ON-FARM AGRONOMIC AND ECONOMIC EVALUATION OF STACKED-GENE COTTON CULTIVARS IN THE COASTAL BEND REGION OF TEXAS

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Abstract

Large plot variety trials containing core varieties were planted at various locations across the Coastal Bend Region of Texas. Because of the rapid commercialization of new cultivars/technologies into the market, growers are forced to make variety selections with minimal information. These trials are intended to add needed information to growers "databases" from which they can utilize when making these critical decisions. In 2009, for the second consecutive year, the Coastal Bend cotton crop will be characterized as being extremely dry with below average yield and fiber quality. Extremely dry conditions at planting time resulted in poor stand establishment and about 350,000 acres were failed out across the region. The average lint yield for the Coastal Bend was 497 lb for 2009, compared to 633 lb/acre in 2008, and compared to 809 lb/acre in 2007. Top performing varieties in these trials included Dynagrow 2570 B2F, Phytogen 375 WRF, Deltapine 0920 B2RF, and Stoneville 4554 B2RF.

Introduction

Cultivar selection is the most important decision made by the cotton (*Gossypium hirsutum L.*) grower; however, with the proliferation of transgenic technology, new seed treatments for both early season insects and disease management, and new genetics, cultivar selection has become even more critical, and one of the most expensive inputs of the production enterprise. Unlike herbicide or insecticide decisions that can be changed during the season to address specific conditions and pests, cultivar selection is made only once and that selection dictates field management for the entire season.

Because of the rapid introduction of new cultivars/technologies into the marketplace today, growers and practitioners are forced to make cultivar selection decisions with less information than in the past. In most cases, decisions are based upon single-year information from academic/public sources, and sometimes the only information available is derived from seed company reports. Due to the rapid turnover of cultivars (three to four year life-cycle), multiple-year testing has virtually become a “thing-of-the-past.”

Traditional small-plot cultivar testing programs are inadequate in scale and design to investigate the economic impact of new cultivars/technologies. Generally, small-plot testing programs are not managed under field-scale, grower conditions. Agronomic management of weed, insect and plant growth regulator use and harvest operations will not be reflective of the commercial system. Consequently, an on-farm, large-plot cultivar testing program was developed by Texas AgriLife Extension cotton agronomists with the goal of providing growers and practitioners with information necessary in making cultivar decisions.

Texas producers planted 4.9 million acres in 2009 which was about 100,000 acres less than 2008. In the Coastal Bend Region 480,000 acres were planted in 2009, although only 135,000 acres were harvested. Transgenic varieties accounted for 90% of the state acreage in 2009. According to the USDA-Agricultural Marketing Service “Cotton Varieties Planted 2009 Crop” survey for the Corpus Christi Classing Office, about 19% of acres were Bollgard/Roundup Ready, 31% Bollgard II/Roundup Ready Flex, 14% Liberty Link and Liberty Link Bollgard II, 5% WideStrike/Roundup Flex, and 9% conventional cotton varieties. The most popular varieties for the region were: Delta Pine 161 B2RF 14 %, Delta Pine 555 BGRR – 12%, Fiber Max 832 – 9%, Delta Pine 141 B2RF - 8%, Fiber Max 840 B2RF – 6%, Fiber Max 835 LLB2 – 5%, Phytogen 375 WRF – 5%, Fiber Max 955 LLB2 - 5%, Delta Pine 449 BGRR – 4%, Fiber Max 832 LL – 4%, Delta Pine 0935 B2RF - 3%, and Delta Pine 444 BGRR – 3%.

Objective

The objective of this project was to compare yield and lint quality of Stacked-Gene Bollgard II and WideStrike Roundup Ready Flex cultivars grown in producer-cooperator fields in the Coastal Bend region of Texas.

Materials and Methods

Up to fourteen cultivars were planted at each location and cultivar selections were determined with input from grower cooperators/committees, Extension faculty, and seed industry representatives. Variety entries consisted of Bollgard II and WideStrike Roundup Ready Flex cultivars.

Plot dimensions ranged from 0.3 to 1.5 acres in size, depending upon the location. Studies were arranged in a randomized complete block design with three replications. All trials were machine harvested with grower picker or stripper harvesters. Plot weights were determined at harvest using a weighing boll buggy equipped with integral electronic scales. Lint samples were obtained from each plot for turnout and high volume instrument (HVI) fiber quality analysis, and Commodity Credit Corporation (CCC) loan value determination. Samples were ginned on a Continental 10 saw gin with no lint cleaner. This method consistently produces higher lint turnout percentages than would be common in a commercial gin. Consequently, higher turnouts equate to lint yields which were generally higher than area-wide commercial yields. Additionally, all data were standardized to a color grade and leaf of 41 – 4. Per pound loan value was calculated using Cotton Incorporated's 2009 Cotton Loan Calculator.

