

ECONOMIC CONSEQUENCES OF USING DIFFERENT COTTON VARIETY TECHNOLOGY SYSTEMS IN ALABAMA

Report for the Alabama Cotton Commission
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Materials and Methods: Cotton was planted at the Tennessee Valley Research and Extension Center (TVREC) at Belle Mina on 4/22/ 2008 and on 4/ 23 at the E.V. Smith Research Center (EVSRC) at Tallassee using 4.5 seed per row foot and 40” rows. Varieties planted at both locations were Stoneville 4554 B2RF (= ST) (Bayer Crop Science), PhytoGen 485 WF (= PHY) (Dow AgroSciences LLC) and a conventional variety CT 210 (= CT) (Seed Tech Genetics). Temik 15G was applied in-furrow at TVREC and Temik 15G + Terraclor Super X was applied in-furrow at EVSRC. The experimental design was a split split plot with varieties being the main plot variable. The main plots were then split by pre-emergence weed control. Half the plots at TVREC received Cotoran 4L plus Prowl H2O at planting. Half the plots at EVSRC received Cotoran and Prowl plus Roundup. All herbicides used and their cost are shown in Tables 1 and 2.

Table 1. DATE OF APPLICATION AND COST OF HERBICIDES USED AT TVREC - 2008.

Herbi- cide	Date Applied	Rate/ Acre	Cost Per Acre /\$	CT 210 Pre	CT 210 No Pre	ST 4554 B2RF Pre	ST 4554 B2RF No Pre	PHY 485 WRF Pre	PHY 485 WRF No Pre
Cotor- ran 4L	4/22	2 pt	10.00	B ¹ G		B-G		B-G	
Prowl H2O	4/22	1pt	4.50	G ²		G		G	
Glypho	5/29	2 pt	9.00				B-G		B-G
Dual	5/29	1 pt	13.13				G		G
Staple	5/29	2 oz	13.00		B				
Select	5/29	10oz	14.00		G				
Glypho	6/9	2 pt	9.00			B-G		B-G	
Staple	6/9	2 oz	13.00	B					
Glypho	6/26	2 pt	9.00				B-G		B-G
Envoke	6/26	0.1oz	7.50		B				
Valor	7/8	2 oz	8.26	B	B	B	B	B	B
MSMA	7/8	2 pt	5.00	G	G	G	G	G	G
Total Cost/\$ ³				41	48	37	44	37	44

¹B = broadleaf weeds ²G = grass ³Rounded to nearest \$

Table 2. DATE OF APPLICATION AND COST OF HERBICIDES USED AT EVSRC- 2008.

Herbi- cide	Date Applied	Rate/ Acre	Cost Per Acre /\$	CT 210 Pre	CT 210 No Pre	ST 4554 B2RF Pre	ST 4554 B2RF No Pre	PHY 485 WRF Pre	PHY 485 WRF No Pre
Round- Up(RU)	3/24	1.5pt	10.88	B ¹ - G ²	B-G	B-G	G-G	B-G	B-G
Cotor- ran 4L	4/24	2 pt	10.00	B G		B-G		B-G	
Prowl 3.3 EC	4/24	2 pt	8.00	G		G		G	
RU	4/24	1.5 pt	10.88	B- G			B- G		B- G
RU WM	5/21	22 oz	11.69				B- G		B- G
Parlay	5/21	1.3pt	12.47				B		G
Staple	5/21	2 oz	13.00		B				
Poast+	5/21	2.25 pt	39.38		G				
RU WM	5/30	2 2oz	11.69			B-G	B-G	B-G	B-G
Envoke	5/30	0.1oz	7.50	B	B				
Caparol	6/17	1.5 pt	\$3.75	B- G	B- G	B- G	B- G	B- G	B- G
MSMA	6/17	2.5 pt	6.25	G	G	G	G	G	G
Total Cost/\$ ³				57	81	61	56	61	56

¹B = broadleaf weeds ²G = grass ³Rounded to nearest \$

The second split was by Heliothine (bollworm/budworm) control and included half the plots “with larvicides” for Heliothine control compared to plots “without larvicides”. AT TVREC half the CT plots received applications for Heliothines on 3 occasions when treatment thresholds were reached (2 Belt + one Brigade spray). A Brigade overspray was made to half the biotech variety plots on 7/30 when Heliothine egg/larval counts exceeded the treatment threshold in the CT plots. At EVSRC applications for Heliothines were applied to half of all the plots each time the economic threshold was reached in the conventional variety plots. There were a total of 4 Heliothine sprays at EVSRC ; twice with Tracer, once with Tracer + Asana and once with Steward + Mystic. Plant bugs in plots “without larvicides” were controlled using 3 sprays at TVREC and 5 sprays at EVSRC.

