

Bt Cotton Resistance Monitoring Studies Submitted to EPA

Bt cotton registrants are required to submit annual resistance monitoring reports for the following lepidopteran target pests:

- cotton bollworm (CBW);
- tobacco budworm (TBW); and
- pink bollworm (PBW).

These reports have generally addressed two objectives:

- 1) bioassay results of pest populations sampled from random locations in cotton-growing regions; and
- 2) the results of investigations into unexpected pest damage to Bt cotton fields.

The table below lists the resistance monitoring reports received by EPA to date. Individual studies are generally identified by MRID numbers, though not all reports have assigned MRID numbers.

Notes:

CBW = cotton bollworm (*Helicoverpa zea*)

TBW = tobacco budworm (*Heliothis virescens*)

PBW = pink bollworm (*Pectinophora gossypiella*)

Year	Insect(s)	Toxin(s)	MRID#
1996-1998	CBW, TBW, PBW	Cry1Ac	448633-01
1999-2000	CBW, TBW, PBW	Cry1Ac	Public literature (reviewed in EPA 2001)
2001	CBW, TBW	Cry1Ac	456863-01
2001	PBW	Cry1Ac	457065-01, 457531-01
2002	CBW, TBW	Cry1Ac	No MRID assigned (Hardee et al. 2003)
2002	PBW	Cry1Ac	No MRID assigned (Dennehy et al. 2003)

Year	Insect(s)	Toxin(s)	MRID#
2001-2003	PBW	Cry2Ab2	462720-01
2002-2003	CBW, TBW	Cry2Ab2	462720-02
2003	CBW, TBW	Cry1Ac, Cry2Ab2	462720-03
2003	PBW	Cry1Ac, Cry2Ab2	464419-01
2004	CBW, TBW	Cry1Ac, Cry2Ab2	465476-01
2004	TBW	Cry2Ab2	465476-02
2004	PBW	Cry1Ac, Cry2Ab2	467350-01
2005	CBW, TBW	Cry1Ac, Cry2Ab2	468266-01
2005	CBW, TBW	Cry2Ab2	468266-02
2005	PBW	Cry1Ac, Cry2Ab2	469048-04, 470216-01
2005	CBW, TBW	Cry1F	469387-01
2006	TBW	Cry1Ac	471664-02
2006	CBW	Cry2Ab2	471664-01
2006	CBW, TBW	Cry1Ac, Cry2Ab2	471664-03
2006	CBW, TBW	Cry1F	472235-01
2006	PBW	Cry1Ac, Cry2Ab2	472989-01
2007	CBW	Cry1Ac, Cry2Ab2	474608-01
2007	TBW	Cry1Ac	474608-02
2007	TBW	Cry2Ab2	474608-03
2007	CBW, TBW	Cry1Ac, Cry1F	474622-01
2007	PBW	Cry1Ac, Cry2Ab2	476224-01

Year	Insect(s)	Toxin(s)	MRID#
2008	CBW	Cry1Ac, Cry2Ab2	477913-02
2008	CBW	Cry2Ab2	477913-03
2008	CBW	Cry1Ac, Cry2Ab2, Cry1F	477913-04
2008	TBW	Cry1Ac	477913-05
2008	TBW	Cry2Ab2	477913-06
2008	CBW, TBW	Cry1Ac, Cry1F	477911-01
2008	PBW	Cry1Ac, Cry2Ab2	479306-01, 482864-01
2009	CBW	Cry1Ac	481673-03
2009	CBW	Cry2Ab2	481673-04
2009	TBW	Cry1Ac	481673-01
2009	TBW	Cry2Ab2	481673-02
2009	CBW, TBW	Cry1Ac, Cry1F	481714-01
2009	PBW	Cry1Ac, Cry2Ab2	483200-01
2010	CBW	Cry1Ac	485241-03
2010	CBW	Cry2Ab2	485241-04
2010	TBW	Cry1Ac	485241-01
2010	TBW	Cry2Ab2	485241-02
2010	CBW	Cry1Ac, Cry2Ab2	485241-05
2010	CBW, TBW	Cry1Ac, Cry1F	486241-01
2010	PBW	Cry1Ac, Cry2Ab	486797-01
2011	CBW	Cry1Ac	488789-03

