

Bt Corn Products Available as of April 2024

Trade Name	Insecticidal Protein(s) 1st Line = Above Ground 2nd Line = Below Ground	# of Insecticidal 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 Viptera® 3110	Cry1Ab, Vip3A	1	1-2	1	1	1	1	0	LL, GT	20% - 400 m
Agrisure Viptera® 3111	Cry1Ab, Vip3A mCry3A	1	1-2	1	1	1	1	0-1	LL, GT	20% - adjacent
Viptera®	Cry1Ab, Cry1F, Vip3A	2	1-2	1-2	1-2	1	1	0	LL, GT	5% IR
Duracade®	Cry1Ab, Cry1F mCry3A, eCry3.1Ab	1	0-1	1-2	1-2	0	0	0-2	LL, GT	5% IR
DuracadeViptera®	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	Insecticidal Protein(s) 1st Line = Above Ground 2nd Line = Below Ground	# of Insecticidal 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
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
SmartStax® PRO with RNAi Technology (Bayer)	Cry1F, Cry1A.105/Cry2Ab2 Cry3Bb1, Cry34/35Ab1, DvSnf7	1	0 – 2	2 – 3	2 – 3	0	0	1-3	LL, RR2	5% IR
Trecepta® RIB Complete®	Vip3A, Cry1A.105/Cry2Ab2	1	1 – 3	2	3	1	1	0	RR2	5% IR
Vorceed™ Enlist™	Cry1F, Cry1A.105/Cry2Ab2 Cry34/35Ab1, Cry3Bb1, DvSnf7	1	0-2	2-3	2-3	0	0	1-3	LL, RR2, Enlist	5% IR
VT Double PRO® RIB Complete®	Cry1A.105/Cry2Ab2	0	0 – 2	2	2	0	0	0	RR2	5% IR
VT4PRO™ with RNAi Technology (Bayer)	Cry1A.105/Cry2Ab2, Vip3A Cry3Bb1, DvSnf7	1	1 – 3	2	3	1	1	1-2	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	

Bt = *Bacillus thuringiensis* (naturally occurring soil bacteria) that produces protein toxins specific to certain insects

RNAi = RNA interference; a gene silencing process initiated by double-stranded ribo-nucleic acid (dsRNA). Must be paired with an effective Bt protein(s) to work against the target pest and reduce risk of resistance.

of Insecticidal 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 Insecticidal Proteins for Each Target Pest**” on page 3 for known resistance cases. Always try to select hybrids with more than one effective insecticidal 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	RNAi Technology
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	
N/A	MON87411	Cry3Bb1	DvSnf7

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 Insecticidal Proteins for Each Target Pest

Target Pest	Effective Insecticidal 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/Cry2Ab2 in US and Ontario	Cry1F
European corn borer (ECB)	Cry1Ab* Cry1A.105 x Cry2Ab2* Cry1F (except the Maritimes)*	Cry1F resistance has been detected throughout NS, near Sussex, NB, near Carmen, MB, and near Montreal, QC. Unexpected injury to Cry1Ab and Cry1A.105 was observed in a field in Truro, NS in 2023. Unexpected injury to Cry1Ab , Cry1A.105 and Cry2Ab2 was observed in a field near New Haven, Connecticut in 2023.	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* dvSnf7	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://www.texasinsects.org/uploads/4/9/3/0/49304017/bttraintable_citations_2024.pdf

Key Points When Selecting Bt Corn Hybrids for Pest Control:

1. No one insecticidal 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. Reduce resistance risk by selecting hybrids containing more than one protein against your primary pest.
3. If only one protein is available to control your primary pest concern, do not use hybrids containing that protein every year to the risk of the pest developing resistance to that protein.
4. Hybrids containing only one trait to control the primary pest do not have integrated refuge and require a structured refuge containing 5 or 20% non-Bt corn that must be planted adjacent to or within 400 metres of the Bt planting. See the tables above confirm the refuge criteria that must be followed for your hybrid.
5. 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.
6. 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.
7. 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/specialist and/or Tracey Baute, OMAFRA, Chair of the Canadian Corn Pest Coalition.

Provincial Contacts for Unexpected Injury Cases:

Province	Contact	Phone	Email
Nova Scotia	Caitlin Congdon	902-698-9473	ccongdon@perennia.ca
PEI	Steven Hamill	902-314-0233	sIhamill@gov.pe.ca
New Brunswick	Chris Maund Jason Wells	506-453-3477 506-432-2150	chris.maund@gnb.ca jason.wells@gnb.ca
Québec	Julien Saguez Brigitte Duval	450-464-2715 ext. 249 819-293-8501 ext. 4432	julien.saguez@cerom.qc.ca brigitte.duval@mapaq.gouv.qc.ca
Ontario	Tracey Baute	519-360-7817	tracey.baute@ontario.ca
Manitoba	John Gavloski	204-745-5668	john.gavloski@gov.mb.ca

Visit the **Canadian Corn Pest Coalition** and **Manage Resistance Now** websites for more information on corn pests, Bt stewardship, and resistance management practices.



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