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Handy Bt Trait Table for the southern cotton-growing region



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Most corn hybrids planted in the U.S. now contain one or more transgenic traits for weed or insect management. These traits are meant to increase flexibility and profitability for producers, but sometimes lead to questions or cause confusion about their spectrum of control or refuge requirements to delay resistance. This bulletin provides a handy one-stop-guide to understand sales materials, bag tags, and the hybrids you purchase.

Table 1 lists the names of the important ‘events’ (transformations of one or more genes) in corn, their more familiar Trade Names, the protein(s) expressed, and their pest targets. Table 2 lists specific trait packages (combinations of events) sold by various seed companies, with their spectrum of control plus refuge % and location. In recent years, the pyramiding of Bt traits allowed for the reduction of caterpillar refuge from 50% to 20%, depending on the trait package. While many hybrids are now sold as a refuge-in-the-bag (RIB), Bts planted in the cotton-region usually still require a separate structured refuge planted as a block or series of rows (within, adjacent to, or ~½ mile from the Bt field). Regardless of the type of Bt hybrid planted, it is still important to take the following steps:

- * Understand the **biology** of each trait, the expected level of control, and refuge requirements;
- * **Confirm that the seed you ordered the previous year** is the seed delivered in the spring;
- * Keep good **planting records** and save a representative sample of **bags or bag tags**;
- * For herbicide applications, **Ask Twice-Spray Once**, especially if you hire a custom applicator;
- * Most important, if you see **unexpected damage or poor performance** of a trait, contact your seed dealer and extension educator immediately so that the field can be visited while the problem is still fresh and samples can be taken. This is critical to **identify and manage cases of Bt resistance**.



This bulletin strives for completeness, but keeping track of Bt traits isn't easy. For a searchable, easy-to-use database of GM crop approvals, see the ISAAA web site at <http://www.isaaa.org/gmapprovaldatabase>

Table 1. Event names for proteins expressed in Bt corn plants

Trade name	Event name	Protein(s) expressed	Insect Target or Herbicide Activity
Agrisure CB/LL	Bt11	Cry1Ab+PAT	corn borer + <i>glufosinate tolerance</i>
Agrisure Duracade	5307	eCry3.1Ab	rootworm
Agrisure RW	MIR604	mCry3A	rootworm
Agrisure Viptera	MIR162	Vip3Aa	broad lesp control
Herculex 1 or CB	TC1507	Cry1F + PAT	corn borer + <i>glufosinate tolerance</i>
Herculex RW	DAS-59122-7	Cry34Ab1/Cry35Ab1+PAT	rootworm + <i>glufosinate tolerance</i>
Roundup Ready 2	NK603	CP4 EPSPS	<i>glyphosate tolerance</i>
YieldGard CB	MON810	Cry1Ab	corn borer
YieldGard VT Pro	MON89034	Cry1A.105+Cry2Ab2	broad lesp control
YieldGard VT RW	MON88017	Cry3Bb1+CP4 EPSPS	rootworm + <i>glyphosate tolerance</i>



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 rootworm | WBC western bean cutworm |

Abbreviations used in Table 2 on page 2



Herbicide activity

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

Table 2. Bt corn trait packages, with spectrum of control and refuge requirements. (Updated 6 April 2015)

