Replicated LESA Irrigated Cotton Variety Demonstration and the Use of Vydate C-LV Under Root-knot Nematode Pressure

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Summary Significant differences were observed for most of the yield, economic, and HVI fiber quality parameters measured. Net value/acre among varieties ranged from a high of $619.38 (PhytoGen 375WRF-with Vydate) to a low of $472.24 (NexGen 4010B2RF), a difference of $147.14. There were no differences between varieties for root galling and root-knot nematode populations in the soil. Two of the varieties (Phytogen 375WRF and Stoneville 5458B2RF) were also tested with and without the nematicide Vydate CLV. Root-knot nematode population densities were higher for Phytogen 375WRF than for Stoneville 5458B2RF when Vydate CLV was absent, but densities were similar across both varieties when Vydate CLV was utilized. Root-knot nematode density was lower for Phytogen 375WRF when Vydate CLV was used, than when it was not used. However, root-knot population densities were similar for Stoneville 5458B2RF with or without Vydate. Net value did not differ between Vydate treatments (with and without) for either PhytoGen 375WRF and Stoneville 5458B2RF.

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

Materials and Methods

Varieties: Deltapine 0935B2RF, Deltapine 1044B2RF, Deltapine 174RF, Dyna-Gro 2570B2RF, NexGen 3348B2RF, NexGen 4010B2RF, PhytoGen 367WRF, PhytoGen 375WRF, Stoneville 4288B2F, Stoneville 5458B2RF

Experimental design: Randomized complete block with 3 replications

Seeding rate: 3.5 seeds/row-ft in 36-inch row spacing

Plot size: Variable length of field (770ft to 2507ft long) by 8 rows for all varieties except for Stoneville 5458B2RF and Phytogen 375WRF which had 16 rows

Planting date: 13-May

Soil Texture: 90% sand, 3% silt, and 7% clay

Soil pH: 7.6

Irrigation: This location was under a LESA center pivot. This trial received approximately 13.45 inches of irrigation and rainfall from 13-May to 20-July. Irrigation and rainfall amounts were not recorded after this period.

Date	Inches of Irrigation/Rainfall
13-May to 10-June	3.49
11-June to 20-July	9.96

Insecticides: Temik 15G was applied in-furrow at planting at a rate of 5 lb/acre. Vydate C-LV was applied in a band at a rate of 17oz per acre on18-June to all plots except for 8 rows of Stoneville 5458B2RF and Phytogen 375WRF in each replication

Harvest: Plots were harvested on 16 & 18-November 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.

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

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 determine for each variety by plot.

Ginning cost and seed values: Ginning cost were based on $3.00 per cwt. of bur cotton and seed value/acre was based on $175/tone. 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 36 row spacing and entries using the online Plaines Cotton Growers Seed Cost Comparison Worksheet available at: http://www.plainscotton.org/Seed/PCGseed10.xls

Results and Discussion

Significant differences were observed for most of the yield, economic, and HVI fiber quality parameters measured (Tables 1 and 2). Lint turnout

ranged from a low of 29.7% and a high of 36.4% for NexGen 4010B2RF and PhytoGen 375WRF (with Vydate), respectively. Seed turnout ranged from a high of 51.8% for Stoneville 4288B2F to a low of 46.9% for Deltapine 174RF. Bur cotton yields averaged 3240lb/acre with a high of 3579 lb/acre for Stoneville 4288B2F, and a low of 2924 lb/acre for Deltapine 0935B2RF. Lint yield varied with a low of 879 lb/acre (NexGen 4010B2RF) and a high of 1175 (PhytoGen 375WRF-with Vydate). After adding lint and seed value, total value/acre for varieties ranged from a low of $634.54 for NexGen 4010B2RF to a high of $795.96 for PhytoGen 375WRF (with Vydate). When subtracting ginning, Vydate C-LV, seed and technology fee costs, the net value/acre among varieties ranged from a high of $619.38 (PhytoGen 375WRF-with Vydate) to a low of $472.24 (NexGen 4010B2RF), a difference of $147.14. There was no significant difference between the PhytoGen 375WRF (no Vydate) and PhytoGen 375WRF (with Vydate). Also, there was no significant difference between the Stoneville 5458B2RF (no Vydate) and Stoneville 5458B2RF (with Vydate).