Plots at TVREC were rated for vigor on 5/29 and plant stand counts were made on 5/30. Plant height was measured at TVREC on 6/30 and 10/14. Plots were harvested on 10/13 and cotton

was ginned to determine % lint. Cotton was classed at the Birmingham classing office and staple, strength, and uniformity characteristics were measured and this information was used in completing the economic analysis.

An on-farm conventional cotton variety trial was conducted in Franklin county. This test included 6 conventional varieties plus DPL 141 B2F. Test plots were arranged in a randomized complete block design with 3 replications per variety. Hand-picked yields were taken from six 10 foot sections of row per variety since weed problems significantly increased variability within plots. Hand-picked yields were taken across each experimental block where varieties had the most uniform appearance. Hand-picked yields were taken in 3, 2 and one location in blocks 1, 2 and 3 respectively. Mechanically-harvested yields (2 whole plots per variety except Top Pick) were taken in the trial also. Due to a scale malfunction there was only one Top Pick plot weighed. This test was never sprayed with any insecticide since no pest reached a treatment threshold.

Results: In the technology systems comparison CT initially grew slower than the two biotech varieties at TVREC. TVREC plots were rated for vigor using a scale of 1 to 5 with 5 being the best possible rating. There was a significant difference in vigor ratings ($P > F = .0012$) in late May. The average vigor rating for CT was 2.44 while the two biotech variety vigor ratings averaged 3.1 (LSD = 0.3). The effect of technology level on cotton plant height in June is shown in Table 3.

Table 3. Effect of technology level on cotton plant height (June) at TVS, 2008

Technology ¹ Variety	Treatment	Plant Height (inches)
	PHY 485 WRF	21.0 A
	ST 4554 B2RF	19.7 B
	CT 210	17.2 C
	LSD (0.10)	1.2
Herbicide	Cotoran + Prowl, Pre	20.0 A
	No Pre	18.6 B
	LSD (0.10)	1.0

¹ Variety X Herbicide $P > F = NS$, Variety, 0.0599, and Herbicide 0.0232 .

There was a significant Variety X Herbicide X Larvicide interaction with respect to October plant height ($P > F = 0.0102$) at TVREC. CT plots without PREs and without larvicides averaged 50.8 inches while CT plots that received one or both of these treatments averaged from 43 to 43.9 inches. ST and PHY plots treated with different

combinations of PREs and larvicides had average heights ranging from 39.8 to 46.4 inches (LSD 0.10 = 3.3).

Stand counts made at TVREC on 5/30 showed there were significantly fewer plants ($Pr > F = 0.0062$) per 20 row feet in the ST plots (63.7) and CT plots (64.7) than in the PHY plots (72.9) (LSD = 5). There was a significant difference in yield among varieties at both TVREC ($Pr > F = 0.0001$) and EVSRC ($Pr > F = 0.0015$). There was a significant variety x larvicide treatment response with respect to yield at both TVREC and EVSRC (Table 5) with CT benefiting from Heliothine control at both locations and PHY benefiting from larvicides at TVREC.

Table 5. Effect of variety and larvicide technology on cotton yield, 2008.

Variety	Larvicide	Lint Yield (lbs/acre)	
		TVREC	EVSREC
ST	None	1958	2196
ST	Treated	1946	2117
PHY	None	1875	1899
PHY	Treated	1981	1819
CT	None	1222	1232
CT	Treated	1720	1530

Variety X Larvicide $Pr > F$ at TVREC = 0.0001, LSD (0.10) at TVREC = 86

Variety X Larvicide $Pr > F$ at EVSRC = 0.0091, LSD (0.10) at EVSRC = 90

ST and PHY with and without larvicide yielded significantly more cotton than CT plots, regardless of larvicide treatment or location. There was no significant difference in ST and PHY “with larvicide and without larvicide” plots at TVREC. ST plots did not respond to larvicide sprays. A pyrethroid applied on July 30 significantly increased the PHY yield at TVREC however, larvicide treatment at EVSRC did not increase PHY yield. Larvicide applications increased CT yield 498 lbs/ac at TVREC and 298 lbs/ac at EVSRC.