Trait Family Product	Bt protein(s)	Insects controlled or suppressed	Herbicide tolerant?	Refuge %, placement (in the cotton region)
AGRISURE				
Agrisure GT/CB/LL, 3010A	Cry1Ab	ECB SCB SWCB CEW FAW SB	GT LL	50% structured-½ mile
Agrisure 3000GT, 3011A	Cry1Ab mCry3A	ECB SCB SWCB CEW FAW SB RW	GT LL	50% structured-w/in, adj
Agrisure Viptera 3110	Cry1Ab Vip3A	BCW CEW ECB FAW SB SCB SWCB TAW WBC	GT LL	20% structured-½ mile
Agrisure Viptera 3111	Cry1Ab mCry3A Vip3A	BCW CEW ECB FAW SB SCB SWCB TAW WBC RW	GT LL	20% structured-w/in, adj
Agrisure 3122 E-Z Refuge	Cry1Ab Cry1F mCry3A Cry34/35Ab1	BCW ECB FAW SB SCB SWCB WBC CEW RW	GT	5% in the bag (RIB) +20% structured-w/in, adj
Agrisure Viptera 3220 E-Z Refuge	Cry1Ab Cry1F Vip3A	BCW CEW ECB FAW SB SCB SWCB TAW WBC	GT	5% in the bag (RIB) +20% structured-½ mile
Agrisure Duracade 5122 E-Z Refuge	Cry1Ab Cry1F mCry3A eCry3.1Ab	BCW ECB FAW SB SCB SWCB WBC CEW RW	GT	5% in the bag (RIB) +20% structured-w/in, adj
Agrisure Duracade 5222 E-Z Refuge	Cry1Ab Cry1F Vip3A mCry3A eCry3.1Ab	BCW CEW ECB FAW SB SCB SWCB TAW WBC RW	GT	5% in the bag (RIB) +20% structured-½ mile
HERCULEX				
Herculex 1 (HX1)	Cry1F	BCW ECB FAW SB SCB SWCB WBC CEW	LL	50% structured-½ mile
Herculex RW (HXRW)	Cry34/35Ab1	---- RW	RR2 (most)	20% structured-w/in, adj
Herculex XTRA (HXX)	Cry1F Cry34/35Ab1	BCW ECB FAW SB SCB SWCB WBC CEW RW		50% structured-w/in, adj
OPTIMUM				
TRIssect	Cry1F mCry3A	BCW ECB FAW SB SCB SWCB WBC CEW RW	LL RR2	50% structured-½ mile
Intrasect	Cry1F Cry1Ab	BCW ECB FAW SB SCB SWCB WBC CEW	LL RR2	20% structured-½ mile (CB)
Intrasect Leptra	Cry1F Cry1Ab Vip3A	BCW CEW ECB FAW SB SCB SWCB TAW WBC	LL RR2	20% structured-½ mile (CB)
Intrasect XTra	Cry1F Cry1Ab Cry34/35Ab1	BCW ECB FAW SB SCB SWCB WBC CEW RW	LL RR2	20% structured-w/in, adj
Intrasect XTreme	Cry1F Cry1Ab mCry3A Cry34/35Ab1	BCW ECB FAW SB SCB SWCB WBC CEW RW	LL RR2	20% structured-w/in, adj
AcreMax (AM)	Cry1F Cry1Ab	BCW ECB FAW SB SCB SWCB WBC CEW	LL RR2	20% structured-½ mile (CB)
AcreMax RW (AMRW)	Cry34/35Ab1	--- RW	LL RR2	10% in the bag (RIB)
AcreMax1 (AM1)	Cry1F Cry34/35Ab1	BCW ECB FAW SB SCB SWCB WBC CEW RW	LL RR2	50% structured-½ mile (CB)
AcreMax TRIssect (AMT)	Cry1F Cry1Ab mCry3A	BCW ECB FAW SB SCB SWCB WBC CEW RW	LL RR2	20% structured-½ mile (CB)
AcreMax Xtra (AMX)	Cry1F Cry1Ab Cry34/35Ab1	BCW ECB FAW SB SCB SWCB WBC CEW RW	LL RR2	20% structured-½ mile (CB)
AcreMax XTrem (AMXT)	Cry1F Cry1Ab mCry3A Cry34/35Ab1	BCW ECB FAW SB SCB SWCB WBC CEW RW	LL RR2	20% structured-½ mile (CB)
YIELDGARD / GENUITY				
YieldGard CB (YGCB)	Cry1Ab	ECB SCB SWCB CEW FAW SB	RR2	50% structured-½ mile
YieldGard VT Rootworm	Cry3Bb1	--- RW	RR2	20% structured-w/in, adj
YieldGard VT Triple	Cry1Ab Cry3Bb1	ECB SCB SWCB CEW FAW SB RW	RR2	50% structured-w/in, adj
Genuity VT Double PRO (or as RIB complete)	Cry1A.105 Cry2Ab2	CEW ECB FAW SB SCB SWCB	RR2	20% structured-½ mile
Genuity VT Triple PRO (or as RIB complete)	Cry1A.105 Cry2Ab2 Cry3Bb1	CEW ECB FAW SB SCB SWCB RW	RR2	20% structured-w/in, adj
Genuity SmartStax RIB Complete	Cry1A.105 Cry2Ab2 Cry1F Cry3Bb1 Cry34/35Ab1	BCW CEW ECB FAW SB SCB SWCB WBC RW	LL RR2	20% structured-½ mile
OTHER				
Smartstax or as Refuge Advanced	Cry1A.105 Cry2Ab2 Cry1F Cry3Bb1 Cry34/35Ab1	BCW CEW ECB FAW SB SCB SWCB WBC RW	LL RR2	20% structured-w/in, adj