PERFORMANCE OF SELECTED BOLLGARD COTTON VARIETIES IN SOUTHEAST ARKANSAS

C.D. Capps, C. Allen, L. Earnest, P. Tugwell and M. Kaharboutli

Abstract

Bt cotton varieties are becoming a very important part of the cotton industry. Knowing how to manage these Bt cotton varieties could increase both profits and yields. Timely worm insecticide treatments to Bt cotton, when worms reach economically damaging levels, provide yield protection.

Introduction

Bt cotton is one of the newly available technologies which provide control of insecticide resistant budworm populations. In addition, Bt cotton technology provides moderate to high levels of budworm suppression.

In the Mississippi River Delta, Bt cotton is best suited for use in areas which are historically infested with moderate to high populations of tobacco budworm. This is because of a number of factors. First, cheap and effective insecticides are available for bollworm control while much less effective chemical controls are available at higher costs for budworm control. This may justify the cost of purchasing Bt technology in areas more heavily infested with budworm.

Objectives

Evaluate the insect control and yield potential of several Bt cotton cultivars under irrigated Southeast Arkansas growing conditions.

Methods and Materials

1996

A split plot was planted on 5-22-96 on a loam soil on the Southeast Branch Experiment Station near Rohwer, Arkansas. Plots were four rows by forty feet. Treatments were randomly assigned to plots (split plot design), and treatments were applied six times. Standard field preparation and fertilization practices were used.

At planting, standard herbicide, fungicide, and insecticide practices were used on all treatments. Tracer was applied at 2 oz/ac on appropriate plots on 8-26, 8-30, and 9-4. Standard irrigation practices included four irrigations applied as needed according to the irrigation scheduler model. Standard harvest preparations were used based on 856 DD60 heat units after node above white flower equal five. The field was picked on 10-24-96.

Reprinted from the *Proceedings of the Beltwide Cotton Conference*
Volume 2:1248-1250 (1998)
National Cotton Council, Memphis TN

COTMAN termination strategy was used to make insecticide termination decisions. Insect control sprays were terminated in each sprayed plot at NAWF 5 + 350 DD60 heat units or at NAWF 5 + 650 heat units.

Insect damaged fruit data was taken by observing ten terminals (top of plant to bloom), ten blooms, and twenty bolls per plot.

COTMAN data collection (plant mapping) was done on each plot to determine fruit set, node/internode development, cut-out, and spray termination.

1997

A split plot was planted on 5-13-97 on the Southeast Branch Experiment Station near Rohwer, Arkansas. Plots were four rows by forty feet. Treatments were randomly assigned to plots (split plot design), and treatments were replicated four times. Standard field preparations and fertilization practices were used.

At planting , standard herbicide, fungicide, and insecticide practices were used on all treatments. Karate was applied at 3.8 oz/ac on appropriate plots on 8-4-97. Standard irrigation practices included four irrigations applied as needed according to the irrigation scheduler model. Standard harvest preparations were used based on percent open bolls (at least 60% for all varieties). The field was picked in 10-1-97.

COTMAN termination strategy was used to make insecticide termination decisions. Insect control sprays were terminated in each sprayed plot at NAWF 5 + 350 heat units.

Insect and damaged fruit data were taken by observing ten terminals (top of plant to bloom), ten blooms and twenty small bolls per plot.

COTMAN data collecting (plant mapping) was done on each plot to determine fruit set, node/internode development, cut-out, and spray termination.

Results

Yields of Bt Varieties

Seed cotton yields produced by Bt cotton without insecticide treatment for worm control are shown in Tables 1 and 2. In 1996, Deltapine 90 Bt and MON 531 were the lowest yielding varieties. Deltapine 50 Bt and NuCotn 33b were the higher yielding varieties. Deltapine 50 Bt yielded significantly more seed cotton than Deltapine 50 did.

In 1997, Deltapine 90 Bt was again the lowest yielding variety (though not significantly different than Paymaster 1215 BG). The top four varieties (Paymaster 1330 BG, Deltapine 20 Bt, NuCotn 32b, and NuCotn 33b) were not significantly different from one another in seed cotton yield.