Micronaire values ranged from a low of 3.6 for NexGen 3348B2RF to a high of 4.7 for Deltapine 0935B2RF. Staple averaged 35.2 across all varieties with a low of 34.0 for Deltapine 0935B2RF and a high of 36.6 for NexGen 4010B2RF. Percent uniformity ranged from a high of 81.9% for NexGen 4010B2RF to a low of 79.1% for Stoneville 5458B2RF. Strength values averaged 28.3 g/tex with a high of 30.8 g/tex for NexGen 4010B2RF and a low of 26.5 g/tex for Stoneville 4288B2RF. Elongation ranged from a high of 8.4% for Deltapine 1044B2RF to a low of 6.6% for NexGen 3348B2RF. Leaf grades ranged from 1 to 3, with a test average of 2.5. Values for reflectance (Rd) and yellowness (+b) averaged 82.2 and 7.7, respectively.

All of the varieties were examined for differences in root galling and root-knot nematode populations in the soil. There were no differences between varieties for these parameters (Table 1).

Two of the varieties (Phytogen 375WRF and Stoneville 5458B2RF) were also tested with and without the nematicide Vydate CLV. The application of this chemical was made after the first generation of the nematode had already entered the roots and caused some galling, so the soil and root population density of root-knot was the only parameter of interest. Root-knot nematode population density was higher for Phytogen 375WRF than for Stoneville 5458B2RF when Vydate CLV was absent (Table 2), but root-knot nematode had similar densities across both varieties when Vydate CLV was present. Root-knot nematode density was lower in Phytogen 375WRF when Vydate CLV was present, than when it was

absent (Table 2). However, root-knot population density was similar both in the absence and presence of Vydate CLV for Stoneville 5458B2RF.

Conclusions

These data indicate that substantial differences can be obtained in terms of net value/acre due to variety and technology selection. However, no differences were obtained in terms of net value/acre due to the use of Vydate C-LV. It should be noted that no inclement weather was encountered at this location prior to harvest and therefore, no pre-harvest losses were observed. Additional multi-site and multi-year applied research is needed to evaluate varieties, technology, and use of Vydate C-LV across a series of environments.

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Table 1. Harvest results from the cotton variety trial under low root-knot nematode pressure, Roy Johnson 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	Vydate cost	Net value	
	-------- % --------		---------- lb/acre ----------			$/lb	---------- $/acre ----------							
PhytoGen 375WRF (Vydate)	36.4	48.0	3232	1175	1551	0.5617	660.23	135.73	795.96	96.97	69.78	9.83	619.38	a
PhytoGen 367WRF (Vydate)	32.7	48.2	3523	1152	1699	0.5567	641.27	148.70	789.97	105.69	69.78	9.83	604.68	ab
Stoneville 4288B2F (Vydate)	31.8	51.8	3579	1138	1854	0.5522	628.37	162.26	790.62	107.36	71.12	9.83	602.31	abc
Stoneville 5458B2RF (No Vydate)	32.6	49.8	3450	1124	1718	0.5455	613.01	150.33	763.34	103.51	71.12	0.00	588.70	abc
PhytoGen 375WRF (No Vydate)	34.5	47.9	3157	1090	1512	0.5612	611.59	132.33	743.92	94.72	69.78	0.00	579.43	abc
Stoneville 5458B2RF (Vydate)	33.4	49.5	3350	1117	1658	0.5442	608.04	145.06	753.10	100.50	71.12	9.83	571.65	abcd
Dyna-Gro 2570B2RF (Vydate)	33.7	51.2	3213	1082	1644	0.5577	603.30	143.87	747.17	96.38	69.56	9.83	571.40	abcd
NexGen 3348B2RF (Vydate)	31.3	51.6	3440	1077	1775	0.5450	586.81	155.31	742.12	103.19	63.59	9.83	565.50	bcd
Deltapine 174RF (Vydate)	35.6	46.9	2955	1051	1385	0.5610	589.49	121.23	710.72	88.66	61.60	9.83	550.63	cde
Deltapine 0935B2RF (Vydate)	35.4	49.5	2924	1036	1448	0.5408	560.41	126.67	687.09	87.73	71.22	9.83	518.31	def
Deltapine 1044B2RF (Vydate)	31.5	51.1	3099	976	1584	0.5515	538.50	138.56	677.06	92.98	70.00	9.83	504.26	ef
NexGen 4010B2RF (Vydate)	29.7	51.4	2962	879	1521	0.5705	501.41	133.13	634.54	88.87	63.59	9.83	472.24	f
Test average	33.2	49.7	3240	1075	1613	0.5540	595.20	141.10	736.30	97.21	68.52	8.19	562.37	
CV, %	4.6	1.6	4.8	5.0	4.8	2.4	5.0	4.8	4.9	4.8	--	--	5.6	
OSL	0.0005	<0.0001	0.0001	<0.0001	<0.0001	0.2492	<0.0001	<0.0001	0.0003	0.0001	--	--	0.0002	
LSD	2.6	1.4	266	90	130	NS	50.24	11.38	61.56	7.97	--	--	53.61	

