these pests—but we need to do more research before we can recommend just how to use it.

Each female T.ost wasp lays her eggs inside corn borer eggs. Normally she parasitizes every egg in the egg mass. Her larvae develop inside the eggs. They eat everything, then pupate right there, turning the egg mass black. They emerge about 15 days later and mate—then each new female seeks more corn borer eggs to parasitize.

T.ost can help you manage European corn borer. But because these wasps are living organism and wind, rain, and sun can either hurt or help them, the control they offer is unlikely to be as good or consistent as insecticides provide. Organic growers and those without high-clearance sprayers to use in sweet corn are the most likely to benefit from T.ost—as are growers who routinely scout and use thresholds, who will save sprays when T.ost keeps the corn borer numbers below threshold.



PHOTOS: JOE OGRONICK

Fig. 1. a: corn earworm, b: fall armyworm, c: European corn borer.

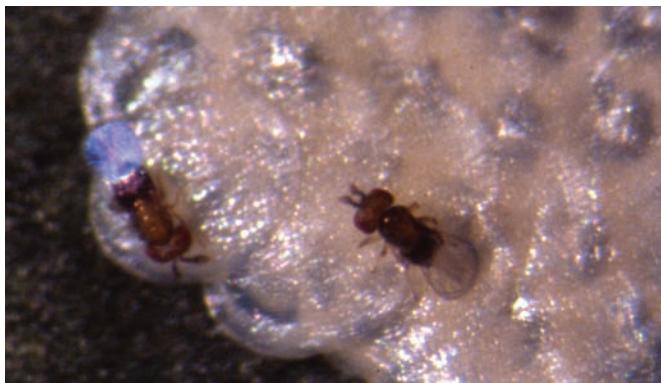


PHOTO: SYLVIE PTICHER

Fig. 2. *Trichogramma ostriniae* on a corn borer egg mass.

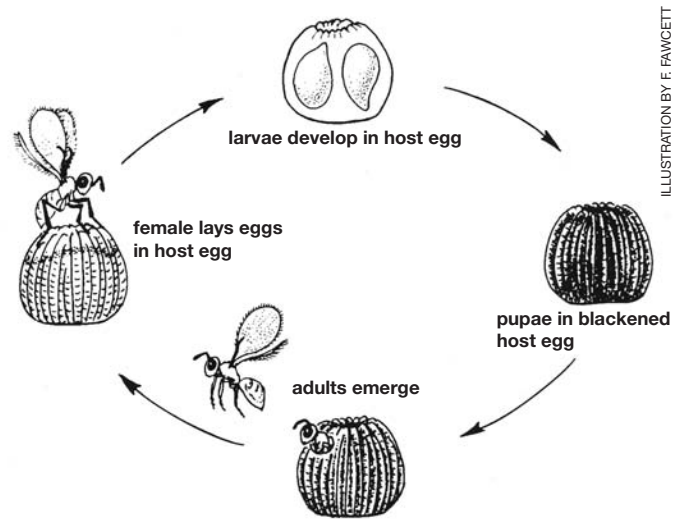


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Fig. 3. *Trichogramma ostriniae* life cycle.

Using T.ost in Sweet Corn

T.ost come to you as pupae inside the grain moth eggs they were reared on. These eggs are glued inside a sturdy paper packet that protects them from lady beetles and lacewings. The packets should not be opened; the wasps can get out through the sides. The adult wasps emerge over the course of a week and fly off to seek corn borer egg masses to parasitize. About 15 days later their offspring emerge, mate, and search for egg masses—and once established, continue until harvest.

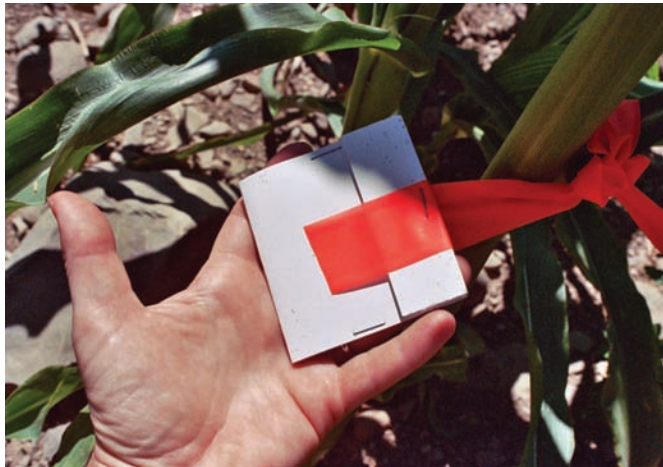


PHOTO: ABBY SEAMAN

Fig. 4. Release packets.