For HVI analysis, fiber samples were sent to the Fiber and Biopolymer Research Institute at Texas Tech University in Lubbock, Texas. Statistical analysis for comparison among cultivars was conducted using Agricultural Research Manager 8, using LSD (P=0.05).

Results and Discussion

Extremely dry weather conditions had a major influence on yield and quality of the 2009 crop. Dry conditions predominated the Coastal Bend weather pattern from prior to planting through boll fill. Rainfall totals were 4.61 and 11.54 inches. As a result, the crop was exposed to moisture stress for the entire growing season (Tables 1-6).

The Matagorda County location was the highest yielding dryland location with an average yield of 1100 lb/a. Colorado Co, the only irrigated location, had an average yield of 1451 lb/a. Average lint yields were 488 lb/a and 1452 lb/a for Calhoun and Colorado counties, respectively, with an overall multi-county average mean yield of 842 lbs/a. In general, mean lint yields of trials improved from south to northeast, with the lowest yielding trials in Calhoun, Victoria and Jackson Counties, 488, 656 and 517 lbs/a. Phytogen 375 WRF, Dynagrow 2570 and DP 0920 B2F were the top lint yielding varieties across the region.

Table 1. Multi-County Average

Variety	Yield (lbs/acre)		Turnout %		Loan Value (¢/lbs)		Lint Value ($/acre)	
DG 2570 B2F	878	a	42.7	ab	51.21	c	468	a
PHY 375 WRF	903	a	43.1	ab	51.39	bc	455	a
DP 0920B2F	871	a	43.3	a	50.65	c	441	a
ST 4554 B2F	855	ab	41.3	cd	51.56	bc	440	a
CG 3220 B2F	863	ab	42.0	bc	51.90	bc	440	a
DP 0935 B2F	834	ab	42.7	ab	50.85	c	436	a
PHY 485 WRF	851	ab	42.5	abc	50.95	c	433	a
ST 5458 B2F	866	a	42.0	bc	50.93	c	429	a
FM 9160 B2F	781	bc	41.3	cd	52.63	b	424	a
FM 840 B2F	714	c	40.2	d	54.11	a	387	a
Mean	**842**		**42.1**		**51.62**		**435**	
P>(F)	0.0033		0.0001		0.0001		0.0609	
LSD (P=.05)	84.5		1.2		1.3		42.4	
STD DEV	65.4		0.9		1.0		32.8	
CV %	7.8		2.2		1.9		7.5	

Table 2. Jackson County Site

Variety	Yield (lbs/acre)		Turnout %		Loan Value (¢/lbs)		Lint Value ($/acre)	
DP 0920 B2F	559	a	41.0	a	51.47	bc	287	a
DG 2570 B2F	553	a	40.0	a	51.08	bc	283	a
CG 3220 B2F	546	a	40.6	a	51.65	bc	282	a
ST 5458 B2F	518	ab	39.4	a	51.48	bc	267	ab
ST 4554 B2F	535	ab	38.8	a	49.78	c	266	ab
PHY 375 WRF	524	ab	37.9	a	49.67	c	260	ab
PHY 485 WRF	518	ab	39.4	a	50.13	c	260	ab
FM 9160 B2F	489	bc	38.6	a	52.93	ab	259	ab
DP 0935 B2F	487	bc	39.2	a	50.07	c	244	b
FM 840 B2F	440	c	37.9	a	54.05	a	238	b
Mean	**517**		**39.3**		**51.23**		**265**	
P>(F)	0.0099		0.3499		0.0046		0.0333	
LSD (P=.05)	56.9		2.8		2.1		29.3	
STD DEV	33.2		1.6		1.2		17.1	
CV %	6.4		4.1		2.4		6.5	

Table 3. Matagorda County Site

Variety	Yield (lbs/acre)		Turnout %		Loan Value (¢/lbs)		Lint Value ($/acre)	
PHY 375 WRF	1239	a	42.1	a	51.65	a	640	a
CG 3220 B2F	1194	ab	40.2	c	53.28	a	636	a
ST 5458 B2F	1196	ab	41.5	ab	51.63	a	618	ab
PHY 485 WRF	1147	bcd	40.8	bc	52.52	a	603	abc
DP 0920 B2F	1152	bc	42.4	a	52.27	a	603	abc
TAM 03WY-37S[1,2]	1114	bcd	38.0	d	52.97	a	590	a-d
ST 4554 B2F	1118	bcd	39.9	c	51.33	a	574	bcd
DG 2570 B2F	1094	cde	40.5	bc	52.05	a	570	bcd
FM 1740 B2F	1064	de	40.6	bc	52.92	a	563	cde
TAM 04 WA-24[1,2]	1071	cde	38.4	d	52.02	a	557	c-f
FM 9160 B2F	1023	ef	40.0	c	53.67	a	549	def
DP 0935 B2F	1073	cde	42.0	a	50.88	a	546	def
Seedtec 212[1]	977	f	38.1	d	52.53	a	513	ef
TAM 02 WK-11L[1,2]	940	f	40.9	bc	54.05	a	508	f
Mean	**1100**		**40.4**		**52.41**		**576**	
P>(F)	0.0001		0.0001		0.0842		0.0001	
LSD (P=.05)	867.0		1.1		1.9		51.3	
STD DEV	51.8		0.6		1.1		30.60	
CV %	4.7		1.6		2.2		5.3	

