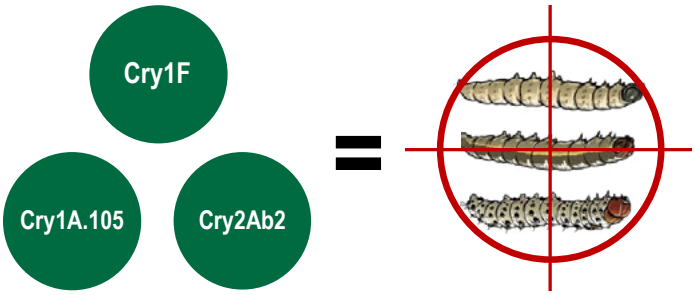
PowerCore® Enlist® Corn—
Making a Difference in Pest Protection

We've been telling you all about PowerCore® Enlist® corn, an advanced product with best-in-class weed control and elite genetics to maximize yield potential. Another benefit of PowerCore Enlist corn comes from the broad-spectrum insect control that helps it protect against tough above-ground pests.

PowerCore Enlist corn features three *Bt* proteins for superior protection against above-ground insects. Each protein offers a distinct mode of action (MOA), and these multiple MOAs delay insect populations developing resistance to *Bt* proteins.



Three *Bt* proteins

Broad-spectrum above-ground insect control

Here's how it works: *Bt* toxins attach to receptors in the gut of pest larvae, causing them to stop feeding, eventually killing the insect. Each *Bt* protein works with specific receptors inside the insect. The three *Bt* proteins in PowerCore Enlist corn provide three different MOAs, whereas VT Double PRO® corn only utilizes two (see table).

More MOAs make a difference. Over time, insects can develop resistance to specific *Bt* proteins through natural selection. Researchers believe resistance develops through three main methods: disruption of the activation of the *Bt* protein inside the insect's gut, mutation or regulation of *Bt* receptors inside the insect, and changes in insect immune systems. Technologies with a pyramid of traits, like PowerCore Enlist corn, incorporate *Bt* traits that bind to insects in multiple ways, making it more difficult for insects to develop selective resistance. As part of an integrated pest management program, PowerCore Enlist corn helps farmers simplify their approach to managing resistance risk.

This kind of effective pest control is important because pests can significantly impact the success of farmers' acres. **It takes less damage than you might think to impact yield: Damage to just 3 kernels per ear can cause a loss of one bushel per acre in lost yield.**

The *Bt* protein technology in PowerCore Enlist corn controls pests including black cutworm *(see next page)*, corn earworm, European corn borer, fall armyworm and Southwestern corn borer.

How does PowerCore Enlist corn trait technology stack up?

- PowerCore Enlist corn provides more effective modes of action against a broader spectrum of above-ground insect pests.

Primary pest controlled	PowerCore® Enlist® corn trait technology	Genuity® VT Double PRO®
 Black cutworm	✓	NONE
 European corn borer	✓✓✓	✓✓
 Fall armyworm	✓✓✓	✓✓
 Southwestern corn borer	✓✓✓	✓✓

Pest Prevention Focus: **Black Cutworm**

PowerCore Enlist corn's pyramid of *Bt* traits helps control some of the most problematic above-ground pests in corn. This month, learn more about the impact black cutworm can have on corn crops.

Pest:
Black cutworm

Scientific name:
Agrotis ipsilon

Black cutworm distribution

There are several generations of black cutworms per year. Usually only the first generation poses a threat to crops.

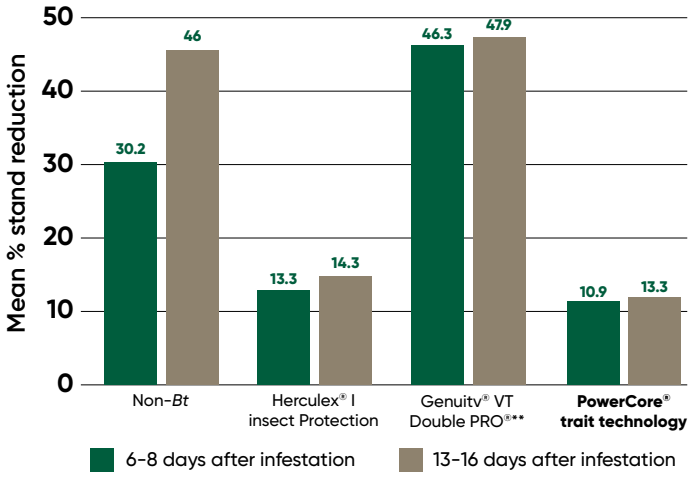
Adults (see photo) migrate north in the spring, south in the fall.

Damages from black cutworm:

- Primarily damages corn seedlings.
- Small larvae chew holes in seedling leaves (injury does not typically cause economic losses).
- Larger larvae cut plants off just below, at or just above the soil surface, reducing stand.

Black cutworm stand reduction

***Bt* corn vs. non-*Bt* corn (15 trials in five states, 2009-11)*[1]**



PowerCore Enlist corn improves stand reductions by approximately 20 to more than 30 percentage points over non-*Bt* corn.

Yield impact:

- Yield reduction depends on the plant's stage of development when cutting occurs—V1 to V5 stages are most vulnerable—and the location of cutting injuries.
- Estimates of impact on yield are highly variable, but could be up to **24% yield loss for V3 plants cut, and up to 81% yield loss for V5 plants cut.**

With its potentially significant impact on corn yields, black cutworm is a pest farmers will want to control in their fields, and PowerCore Enlist corn can help them do that.

*Efficacy of the *Bt* proteins expressed for control of lepidopteran pests.
**Double PRO does not claim to control black cutworm.

[1] Rule, D. M., S. P. Nolting, et al. "Efficacy of pyramided *Bt* proteins Cry1F, Cry1A.105, and Cry-2Ab2 expressed in SmartStax corn hybrids against lepidopteran insect pests in the northern United States." *Journal of Economic Entomology*, 107, 1 (2014): 403–409. https://pubmed.ncbi.nlm.nih.gov/24665726/

In next month's Pest Prevention Focus, we'll cover the impact of European corn borer.