

## Bt Corn Products Available as of October 2020

Trade Name	Bt Protein(s) 1st Line = Above Ground 2nd Line = Below Ground	# of Bt Proteins Providing Protection							Herbicide Tolerance				Refuge % & Location
		Above Ground						Below Ground					
		BCW	CEW	ECB	FAW	TAW	WBC	CRW	LL	GT	RR2	Enlist	
Agrisure® CB/LL	Cry1Ab	0	0-1	1	0	0	0	0	X				20% - 400 m
Agrisure® GT/CB/LL Agrisure® 3010	Cry1Ab	0	0-1	1	0	0	0	0	X	X			20% - 400 m
Agrisure® 3000GT	Cry1Ab mCry3A	0	0-1	1	0	0	0	0-1	X	X			20% - adjacent
Agrisure® 3120 E-Z Refuge®	Cry1Ab, Cry1F	1	0-1	1-2	0-1	0	0	0		X			5% IR
Agrisure® 3122 E-Z Refuge®	Cry1Ab, Cry1F mCry3A, Cry34/35Ab1	1	0-1	1-2	0-1	0	0	0-2		X			5% IR
Agrisure 3110 Viptera®	Cry1Ab, Vip3A	1	1-2	1	1	1	1	0	X	X			20% - 400 m
Agrisure 3111 Viptera®	Cry1Ab, Vip3A mCry3A	1	1-2	1	1	1	1	0-1	X	X			20% - adjacent
Agrisure Viptera® 3220 E-Z Refuge®	Cry1Ab, Cry1F, Vip3A	2	1-2	1-2	1-2	1	1	0		X			5% IR
Agrisure Viptera® 3330 E-Z Refuge®	Cry1Ab, Vip3A, Cry1A.105/ Cry2Ab2	1	1-4	3	3	1	1	0	X	X			5% IR
Agrisure Duracade® 5122 E-Z Refuge®	Cry1Ab, Cry1F mCry3A, eCry3.1Ab	1	1-2	1-2	1-2	0	0	0-2	X	X			5% IR
Agrisure Duracade® 5222 E-Z Refuge®	Cry1Ab, Cry1F, Vip3A mCry3A, eCry3.1Ab	2	1-3	1-2	1-3	1	1	0-2	X	X			5% IR
Genuity® VT Triple PRO®	Cry1A.105/Cry2Ab2 Cry3Bb1	0	0-2	2	2	0	0	0-1			X		10% IR
Optimum® AcreMax®	Cry1Ab Cry1F	1	0-1	1-2	0-1	0	0	0	X		X		5% IR
Optimum® AcreMax® Leptra®	Cry1Ab, Cry1F, Vip3A	2	1-2	1-2	1-2	1	1	0	X		X		5% IR
Optimum® AcreMax® XTreme	Cry1Ab, Cry1F Cry34/35Ab1, mCry3A	1	0-1	1-2	0-1	0	0	0-2	X		X		5% IR
Optimum® Intrasect®	Cry1Ab, Cry1F	1	0-1	1-2	0-1	0	0	0	X		X		5% - 400 m
PowerCore™	Cry1F, Cry1A.105/Cry2Ab2	1	0-2	2-3	2-3	0	0	0	X		X		5% IR
PowerCore Enlist™	Cry1F, Cry1A.105/Cry2Ab2	1	0-2	2-3	2-3	0	0	0	X		X	X	5% IR
Qrome	Cry1Ab, Cry1F Cry34/35Ab1, mCry3A	1	0-1	1-2	0-1	0	0	0-2	X		X		5% IR

Trade Name	Bt Protein(s) 1st Line = Above Ground 2nd Line = Below Ground	# of Bt Proteins Providing Protection (See Resistance Table Provided Below)							Herbicide Tolerance				Refuge % & Location
		Above Ground						Below Ground	LL	GT	RR2	Enlist	
		BCW	CEW	ECB	FAW	TAW	WBC	CRW					
SmartStax® (Bayer)	Cry1F, Cry1A.105/Cry2Ab2 Cry3Bb1, Cry34/35Ab1	1	0 – 2	2 – 3	2 – 3	0	0	0-2	X		X		5% adjacent (2 row min) or 5% IR
SmartStax® Enlist™	Cry1F, Cry1A.105/Cry2Ab2 Cry3Bb1, Cry34/35Ab1	1	0 – 2	2 – 3	2 – 3	0	0	0-2	X		X	X	5% IR
SmartStax® Refuge Advanced (Corteva™)	Cry1F, Cry1A.105/Cry2Ab2 Cry3Bb1, Cry34/35Ab1	1	0 – 2	2 – 3	2 – 3	0	0	0-2	X		X		5% adjacent (2 row min) or 5% IR
Trecepta®	Vip3A Cry1A.105/Cry2Ab2	1	1 – 3	2	3	1	1	0		X			5% IR
VT Double PRO®	Cry1A.105/Cry2Ab2	0	0 – 2	2	2	0	0	0			X		5% IR
<b>SWEET CORN PRODUCTS</b>													
Attribute II Series (Syngenta)	Cry1Ab, Vip3A	1	0 – 1	1	1	1	1	0	X				No refuge needed if stubble is destroyed within 30 days
Performance Series	Cry1A.105/Cry2Ab2 Cry3Bb1	0	0 – 2	2	2	0	0	0-1			X		

**# of Bt Proteins:** Where ranges are given under each pest, the protein may no longer be effective for the pest listed. See table titled “Resistance Status of Bt Proteins for Each Target Pest” for known resistance cases. Always try to select hybrids with more than one effective Bt protein against your target pest.

