RESULTS FROM LARGE SCALE COTTON VARIETY TESTS IN THE TEXAS HIGH PLAINS

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Abstract

On farm large plot variety testing provides valuable information to cotton producers in the Texas High Plains on performance of commercially available cotton cultivars. The objectives of this project were to compare the performance of several commercial cotton varieties under varying production systems across the Texas High Plains. Five large plot trials were initiated in 2012. Parameters measured and reported here include lint yield, lint loan value and value per acre. The continued drought conditions resulted in below average cotton yields under the irrigated production systems utilized at some trial locations and in areas across the Texas High Plains. Significant differences were observed among varieties for most parameters reported. Results from the trials indicate that differences in overall performance among commercially available cotton cultivars can be observed under varying production environments and management practices. This information can provide assistance to producers in selecting cotton varieties for planting. However, the results from several trials across multiple locations and, if possible, multiple years should be referred to prior to variety selections.

Introduction

The 2012 growing season in the Texas High Plains was considerably better than was observed in 2011. However, drought conditions returned later in the season and cotton grown under low capacity irrigation systems resulted in lower than average yields. Five large plot replicated variety tests were initiated in 2012 to compare performance of several commercially available cotton varieties. Parameters measured included plant stand establishment, days to cutout, various plant mapping parameters, lint and seed yield, and fiber quality. Significant differences were observed among varieties at most locations for lint yield, fiber quality and loan value. Only lint yield, lint loan value, and lint value per acre are presented.

Materials and Methods

For scientific validity, three replications of each variety were included at each location. Locations included Blanco (Crosby County), Farwell (Parmer County), Plains (Yoakum County), Ralls (Crosby County), and Halfway (Hale County). Plot sizes varied by location and all but the Farwell location was planted to 40” rows (30” row spacing at Farwell). All locations were under center pivot irrigation (LEPA or LESA) with exception of the Ralls location which was under sub-surface drip irrigation. A randomized complete block design was used at all five locations. Weed and insect control measures, if needed, and harvest aid applications were performed commercially or by cooperating producers. Plots were harvested with commercial harvesters by producers with assistance provided by program personnel.

Location 1: Blanco, TX – Crosby County

Fourteen varieties were planted to 40” raised bed rows on May 16 with an approximate seeding rate of 42,000 seed per acre. The rows were circular due to center pivot LEPA irrigation system (sprinklers utilized for stand establishment). Soil type was a Pullman clay loam. Plot sizes were 8 rows wide by variable length due to circular rows. Harvest timings were split due to harvest aid failure to desiccate leaves in replication 2. Harvest occurred on October 24 and 25 for replications 1 and 3, and replication 2 was harvested on October 29 following a freeze event to dry down green leaf material left by harvest aids. Producer/cooperator harvesting equipment was utilized. Harvest material was transferred to the West Texas Lee Weigh Wagon for plot weight determination. Grab samples were taken by plot and ginned at the Texas A&M AgriLife Research and Extension Center at Lubbock. Resulting lint samples were submitted to the Texas Tech University – Fiber and Biopolymer Research Institute for HVI fiber analysis.

Location 2: Farwell, TX – Parmer County
At the Farwell location, twelve varieties were planted to 30" straight rows on the flat on May 18 with a seeding rate of approximately 60,000 seed per acre. This location was under a Low Elevation Spray Application (LESA) center pivot irrigation system with a terminated rye cover crop and an Olton clay loam soil. Plot size was 8 rows by variable length due to center pivot. Plots were harvested on November 7 and grab samples were taken by plot and ginned at the Texas A&M AgriLife Research and Extension Center at Lubbock. Resulting lint samples were submitted to the Texas Tech University – Fiber and Biopolymer Research Institute for HVI fiber analysis.

Location 3: Plains, TX – Yoakum County
Twenty varieties were planted to 40" raised bed rows on May 23 with an approximate seeding rate of 49,000 seed per acre. The rows were circular due to center pivot LESA irrigation system on an Amarillo fine sandy loam soil. Plot size was 12 rows by variable length due to center pivot. Plots were harvested on October 31 and grab samples were taken by plot and ginned at the Texas A&M AgriLife Research and Extension Center at Lubbock. Resulting lint samples were submitted to the Texas Tech University – Fiber and Biopolymer Research Institute for HVI fiber analysis.

