

## Corn Earworm in Corn (Corn-Growing Area)

- Corn earworm (CEW) feed on more than 100 wild plants and at least 16 cultivated crops; they are also called cotton bollworm, soybean podworm, tomato fruit worm, and vetchworm.<sup>1</sup>
- Yield losses from CEW in the United States are estimated to range from 5 to 7% annually.<sup>1</sup>
- Proper identification of CEW is critical for an appropriate management strategy.
- Insecticides are expensive and may not be effective against CEW; however, new tools are available to combat this pest and help protect corn yield potential.



### Corn Products with Insect Trait Protection

Genuity® brand corn insect trait products have the potential to improve grain quality and increase yield potential by providing multiple modes of action for advanced above ground insect protection (Figure 1). Genuity® VT Double PRO®, Genuity® VT Triple PRO®, and Genuity® SmartStax® technologies provide dual modes of action for above-ground insects, including CEW. Other corn products containing insect protection traits such as Optimum® AcreMax® or Optimum® IntraSect® have no mode of action against CEW (Table 1).



Figure 1. Corn ear without (left) and with (right) Genuity® VT Triple PRO® trait.



Figure 2. CEW larvae vary in color. Note the dark tubercles along their back and sides and the orange head capsule.

### CEW Larvae Identification

Corn earworm larvae feed on corn ears, cotton squares and bolls, grain sorghum seed heads, and soybean pods and seeds. When small, CEW larvae are pale yellow, while the larger larvae are pale green to dark brown. There are 3 to 4 stripes across their body length and numerous small, black spines along their back and sides (Figure 2). When disturbed, they curl into a C-shape.<sup>1</sup>

**Similar Larvae.** Larvae of CEW can be mistaken for fall armyworm (FAW), true armyworm (TAW), European corn borer (ECB), southwestern corn

**Table 1. Trait Comparison of Mode of Action (MOA) for Control/Management of Corn Insects in the Corn-Growing Area.<sup>1</sup>**

Insect Species	Genuity® SmartStax®	Genuity® VT Double PRO®	Genuity® VT Triple PRO®	Optimum® AcreMax®	Optimum® IntraSect®
Corn Earworm <sup>2</sup>	**	**	**		
Fall Armyworm	***	**	**	*	*
European Corn Borer	***	**	**	**	**
Southwestern Corn Borer	***	**	**	**	**
Western Bean Cutworm	*			*	*
Refuge (Corn Growing Area)	5% RIB	5% RIB	10% RIB	95:5 Integrated	5% Structured

<sup>1</sup>MOA = Control of Pest: \* = single mode-activity, \*\* = dual mode-activity, \*\*\* = triple mode-activity;

<sup>2</sup>In the 2014 Product Stewardship Guide, DuPont Pioneer claims suppression of corn earworm with Optimum® AcreMax® and Optimum® IntraSect® products.

borer (SWCB), or western bean cutworm (WBC); however, they can be identified by markings and head capsule color (Figure 3):

- **FAW** larvae have a prominent white, inverted Y-shaped mark on their head capsule. The larvae vary from light tan or green to almost black in color.
- **TAW** have a gray or greenish-brown head covered with a network of lines.
- **ECB** head is dark brown to black. The larvae have smooth, dirty white colored skin, often having a pinkish tinge, with several dark spots scattered over the sides and top of the body.
- **SWCB** larvae have a brown head and are dull white with a pattern of raised black spots on the body.
- **WBC** are tan with a darker, faint diamond-shaped pattern on their back, and dark stripes immediately behind their head. Larvae turn pinkish tan or pale brown as they mature.

### CEW Life Cycle & Feeding

There are usually two generations per year in much of the Midwest but multiple generations



Figure 3. Larvae similar to CEW. The TAW and SWCB images are courtesy of Frank Peairs, Colorado State University, bugwood.org.

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can occur in the South per year. The adult moth migrates from the southern states to other areas of the Corn Growing Area/Midwest with winds and storms in late spring and early summer.

First generation moths mate and females lay eggs in the whorl of the corn plant, while the second generation lays eggs on corn silks. Each female can produce 500 – 3,000 eggs.<sup>1</sup>



## Damage Symptoms

First generation CEW larvae feed in the whorl causing numerous ragged holes on the unfurled leaves and slight defoliation (Figure 4).

The second generation usually appears during pollination. Larvae enter the corn ear primarily through the silk channel.

Feeding may cause damage to the tassel, silks, and kernels.<sup>2</sup> As silks dry, CEW begin feeding on tip kernels and along the sides of the ear near the tip. Injury from CEW larvae feeding can provide an entry point for secondary pests, including fungi, that may produce mycotoxins. Because CEW larvae are cannibalistic, only one larva usually survives per ear.



Figure 4. Holes on corn leaves due to whorl stage feeding of CEW.

## Scouting

**Early Feeding.** Scouting for CEW should begin in early spring. Potential damage from CEW can be estimated by using pheromone traps to count adult moths that enter an area to lay eggs.

**Late Feeding.** Scouting for CEW larvae should also occur later in the season by evaluating corn ears. Although damage may have already occurred, products can perform differently in regards to CEW feeding.

## Monitor CEW Feeding & Damage

It is highly recommended to follow the non-destructive steps, outlined below, to evaluate CEW damage, to keep the corn ear attached:

- When silks begin to appear, pull them back lightly.
- If there is no damage from CEW, silks will stay attached and resist being pulled out (Figure 5).
- If silks are not attached and can



Figure 5. No CEW damage as silks cannot be pulled out easily.



Figure 6. When corn silks can be pulled out easily, silks have been cut or damaged by CEW.



Figure 7. Cut silks of a corn ear damaged by CEW.

be pulled; using slight pressure, continue to pull until the silks are out of the husk. Damage can include cut silks and kernel feeding; larva may still be present (Figures 6-7).

## Comparing Larval Ear Feeding Damage.<sup>2</sup>

- **CEW** larvae enter the ear through the silk channel, while the **ECB** and **FAW** enter through the husks or cob. The latter also enter at the base of the ear feeding along the sides and may tunnel into the cob. They usually emerge at the base of the ear, leaving round holes in the husks.
- **ECB** feed on pollen and silks before entering the ear by tunneling through the shank and cob. ECB feeding is not focused on any one area. Injury can occur at both ends and along all sides of the ear.
- **WBC** enter corn ears through silk channels or by chewing through husks, causing injury to the tip, base, and sides of the ear. Larvae of the WBC are not cannibalistic, and several may infest an ear.

## Insecticide Applications

If the corn crop doesn't contain *B.t.* traits that offer control against CEW, an insecticide application may be considered in whorl stage corn, if economic threshold levels are met.

Insecticide use for CEW feeding on corn ears is not economical because the CEW is protected by the ear husk.

Sources: <sup>1</sup> Boyd, M. and W. Bailey. 2001. Corn earworm in Missouri. MU Guide, University of Missouri-Columbia, <https://mospace.umsystem.edu> (verified 5/21/14); <sup>2</sup> Cook, K. 2005. Corn earworm, European corn borer, fall armyworm, or western bean cutworm: Which one is causing the injury I'm finding on my corn ears? The Bulletin No. 23, Article 4. University of Illinois, <http://bulletin.ipm.illinois.edu> (verified 5/22/14). Steffey, K.L. et al. 1999. Handbook of corn insects. Entomological Society of America.

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