

The European Corn Borer in Hops and Hemp

As the production of hemp and hops grows in the northeast, pests such as the European corn borer (ECB), *Ostrinia nubilalis*, are increasingly problematic for these crops. As the name suggests, ECB are a major pest of corn, though they can be damaging to hundreds of plants. The ECB caterpillars feed on and weaken plant stems, which can cause them to break, ultimately reducing quality and yields. If corn planting is delayed, ECB may shift to alternate hosts. Depending on the year, farmers have reported varying degrees of damage. Crops located near corn fields can be at higher risk. It is important to understand the lifecycle of the ECB, so proper monitoring and control measures can be put into place to minimize crop damage.

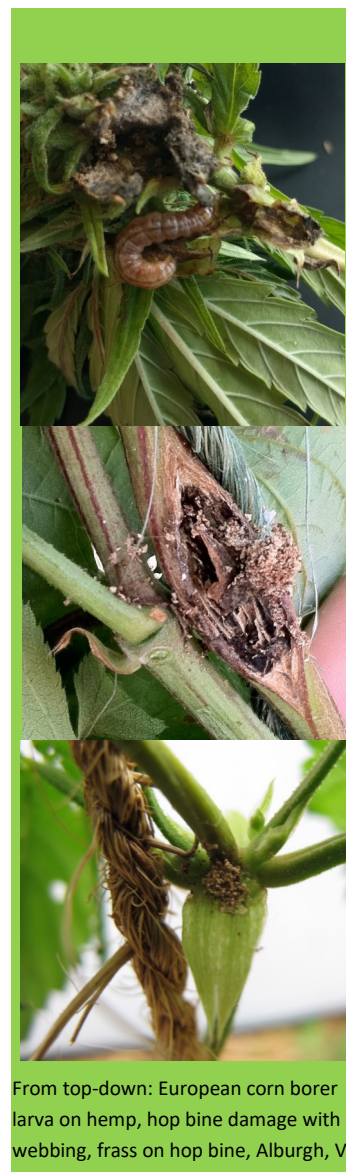
Life Cycle

The ECB overwinters as a caterpillar in crop debris left over from the previous season. They then pupate and emerge as a moth in the spring. The moths generally start their first flight at 374 growing degree-days (GDDs - base 50), begin laying eggs at 450 GDDs (early to mid-June in VT), and their peak flight occurs at 631 GDDs (late June to early July). Females lay 200-500 eggs on their host plants in the following 2-3 weeks, and eggs hatch about 12 days later. Often the first generation lays their eggs in grassy areas, especially if a host crop isn't present. The resulting caterpillars feed on the leaves for about a week, and then bore into stems and petioles, damaging the host plant. Inside the plant, corn borers damage vascular tissue, disrupting the flow of nutrients and water. In warmer parts of the northeast where the seasonal growing degree-day accumulation is sufficient, ECB can complete a second generation with the beginning of the second flight occurring at 1400 GDDs, the first eggs laid at 1450 GDDs, and eggs hatching at 1550 GDDs. In Vermont, this begins in August.

Scouting

Growers should monitor their crops for corn borers eggs beginning in early spring. Regularly scouting your crop is a cheap and easy way to monitor pest populations and potential problems that may arise. The ECB can easily be managed in their egg and larval stages, but once the caterpillars enter the stem or bine, they are more difficult to deal with. To scout your hemp and hop plants, examine the top and bottom of the leaves, on low and high portions of the plant stems. Choose random plants throughout your fields and hop yards to gain a representative view of the entire planting.

The ECB moth flights in June and August can also be monitored using pheromone-baited Scentry Heliothis net traps. Place two traps at least 50 feet apart along the edge of your field or hop yard, with the bottom of the trap above the top of grassy weeds, no higher than 4 inches above the vegetation. Avoid placing them over bare ground. Because there are two strains of ECB found in New England (New York strain and Iowa strain), bait one trap with a lure for each. Be sure to check the traps once or twice per week, and replace lures every other week. Several states in the Northeast maintain ECB monitoring networks geared towards sweet corn production (for example NY: <http://sweetcorn.nysipm.cornell.edu/>, PA: http://www.pestwatch.psu.edu/sweet_corn.htm), so you can get a general idea of when the ECB flights are occurring in our surrounding region. However, ECB distributions are notoriously patchy, so it is important not to become over reliant on data from other states, or even regions within states.



