



**Replicated LESA Irrigated Cotton Variety Demonstration
Under Full and Limited (15% reduction) Irrigation
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Gaines County
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Summary Significant differences were observed for all yield, economic, and most of the HVI fiber quality parameters measured. Net value/acre among varieties ranged from a high of \$914.77 (Deltapine 1032B2RF-Full Irrigation) to a low of \$619.30 (NexGen 3348B2RF-Limited Irrigation), a difference of \$295.48. There was a significant difference of \$209.74 between the Deltapine 1032B2RF-Full Irrigation and Deltapine 1032B2RF-Limited Irrigation. There was also a significant difference of \$97.72 between the NexGen 3348B2RF-Full Irrigation and NexGen 3348B2RF-Limited Irrigation. However, there was no significant difference between the Stoneville 4288B2RF-Full Irrigation and Stoneville 4288B2RF-Limited Irrigation. PhytoGen 367WRF showed a large numerical difference in net value of \$118.90 between the full and limited irrigation. Dyna-Gro 2570B2RF also showed a large numerical difference of \$62.90 between the full and limited irrigation. However, Stoneville 5458B2RF did not show a large numerical difference between full and limited irrigation. These data indicate that some varieties may have substantial differences in terms of varieties performance due to irrigation amounts. However, other varieties may not have as great of performance differences under varying levels of irrigation.

Objective The objective of this project was to compare agronomic characteristics, yields, gin turnout, fiber quality, and economic returns of transgenic cotton variety under full and limited irrigated production in Gaines County.

Materials and Methods

Varieties: Dyna-Gro 2570B2RF, Deltapine 1032B2RF, NexGen 3348B2RF, PhytoGen 367WRF, Stoneville 4288B2F, Stoneville 5458B2RF

Experimental design: Randomized complete block with 3 replications

Seeding rate: 3.5 seeds/row-ft in 40-inch row spacing

Plot size: 4 rows by variable length of field (175ft to 810ft long)

Planting date: 11-May

Soil Texture: 92% sand, 1% silt, and 7% clay

Soil pH: 8.0

Irrigation: This location was under a LESA center pivot. The full irrigation portion of the trial received approximately 15.87 inches of irrigation and rainfall from 11-May to 3-August. The limited irrigation portion of the trial received approximately 13.53 inches (15% reduction) of irrigation and rainfall from 11-May to 27-August 27. Irrigation and rainfall was not recorded after this time period.

Date	Inches of Irrigation/Rainfall Full Irrigation	Inches of Irrigation/Rainfall Limited Irrigation
11-May to 10-June	2.48	1.76
11-June to 15-July	8.29	7.07
16-July to 27-August	5.1	4.7

Insecticides: Temik 15G was applied infurrow at planting at a rate of 5 lb/acre

Harvest: Plots were harvested on 18-October using a commercial stripper harvester. Harvest material was transferred into a weigh wagon with integral electronic scales to determine individual plot weights. Plot yields were adjusted to lb/acre.

We were unable to harvest the 3rd replication of Dyna-Gro 2570B2RF, PhytoGen 367WRF, and Stoneville 5458B2RF. Therefore, these three varieties were excluded from the statistical analysis that is reported in Tables 1 and 2.

Averages of the 1st and 2nd replications for all varieties are reported in Table 3.

Gin Turnout: Grab samples were taken by plot and ginned at the Texas AgriLife Research and Extension Center at Lubbock to determine gin turnovers.

Fiber Analysis: Lint samples were submitted to the Fiber and Biopolymer Research Institute at Texas Tech University for HVI analysis, and USDA Commodity Credit Corporation (CCC) Loan values were determined for each variety by plot.

Ginning cost and seed values:

Ginning costs were based on \$3.00 per cwt. of bur cotton and seed value/acre was based on \$175/ton. Ginning costs did not include checkoff.

Seed and technology fees:

Seed and technology costs were calculated using the appropriate seeding rate (3.5 seed/row-ft) for the 40 row spacing and entries using the online Plains Cotton Growers Seed Cost Comparison Worksheet available at: <http://www.plainscotton.org/Seed/PCGseed10.xls>

Results and Discussion

Significant differences were observed for all yield, economic, and most of the HVI fiber quality parameters measured (Tables 1 and 2). Lint turnout ranged from a low of 29.8% and a high of 37.4% for NexGen 3348B2RF-Limited and Deltapine 1032B2RF-Full, respectively (Table 1). Seed turnout ranged from a high of 52.1% for NexGen 3348B2RF-Limited to a low of 47.1% for Deltapine 1032B2RF-Limited. Bur cotton yields averaged 4271lb/acre with a high of 4892 lb/acre for Stoneville 4288B2RF-Full, and a low of 3659 lb/acre for NexGen 3348B2RF-Limited. Lint yield varied with a low of 1092 lb/acre (NexGen 3348B2RF-Limited) and a high of 1616 (Deltapine 1032B2RF-Full). Lint loan values ranged from a low of \$0.5548/lb (Stoneville 4288B2RF-Limited) to a high of \$0.5742/lb (Deltapine 1032B2RF-Full). After adding lint and seed value, total value/acre for varieties ranged from a low of \$786.31 for NexGen 3348B2RF-Limited to a high of \$1109.58 for Deltapine 1032B2RF-Full.