Insecticide Treatment of Bt Varieties

In 1996, Deltapine 90 Bt and MON 531 were the only varieties which responded with significantly higher yields to insecticide treatments (Table 3). Across all Bt varieties tested in 1996, plots treated for worm control yielded more but not statistically more seed cotton per acre than untreated plots. In the 1997 trial, only NuCotn 33b responded to treatment for worm control with increased seed cotton yields.

Summarizing data across all Bt varieties in both years, worm insecticide treatments produced a significant increase in seed cotton yields.

Insecticide Termination on Bt Cotton

The insecticide termination data collected in the 1996 study showed seed cotton yields in Bt cotton lines were not different in plots left unsprayed, terminated at NAWF 5 + 350 DD60 heat units, and at NAWF 5 + 650 DD60 heat units. Numerically, the sprayed plots tended to make higher yields. One insecticide treatment at NAWF 5 + 650 DD60 heat units did not produce a seed cotton yield advantage over termination of sprays at NAWF. 5 + 350 DD60 heat units.

Conclusions

Deltapine 90 Bt, MON 531, and Paymaster 1215 BG appear to be ill suited for Southeast Arkansas growing conditions, while Deltapine 50 Bt, Paymaster 1330 BG, and NuCotn 32b appear to be better suited. NuCotn 33b and Delta pine 20 Bt give indications of yield variability from year to year.

Over all, properly timed insecticide applications for worm control produced higher yields. This is an indication that bollworms can cause injury and yield loss to Bt cotton lines.

Late insecticide treatments have little chance of producing yield increases for Bt cotton lines. Late sprays would not be expected to produce yield increases on Bt cotton, and in this study such yield increases were not observed.

Table 1. Seed cotton yields of varieties that were not treated in 1996.

Untreated Cotton Yields 1996	
Variety	Seed Cotton Weight
Deltapine 90 Bt	1885 a
MON 531	2569 b
Deltapine 20 Bt	3104 c
Deltapine 50	3139 cd
NuCotn 33b	3540 de
Deltapine 50 Bt	3861 e

Table 2. Seed cotton yields of varieties that were not treated in 1997.

Untreated Cotton Yields 1997	
Variety	Seed Cotton Weight
Deltapine 90 Bt	3311 a
Paymaster 1215 BG	3499 ab
NuCotn 33b	3702 bc
NuCotn 32b	3762 bc
Deltapine 20 Bt	3840 c
Paymaster 1330 BG	3926 c

Table 3. Comparison of seed cotton yields of varieties that were treated and untreated in 1996.

Treated vs. Untreated Cotton Yields 1996			
Variety	DP 90 Bt	MON 531	DP 20 Bt
treated	2049 a	2890 a	3148 a
untreated	1885 a	2569 a	3104 a
Variety	DP 50	NC 33b	DP 50 Bt
treated	3620 a	3660 a	3815 a
untreated	3139 b	3540 a	3861 a

Table 4. Comparison of all Bt varieties vs. Deltapine 50 in 1996.

All Bt Varieties vs. DP 50 1996		
Variety	Treatment	Seed Cotton Yield
Deltapine 50	yes	3620 a
Deltapine 50	no	3138 b
All Bt varieties	yes	3112 b
All Bt varieties	no	2991 b

Table 5. Comparison of seed cotton yields of varieties that were treated and untreated in 1997.

Treated vs. Untreated Cotton Yields in 1997			
Variety	NC 33b	DP 20 Bt	DP 90 BT
treated	3852 a	3792 a	3710 a
untreated	3701 a	3840 a	3310 a
Variety	PM 1215BG	PM 1330BG	NC 32 Bt
treated	3714 a	3982 a	3982 a
untreated	3499 a	3926 a	3762 b

Table 6. Comparison of all Bt varieties from 1996 & 1997 that were treated and untreated.

1996 &1997 Bt Varieties Treated vs. Untreated	
Treatments	Seed Cotton Weight
treated	3509 a
untreated	3363 b

Table 7. Seed cotton yields of Bt cotton with sprays terminated at NAWF 5 + 350, NAWF 5 + 650, and no sprays.

Spray Terminations 1996	
Treatments/Termination	Seed Cotton Yield
NAWF 5 + 350	3122 a
NAWF 5 + 650	3103 a
No treatment	2992 a