**IR** = refers to Integrated Refuge, where refuge hybrid seed has been pre-mixed with Bt hybrid seed in the bag.

**Note:** Herbicide tolerances listed are for the non-Integrated Refuge products. IR products may have different herbicide tolerances and herbicide selection should be based on the properties of the refuge hybrid.

**Field corn trade names and their ‘events’ (gene transformations)**

Trade Name	Event	Bt Protein(s) expressed
Agrisure CB/LL	Bt11	Cry1Ab
Agrisure Duracade	5307	eCry3.1Ab
Agrisure RW	MIR604	mCry3A
Agrisure Viptera	MIR162	Vip3Aa20 (Vip3A)
Herculex I (HXI)	TC1507	Cry1F
Herculex CRW	DAS-59122-7	Cry34/35Ab1
None – part of Qrome	DP-4114	Cry1F + Cry34/35Ab1
Yieldgard Corn Borer	MON810	Cry1Ab
Yieldgard Rootworm	MON863	Cry3Bb1
Yieldgard VT Pro	MON89034	Cry1A.105/Cry2Ab2
Yieldgard VT Rootworm	MON88017	Cry3Bb1

**Abbreviations used in the table**

Target Insect	
BCW	Black cutworm
CEW	Corn earworm
ECB	European corn borer
FAW	Fall armyworm
TAW	True armyworm
WBC	Western bean cutworm
CRW	Corn rootworm
Herbicide Tolerance Trait	
LL	Liberty Link / Glufosinate tolerant
GT	Glyphosate tolerant
RR2	Roundup Ready®/Glyphosate tolerant
ENLIST	2,4-D, FOPS

Any edits required on these tables can be directed to: Tracey Baute, Field Crop Entomologist, OMAFRA

## Resistance Status of Bt Proteins for Each Target Pest

Target Pest	Effective Bt Proteins * = see next column	Bt Proteins of Known Resistance (widespread or local)	Bt Proteins that Never Worked on the Pest
Black cutworm (BCW)	Cry1F Vip3A	None	Cry1Ab Cry1A.105 x Cry2Ab2
Corn earworm (CEW)	Vip3A	<b>Cry1Ab</b> in US and Ontario <b>Cry1A.105 x Cry1Ab2</b> in US and Ontario	Cry1F
European corn borer (ECB)	Cry1Ab Cry1A.105 x Cry2Ab2 Cry1F (except the Maritimes)*	<b>Cry1F</b> (in Maritimes)	Vip3A
Fall armyworm (FAW)	Cry1F* Cry1A.105 x Cry2Ab2	<b>Cry1F</b> in southern US	Cry1Ab Vip3A
True armyworm (TAW)	Vip3A	None	Cry1Ab, Cry 1F Cry1A.105 x Cry2Ab2
Western bean cutworm (WBC)	Vip3A	<b>Cry1F</b> widespread in US and Canada	Cry1Ab Cry1A.105 x Cry2Ab2
Corn rootworm (CRW)	Cry3Bb1* Cry34/35Ab1* mCry3A* eCry3.1Ab*	<b>Cross resistance to multiple proteins is suspected in some Ontario populations. Pyramid hybrids may experience injury. Use with best management practices, esp. rotate to non-host crop where high pest pressure is observed.</b> <b>Cry3Bb1</b> in the US and Ontario <b>Cry34/35Ab1</b> in the US and Ontario <b>mCry3A</b> in the US and Ontario <b>eCry3.1Ab</b> in the US	

\*References for reported resistance: [https://agrilife.org/lubbock/files/2020/02/BtTraitTable\\_Citations.pdf](https://agrilife.org/lubbock/files/2020/02/BtTraitTable_Citations.pdf)

### Key Points When Selecting Bt Corn Hybrids for Pest Control:

1. No one protein controls all corn pests. Know your primary pest of concern and select hybrids that contain proteins that provide effective control. Most hybrids contain multiple proteins to control ECB and/or CRW but may not target your primary pest of concern.
2. To reduce the risk of resistance, select hybrids that contain more than one protein against your primary pest concern.
3. If only one protein is available to control your primary pest concern, do not use that protein every year.
4. Growers should avoid continuous use of any control technology and implement recommended best management practices, especially crop rotation to a non-host, in situations where high corn rootworm populations are observed and/or a resistant population is suspected.
5. Note any potential resistance cases mentioned for each pest. Some resistance cases are local or regional while others are widespread. Resistant pest populations that migrate from the southern US can influence the effectiveness of Bt traits in Canada, as is the case with corn earworm.
6. Scout and report any injury found by pests that should be controlled by the Bt hybrid are using. If injury has been found, contact your seed agronomist, provincial entomologist and/or Tracey Baute, OMAFRA, Chair of the Canadian Corn Pest Coalition.