

For more information

- **Handy Bt Trait Table, C. DiFonzo and Eileen Cullen, Updated April 2011**
<http://www.entomology.wisc.edu/cullenlab/extension/xtras/PDFs/Handy%20Bt%20Trait%20Table.pdf>
- **Cutworm identification photos, Entomology Image Gallery, Iowa State University**
<http://www.ent.iastate.edu/imagegal/lepidoptera/bcutworm/>
- **Late planting resources, University of Minnesota Extension**
<http://www.extension.umn.edu/agriculture/crops/late-planting/>

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Figure 1. Photo by G.E. Cardon, Bugwood.org

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Focus on Ag

Dear Ag Producer,

In light of your time constraints in this challenging season, I'd like to quickly bring a few things to your attention.

Late planting can favor certain insect pests in corn. Two to watch for this season are black cutworm and corn earworm. Not all Bt hybrids control these pests, so in this edition, we'll sort through the traits that offer protection, then talk about what to look for in fields that may not be protected. Other late planting resources are available at a University of Minnesota Extension website (<http://www.extension.umn.edu/agriculture/crops/late-planting/>).

If you are interested in following local on-farm research, we have several studies in corn on irrigated sands this year. Thanks to help from local producers Paul Bauer and Doug Felton, we're repeating the nitrogen rate study and adding two new trials. In these new studies, we want to know if there is any yield advantage to splitting applications of sulfur or potash. We're also looking at how rates and application timing affect leaching potential of these two nutrients.

We'll be on-site of two of these studies for a Field Day later in July. Dr. Dan Kaiser, a University of Minnesota Soil Scientist, will be on hand to guide us through the sulfur and nitrogen studies near Hastings. The event will also include a workshop on estimating soil moisture for irrigation scheduling with a guest speaker. Watch for a postcard in early July for details!

Wishing you a successful growing season!

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Figure 2. Black cutworm damage to field corn. Photo by W.M. Hantsbarger, Bugwood.org

Late planting and pest dynamics

Two pests to watch for this season

Insect pest dynamics can shift with late-planted corn. Two larval pests, in particular, can take advantage of the crop's delayed development: 1) Black cutworm in early-season and 2) Corn earworm in mid-season.

Neither pest can overwinter in our climate, so moths must migrate from the south every season. A network of traps monitor for these and other pests, including European corn borer and fall armyworm. In the case of **black cutworm**, trapping moths does not predict economic damage, but it does indicate when to start scouting for field damage. Scouting should continue until the five-leaf stage (V5) when corn is no longer vulnerable to cutting. In Iowa, models based on trap captures from mid- to late-April suggested that producers should have started scouting for cutting damage May 22 in the northern tier of Iowa counties. Closer to home, significant flights were detected near New Ulm in early May and near Faribault in the May 21-22 storms, suggesting that scouting should start in early June and continue through the month.

Corn earworm flights that start arriving in late July and early August can cause problems in late-planted field corn, sweet corn or hybrid seed corn. Moths lay eggs on green and yellow color silks. When the larvae hatch, they crawl down the silk to feed on kernels. If control is needed, it is in this narrow window before larvae are protected by the ear tip. Several websites monitor corn earworm flights: University of Minnesota Vegetable IPM Resource (<http://www.vegedge.umn.edu/CEW.htm>), Pest Watch through Penn State (<http://www.pestwatch.psu.edu/sweet-corn/tool/tool.html>) and an Insect Forecast sponsored by Monsanto (<http://www.insectforecast.com/>).

Are your fields protected with Bt corn?

Not necessarily. Not all Bt (*Bacillus thuringiensis*) hybrid corn is effective in controlling black cutworm or corn earworm, since pests vary in their sensitivity to the different Bt proteins that are expressed. Hybrids that express the Vip3A protein found in Agrisure Viptera products or the Cry1F protein in Herculex, Optimum and Smartstax products can control **black cutworm**.

Corn earworm is controlled by the Vip3A protein (Agrisure Viptera) and the double-trait Cry1A.105 and Cry2Ab2 proteins in Genuity and Smartstax products. To help sort through the transgenic hybrids and the pests they control,

Chris DiFonzo, Michigan State, and Eileen Cullen, University of Wisconsin, developed a very Handy Bt Trait Table. It's been adapted to highlight black cutworm and corn earworm control and suppression (Table 1).

What about seed treatments? The nicotoid insecticide found in Poncho is labeled for black cutworm control. If cutworm pressure is high, however, the larvae populations could overcome the seed treatment. To be on the safe side, check for damage until V5.

Scout!

Some fields are more attractive for **black cutworm** egg-laying than others. In addition to late planted corn, fields that are weedy or have a great deal of crop residue (no-till or strip-till) are typically more at risk.