When subtracting ginning, seed and technology fee costs, the net value/acre among varieties ranged from a high of \$914.77 (Deltapine 1032B2RF-Full Irrigation) to a low of \$619.30 (NexGen 3348B2RF-Limited Irrigation), a difference of \$295.48 (Table 1). There was a significant difference of \$209.74 between the Deltapine 1032B2RF-Full Irrigation and Deltapine 1032B2RF-Limited Irrigation. There was also a significant difference of \$97.72 between the NexGen 3348B2RF-Full Irrigation and NexGen 3348B2RF-Limited Irrigation. However, there was no significant difference between the Stoneville 4288B2RF-Full Irrigation and Stoneville 4288B2RF-Limited Irrigation.

Phytogen 367WRF showed a large numerical difference in net value of \$118.90 between the full and limited irrigation (Table 3). Dyna-Gro 2570B2RF also showed a large numerical difference of \$62.90 between the full and limited irrigation. However, Stoneville 5458B2RF did not show a large numerical difference between full and limited irrigation.

Micronaire values ranged from a low of 4.2 for NexGen 3348B2RF-Full to a high of 4.8 for Stoneville 4288B2F (Table 2). Staple averaged 36.6 across all varieties with a low of 35.9 for Stoneville 4288B2F-Limited and a high of 37.3 for Deltapine 1032B2RF. Percent uniformity ranged from a high of 83.3% for Deltapine 1032B2RF-Full to a low of 81.8% for NexGen 3348B2RF-Limited. Strength values averaged 30.0 g/tex with a high of 30.9 g/tex for Deltapine 1032B2RF and a low of 28.4 g/tex for Stoneville 4288B2F-Limited. Elongation ranged from a high of 7.8% for Stoneville 4288B2F-Limited to a low of 6.6% for Deltapine 1032B2RF-Full. Leaf grades ranged from 1 to 3, with a test average of 2.5. Values for reflectance (Rd) and yellowness (+b) averaged 80.8 and 8.4, respectively.

Conclusions

These data indicate that some varieties may have substantial differences in terms of varieties performance due to irrigation amounts. However, other varieties may not have as great of performance differences under varying levels of irrigation. Additional multi-site and multi-year applied research is needed to evaluate varieties and technology across a series of environments.

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Table 1. Harvest results from the cotton variety trial under full and limited center pivot irrigation (3 varieties), Shelby Elam Farm, Seminole, TX, 2010.

Entry	Lint turnout	Seed turnout	Bur cotton yield	Lint yield	Seed yield	Lint loan value	Lint value	Seed value	Total value	Ginning cost	Seed/technology cost	Net value
	----- % -----		----- lb/acre -----			\$/lb				----- \$/acre -----		
Deltapine 1032B2RF (Full Irrigation)	37.4	48.0	4327	1616	2075	0.5742	928.05	181.53	1109.58	129.80	65.01	914.77 a
Stoneville 4288B2F (Full Irrigation)	30.1	51.2	4892	1474	2505	0.5557	819.27	219.21	1038.47	146.76	64.01	827.70 a
Stoneville 4288B2F (Limited Irrigation)	30.8	51.1	4795	1475	2451	0.5548	818.51	214.49	1033.00	143.85	64.01	825.14 a
NexGen 3348B2RF (Full Irrigation)	30.5	51.8	4122	1256	2135	0.5662	711.12	186.79	897.92	123.66	57.23	717.02 b
Deltapine 1032B2RF (Limited Irrigation)	33.2	47.1	3828	1269	1805	0.5727	726.98	157.92	884.90	114.85	65.01	705.03 bc
NexGen 3348B2RF (Limited Irrigation)	29.8	52.1	3659	1092	1907	0.5672	619.44	166.87	786.31	109.78	57.23	619.30 c
Test average	32.0	50.2	4271	1364	2146	0.5651	770.56	187.80	958.36	128.12	62.09	768.16
CV, %	8.1	2.2	6.0	6.0	6.1	1.4	6.0	6.1	6.0	6.0	--	6.5
OSL	0.0345	0.0009	0.0007	0.0002	0.0003	0.0524 [†]	0.0002	0.0003	0.0004	0.0007	--	0.0003
LSD	4.7	2.0	470	150	239	0.0117	84.17	20.95	104.72	14.10	--	90.75

For net value/acre, means within a column with the same letter are not significantly different at the 0.05 probability level.