Instructions for using T.ost as your primary European corn borer control

Timing is everything in using T.ost. Our pheromone trap network (Sweet Corn Pheromone Trap Network for Western New York <http://nysipm.cornell.edu/scouting/scnetwork/default.asp> for western NY; Penn State Pest Watch http://www.pestwatch.psu.edu/sweet_corn.htm for the Northeast) alerts you to when corn borer moths begin flying and laying eggs in your area. Time your releases to coincide with these flights. No point in jumping the gun; your wasps won't be able to reproduce if you release them before the borers lay their eggs.

If your farm isn't near any trapping locations, think about purchasing a set of corn borer pheromone traps. Instructions for using corn borer traps can be found in the fact sheet Pheromone Traps—Effective Tools for Monitoring Lepidopterous Insect Pests of Sweet Corn 1995 http://nysipm.cornell.edu/factsheets/vegetables/swcom/pheromone_traps.pdf.

The moths in the first generation flight of ECB, usually in early June, can lay a lot of eggs and cause a lot of damage to early plantings of corn. Damage in fields that have been transplanted, row covered, or planted under plastic can be especially high because the moths are attracted to the largest plants. For the first generation flight we recommend the following release strategy:

Strategy for first generation flight	
First release	30,000 per acre in all fields 6" or taller, as soon as moths start to fly
Second release	60,000 per acre one week later
Third release	60,000 per acre one week after the second release

This release strategy should roughly coincide with the first generation flight.

We use a second release strategy for later fields and subsequent flights of ECB moths. In this case, the fields in the

late whorl through green silk stage are most attractive to the egg-laying female moths.

Strategy for later season releases	
First release	30,000 per acre when the corn has 6-8 leaves (~18" tall)
Second release	60,000 per acre one week after the first release
Third release	60,000 one week after the second release (late whorl/early tassel stage)

Measure your field carefully to be sure you've ordered enough wasps.

Attach one release packet per acre to corn plants evenly spaced through your fields. Avoid field edges.

Tie each packet beneath a leaf about midway up the plant. You want them to have some shade—this reduces heat stress. Tie the third release packets just below the ear zone.

Instructions for using T.ost to suppress European corn borer infestations and save sprays in an IPM management program

One release of 30,000 wasps per acre when corn is about 18 inches tall "inoculates" your cornfield with T.ost, which offers season-long suppression by parasitizing 60–70 % of corn borer egg masses. Inoculative releases are relatively simple to use—and relatively inexpensive. They are compatible with IPM programs that base insecticide applications on scouting and thresholds.

Using T.ost should reduce the number of sprays needed to manage corn borer. Research shows that such releases in unsprayed fields, compared to fields without releases, typically result in 50% damage reduction. This means, for example, that fields that would have incurred 10% damage without spray or T.ost incur only 5% damage when T.ost is used.

Most seasons, inoculative releases are unlikely to provide complete control, but they will help suppress infestations. If your scouting results show that you are above threshold, yes, spraying will probably kill the adults. But T.ost larvae will be protected in the corn borer egg masses. When they emerge, they'll help suppress future generations of borers. Recent research indicates that releasing 30,000 wasps per acre is equivalent to the control offered by one insecticide application, and that combining both releases and insecticides works better than either one alone.

Toxicity of selected insecticides used in sweet corn against <i>Trichogramma</i> wasps.	
Insecticide	Toxicity Rating
Ambush	5*
Asana XL	5
Avaunt	3
Baythroid	5
Intrepid	1
Lannate LV	5
SpinTor	5
Warrior T	5

*5 = most toxic, 1 = least toxic

Monitoring T.ost in the field

Scout for parasitized European corn borer egg masses to see if wasps have become established in your fields. Look near the midribs on the undersides of leaves in the ear zone—extending from the leaf below the lowest ear to the leaf above the top ear. A good time to scout is from tasseling through the green silk stage. This gives you a good sense of how many larvae survived early releases and how many parasitized eggs are still in the field.

The advantage to scouting: low parasitism or very high corn borer infestation (or both!) could contribute to unacceptable levels of infestation at harvest. What can cause low parasitism? Low temperatures—below 40°F—reduce T.ost emergence. And weedy fields or long spells of rainy weather can hinder wasps as they search for egg masses.

Parasitized eggs turn completely black. Normal eggs that are just about to hatch look like little blackheads surrounded by a lighter ring; that's the borer's tiny "head capsule" showing through the surface of the egg.

Not all the egg masses you see as you scout will be old enough to have turned black yet. But if you like to experiment, you could bring a few white egg masses into the house—just cut them out of the leaf—for a couple of days to see if they turn black. Put them into a closed deli carton with a piece of damp paper towel to protect them from drying out.