Year	Insect(s)	Toxin(s)	MRID#
2011	CBW	Cry2Ab2	488789-04
2011	TBW	Cry1Ac	488789-01
2011	TBW	Cry2Ab2	488789-02
2011	CBW, TBW	Cry1Ac, Cry1F	489571-01
2011	PBW	Cry1Ac	490182-01, 490194-01
2011	TBW	FLCry1Ab	489634-01
2011	CBW	Vip3A	485912-01
2012	CBW	Cry1Ac	491632-03
2012	CBW	Cry2Ab2	491632-04
2012	TBW	Cry1Ac	491632-01
2012	TBW	Cry2Ab2	491632-02
2012	CBW, TBW	Cry1Ac, Cry1F	492250-01
2012	PBW	Cry1Ac	492739-01, 492776-01
2012	TBW	FLCry1Ab	492068-01
2012	CBW	Vip3A	492064-01
2013	CBW	Cry1Ac	494195-03
2013	CBW	Cry2Ab2	494195-04
2013	TBW	Cry1Ac	494195-01
2013	TBW	Cry2Ab2	494195-02
2013	CBW, TBW	Cry1Ac, Cry1F	494778-01
2013	PBW	Cry1Ac	495336-01
2013	TBW	FLCry1Ab	495591-01

Year	Insect(s)	Toxin(s)	MRID#
2013	CBW	Cry1Ab, Cry1F, Vip3A	494600-01
2014	CBW	Cry1Ac	496603-03, 497102-01
2014	CBW	Cry2Ab2	496603-04, 497102-01
2014	TBW	Cry1Ac	496603-01, 497102-01
2014	TBW	Cry2Ab2	496603-02, 497102-01
2014	CBW, TBW	Cry1Ac, Cry1F	497242-01
2014	PBW	Cry1Ac	497102-02
2014	CBW	Vip3A	497848-01
2015	CBW, TBW	Cry1Ac, Cry2Ab2	499587-01
2015	CBW, TBW	Cry1Ac, Cry1F	500345-01
2015	PBW	Cry1Ac	501078-01
2015	PBW	Cry1Ac, Cry2Ab2	501379-01
2016	CBW, TBW, PBW	Cry1F, Cry1Ac, Cry2Ab2, Vip3A	503670-01
2017	CBW, TBW, PBW	Cry1F, Cry1Ac, Cry2Ab2, Vip3A	506703-01
2018	CBW, TBW, PBW	Cry1F, Cry1Ac, Cry2Ab2, Vip3A	509327-01
2019	CBW, TBW	Cry1F, Cry1Ac, Cry2Ab2, Vip3A	512535-01
2020	CBW, TBW	Cry1F, Cry1Ac, Cry2Ab2, Vip3A	516713-01

2021	CBW, TBW	Cry1F, Cry1Ac, Cry2Ab2 Vip3A	520123-01
2022	CBW, TBW	Cry1F, Cry1Ac, Cry2Ab2 Vip3A	522477-01

References

EPA, 2001. Bt Plant-Incorporated Protectants Biopesticides Registration Action Document. October 15, 2001. Available at:

http://www3.epa.gov/pesticides/chem_search/reg_actions/pip/1-overview.pdf

Dennehy, T.J., et al., 2003. Susceptibility of southwestern pink bollworm to Cry1Ac: final results of the 2002 season studies. Unpublished study submitted to EPA. No MRID# assigned.

Hardee, D.R., et al., 2003. Monitoring for Cry1Ac susceptibility among field populations of cotton bollworm and tobacco budworm during the 2002 growing season. Unpublished study submitted to EPA. No MRID# assigned.