From top-down: European corn borer larva on hemp, hop bine damage with webbing, frass on hop bine, Alburgh, VT.

Northwest Crops and Soils Program | 278 So. Main Street, Suite 2 | St. Albans, VT 05478-1866

802-524-6501 or 1-800-639-2130 (toll-free in Vt.) | susan.brouillette@uvm.edu

uvm.edu/extension/nwcrops

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Depending on the time of the season, you will see the European corn borer in the various forms described below. Evidence of plant damage includes stem wounds, bored holes, and discolored plant tissue. You may also see larval frass (feces) that looks like saw dust.

Eggs	Larvae	Pupae	Moths
Smaller than a pin head, easily seen in clusters	Light grey to faint pink caterpillars	Smooth	Light brown, wavy bands across wings, about 1" long
White, then yellow, then develop a black spot prior to hatching	Dark head & dark spots along sides	Reddish-brown	Tip of body protrudes beyond wings
Covered in waxy film	Pall strip along back	Cylindrical	Male slightly smaller, darker
Found on leaves	Grows to about 1"	½ inch long	Active in grassy areas before dawn



Hops wilting due to tissue damage from corn borer, Alburgh, VT.

Below are the European corn borer life stages; **(A)** eggs with characteristic fish scale appearance, **(B)** hatching larvae, **(C)** frass and pupae within stem, and **(D)** moths. *Photo credit: Smith, Auburn University, Bugwood.org.*



If you determine that a chemical control is necessary, it is important to recognize that because industrial hemp production was only recently legalized throughout the U.S., currently there are very few EPA-registered pesticide products labeled for use on hemp. Hop growers, on the other hand, have more options. Regardless of the crop, effective chemical control can be achieved when used to target newly hatched caterpillars before they enter the stem, during mid-June. Once the ECB has burrowed inside your hemp stalks and hop bines, pesticides will be less effective. This highlights the importance of scouting your crop before making pesticide application decisions. Spraying may be necessary if 15% or more of plants have ECB caterpillars or show fresh feeding damage. If infestation is still over 15% in 4-7 days, spray again. For current information about pesticide registration, see the National Pesticide Information Retrieval System (<http://npirpublic.ceris.purdue.edu/state>) or the appropriate state-run pesticide registration database. Read the label before applying any pesticide, and remember that the label is the law.

Management

Integrated pest management (IPM) strategies combines a variety of techniques to manage the pest below the economic injury level. There are multiple cultural and biological practices that can be effective when dealing with ECB, and other pests, in your field or hop yard. Practices include:

- Burial or removal of crop residues after harvest.
- Autumn plowing and spring tillage to expose pests to natural enemies and the elements.
- Cultivation or cover cropping to keep weeds down
- Planting an early adjacent trap crop like corn, to attract ECB to lay larvae there instead .
- Promoting naturally occurring predators (ladybugs, green lacewings, etc.) by planting adjacent flowering plants. Natural predators like ladybugs are also attracted to pollen.
- Transplanting hemp early to help seedlings harden before pests start to arrive.
- Releasing commercially available natural enemies. *Trichogramma* wasps can be purchased as cards of eggs at an insectary or online, such as at arbico-organics.com and groworganic.com. *Trichogramma* wasps are parasites that lay their eggs inside the ECB eggs, preventing them from hatching. They should be release when the moths are beginning to lay eggs, within a week of the start of the moth flight.

Sources: McPartland, J.M. (2000). *Hemp Diseases and Pests: Management and Biological Control: an Advanced Treatise*. CABI Publishing.

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