the **Handy Bt Trait Table** for U.S. Corn Production

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Most corn hybrids planted in the U.S. contain one or more transgenic traits for weed or insect management. These traits can increase flexibility and profitability for producers, but sometimes cause confusion about their spectrum of control or refuge requirements. The Handy Bt Trait Table provides a helpful list of trait names (below) and details of trait packages (next page) to make it easier to read company seed guides, sales materials, and bag tags. Note that there are two versions of the table (north/Midwest vs. south/cotton belt) which differ only in refuge percentages.

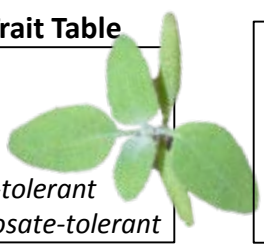
Important clarifications or changes to the Trait Table for 2017

- ✓ An insect is listed in the CONTROL SPECTRUM column if seed providers claim protection or efficacy for a given Bt package; insect species which are 'suppressed' are no longer listed. Actual field-level performance of hybrids on lepidopteran and rootworm larvae may differ if there are local or regional insect populations which are less susceptible or resistant to Bt proteins.
- ✓ To address local or regional performance issues, a new column ('May be Ineffective On') was added to highlight insect x Bt combinations with documented field-failures, confirmed resistance, or cross-resistance. An insect is listed in this column only if ALL of the Bt proteins which should control it in a product are 'ineffective' somewhere in the US or Canada. Ineffective ratings are based on published lab assays &/or field research from field corn, sweet corn, and cotton. University extension specialists or local educators can assist in determining if you are in an area where reduced effectiveness was reported. On a broader scale, this column is intended to alert growers and consultants to potential management problems, influence seed selection, and encourage field scouting.
- ✓ The refuge column was simplified to include only the % and an indication if the refuge is in the bag.

Field corn 'events' (transformations of one or more genes) and their Trade Names

Trade name for trait	Event	Protein(s) expressed	Insect Target or *Herbicide Activity*
Agrisure CB/LL	Bt11	Cry1Ab + *PAT*	corn borer + *glufosinate tolerance*
Agrisure Duracade	5307	eCry3.1Ab	rootworm
Agrisure GT	GA21	*EPSPS*	*glyphosate tolerance*
Agrisure RW	MIR604	mCry3A	rootworm
Agrisure Viptera	MIR162	Vip3A	broad lep control (but not corn borer)
Herculex 1 or CB	TC1507	Cry1Fa2 + *PAT*	corn borer + *glufosinate tolerance*
Herculex RW	DAS-59122-7	Cry34Ab1/Cry35Ab1 + *PAT*	rootworm + *glufosinate tolerance*
Roundup Ready 2	NK603	*EPSPS*	*glyphosate tolerance*
Yieldgard Corn Borer	MON810	Cry1Ab	corn borer
Yieldgard Rootworm	MON863	Cry3Bb1	rootworm
Yieldgard VT Pro	MON89034	Cry1A.105 + Cry2Ab2	broader lep control
Yieldgard VT Rootworm RR	MON88017	Cry3Bb1 + *EPSPS*	rootworm + *glyphosate tolerance*

Abbreviations used in the Trait Table



Herbicide activity

- D *2-4 D tolerant*
- GT *glyphosate tolerant*
- LL Liberty Link - *glufosinate-tolerant*
- RR2 Roundup Ready 2, *glyphosate-tolerant*

Insect targets

BCW	black cutworm	SB	stalk borer
CEW	corn earworm	SCB	sugarcane borer
ECB	European corn borer	SWCB	southwestern corn borer
FAW	fall armyworm	TAW	true armyworm
RW	corn rootworm	WBC	western bean cutworm

Bt corn trait packages with their Bt proteins, spectrum of control, & % refuge (Updated January 2017)