Table 4. Victoria County Site

Variety	Yield (lbs/acre)		Turnout %		Loan Value (¢/lbs)		Lint Value ($/acre)	
DG 2570 B2F	718	a	44.5	bcd	52.20	a	375	a
PHY375 WRF	721	a	45.1	ab	51.10	a	368	a
ST 4554 B2F	690	ab	43.3	ef	52.35	a	361	ab
ST 5458 B2F	680	abc	44.0	de	51.13	a	348	abc
DP 0935 B2F	687	ab	45.3	a	50.00	a	344	abc
CG 3220 B2F	627	cde	44.2	cd	51.55	a	323	bc
PHY 485 WRF	639	bcd	43.1	f	50.28	a	322	c
DP 0920 B2F	633	bcd	44.9	abc	49.33	a	312	c
FM 9160 B2F	593	de	42.7	f	52.60	a	312	c
FM 840 B2F	571	e	41.8	g	54.30	a	310	c
Mean	**656**		**43.9**		**51.48**		**338**	
P>(F)	0.0025		0.0001		0.3875		0.0239	
LSD (P=.05)	58.19		0.74		4.22		39.40	
STD DEV	25.72		0.33		1.87		17.40	
CV %	3.92		0.74		3.62		5.17	

Table 5. Calhoun County Site

Variety	Yield (lbs/acre)		Turnout %		Loan Value (¢/lbs)		Lint Value ($/acre)	
PHY 375 WRF	592	a	46.3	a	49.88	bcd	296	a
ST 4554 B2F	517	b	43.1	d	49.52	cd	256	b
FM 840 B2F	471	bcd	41.5	e	53.85	a	254	bc
CG 3220 B2RF	485	bcd	43.3	d	51.22	abc	248	bc
DP 0935 B2RF	496	bc	44.5	bc	49.27	cd	244	bc
FM 9160 B2F	443	d	43.3	d	52.68	ab	234	bc
PHY 485 WRF	474	bcd	43.7	cd	49.20	cd	234	bc
ST 5458 B2F	460	cd	43.9	cd	50.68	bcd	233	bc
DG 2570 B2F	475	bcd	44.4	bc	48.50	cd	231	bc
DP 0920 B2RF	466	bcd	44.9	b	48.12	d	224	c
Mean	**488**		**43.9**		**50.29**		**245**	
P>(F)	0.0008		0.0001		0.008		0.0053	
LSD (P=.05)	51.8		0.9		2.8		30.2	
STD DEV	30.2		0.5		1.6		17.6	
CV %	6.2		1.2		3.3		7.2	

Table 6. Colorado County Site

Variety	Yield (lbs/acre)		Turnout %		Loan Value (¢/lbs)		Lint Value ($/acre)	
DG 2570 B2F	1550	a	43.9	a	53.17	ab	824	a
DP 0920B2F	1545	a	43.3	a	51.58	bc	797	a
PHY 485 WRF	1475	a	45.4	a	52.80	ab	779	a
CG 3220 B2F	1462	a	41.7	a	53.12	ab	776	a
PHY 375 WRF	1439	a	44.5	a	53.75	a	774	a
DP 0935 B2F	1429	a	42.3	a	52.75	ab	753	a
ST 4554 B2F	1413	a	41.4	a	53.28	a	752	a
ST 5458 B2F	1474	a	41.3	a	50.93	c	751	a
FM 840 B2F	1375	a	39.5	a	54.25	a	746	a
FM 9160 B2F	1357	a	41.9	a	53.07	ab	719	a
Mean	**1452**		**42.5**		**52.87**		**767**	
P>(F)	0.3758		0.3477		0.0218		0.646	
LSD (P=.05)	175.9		4.7		1.6		99.7	
STD DEV	102.5		2.7		1.0		58.1	
CV %	7.1		6.4		1.8		7.6	

Conclusions

In 2009, for the second consecutive year, the Coastal Bend cotton crop will be characterized as being extremely dry with below average yield and fiber quality. Extremely dry conditions at planting time resulted in poor stand establishment and about 350,000 acres were failed out across the region. The average lint yield for the Coastal Bend was 497 lb for 2009, compared to 633 lb/acre in 2008, and compared to 809 lb/acre in 2007. Top performing varieties in these trials included Dynagrow 2570 B2F, Phytogen 375 WRF, Deltapine 0920 B2RF and Stoneville 4554 B2RF.