



Corn Earworm and Western Bean Cutworm Control with Genuity® Traits

When evaluating the performance of Genuity® corn insect protection traits, it is important to know where these traits are expressed in the plant and how these traits affect target insects. Comparing corn with Genuity® traits to corn with other trait offerings or no traits can help determine the efficacy and consistency of Genuity® traits.

INSECT BIOLOGY AND DAMAGE

Larvae of corn earworm (CEW; *Helicoverpa zea*) and western bean cutworm (WBC; *Loxagrotis albicosta*) are often mistaken for each other and the damage they cause can be indistinguishable. Because Genuity® VT Double PRO™, Genuity® VT Triple PRO™ Corn, and Genuity® SmartStax™ Corn offer different levels of protection against these important corn pests (Table 1), finding the larvae responsible for any injury and accurately identifying them is critical to evaluating Genuity® traits.

Corn Earworm

- CEW larvae are light green to dark brown, usually have an orange head capsule, and 3 to 4 stripes across their body length (Figure 1).
- Losses from CEW have been estimated as high as 7%¹.
- Larvae feed on leaves; disrupt pollination by feeding on silks and tassels; cause injury to the ear and destroy developing kernels.
- Injury to the ears can allow invasion by secondary pests and fungi that may produce mycotoxins.

Figure 1. CEW larvae ranging in color from light green to brown. Note the dark tubercles along the length of the body.



Figure 2. WBC larvae showing a range of sizes and colors (Source: Purdue Extension Entomology).

Table 1. Mode of action of control for CEW and WBC with Genuity® corn products.

	Genuity® VT Double PRO™	Genuity® VT Triple PRO™	Genuity® SmartStax®
CEW	**	**	**
WBC			*

* = single mode-activity, ** = dual mode-activity

Western Bean Cutworm

- WBC larvae 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 (Figure 2).
- Larvae may enter the whorl to feed on pollen in the tassel or if the plant has tasseled, to the ear to feed on silks.
- Pollination may be poor if silks are damaged from feeding.
- Once the ear is formed, cutworms feed on developing kernels and can destroy as much as 50 to 60% of the kernels².
- Losses due to direct larval feeding may be compounded by subsequent fungal and mold infections associated with larval waste products.

EXPECTED LEVEL OF PROTECTION

While control of CEW and WBC is good with Genuity® traits, these insects do need to feed on plant tissue to ingest the *B.t.* protein. Therefore, minor feeding may be observed, but damage should be minimal. Moths lay eggs indiscriminately on corn. Consequently, larvae may be present in fields planted with Genuity® corn products; however,

- Fewer larvae should be present on Genuity® products and these larvae are often smaller than those found on other corn products (Figure 3).
- The larvae that are present on corn with Genuity® traits generally do not make it to pupation and exit holes in ears with Genuity® traits are rarely found.

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Figure 3. Smaller CEW larva and less damage on Genuity® hybrid (right) compared to larva and damage in a similar hybrid without Genuity® insect protection traits.



Figure 4. WBC larvae hatching. Fields nearing tassel emergence and/or hybrids with upright leaves are preferred for egg-laying.



Figure 5. Tight husks keep larvae near the ear tip.



Figure 6. Insect feeding limited to aborted kernels on a Genuity® VT Triple PRO™ hybrid.

The *B.t.* proteins that target CEW and WBC in Genuity® corn products are expressed in kernels and green tissue such as leaves, stalks, silks, and husks. When evaluating the presence of larvae in Genuity® products, remember that:

- CEW, WBC, and other target insects must eat plant tissue containing expressed Genuity® *B.t.* traits in order to be controlled.
- Larger larvae that have survived by cannibalizing other CEW larvae or have been feeding on non-expressing tissue must ingest a higher dose of the *B.t.* protein and may take longer to die.
- Larvae that do survive tend to be smaller and less vigorous than larvae on other corn technologies.

OTHER FACTORS AND CONSIDERATIONS

Plant morphology and environmental factors can influence the amount of feeding that occurs and whether larvae are present.

- Hybrid maturity, timing of silking, and husk cover and tightness influence the number of larvae and damaged kernels (Figures 4 and 5).
- Ears that are tipped back due to drought stress or other factors can look worse than they really are. Insect feeding may be limited to aborted kernels and feeding on harvestable kernels may not occur (Figure 6).

- Ear rot fungi may be introduced where insect feeding does occur; however, the limited insect feeding on Genuity® products can reduce the risk of ear rots like *Aspergillus* and development of mycotoxins such as aflatoxin.
- Other insects, such as sap beetles, may infest injured areas and cause additional damage.

Sources: ¹M.L. Boyd & W.C. Bailey 2001. Corn earworm in Missouri. MU Extension, University of Missouri-Columbia. [Online] <http://extension.missouri.edu> (Verified 7/23/11);

²Steffey, K. et al. 1999. Handbook of Corn Insects. Entomological Society of America.

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