Location 4: Ralls, TX – Crosby County
Twelve varieties were planted to 40" raised bed rows on May 17 with an approximate seeding rate of 49,000 seed per acre. This location was under sub-surface drip irrigation with an Olton loam soil. Plot size was 8 rows by field length. Plots were harvested on November 15 and grab samples were taken by plot and ginned at the Texas A&M AgriLife Research and Extension Center at Lubbock. Resulting lint samples were submitted to the Texas Tech University – Fiber and Biopolymer Research Institute for HVI fiber analysis.

Location 3: Halfway, TX – Hale County
Ten varieties were planted to 40" raised bed rows on May 21 with an approximate seeding rate of 52,000 seed per acre. The rows were circular due to center pivot LESA irrigation system on a Pullman clay loam soil. Plot size was 4 rows by variable length due to center pivot. Plots were harvested on November 13 and grab samples were taken by plot and ginned at the Texas A&M AgriLife Research and Extension Center at Lubbock. Resulting lint samples were submitted to the Texas Tech University – Fiber and Biopolymer Research Institute for HVI fiber analysis.

Results and Discussion

At the Blanco location, lint turnouts of field-cleaned bur cotton ranged from a high of 32.7% for PhytoGen 499WRF to a low of 30.1% for NexGen 4012B2RF. Lint yields averaged 546 lb/acre (Table 1). PhytoGen 499WRF had the highest lint yield with 610 lb/acre. Loan values derived from grab samples ranged from $0.5630 for Croplan Genetics 3787B2RF to $0.5003 for All-Tex Edge B2RF. This resulted in lint values ranging from $339.31/acre for PhytoGen 499WRF to $258.67/acre for FiberMax 9250GL.

Table 1. Harvest results from the Large Plot Irrigated Systems Variety Trial, Mark Appling Farm, Blanco, TX, 2012.

Entry	Lint yield		Lint loan value		Lint value	
	lb/acre		$/lb		$/acre	
PhytoGen 499WRF	610	a	0.5558	a	339.31	a
FiberMax 9170B2F	580	ab	0.5500	ab	319.05	ab
Croplan Genetics 3787B2RF	555	bcd	0.5630	a	312.45	ab
NexGen 1511B2RF	567	abc	0.5457	ab	309.14	ab
Deltapine 1219B2RF	551	bcd	0.5548	a	305.45	ab
NexGen 4012B2RF	544	bcd	0.5417	ab	294.73	bc
FiberMax 2011GT	535	bcd	0.5423	ab	290.31	bcd
Deltapine 1044B2RF	553	bcd	0.5227	bcd	289.21	bcd
PhytoGen 367WRF	571	ab	0.5057	cd	288.82	bcd
FiberMax 2989GLB2	502	d	0.5347	abc	268.52	cd
All-Tex Nitro-44 B2RF	515	cd	0.5210	bcd	268.38	cd
All-Tex Edge B2RF	531	bcd	0.5003	d	265.47	cd
Croplan Genetics 3156B2RF	517	cd	0.5107	cd	264.25	cd
FiberMax 9250GL	509	d	0.5083	cd	258.67	d
Test average	546		0.5326		290.98	
CV, %	7.0		3.4		7.0	
OSL	0.0822†		0.0011		0.0009	
LSD	53		0.0301		34.23	

Means followed by the same letter within each column are not significantly different.
CV - coefficient of variation.
OSL - observed significance level, or probability of a greater F value.
LSD - least significant difference at the 0.05 level, † - significant at the 0.10 level.
Note: some columns may not add up due to rounding error.
Value for lint based on CCC loan value from grab samples and FBRI HVI results.

Significant differences were observed among varieties for most yield and economic parameters measured at the Farwell location. Lint turnouts of field-cleaned bur cotton averaged 33.1% and ranged from a high of 36.0% for FiberMax 2011GT to a low of 30.7% for NexGen 2051B2RF. Lint yields ranged from 874 lb/acre for Deltapine 1219B2RF to 713 lb/acre for NexGen 1551RF (Table 2). Loan values derived from grab samples averaged $0.5392/lb. with a high of $0.5658 for FiberMax 1944GLB2 to a low of $0.4900 for Croplan Genetics 3156B2RF. After applying loan values to lint yields, the test average lint value was $439.93/acre.

Table 2. Harvest results from the Large Plot Irrigated Systems Variety Trial, Mark and Ryan Williams Farm, Farwell, TX, 2012.

