Bt Corn Products Available as of March 2023

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		
Agrisure® CB/LL	Cry1Ab	0	0 – 1	1	0	0	0	0	LL	20% - 400 m
Agrisure® GT/CB/LL Agrisure® 3010	Cry1Ab	0	0 – 1	1	0	0	0	0	LL, GT	20% - 400 m
Agrisure® 3000GT	Cry1Ab mCry3A	0	0 – 1	1	0	0	0	0 – 1	LL, GT	20% - adjacent
Agrisure® 3120 E-Z Refuge®	Cry1Ab, Cry1F	1	0 – 1	1 – 2	0 – 1	0	0	0	LL, GT	5% IR
Agrisure® 3122 E-Z Refuge®	Cry1Ab, Cry1F mCry3A, Cry34/35Ab1	1	0 – 1	1 – 2	0 – 1	0	0	0 – 2	LL, GT	5% IR
Agrisure 3110 Viptera®	Cry1Ab, Vip3A	1	1 – 2	1	1	1	1	0	LL, GT	20% - 400 m
Agrisure 3111 Viptera®	Cry1Ab, Vip3A mCry3A	1	1 – 2	1	1	1	1	0 – 1	LL, GT	20% - adjacent
Agrisure Viptera® 3220 E-Z Refuge®	Cry1Ab, Cry1F, Vip3A	2	1 – 2	1 – 2	1 – 2	1	1	0	LL, GT	5% IR
Agrisure Viptera® 3330 E-Z Refuge®	Cry1Ab, Vip3A, Cry1A.105/ Cry2Ab2	1	1 – 4	3	3	1	1	0	LL, GT	5% IR
Agrisure Duracade® 5122 E-Z Refuge®	Cry1Ab, Cry1F mCry3A, eCry3.1Ab	1	0 – 1	1 – 2	1 – 2	0	0	0 – 2	LL, GT	5% IR
Agrisure Duracade® 5222 E-Z Refuge®	Cry1Ab, Cry1F, Vip3A mCry3A, eCry3.1Ab	2	1 – 2	1 – 2	1 – 3	1	1	0 – 2	LL, GT	5% IR
Optimum® AcreMax®	Cry1Ab, Cry1F	1	0 – 1	1 – 2	0 – 1	0	0	0	LL, RR2	5% IR
Optimum® AcreMax® Leptra®	Cry1Ab, Cry1F, Vip3A	2	1 – 2	1 – 2	1 – 2	1	1	0	LL, RR2	5% IR
Optimum® AcreMax® XTreme	Cry1Ab, Cry1F Cry34/35Ab1, mCry3A	1	0 – 1	1 – 2	0 – 1	0	0	0 – 2	LL, RR2	5% IR
PowerCore™ Refuge Advanced	Cry1F, Cry1A.105/Cry2Ab2	1	0 – 2	2 – 3	2 – 3	0	0	0	LL, RR2	5% IR
PowerCore Enlist™	Cry1F, Cry1A.105/Cry2Ab2	1	0 – 2	2 – 3	2 – 3	0	0	0	LL, RR2, Enlist	5% - 400 m
PowerCore Enlist™ Refuge Advanced	Cry1F, Cry1A.105/Cry2Ab2	1	0 – 2	2 – 3	2 – 3	0	0	0	LL, RR2, Enlist	5% IR
Qrome	Cry1Ab, Cry1F Cry34/35Ab1, mCry3A	1	0 – 1	1 – 2	0 – 1	0	0	0 – 2	LL, RR2	5% IR
SmartStax® RIB Complete® (Bayer)	Cry1F, Cry1A.105/Cry2Ab2 Cry3Bb1, Cry34/35Ab1	1	0 – 2	2 – 3	2 – 3	0	0	0 – 2	LL, RR2	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		
		BCW	CEW	ECB	FAW	TAW	WBC	CRW		
SmartStax® Enlist™	Cry1F, Cry1A.105/Cry2Ab2 Cry3Bb1, Cry34/35Ab1	1	0 – 2	2 – 3	2 – 3	0	0	0 – 2	LL, RR2, Enlist	5% - 400m
SmartStax® Refuge Advanced (Corteva™)	Cry1F, Cry1A.105/Cry2Ab2 Cry3Bb1, Cry34/35Ab1	1	0 – 2	2 – 3	2 – 3	0	0	0 – 2	LL, RR2	5% IR
SmartStax® (Corteva™)	Cry1F, Cry1A.105/Cry2Ab2 Cry3Bb1, Cry34/35Ab1	1	0 – 2	2 – 3	2 – 3	0	0	0 – 2	LL, RR2	5% - 400m
Trecepta® RIB Complete®®	Vip3A, Cry1A.105/Cry2Ab2	1	1 – 3	2	3	1	1	0	RR2	5% IR
VT Double PRO® RIB Complete®	Cry1A.105/Cry2Ab2	0	0 – 2	2	2	0	0	0	RR2	5% IR
SWEET CORN PRODUCTS										
Attribute II Series (Syngenta)	Cry1Ab, Vip3A	1	0 – 1	1	1	1	1	0	LL	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	RR2	

# of Bt Proteins: Where ranges are given under each pest, the protein may no longer be effective or has reduced effectiveness for the pest listed. See table titled "***Resistance Status of Bt Proteins for Each Target Pest*" on page 3** for known resistance cases. Always try to select hybrids with more than one effective Bt protein against your target pest.

Above Ground = Lepidoptera (caterpillars); **Below Ground** = Coleoptera (beetles)

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	LibertyLink® / Glufosinate tolerant
GT	Glyphosate tolerant
RR2	Roundup Ready®/Glyphosate tolerant
Enlist	2,4-D, FOPS

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/Cry2Ab2
Corn earworm (CEW)	Vip3A	**Cry1Ab** in US and Ontario **Cry1A.105/Cry1Ab2** in US and Ontario	Cry1F
European corn borer (ECB)	Cry1Ab Cry1A.105 x Cry2Ab2 Cry1F (except the Maritimes)*	**Cry1F** (in Maritimes). Resistance has also been detected at one site in Manitoba and another in Quebec.	Vip3A
Fall armyworm (FAW)	Cry1F* Cry1A.105 x Cry2Ab2 Vip3A	**Cry1F** in southern US	Cry1Ab
True armyworm (TAW)	Vip3A	None	Cry1Ab, Cry 1F Cry1A.105/Cry2Ab2
Western bean cutworm (WBC)	Vip3A	**Cry1F** widespread in US and Canada	Cry1Ab Cry1A.105/Cry2Ab2
Corn rootworm (CRW)	Cry3Bb1* Cry34/35Ab1* mCry3A* eCry3.1Ab*	**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.** **Cry3Bb1** in the US and Ontario **Cry34/35Ab1** in the US **mCry3A** in the US and Ontario **eCry3.1Ab** in the US	

*References for reported resistance: 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 repeated use of any management tool and implement recommended best management practices, especially crop rotation to a non-host crop, 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 proteins in Canada, as is the case with corn earworm and fall armyworm.
6. Scout and report any injury found by pests that should be controlled by the Bt hybrid being used. If injury has been found, contact your seed agronomist, provincial entomologist and/or Tracey Baute, OMAFRA,

Chair of the Canadian Corn Pest Coalition.