

# **SURVEY OF WORM DAMAGED COTTON BOLLS IN NORTHEAST LOUISIANA**

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## **Abstract**

Bt-transgenic cotton varieties, that are active against several caterpillar pests, have been grown in Louisiana since 1996. In 2002, approximately 492,000 acres of cotton were grown in Louisiana with an expected average yield of 698 pounds per acre. Approximately 77 percent of the cotton acreage was planted to a Bt-transgenic variety. Approximately eighty percent of the cotton producers that grew these Bt-transgenic varieties used the 95:5 embedded refuge option (Bt:non-Bt), while the remaining producers opted for either the 80:20 (predominate), the 95:5 untreated option, or did not plant any Bt cotton.

Boll sample surveys were taken to compare the amount of damage caused by worms in Bt and non-Bt varieties on various farms in northeast Louisiana. Comparisons were made among Bt cotton and associated refuge planted under the 95:5 embedded, or the 80:20 option or 100 percent non-Bt cotton.

## **Methods and Materials**

Twelve cotton production farms in northeast Louisiana were surveyed to compare the amount of worm damage in Bt and non-Bt cotton. Farms were classified by refuge option (95:5 embedded or 80:20), or opted to plant 100 percent non-Bt cotton varieties. A total of 54 fields were sampled for percent worm damaged bolls. Of the 54 fields sampled, 9 fields were 20 percent non-Bt refuge, 8 fields were five percent non-Bt embedded refuge, 14 fields were 80 percent Bt, 13 fields were 95 percent Bt, and 10 fields were 100 percent non-Bt varieties. Each farm represents a different geographic location in Northeast Louisiana.

All fields were sampled at, or after defoliation. At all farms, three randomly selected sites in each field were surveyed, damaged boll counts were taken on 100 or more consecutive bolls (down one plant and up the next plant until 100 bolls were counted and the last plant had all bolls counted as well). Total number of bolls, and number of worm damaged bolls were recorded at each site along with number of plants and how many row feet required to reach 100 bolls for each sample site.

Records were attained from each farm to determine what types of insecticides were used for worm control. Only applications made specifically for worms were documented for control against these pests.

## **Results and Discussion**

Comparison of the two refuge types with their associated Bt cotton indicated that there were more damaged bolls in the five percent non-Bt (embedded refuge) than the 95 percent Bt cotton, and also more damaged bolls in the 20 percent non-Bt cotton than the 80 percent Bt cotton (Table 1). Boll damage was higher in both the 95 percent Bt cotton and its associated five percent refuge than in the 80 percent Bt cotton, but not the 20 percent refuge.

The highest percent boll damage occurred on farm number seven (95:5 refuge option) where 8.2 percent the bolls were damaged cotton in the five percent refuge, but only 3.1 percent of the total bolls were damaged in the 95 percent Bt cotton fields (Table 2). Boll damage by worms in the five percent refuge appears to be higher than in its associated 95 percent Bt cotton field at other farms. All farms using the 80:20 refuge option had greater damage in the 20 percent non-Bt refuge than in its associated 80 percent Bt fields. The highest boll damage for the four farms that used the 80:20 refuge option occurred at farm number one where 2.9 percent of the bolls were damaged in the 20 percent non-Bt cotton, and 1.4 percent of the bolls were damaged in its associated 80 percent Bt cotton (Table 2). Boll damage surveys taken on the farms that were zero percent Bt are intermediate to all other farms evaluated.

Of the four varieties surveyed that were in five percent embedded refuge; Fiber Max 832 had the highest percent damaged with 8.2 percent of the total bolls damaged and Deltapine 5415 RR had the fewest with 1.2 percent of the total bolls damaged (Table 3). Of the three varieties surveyed that were in the 20 percent refuge option, Fiber Max 958 had the highest percent of bolls damaged with 2.9 percent of the total bolls damaged and Deltapine 5415 only had 0.6 percent of the total bolls damaged (Table 3). Eight varieties were surveyed that were 95 percent Bt option, Fiber Max 989 BR had the most damaged with 6.7 percent of the total bolls damaged (Table 3). Of the four varieties that were surveyed in the 80 percent Bt option Deltapine 33 B had the most damage with one percent of the total bolls damaged and Stoneville 49 B had the no damage (Table 3).