Entry	Lint yield		Lint loan value		Lint value	
	lb/acre		$/lb		$/acre	
PhytoGen 367WRF	832	ab	0.5638	a	469.22	a
Deltapine 1212B2RF	867	a	0.5405	abc	468.82	a
FiberMax 9250GL	850	ab	0.5428	abc	461.52	a
FiberMax 2011GT	815	ab	0.5527	ab	450.57	ab
Deltapine 1219B2RF	874	a	0.5152	cd	450.17	ab
FiberMax 1944GLB2	784	bcd	0.5658	a	443.86	ab
PhytoGen 499WRF	833	ab	0.5322	abc	443.53	ab
All-Tex Edge B2RF	798	abc	0.5527	ab	441.02	ab
All-Tex Epic RF	839	ab	0.5228	bcd	438.73	ab
Croplan Genetics 3156B2RF	858	ab	0.4900	d	420.24	bc
NexGen 2051B2RF	737	cd	0.5395	abc	397.73	c
NexGen 1551RF	713	d	0.5520	ab	393.77	c
Test average	817		0.5392		439.93	
CV, %	5.5		3.7		5.42	
OSL	0.0038		0.0052		0.0094	
LSD	76		0.0336		40.36	

Means followed by the same letter within each column are not significantly different.
CV - coefficient of variation.
OSL - observed significance level, or probability of a greater F value.
LSD - least significant difference at the 0.05 level.
Note: some columns may not add up due to rounding error.
Value for lint based on CCC loan value from grab samples and FBRI HVI results.

At the Plains location the early freeze event on October 8 appeared to be beneficial to earlier maturity varieties in terms of lint yield and quality. Lint turnouts of field-cleaned bur cotton ranged from a high of 36.0% for NexGen 1511B2RF to a low of 28.9% for All-Tex Edge B2RF. NexGen 1511B2RF also had the highest lint yield with 1045 lbs/acre and the test average was 902 lbs/acre (Table 3). Loan values derived from grab samples ranged from $0.5810 for NexGen 4111RF to $0.5270 for Croplan Genetics 3156B2RF. This resulted in lint values ranging from $586.55/acre for NexGen 1511B2RF to $434.15/acre for FiberMax 9058F.

Table 3. Harvest results from the Large Plot Irrigated Systems Variety Trial, Rickey Bearden Farm, Plains, TX, 2012.

Entry	Lint yield		Lint loan value		Lint value	
	lb/acre		$/lb		$/acre	
NexGen 1511B2RF	1045	a	0.5615	abcd	586.55	a
Croplan Genetics 3787B2RF	1004	ab	0.5570	bcd	559.06	ab
Deltapine 1212B2RF	954	bcd	0.5662	abcd	540.07	bc
All-Tex Nitro-44 B2RF	961	bc	0.5523	bcd	530.82	bcd
Stoneville 4288B2F	917	cdef	0.5722	ab	524.86	bcde
Deltapine 1032B2RF	934	bcde	0.5515	bcde	514.90	cdef
FiberMax 2484B2F	914	cdef	0.5560	bcd	508.39	cdefg
FiberMax 2011GT	905	cdef	0.5612	abcd	507.98	cdefgh
FiberMax 2989GLB2	926	bcdef	0.5463	def	505.68	cdefgh
NexGen 4111RF	865	efg	0.5810	a	502.55	cdefgh
PhytoGen 367WRF	908	cdef	0.5470	cdef	496.67	defgh
FiberMax 1944GLB2	878	defg	0.5587	abcd	490.49	defgh
Dyna-Gro 2570B2RF	918	cdef	0.5283	ef	484.75	efgh
All-Tex Edge B2RF	876	defg	0.5447	def	477.20	fghi
PhytoGen 499WRF	848	fgh	0.5605	abcd	475.38	fghi
NexGen 4010B2RF	825	gh	0.5705	abc	470.80	ghi
Deltapine 1219B2RF	854	fgh	0.5495	bcdef	469.11	ghi
Stoneville 5458B2RF	848	fgh	0.5505	bcdef	466.80	ghi
Croplan Genetics 3156B2RF	883	cdefg	0.5270	f	465.10	hi
FiberMax 9058F	775	h	0.5602	abcd	434.15	i
Test average	901		0.5551		500.56	
CV, %	5.3		3.1		5.2	
OSL	<0.0001		0.0668†		<0.0001	
LSD	79		0.0237		43.15	

Means followed by the same letter within each column are not significantly different.
CV - coefficient of variation.
OSL - observed significance level, or probability of a greater F value.
LSD - least significant difference at the 0.05 level, † - significant at the 0.10 level.
Note: some columns may not add up due to rounding error.
Value for lint based on CCC loan value from grab samples and FBRI HVI results.