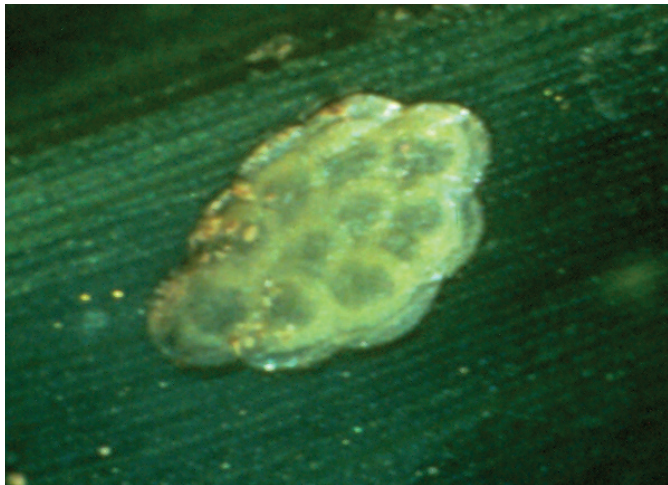


PHOTO: JOE OGORODNICK

Fig. 5. ECB egg mass in the "white" stage, soon after oviposition.

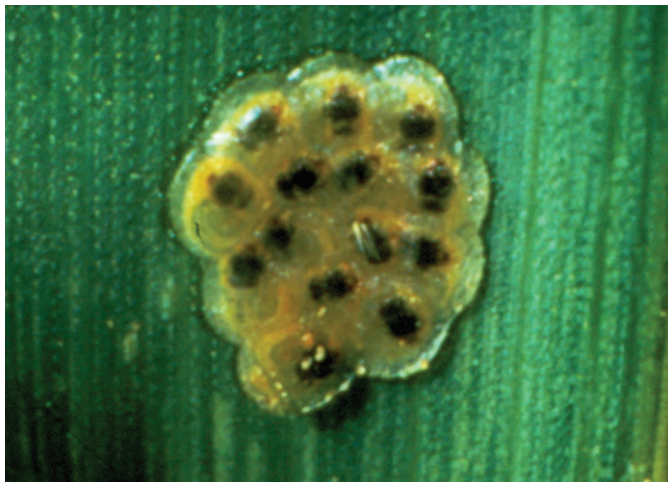


PHOTO: JOE OGORODNICK

Fig. 6. ECB egg mass in the "black head" stage, just before hatching.

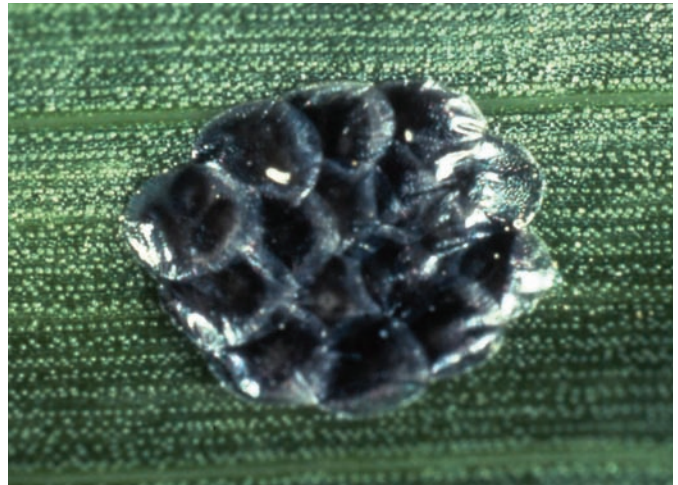


PHOTO: SYLVIE PTICHER

Fig. 7. Parasitized and black head stage egg masses.

Using T.ost in peppers and potatoes

T.ost don't search other crops as successfully as they do corn. Even so, they show promise for managing European corn borers in peppers and potatoes when trap network reports and scouting show that borers are flying.

Release 100,000 wasps per acre during ECB flights when your peppers are at or past flowering. Three or four releases every 7–10 days should suffice.

Two releases of 50,000 wasps per acre during the first generation of borers provide good control in potatoes.

Ordering and handling

Wasps are currently (2008) only being reared for commercial distribution at IPM Laboratories in Locke, NY. To be sure they have enough wasps on hand, contact them as soon as you start planting corn to let them know field sizes and planting dates. They often like to put farmers on an automatic delivery plan, which saves you the trouble of ordering each week. Your job is then to place the wasps in the fields that are in the correct plant stages as described earlier.

Once they come, get the packets into the field as quickly as you can. If there's a delay in setting them out, keep them as cool as possible to delay emergence—but don't refrigerate them. High temperatures—direct sun or a hot car—can toast your T.ost.

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