There was also a significant variety x herbicide interaction with respect to yield at TVREC with CT 210 yielding significantly more cotton when pre-emergence herbicides were used (Table 6).

Table 6. Effect of variety and herbicide technology on cotton yield at TVREC, 2008.

Variety	Herbicide	Lint yields/TVS/lbs/acre
Stoneville 4554 B2RF	No Pre	1696
	Preemergence	1674
Phytogen 485 WRF	No Pre	1689
	Preemergence	1737
CT 210 Conventional	No Pre	1235
	Preemergence	1394
Variety X Herbicide $Pr > F$		0.0447 LSD (0.10=86)

Table 7 and 8 show the results of the economic analysis for the 12 variety/larvicide/herbicide combinations at TVREC and EVSRC.

Table 7. Net returns for 3 cotton technology systems at TVREC in 2008¹.

Variety	Pre-Herbicide	Larvicide	Lbs Lint/A	Value /Ac \$	Seed + Tech Fee Cost/Ac ²	Herbicide Cost/Ac	Insecticide Cost/Ac	Net \$
ST	No	No	1920	1042	77	44	41	880
ST	No	Yes	1995	1082	77	44	43	918
ST	Yes	No	1995	1079	77	37	41	924
ST	Yes	Yes	1896	1032	77	37	43	875
PHY	No	No	1817	985	75	44	41	825
PHY	No	Yes	1999	1081	75	44	43	919
PHY	Yes	No	1933	1045	75	37	41	892
PHY	Yes	Yes	1964	1062	75	37	43	907
CT	No	No	1068	578	20	48	41	469
CT	No	Yes	1704	923	20	48	78	777
CT	Yes	No	1376	720	20	41	41	618
CT	Yes	Yes	1731	941	20	41	78	802

¹ Abbreviations, ST, Stoneville 4554B2RF; PHY, PhytoGen 485 WF; CT, CT 210

² Seed plus tech fee cost per acre based on seeding rate of 4.6 acres per bag of ST and PHY cotton seed and 4 acres per bag of CT seed.

Table 8. Net returns for 3 cotton technology systems at EVSRC in 2008¹.

<i>Variety</i>	<i>Pre-Herbicide</i>	<i>Larvicide</i>	<i>Lbs Lint/Ac</i>	<i>Value /Ac \$</i>	<i>Seed + Tech Fee Cost/Ac²</i>	<i>Herbicide Cost/Ac</i>	<i>Insecticide Cost/Ac</i>	<i>Net \$</i>
ST	No	No	2173	1179	101	56	30	992
ST	No	Yes	2103	1140	101	56	89	894
ST	Yes	No	2220	1189	101	61	30	997
ST	Yes	Yes	2082	1125	101	61	89	874
PHY	No	No	1805	976	96	56	30	794
PHY	No	Yes	1806	982	96	56	89	741
PHY	Yes	No	1951	1056	96	61	30	869
PHY	Yes	Yes	1805	971	96	61	89	725
CT	No	No	1234	661	20	58	30	553
CT	No	Yes	1507	809	20	58	89	642
CT	Yes	No	1332	715	20	57	30	608
CT	Yes	Yes	1380	739	20	57	89	573

¹ Abbreviations, ST, Stoneville 4554B2RF; PHY, Phytogen 485 WF; CT, CT 210

² Seed plus tech fee cost per acre based on seeding rate of 4.6 acres per bag of ST and PHY cotton seed and 4 acres per bag of CT seed.

Loan values ranged from 52.3 to 54.45 cents per lb at TVREC and from 53.55 to 54.35 cents per lb at EVSRC. The CT plots “without pre-herbicides and without larvicides” netted the least return after selected expenses were considered at both locations. ST plots “with a pre-herbicide and without larvicides” netted the highest return at both locations.

Seed cotton yields (lbs/acre) in the on-farm variety trial are given in Table 9 below.

Table 9. Seed cotton yields in on-farm variety trial in Franklin County, 2008.

Variety	Average Mechanical Picker Yield ¹	Mean Hand-Picked Yield ²
Bronco 7139	2180	2386
CT Lindwood	2073	1871
CT 310	1829	2178
Top Pick	1690	2115
DPL 141B2F	1677	2325
CT 210	1577	2331
Bronco 1492	1293	2317

¹ 2 reps per variety except Top Pick which had one rep, ² 6 reps per variety

Comparative yields obtained by mechanical harvest of large plots (700 ft long x 8 rows wide) were distorted by weed induced variability that was not uniform across plots.