TRAIT FAMILY Specific Product	Bt protein(s)	CONTROL SPECTRUM Marketed for control of: above-ground----------in soil		May be locally or regionally ineffective on:	Herbicide tolerance	Refuge - Midwest/ North
AGRISURE						
Agrisure 3010, 3010A	Cry1Ab	ECB SCB SWCB	---	SCB	GT LL	20%
Agrisure 3000GT, 3011A	Cry1Ab mCry3A	ECB SCB SWCB	RW	SCB RW	GT LL	20%
Agrisure Viptera 3110	Cry1Ab Vip3A	BCW CEW ECB FAW SB SCB SWCB TAW WBC	---		GT LL	20%
Agrisure Viptera 3111	Cry1Ab Vip3A mCry3A	BCW CEW ECB FAW SB SCB SWCB TAW WBC	RW	RW	GT LL	20%
Agrisure 3122 E-Z Refuge	Cry1Ab Cry1F mCry3A Cry34/35Ab1	BCW ECB FAW SB SCB SWCB WBC	RW	FAW, WBC RW	GT	5% in bag
Agrisure Viptera 3220 E-Z Refuge	Cry1Ab Cry1F Vip3A	BCW CEW ECB FAW SB SCB SWCB TAW WBC	---		GT	5% in bag
Agrisure Duracade 5122 E-Z Refuge	Cry1Ab Cry1F mCry3A eCry3.1Ab	BCW ECB FAW SB SWCB WBC	RW	FAW, WBC RW	GT	5% in bag
Agrisure Duracade 5222 E-Z Refuge	Cry1Ab Cry1F Vip3A mCry3A eCry3.1Ab	BCW CEW ECB FAW SB SCB SWCB TAW WBC	RW	RW	GT	5% in bag
HERCULEX						
Herculex 1 (HX1)	Cry1F	BCW ECB FAW SB SCB SWCB WBC	---	FAW, SWCB, WBC	LL	20%
Herculex RW (HXRW)	Cry34/35Ab1	---	RW	RW	RR2	20%
Herculex XTRA (HXX)	Cry1F Cry34/35Ab1	BCW ECB FAW SB SCB SWCB WBC	RW	FAW, SWCB, WBC RW	(most)	20%
OPTIMUM						
Intrasect (YHR)	Cry1Ab Cry1F	BCW ECB FAW SB SCB SWCB WBC	---	FAW, WBC	LL RR2	5%
AcreMax (AM)	Cry1Ab Cry1F	BCW ECB FAW SB SCB SWCB WBC	---	FAW, WBC	LL RR2	5% in bag
Leptra (VYHR)[a] AcreMax Leptra (AML)[b]	Cry1Ab Cry1F Vip3A	BCW CEW ECB FAW SB SCB SWCB TAW WBC	---		LL RR2	[a]5% ½ mile [b]5% in bag
AcreMax RW (AMRW)	Cry34/35Ab1	---	RW	RW	LL RR2	10% in bag
AcreMax1 (AM1)	Cry1F Cry34/35Ab1	BCW ECB FAW SB SCB SWCB WBC	RW	FAW, SWCB, WBC RW	LL RR2	10% in bag 20% ECB
TRIsect (CHR)	Cry1F mCry3A	BCW ECB FAW SB SCB SWCB WBC	RW	FAW, SWCB, WBC RW	LL RR2	20%
Intrasect TRIsect (CYHR)[a] AcreMax TRIsect (AMT)[b]	Cry1Ab Cry1F mCry3A	BCW ECB FAW SB SCB SWCB WBC	RW	FAW, WBC RW	LL RR2	[a]20% [b]10% in bag
Intrasect Xtra (YXR)[a] AcreMax Xtra (AMX)[b]	Cry1Ab Cry1F Cry34/35Ab1	BCW ECB FAW SB SCB SWCB WBC	RW	FAW, WBC RW	LL RR2	[a] 20% [b]10% in bag
Intrasect Xtreme (CYXR)[a] AcreMax XTreme (AMXT)[b]	Cry1Ab Cry1F mCry3A Cry34/35Ab1	BCW ECB FAW SB SCB SWCB WBC	RW	FAW, WBC RW	LL RR2	[a]5% [b]5% in bag
YIELDGARD or GENUITY						
YieldGard CB (YGCB)	Cry1Ab	ECB SCB SWCB	---	SCB	RR2	20%
YieldGard VT Rootworm	Cry3Bb1	---	RW	RW	RR2	20%
YieldGard VT Triple	Cry1Ab Cry3Bb1	ECB SCB SWCB	RW	SCB RW	RR2	20%
Genuity VT Double PRO[a] or RIB complete[b]	Cry1A.105 Cry2Ab2	CEW ECB FAW SB SCB SWCB	---	CEW	RR2	[a]5% [b]5% in bag
Genuity VT Triple PRO[a] or RIB complete[b]	Cry1A.105 Cry2Ab2 Cry3Bb1	CEW ECB FAW SB SCB SWCB	RW	CEW RW	RR2	[a]20% [b]10% in bag
Genuity SmartStax[a] or RIB Complete[b]	Cry1A.105 Cry2Ab2 Cry1F Cry3Bb1 Cry34/35Ab1	BCW CEW ECB FAW SB SCB SWCB WBC	RW	CEW, WBC RW	LL RR2	[a]5% [b]5% in bag
OTHER						
Powercore[a] Powercore Refuge Adv.[b]	Cry1A.105 Cry2Ab2 Cry1F	BCW CEW ECB FAW SB SCB SWCB WBC	---	CEW, WBC	LL RR2	[a]5% [b]5% in bag
Smartstax[a] Smartstax Refuge Adv.[b]	Cry1A.105 Cry2Ab2 Cry1F Cry3Bb1 Cry34/35Ab1	BCW CEW ECB FAW SB SCB SWCB WBC	RW	CEW, WBC RW	LL RR2	[a]5% [b]5% in bag