Don’t Overlook European Corn Borer

KEY POINTS

- Yield loss continues to occur annually from European corn borer (ECB).
- The use of corn products protected from ECB by *Bacillus thuringiensis (B.t.)* corn technology has contributed to considerable suppression of the insect.[1]
- Potential yield loss has been reported to be 12.1% when there are 3 ECB larvae/ plant at tassel.[4]
- Scouting and treating ECB with an insecticide when thresholds are exceeded may only result in 60-80% control.[1,2]

Table 1. European corn borer life stages and feeding activity[3]

Life Stage	Accumulated Degree Days (50 °F Base)	Larval Activity
First Spring Moth	0	
Larval Hatch	212	Pinhole leaf feeding
First Generation 2nd to 5th Instars	318-792	Shot-hole feeding, mid-rib & stalk boring
2nd Generation Larval Hatch	1404	Pollen & leaf axil feeding
2nd Generation 2nd to 5th Instars	1510-1984	Sheath, collar, mid-rib feeding, stalk boring

The widespread use of *B.t.* corn products has contributed to suppression of ECB populations. Growers who are using non-*B.t.* corn products face potential challenges from ECB infestations that can result in yield loss, quality issues, and the need to rely on precisely timed insecticide applications for potential control.

ECB Life Cycle, Description, and Scouting

Fifth instar ECB larva overwinter in corn stalks, stems of other host plants, and in plant debris on or in the soil. Larvae begin pupation when temperatures reach 50 °F in the spring and emerge as moths about 7 to 10 days later. Male and female moths are similar in appearance and have alternating yellow and brown wavy lines across each wing (Figure 1, Top).

In corn, the moths generally seek out the taller corn in the area (usually the earliest planted) to lay eggs for the first generation.

- Individual eggs are about the size of a pencil lead, are laid in clusters that overlap, and are similar in appearance to fish scales.
- An egg cluster can contain as many as 60 eggs, but average about 23 eggs.
- Eggs hatch in about 5 to 7 days.
- Prior to hatch, the larvae can be seen inside the egg with a visible black head capsule.
- Mature ECB larvae are about 1 inch in length and have two distinct brown spots on each abdominal segment.

Figure 1. (Top) European corn borer egg mass, larva, adult moth, and pupa and (Bottom) shot holes from whorl feeding can interfere with nutrient translocation.

First Generation ECB. Beginning at moth activity, accumulated growing degree days (GDD), base 50 °F, can be used as an aid to decide when to scout for first generation larvae and whorl damage (Table 1). Larvae feed on plant leaves in the whorl, chewing small holes in the leaves which create a “shot-hole” effect when leaves unfurl (Figure 1, Bottom). Third and fourth instar larvae begin to tunnel into the stalk or leaf midribs where they develop, mature, and later pupate. Larvae may be found in unrolled leaves

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in the whorl or behind leaf sheaths. Stalks need to be split to find older larvae.

Figure 2. Second generation European corn borer feeding in ear shank and associated frass.

Second Generation ECB. Begin scouting for second generation egg masses when ECB moths are found in light or pheromone traps. Fields most likely to be infested have green, succulent corn plants with shedding pollen or green silks in late July and early August, usually later planted corn. Particular attention should be placed in silage production areas where longer maturity products, which could be at higher risk of infestation, are used. Egg masses should be counted on the underside of the leaves above and below the ear leaf for a 3 to 4 week period during egg laying. Young larvae feed on pollen in leaf axils or on leaves. Larger larva feed on leaf sheaths, collars and midribs before tunneling into stalks, ears, and ear shanks (Figure 2). Stalk tunneling affects the plant’s ability to transfer nutrients and water to the developing ear resulting in the potential for yield loss. Ear drop, stalk breakage, and secondary invasion of stalk rot also contribute to the potential for yield loss.

ECB Economic Thresholds. Treatment thresholds change based on growth stage at time of infestation (Table 2), expected yield, price/bu, and insecticide treatment cost/acre. To assess first generation infestation levels, additional field information such as percentage of plants with whorl feeding and average number of larvae/infested plant should be determined. For second and later generations, determine average number of egg masses/plant.

Granular or liquid insecticide applications directed over the whorl provide about 80% control of first generation larvae.[1,2] Insecticide applications for second generation larval control is estimated to be 60 to 75%.[1,2] Once larvae begin boring into the stalk, insecticide applications are ineffective. Multiple applications may be necessary to provide adequate control for both first and second generations. It’s important to remember that some insecticides can flare mite populations, primarily due to the loss of natural enemies killed by the insecticide treatments. Scout for mites within 5 days after an insecticide application.

Table 2. Percentage yield loss caused by European corn borers (ECB) at various corn growth stages*, [4]

Plant Stage	Number of ECB Larvae/Plant		
	1	2	3
Early Whorl	5.5	8.2	10.0
Late Whorl	4.4	6.6	8.1
Pre-Tassel	6.6	9.9	12.1
Pollen Shedding	4.4	6.6	8.1
Blister	3.0	4.5	5.5
Dough	2.0	3.0	3.7

*Percentage yield loss is based on physiological stresses and does not include loss due to stalk breakage and/or ear breakage.

Management worksheets that outline scouting procedures and help calculate treatment thresholds are available from state Extension services.[1]

Corn producers may want to consider protecting yield potential by selecting *B.t.* corn products that provide protection against ECB yield loss. VT Double PRO® corn technology has dual modes of action against ECB and other above-ground insects. Genuity® VT Triple PRO® corn and SmartStax® corn technologies provide protection against ECB, other above-ground insects, and corn rootworms.

Sources:

[1]Fernandez-Cornejo, J., Wechsler, S., Livingston, M., and Mitchell, L. 2014. Genetically engineered crops in the United States. USDA-ERS Economic research report number 162. https://ssrn.com/abstract=2503388 or http://dx.doi.org/10.2139/ssrn.2503388

[2]Gray, M.E. 2014. Remember the European corn borer? the Bulletin, June 30, 2014. University of Illinois. http://bulletin.ipm.illinois.edu/?p=2354

[3]Cook, K.A., Ratcliffe, S.T., Gray, M.E., and Steffey, K.L. 2003. European corn borer. Insect Fact Sheet. Integrated pest management. University of Illinois. https://ipm.illinois.edu/fieldcrops/insects/european_corn_borer.pdf

[4]Krupke, C.H., Bledsoe, L.W., and Obermeyer, J.L. 2010. European corn borer in field corn. Bulletin E-17-W. Purdue University.

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