Citations for ineffectiveness ratings in the Handy Bt Trait Table

Insect	Bt protein	Crop & Location	For more information
Corn earworm (CEW) *Helicoverpa zea*	Cry1Ab	Sweet corn Maryland	• Dively et al. 2016. Field-evolved resistance in corn earworm to Cry proteins expressed by transgenic sweet corn. PLoS ONE 11(12)
	Cry1A.105 xCry2Ab2	Sweet corn Maryland	• Dively et al. 2016. Field-evolved resistance in corn earworm to Cry proteins expressed by transgenic sweet corn. PLoS ONE 11(12)
fall armyworm (FAW) *Spodoptera frugiperda*	Cry1F	Field corn Florida N. Carolina	• Huang et al. 2014. Cry1F Resistance in fall armyworm *Spodoptera frugiperda*: Single gene versus pyramided Bt maize. PlosOne 9(11). • Li et al. 2016. Frequency of Cry1F non-recessive resistance alleles in North Carolina field populations of *Spodoptera frugiperda*. PlosOne 11(4).
western corn rootworm (RW) *Diabrotica virgifera virgifera*	Cry3Bb1	Field Corn Iowa Minnesota	• Gassmann et al. 2011. Field-Evolved Resistance to Bt maize by western corn rootworm. PLoS ONE 6(7). • Gassmann et al. 2012. Western corn rootworm and Bt maize: Challenges of pest resistance in the field. GM Crops & Food: Biotech in Ag and the Food Chain 3(3) 1-10. • Gassmann et al. 2012. Field-evolved resistance to Bt maize by western corn rootworm: Predictions from the laboratory and effects in the field. J. Invertebrate Pathology 110:287-293. • Zukoff et al. 2016. Multiple assays indicate varying levels of cross resistance in Cry3Bb1-selected field populations of the western corn rootworm to mCry3A, eCry3.1Ab & Cry34/35Ab1. JEE 109(3): 1387-1398.
	mCry3A	Field Corn Iowa Minnesota	• Gassmann et al. 2014. Field-evolved resistance by western corn rootworm to multiple *Bacillus thuringiensis* toxins in transgenic maize. PNAS 111(14). 5141–5146. Zukoff et al. 2016. Multiple assays indicate varying levels of cross resistance in Cry3Bb1-selected field populations of the western corn rootworm to mCry3A, eCry3.1Ab & Cry34/35Ab1. JEE 109(3): 1387-1398.
	eCry3.1Ab	Field Corn Iowa Minnesota	• Jakka et al.. 2016. Broad-spectrum resistance to *Bacillus thuringiensis* toxins by western corn rootworm. Nature Scientific Reports 6, 27860; doi: 10.1038/srep27860. • Zukoff et al. 2016. Multiple assays indicate varying levels of cross resistance in Cry3Bb1-selected field populations of the western corn rootworm to mCry3A, eCry3.1Ab & Cry34/35Ab1. JEE 109(3): 1387-1398.
	Cry34/35Ab1	Field Corn Iowa Minnesota	• Gassmann et al. 2016. Evidence of resistance to Cry34/35Ab1 corn by western corn rootworm: Root injury in the field and larval survival in plant-based Bioassays. JEE 109(4): 1872–1880 • Zukoff et al. 2016. Multiple assays indicate varying levels of cross resistance in Cry3Bb1-selected field populations of the western corn rootworm to mCry3A, eCry3.1Ab & Cry34/35Ab1. JEE 109(3): 1387-1398.
SW corn borer (SWCB) *Diatraea grandiosella*	Cry1F	Field Corn AZ, NM	• Arizona Pest Management Center. Posted 1 Feb 2017. Chlorpyrifos use in Arizona and New Mexico. Public comment submitted to EPA, ID Docket EPA-HQ-OPP-2015-0653-0654.

western bean cutworm (WBC) *Striacosta albicosta*	Cry1F	Field Corn Great Lakes region	• Ostrem et al 2016. Monitoring susceptibility of western bean cutworm field populations to *Bacillus thuringiensis* Cry1F protein, J. Econ. Entomol. 109(2) 847–853. • Smith et al. 2017. Evidence for field-evolved resistance of Striacosta albicosta to Cry1F Bacillus thuringiensis protein and transgenic corn hybrids in Ontario, Canada. J. Econ. Entomol. 110: 2217-2228. • Numerous field failures in Great Lakes region in 2016