Corn that isn't protected by either a seed treatment or a Bt trait that controls black cutworm should be scouted until V5. To scout for black cutworm, examine 50 plants in 5 areas. Look for leaf feeding, wilting (which can indicate feeding below ground), and surface cutting. Cutworms feed at night and hide during the day; they can be found by gently digging around the base of a damaged plant. Black cutworms can easily be confused with the dingy cutworm, a pest that rarely causes economic damage. Black cutworms are gray to nearly black and their skin looks pebbly under magnification, while dingys are smooth. For excellent identification tips, visit <http://www.ipm.iastate.edu/ipm/icm/2004/5-17-2004/cutworms.html>.

Black cutworm control is recommended when larvae are less than 3/4 inches long and 2-3 percent of the plants are wilted or cut. If the larvae are longer than 3/4 inches long, then the threshold increases to 5 percent. Iowa State has also developed a dynamic threshold that takes corn price and input costs into account. To access the spreadsheet, visit <http://www.extension.iastate.edu/CropNews/2009/0527hodgson.htm>.

Corn earworm economic damage thresholds are based on the number of male moths caught in pheromone traps each night, particularly in hybrid seed or sweet corn. If 5-10 moths are caught and the corn is at 10 percent silk, then treatment is recommended.

Wisconsin has published a comprehensive pest management guide for 2011 that includes in-depth discussions of these and other pests, as well as treatment options (<http://learningstore.uwex.edu/Assets/pdfs/A3646.pdf>).

Table 1. *Bacillus thuringiensis* (Bt) proteins expressed and insects controlled or suppressed by transgenic corn hybrid traits¹. Two insects favored by late planting, black cutworm and corn earworm, are highlighted as **controlled** or **suppressed**.

Current April 2011	Bt protein(s)	Insects controlled (bold) or <i>suppressed (italics)</i> ²	
		Feeding above ground	Feeding in soil
Agrisure products			
Agrisure CB/LL	Cry1Ab	ECB <i>CEW</i> FAW <i>SB</i>	-
Agrisure GT/CB/LL	Cry1Ab	ECB <i>CEW</i> FAW <i>SB</i>	-
Agrisure RW	mCry3A	-	CRW
Agrisure GT/RW	mCry3A	-	CRW
Agrisure CB/LL/RW	Cry1Ab mCry3A	ECB <i>CEW</i> FAW <i>SB</i>	CRW
Agrisure 3000GT	Cry1Ab mCry3A	ECB <i>CEW</i> FAW <i>SB</i>	CRW
Agrisure Viptera 3110	Cry1Ab Vip3A	BCW CEW ECB FAW WBC SB	-
Agrisure Viptera 3111	Cry1Ab mCry3A Vip3A	BCW CEW ECB FAW WBC SB	CRW
Agrisure Viptera 3220	Cry1Ab Cry1F Vip3A	BCW CEW ECB FAW WBC SB	-
Herculex products			
Herculex 1 (HX1)	Cry1F	BCW ECB FAW WBC <i>CEW</i>	-
Herculex RW (HXRW)	Cry34/35Ab1	-	CRW
Herculex XTRA (HXX)	Cry1F Cry34/35Ab1	BCW ECB FAW WBC <i>CEW</i>	CRW
Optimum products			
Optimum Intrasect	Cry1F Cry1Ab	BCW ECB FAW WBC <i>CEW</i>	-
Optimum AcreMaxRW	Cry34/35Ab1	-	CRW
Optimum AcreMax1 (AM1)	Cry1F Cry34/35Ab1	BCW ECB FAW WBC <i>CEW</i>	CRW
YieldGard products			
YGCB	Cry1Ab	ECB <i>CEW</i> FAW <i>SB</i>	-
YGRW	Cry3Bb1	-	CRW
YieldGard Plus	Cry1Ab Cry3Bb1	ECB <i>CEW</i> FAW <i>SB</i>	CRW
YieldGard VTRW	Cry3Bb1	-	CRW
YieldGard VT Triple	Cry1Ab Cry3Bb1	ECB <i>CEW</i> FAW <i>SB</i>	CRW
Genuity / SmartStax products			
Genuity VT Double Pro (VT2P)	Cry1A.105 Cry2Ab2	CEW ECB FAW	-
Genuity VT Triple Pro (VT3P)	Cry1A.105 Cry2Ab2 Cry3Bb1	CEW ECB FAW	CRW
SmartStax (Dow) or Genuity SmartStax (Monsanto) (GENSS)	Cry1A.105 Cry2Ab2 Cry1F Cry3Bb1 Cry34/35Ab1	BCW CEW ECB FAW WBC	CRW
Genuity SmartStax RIB Complete (Mon)	Same as GENSS above	BCW CEW ECB FAW WBC	CRW
REFUGE ADVANCED Powered by SmartStax (Dow)	Same as GENSS above	BCW CEW ECB FAW WBC	CRW

¹Adapted from Handy BT Trait Table by Chris DiFonzo, Michigan State University and Eileen Cullen, University of Wisconsin. Updated April 2011.

²BCW = Black cutworm; CEW = Corn earworm; CRW = Corn rootworm; ECB = European corn borer; FAW = Fall armyworm; SB = Stalk borer; and WBC = Western bean cutworm.