

## Selecting Traits for Corn Insect Management

Historically, corn products were selected based on their performance across multiple locations and years, as well as the desired end-use of the product (grain, silage, ethanol, food-grade, etc.). Yield consistency, emergence, vigor, standability, disease tolerance, tillage, population, etc. are all important factors to consider when selecting corn products. However, with the advent of insect-protection traits in corn, selection of the correct product also needs to include above- and below-ground insect control.

There are a number of *Bacillus thuringiensis* (*B.t.*) trait options available across most corn production areas of the U.S. for insect protection. The first step in this process is identifying the insect pest(s) that are likely to be present and selecting the proper trait(s) to control those pests. Some common insects that are currently controlled or suppressed with insect-protection traits in corn are:

- European corn borer
- Corn earworm
- Western corn rootworm
- Southwestern corn borer
- Western bean cutworm
- Northern corn rootworm
- Fall armyworm
- Black cutworm
- Mexican corn rootworm

By providing protection against insects, biotech traits can dramatically reduce the risk of damage caused by insect feeding such as stalk and root lodging, ear droppage, and overall yield loss.

					ABOVE-GROUND			BELOW-GROUND	
		% Refuge in Bag	Glyphosate Tolerant	Glufosinate Tolerant	VT Double PRO®	Herculex® I	Agrisure Viptera®	YieldGard VT Rootworm/RR2™	Herculex® RW
<ul style="list-style-type: none"> <li>• One effective mode of action</li> <li>• • Two effective modes of action</li> </ul> <p><i>Refer to the table on page 3 for information regarding efficacy against specific insect pests.</i></p>									
<b>BAYER CROP SCIENCE</b>	VT Double PRO® corn		•		••				
	VT Double PRO® RIB Complete® corn blend	5%	•		••				
	Trecepta® corn		•		••		•		
	Trecepta® RIB Complete® corn blend	5%	•		••		•		
	VT Triple PRO® corn		•		••			•	
	VT Triple PRO® RIB Complete® corn blend	10%	•		••			•	
	SmartStax® corn		•	•	••	•		•	•
	SmartStax® RIB Complete® corn blend	5%	•	•	••	•		•	•

**Figure 1. The corn insect B.t. trait reference table indicates which traits are available for above- and below-ground insect control. The % refuge in bag is also noted. For cotton-production areas there is no refuge in bag option for traitled corn. The refuge must be structured.**

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## VT Double PRO®

VT Double PRO provides above-ground protection from European corn borer, southwestern corn borer, fall armyworm, and corn earworm with two modes of action (MOA) for each of these pests.

## Trecepta®

Trecepta technology offers protection from European corn borer (2 MOA), southwestern corn borer (3 MOA), fall armyworm (3 MOA), corn earworm (3 MOA), black cutworm (1 MOA), and western bean cutworm (1 MOA). Where these insects are a concern, the use of Trecepta will give added protection with the additional MOA. If a corn field is being planted early or later than the majority of the corn fields in the area, those fields may experience higher infestations of corn insects. Trecepta can be an important management tool to reduce the damage caused by insect pests.

## SmartStax® Technology and Corn Rootworm

In many areas of the Corn Belt, production practices that favor the growth of corn rootworm (CRW) populations include long-term corn rotations, late-planted fields, and/or planting of late-maturing corn products. For example, full-season corn products used by many silage growers are often prime targets for escalating CRW beetle populations because they pollinate later in the season when other desirable adult CRW food sources have deteriorated.

## Management Options for CRW Control

- Crop rotation has been and continues to be a recommended method to effectively control CRW larvae. However, crop rotation is not as effective in certain areas of the Corn Belt due to extended diapause populations of northern corn rootworm and the soybean variant of western corn rootworm.
- Seeds with multiple MOA, such as products with SmartStax® technology, have proven to be a consistent CRW management tool.
- If rotation or SmartStax® RIB Complete® corn blend products are not acceptable options, consider using soil-applied insecticides in combination with corn products that do not have protection from CRW.

	ABOVE GROUND			BELOW GROUND	
	VT Double PRO® corn	Herculex® I	Agrisure Viptera®	YieldGard VT Rootworm/RR2™	Herculex® RW
European corn borer	**	*			
Southwestern corn borer	**	*	*		
Fall armyworm	**	*	*		
Corn earworm <sup>1</sup>	**		*		
Western bean cutworm			*		
Black cutworm		*	*		
Western corn rootworm				*	*
Northern corn rootworm				*	*
Mexican corn rootworm				*	*
**Dual-mode activity      *Single-mode activity Mode of action equals control of pest.					
<sup>1</sup> Cry1A.105 and Cry2Ab2 from <i>B.t.</i> controls or suppresses corn earworm.					

**Figure 2. Corn insect B.t. trait reference table indicating which insects are controlled or suppressed by which trait.**

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- Due to resistance concerns, planting single-mode-of-action technologies such as VT Triple PRO® products or VT Triple PRO® RIB Complete® corn blend products is not recommended when less than satisfactory control of CRW has been observed.

Corn product selection is a critical component for achieving yield goals. All of the selection criteria used for historic product selection is still important, but it is equally important to select and implement the proper traits to manage insect pressure and maximize yields.

## Sources

- <sup>1</sup> Carefully Choose Corn Hybrids for Your Farm Crop Science US. <https://www.cropsience.bayer.us/learning-center/articles/carefully-choose-corn-hybrids-for-your-farm?print=true>
- <sup>2</sup> Transgenic Trait Selection in Corn-Why is corn selectively bred? <https://agrilifeextension.tamu.edu/library/farming/transgenic-trait-selection-in-corn/>
- <sup>3</sup> A Guide to Choosing Corn Hybrids. <https://crops.extension.iastate.edu/cropnews/2017/10/guide-choosing-corn-hybrids>

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**ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS.** *B.t.* products may not yet be registered in all states. Check with your seed brand representative for the registration status in your state.

**IMPORTANT IRM INFORMATION: RIB Complete®** corn blend products do not require the planting of a structured refuge except in the Cotton-Growing Area where corn earworm is a significant pest. **See the IRM/Grower Guide for additional information. Always read and follow IRM requirements.**

**Performance may vary,** from location to location and from year to year, as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible and should consider the impacts of these conditions on the grower's fields.

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