### Acknowledgements

The authors would like to thank student workers from the Scott Research, Extension and Education Center. The authors would also like to thank the LSU AgCenter, and Cotton Incorporated for financial support.

Table 1. Percent Bolls Damaged by Bt Cotton Refuge Type.

Refuge Option	% Bt	No. of Fields	Sampled Row ft.	Bolls		
				Total	Damaged	% Damaged
80:20	80	14	210	4438	24	0.5
80:20	20	9	179	2843	44	1.5
95:5	95	13	199	4107	60	1.5
95:5	5	8	132	2540	80	3.1
100 non-Bt	0	10	133	3150	29	0.9

Table 2. Percent of Bolls Damaged by Farm and Bt Cotton Refuge Type.

Farm	Refuge Option	% Bt	Sampled Row ft.	Bolls			Cost/Acre <sup>1</sup>
				Total	Damaged	% Damaged	
1	80:20	80	47	947	13	1.4	\$13.40
1	80:20	0	47	939	27	2.9	\$121.05
2	80:20	80	90	1914	4	0.2	\$65.25
2	80:20	0	37	959	6	0.6	\$111.59
3	95:5	95	43	925	6	0.6	\$9.75
3	95:5	0	27	623	8	1.3	\$0.0
4	0:100	0	74	1580	21	1.3	\$151.30
5	95:5	95	20	326	22	6.7	\$20.59
5	95:5	0	17	324	24	7.4	\$20.59
6	95:5	95	9.5	331	3	0.9	\$14.10
6	95:5	0	15	323	3	0.9	\$0.0
7	95:5	95	22.5	322	10	3.1	\$14.10
7	95:5	0	32	318	26	8.2	\$0.0
8	95:5	95	40	953	8	0.8	\$12.85
9	80:20	80	29	638	3	0.5	\$14.10
9	80:20	0	36	629	9	1.4	\$32.15
10	80:20	80	45	939	4	0.4	\$23.10
10	80:20	0	14	316	2	0.6	\$94.20
11	0:100	0	59	1570	8	0.5	\$73.69
12	95:5	95	65	1250	11	0.9	\$22.50
12	95:5	0	41	952	19	2.0	\$22.50

<sup>1</sup>Approximate cost of worm control based on application data and average insecticide cost.

Table 3. Percent of Bolls Damaged by Variety and Bt Cotton Refuge Type.

Variety	No. Fields	Refuge	Sampled Row ft.	Bolls		
		Option		Total	Damaged	% Damaged
Delta Pearl	3	80:20	50	945	11	1.2
DP5415RR	3	80:20	37	959	6	0.6
FM958	3	80:20	47	939	27	2.9
DP33B	5	80:20	75.5	1585	16	1.0
DP458BR	4	80:20	58	1280	4	0.3
ST49B	2	80:20	32	634	0	0.0
ST4619B	3	80:20	44.5	939	4	0.4
DP5415RR	3	95:5	42	946	11	1.2
FM832	1	95:5	32	318	26	8.2
SG521RR	1	95:5	17	324	24	7.4
ST4793RR	3	95:5	41	952	19	2.0
DP20B	1	95:5	14	317	3	0.9
DP33B	2	95:5	25.5	636	5	0.8
DP451BR	3	95:5	42.5	925	6	0.6
FM832B	1	95:5	22.5	322	10	3.1
FM989BR	1	95:5	20	326	22	6.7
PM1218BR/DP451BR <sup>1</sup>	1	95:5	9.5	331	3	0.9
ST49B	2	95:5	32	632	6	0.9
ST5599BR	2	95:5	33	618	5	0.8
DP565	8	100 non-Bt	102	2517	18	0.7
FM958	2	100 non-Bt	31	633	11	1.7

<sup>1</sup>Field interplanted mix of two varieties.