CV - coefficient of variation.

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

LSD - least significant difference at the 0.05 level, [†]indicates significance at the 0.10 level.

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

Assumes:

\$3.00/cwt ginning cost.

\$175/ton for seed.

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

Table 2. HVI fiber property results from the cotton variety trial under full and limited center pivot irrigation (3 varieties), Shelby Elam Farm, Seminole, TX, 2010.

Entry	Micronaire	Staple	Uniformity	Strength	Elongation	Leaf	Rd	+b	Color grade	
	units	32 ^{nds} inches	%	g/tex	%	grade	reflectance	yellowness	color 1	color 2
Deltapine 1032B2RF (Limited Irrigation)	4.7	37.3	82.4	30.9	6.9	1.0	82.5	8.1	1.3	1.0
Deltapine 1032B2RF (Full Irrigation)	4.4	37.3	83.3	30.9	6.6	1.7	81.9	8.1	1.7	1.0
NexGen 3348B2RF (Limited Irrigation)	4.3	36.4	81.8	30.1	6.9	2.7	79.9	8.6	2.0	1.0
NexGen 3348B2RF (Full Irrigation)	4.2	36.3	82.5	29.9	6.9	3.0	79.9	8.6	2.0	1.0
Stoneville 4288B2F (Limited Irrigation)	4.8	35.9	82.5	28.4	7.8	3.0	80.7	8.4	1.7	1.0
Stoneville 4288B2F (Full Irrigation)	4.8	36.6	82.1	29.6	7.5	3.7	79.6	8.6	2.0	1.0
Test average	4.5	36.6	82.4	30.0	7.1	2.5	80.8	8.4	1.8	1.0
CV, %	4.3	1.0	1.1	3.8	4.2	16.3	0.5	2.9	--	--
OSL	0.0172	0.0039	0.4628	0.1629	0.0045	0.0001	<0.0001	0.0556 [†]	--	--
LSD	0.4	0.7	NS	NS	0.5	0.7	0.7	0.4	--	--

CV - coefficient of variation.

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

LSD - least significant difference at the 0.05 level, [†]indicates significance at the 0.10 level, NS - not significant

Table 3. Harvest results from the cotton variety trial under full and limited center pivot irrigation (all varieties), Shelby Elam Farm, Seminole, TX, 2010.

Entry	Lint turnout	Seed turnout	Bur cotton yield	Lint yield	Seed yield	Lint loan value	Lint value	Seed value	Total value	Ginning cost	Seed/technology cost	Net value
	----- % -----		----- lb/acre -----			\$/lb			----- \$/acre -----			
PHY 367WRF (Full Irrigation)	32.5	49.3	4942	1605	2440	0.5708	916.73	213.49	1130.22	148.27	62.80	919.15
DP 1032B2RF (Full Irrigation)	34.1	48.5	4524	1539	2192	0.5740	883.48	191.79	1075.27	135.73	65.01	874.53
ST 5458B2RF (Full Irrigation)	31.2	50.1	4982	1551	2496	0.5603	869.20	218.40	1087.60	149.46	64.01	874.13
ST 5458B2RF (Limited Irrigation)	32.6	50.8	4837	1571	2456	0.5458	857.45	214.90	1072.35	145.11	64.01	863.23
DG 2570B2RF (Full Irrigation)	33.7	51.8	4412	1485	2282	0.5735	851.43	199.71	1051.13	132.35	62.60	856.18
ST 4288B2F (Full Irrigation)	30.6	51.9	4946	1509	2555	0.5530	834.50	223.55	1058.05	148.37	64.01	845.67
ST 4288B2F (Limited Irrigation)	30.9	51.9	4770	1472	2475	0.5495	810.55	216.52	1027.07	143.09	64.01	819.97
PHY 367WRF (Limited Irrigation)	32.6	48.8	4364	1417	2130	0.5693	807.55	186.40	993.95	130.91	62.80	800.24
DG 2570B2RF (Limited Irrigation)	33.1	51.2	4188	1386	2145	0.5725	793.84	187.69	981.53	125.65	62.60	793.28
NG 3348B2RF (Full Irrigation)	30.5	51.3	4184	1275	2147	0.5658	721.53	187.84	909.38	125.53	57.23	726.62
DP 1032B2RF (Limited Irrigation)	33.8	47.8	3824	1293	1828	0.5735	741.73	159.99	901.72	114.72	65.01	721.99
NG 3348B2RF (Limited Irrigation)	29.9	52.3	3554	1060	1862	0.5673	601.23	162.91	764.15	106.63	57.23	600.29

We were not able to collect data from the third replication of PHY 367WRF, ST 5458B2RF, and DG 2570B2RF. Therefore, the data in this table represents the average of two replications. Statistical Analysis was not performed.