

# Late Season Pink Bollworm Pressure in the Top Crop of Bt and Non-Bt Cotton

*Tim C. Knowles, Tim J. Dennehy, and Albert Rovey*

## **Abstract**

*Green bolls (100/field) were sampled from the uppermost internodes within adjacent fields of Bt (Deltapine 33B) and non-Bt refuge (Hyperformer HS 44 or Deltapine 20) experiencing severe pink bollworm pressure late in the growing season. Evidence of 3<sup>rd</sup> instar or larger pink bollworm larvae survival was higher in susceptible bolls sampled from transgenic Bt cotton late in the 1998 growing season, compared to that observed late in the 1997 growing season.*

## **Introduction**

Transgenic Bt cotton expresses an insecticidal protein from *Bacillus thuringiensis* which is active against lepidopteran pests including pink bollworm larvae. However, there is concern over the risk of reduced expression of the protein late in the growing season in senescent cotton. Furthermore, late season insect populations can explode and even Bt cotton could be at risk of losses to worm pests at this time. Therefore, University of Arizona guidelines for Bt cotton production suggest that irrigation termination, chemical termination, harvest and plowdown should be timed to maximize the first fruit cycle set and minimize late season exposure to pink bollworm and other pests.

## **Materials and Methods**

A field experiment was conducted during 1997 in Parker Valley (located in southwestern La Paz County) to determine the effects of severe late season pink bollworm pressure on loss of top crop yield potential of Bt (Deltapine 33B) and non-Bt refuge (Hyperformer HS 44) cotton varieties Knowles et. al., 1998). On October 17, 100 susceptible green bolls were sampled from the uppermost internodes within adjacent Bt and non-Bt fields. Both of these fields experienced extremely heavy pink bollworm pressure during the 1996 and 1997 growing seasons.

The experiment was repeated in 1998 examining adjacent fields of Bt (Deltapine 33B) and non-Bt refuge (Deltapine 20) upland cotton varieties. On October 29 and November 9, susceptible green bolls were sampled from the uppermost internodes within adjacent Bt and non-Bt fields. Two hundred Bt and 100 non-Bt bolls were sampled. Both of these fields experienced moderate to heavy pink bollworm pressure during the 1998 growing season.

Bolls were cracked and examined to determine the number of warts and mines per boll, the total number of live and dead pink bollworm larvae within each boll, the larval instar of live larvae, percent of the boll damaged or stained by pink bollworm feeding activity, and the total number of exit holes per boll. The presence of live 3<sup>rd</sup> instar or larger larvae, or exit holes, were considered evidence confirming the presence of 3<sup>rd</sup> or larger instar larvae during the growing season.

## **Results and Discussion**

In 1997, evidence of 3<sup>rd</sup> instar or larger pink bollworm larvae was found in 100% of the non-Bt (HS 44) late season bolls, compared to the 1% found in the adjacent transgenic Bt (Deltapine 33B) late season bolls (Table 1). In 1998, evidence of 3<sup>rd</sup> instar or larger pink bollworm larvae was found in 55 to 78% of the non-Bt (Deltapine 20) late season bolls, compared to the 2% found in the adjacent transgenic Bt (Deltapine 33B) late season bolls.

Furthermore, in 1997 pink bollworm feeding destroyed more than 50% of the lint in 81% of the non-Bt late season bolls and less than 25% of the lint in 82% of the transgenic Bt late season bolls (Table 2). In 1998, pink bollworm feeding destroyed less than 50% of the lint in 90% of the non-Bt late season bolls and less than 25% of the lint in 90% of the transgenic Bt late season bolls.

Although more 3<sup>rd</sup> instar or larger pink bollworm larvae were found in the 1998 transgenic Bt cotton crop, compared to the previous year, actual lint yield reductions of the top crop were similar for both years. However, pink bollworm pressure in and subsequent damage to the top crop were less during the 1998 study, compared to 1997.

## **Acknowledgment**

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## **References**

Knowles, Tim C., Tim J. Dennehy, and Albert Rovey. 1998. Late season pink bollworm pressure in the top crop of Bt and non-Bt cotton. 1998 U of AZ Cotton Report. Series P-112. p. 308-310.

Table 1. Percentage of non-Bt (HS 44 or DP 20) and Bt (DP 33B) cotton bolls sampled from adjacent fields containing or affected by pink bollworm (PBW) larvae in 1997 and 1998.

Sample Date	Variety	Live PBW Larvae		PBW Exit Holes	Evidence of 3 <sup>rd</sup> Instar or Larger PBW
		1 <sup>st</sup> - 2 <sup>nd</sup> Instar	3 <sup>rd</sup> + Instar		
10-17-97	HS 44	0	0	100	100
	DP 33B	0	0	1	1
10-29-98	DP 20	6	27	73	78
	DP 33B	0	0	0	0
11-9-98	DP 20	14	46	32	55
	DP 33B	1	1	1	2

Table 2. Percentage damage to non-Bt (HS 44 or DP 20) and Bt (DP 33B) cotton bolls sampled from adjacent fields caused by pink bollworm (PBW) larvae in 1997 and 1998.

Sample Date	Variety	Portion of Boll Damaged				
		None	1 to 10%	11 to 25%	26 to 50%	50% +
10-17-97	HS 44	0	0	0	19	81
	DP 33B	34	16	32	15	3
10-29-98	DP 20	2	4	31	41	22
	DP 33B	84	7	7	2	0
11-9-98	DP 20	22	9	24	35	10
	DP 33B	36	33	21	10	0