At the Ralls location, field variability was higher than observed in previous years due to a light hail event in late July and irrigation issues resulting from a lightning strike on the control system. Lint turnouts of field-cleaned bur cotton ranged from a high of 34.5% for Croplan Genetics 3787B2RF to a low of 29.2% for Deltapine 1044B2RF. Lint yields averaged 1254 lb/acre and PhytoGen 499WRF had the highest lint yield with 1402 lb/acre (Table 4). Loan values derived from grab samples ranged from $0.5642 for NexGen 4010B2RF to $0.4915 for Deltapine 1044B2RF. This resulted in lint values ranging from $756.14/acre for PhytoGen 499WRF to $549.81/acre for Deltapine 1044B2RF.

Table 4. Harvest results from the Crosby County Irrigated RACE, David Crump Farm, Ralls, TX, 2012.

Entry	Lint Yield	Lint loan value		Lint value	
	lb/acre	$/lb		$/acre	
PhytoGen 499WRF	1402	0.5397	abcd	756.41	a
FiberMax 2989GLB2	1374	0.5465	abcd	751.14	a
Stoneville 5458B2RF	1321	0.5437	abcd	718.08	ab
FiberMax 2484B2F	1331	0.5242	cd	697.82	ab
Dyna-Gro 2570B2RF	1242	0.5577	ab	692.35	ab
PhytoGen 367WRF	1326	0.5178	de	686.62	ab
Deltapine 0912B2RF	1239	0.5497	abc	680.90	ab
Croplan Genetics 3787B2RF	1212	0.5532	abc	670.65	ab
NexGen 4010B2RF	1133	0.5642	a	639.27	bc
NexGen 1511B2RF	1167	0.5408	abcd	631.04	bc
All-Tex Nitro-44 B2RF	1186	0.5303	bcd	628.90	bc
Deltapine 1044B2RF	1119	0.4915	e	549.81	c
Test average	1254	0.5383		675.25	
CV, %	9.6	3.3		9.4	
OSL	0.1006	0.0043		0.0359	
LSD	NS	0.0304		107.80	

Means followed by the same letter within each column are not significantly different.
CV - coefficient of variation.
OSL - observed significance level, or probability of a greater F value.
LSD - least significant difference at the 0.05 level, ns – not significant.
Note: some columns may not add up due to rounding error.
Value for lint based on CCC loan value from grab samples and FBRI HVI results.

Significant differences were observed among varieties for most yield and economic parameters measured at the Halfway location. Lint turnouts of field-cleaned bur cotton were not significant and averaged 36.1%. Lint yields ranged from 1015 lb/acre for PhytoGen 499WRF to 807lb/acre for Deltapine 1219B2RF (Table 5). Loan values derived from grab samples ranged averaged $0.5427/lb with a high of $0.5612 for PhytoGen 499WRF to a low of $0.5042 for Croplan Genetics 3156B2RF. After applying loan values to lint yields, the test average lint value was $508.06/acre.

Table 5. Harvest results from the Hale County Irrigated RACE, Texas A&M AgriLife Research Center Farm, Halfway, TX, 2012.

Entry	Lint yield		Lint loan value		Lint value	
	lb/acre		$/lb		$/acre	
PhytoGen 499WRF	1015	a	0.5612	a	569.73	a
FiberMax 2484B2F	988	ab	0.5607	ab	554.06	ab
All-Tex Nitro-44 B2RF	965	ab	0.5495	abc	530.39	abc
Deltapine 1032B2RF	952	ab	0.5538	abc	527.42	abc
Dyna-Gro 2570B2RF	956	ab	0.5432	abc	519.10	bc
FiberMax 2011GT	922	b	0.5473	abc	504.39	cd
Stoneville 4288B2F	918	b	0.5370	bc	492.88	cd
NexGen 4111RF	904	b	0.5392	abc	487.21	cd
Croplan Genetics 3156B2RF	926	b	0.5042	d	466.76	de
Deltapine 1219B2RF	807	c	0.5310	c	428.65	e
Test average	935		0.5427		508.06	
CV, %	5.6		2.5		5.5	
OSL	0.0109		0.0037		0.0003	
LSD	89		0.0237		47.96	

Means followed by the same letter within each column are not significantly different.

CV - coefficient of variation.

OSL - observed significance level, or probability of a greater F value.

LSD - least significant difference at the 0.05 level.

Note: some columns may not add up due to rounding error.

Value for lint based on CCC loan value from grab samples and FBRI HVI results.

Summary

Results from these studies, and others, indicate significant differences exist among varieties in terms of lint and seed yield, lint loan value, and fiber quality under varying environmental conditions and management practices. When selecting varieties for planting, producers should compare results from as many locations across as many years as possible. Variety testing results can be obtained from university and company trials.