

# WEED CONTROL AND YIELD PERFORMANCE OF TRANSGENIC COTTON IN ULTRA NARROW ROWS

*Michelle L. Mobley, Nilda R. Burgos, and Marilyn R. McClelland<sup>1</sup>*

## RESEARCH PROBLEM

The recent developments in herbicide technology and biotechnology are dramatically changing weed management programs in cotton (Snipes *et al.*, 1996). Herbicide-tolerant cultivars allow the option to manage weeds in ultra-narrow row cotton. This research was designed to compare yield of transgenic cotton in conventional and ultra-narrow rows and to determine whether a soil-applied herbicide is needed in transgenic cultivars.

## BACKGROUND INFORMATION

Ultra-narrow-row cotton is generally defined as cotton planted in 7.5 to 15-inch row spacing (Jost and Cothren, 1999). Fowler and associates (1999) found that ultra-narrow rows provided good weed control and higher yields than cotton planted in conventional row spacing.

## MATERIALS AND METHODS

Studies were conducted at Fayetteville and Little Rock in 1999. The Little Rock study was a randomized complete-block design with four replications using three glyphosate-tolerant cultivars and the bromoxynil-tolerant cultivar BXN47. Narrow rows were spaced 7.5 inches apart and conventional rows 30 inches apart. Herbicide treatments consisted of total postemergence (POST) programs of glyphosate or bromoxynil + pyriithiobac and each of the POST programs following a soil-applied treatment of flumeturon + metolachlor preemergence (Table 1). In Fayetteville, the design was a split factorial with two varieties (PM1220 and BXN47), two herbicides programs (total POST and soil-applied followed by POST), and two row spacings (7.5 and 40 inches). The herbicides used were the same as those at Little Rock. Weed control ratings were taken before the first POST application and at 2, 4, and 6 to 8 wk after the last POST application. For conventional row spacing, bolls were hand-harvested from two rows, 6.6 ft long, per plot. An equivalent area was harvested for ultra-narrow-row plots. Data were subjected to analysis of variance, and means were separated by least significant difference.

---

<sup>1</sup> Graduate Assistant, Assistant Professor, and Research Associate, Crop, Soil, and Environmental Sciences Department, University of Arkansas, Fayetteville, AR.

## RESULTS

In Little Rock, Palmer amaranth and prickly sida were controlled better in treatments containing a soil-applied herbicide for BXN47 early in the season. This remained true 80 days after planting (DAP) for Palmer amaranth. Early-season control of pitted morningglory was superior in treatments with a soil-applied herbicide in all cultivars. The glyphosate program for PM1220 controlled pitted morningglory (93%) and Palmer amaranth (97%) late in the season better than did the bromoxynil program for BXN47. In general, treatments with a soil-applied herbicide followed by a POST program had higher yields (Tables 2 and 3). Row spacing did not influence yield.

Throughout the season in Fayetteville, Palmer amaranth control was similar in all treatments (92 to 100%). Soil-applied herbicide improved the season-long control of pitted morningglory and prickly sida. All treatments had  $\geq 95\%$  control for goosegrass the entire season. Plants in conventional row spacings had higher yields than those in ultra narrow rows. In general PM1220 produced higher yields than BXN47.

## PRACTICAL APPLICATION

Using an ultra-narrow row production system is a viable, economical alternative that allows producers to grow high-yielding, quality, short-season cotton across a wide variation of soils, topography, and tillage conditions. This system has advantages of less erosion, machinery, cost, labor, and weed pressure than conventional row spacing. Yet there are disadvantages to using an ultra-narrow row production system, including elimination of post-directed herbicide applications, planting flat, no cultivation, and the potential for lower grades due to trash (Atwell *et al.*, 1996). Soil type and planting date, among other factors, need to be considered when choosing the best row spacing (Burmester, 1996).

## ACKNOWLEDGMENTS

We thank Ford Baldwin and his staff for their help in establishing the experiment at Little Rock and Vaughn Skinner for facilitating field operations at Fayetteville; Scott Payne and Celeste Wheeler for their assistance throughout the season; Diana Danforth for teaching us COTMAN; Monsanto Co., Inc., William Roberston, and Don Johnson for the cotton seed; and Alan Hopkins (Bayer) for Gaucho seed treatment.

## LITERATURE CITED

- Atwell, S., R. Perkins, B. Guice, W. Stewart, J. Harden, and T. Odeneal. 1996. Essential steps to successful ultra narrow row cotton production. Proc. Beltwide Cotton Conf., National Cotton Council, Memphis, TN. pp. 1210.
- Burmester, C.H. 1996. Status of ultra narrow row research in the southeast. Proc. Beltwide Cotton Conf., National Cotton Council, Memphis, TN. pp. 67-68.
- Fowler, J.T. Jr., E.C. Murdock, J.T. Staples, Jr., and J.E. Toler. 1999. Weed control in ultra-narrow-row roundup ready cotton. Proc. Beltwide Cotton Conf., National Cotton Council, Memphis, TN. pp. 739.

- Jost, P.H. and J.T. Cothren. 1999. Is ultra-narrow row earlier than conventionally-spaced cotton? Proc. Beltwide Cotton Conf., National Cotton Council, Memphis, TN. pp. 640.
- Snipes, C. 1996. Weed control in ultra narrow row cotton possible strategies assuming a worst case scenario. Proc. Beltwide Cotton Conf., National Cotton Council, Memphis, TN. pp. 66.

**Table 1. Herbicide treatments applied.**

Herbicide	Application Timing	Rate lb ai/acre
Fluometuron	PRE	1.0
Metolachlor	PRE	0.75
Glyphosate	POST (1-3 lf & 6-8 lf)	1.0
Bromoxynil	POST (1-3 lf)	0.25
Pyrithiobac sodium	POST (1-3 lf)	0.047
Clethodim	As needed	0.25
Prithiobac sodium	As needed	0.062

**Table 2. Effect of cultivar and weed control system on seedcotton yields of ultra-narrow row cotton.**

Cultivar	Fayetteville		Little Rock	
	PRE	POST	PRE	POST
	----- yield in lb/acre -----			
BXN47	1302	919	949	442
PM1220	1255	1904	1296	922
SG125	1209	844	1209	844
DP450	1221	661	1221	661

**Table 3. Effect of cultivars and weed control system on seedcotton yields of conventional row spacing.**

Cultivar	Fayetteville		Little Rock	
	PRE	POST	PRE	POST
	----- yield in lb/acre -----			
BXN47	1721	1535	585	156
PM1220	2755	2420	801	844