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, NS - not significant
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 low root-knot nematode pressure, Roy Johnson Farm, Seminole, TX, 2010.

Entry	Micronaire	Staple	Uniformity	Strength	Elongation	Leaf	Rd	+b	Color grade	
	units	32nds inches	%	g/tex	%	grade	reflectance	yellowness	color 1	color 2
Deltapine 0935B2RF (Vydate)	4.7	34.0	80.5	27.7	7.0	1.0	83.4	7.8	1.3	1.0
Deltapine 1044B2RF (Vydate)	4.5	34.6	81.1	28.6	8.4	2.0	83.1	7.5	1.7	1.0
Deltapine 174RF (Vydate)	4.5	35.7	80.8	26.8	7.0	2.7	81.3	7.8	2.0	1.0
Dyna-Gro 2570B2RF (Vydate)	4.1	35.3	80.4	28.1	8.1	2.0	82.7	7.8	2.0	1.0
NexGen 3348B2RF (Vydate)	3.6	35.7	81.4	29.8	6.6	3.7	81.4	7.5	2.0	1.0
NexGen 4010B2RF (Vydate)	4.1	36.6	81.9	30.8	6.8	2.0	82.2	7.9	2.0	1.0
PhytoGen 367WRF (Vydate)	4.0	35.7	80.7	29.0	7.5	3.3	82.0	7.9	2.0	1.0
PhytoGen 375WRF (Vydate)	4.2	35.6	80.5	27.6	6.7	2.7	82.6	7.3	2.0	1.0
PhytoGen 375WRF (No Vydate)	4.3	35.1	81.6	27.7	6.8	2.3	82.9	7.4	1.7	1.0
Stoneville 4288B2F (Vydate)	4.7	35.1	80.1	26.5	7.5	3.0	82.2	7.8	2.0	1.0
Stoneville 5458B2RF (Vydate)	4.7	34.6	80.1	28.7	6.7	2.7	81.4	8.0	2.0	1.0
Stoneville 5458B2RF (No Vydate)	4.4	34.5	79.1	27.9	7.1	2.7	80.9	8.1	2.0	1.0
Test average	4.3	35.2	80.7	28.3	7.2	2.5	82.2	7.7	1.9	1.0
CV, %	7.3	1.5	1.0	2.4	5.1	27.9	0.6	2.5	--	--
OSL	0.0087	0.0005	0.0241	<0.0001	<0.0001	0.0122	<0.0001	0.0005	--	--
LSD	0.5	0.9	1.4	1.2	0.6	1.2	0.8	0.3	--	--

CV - coefficient of variation.
OSL - observed significance level, or probability of a greater F value.
LSD - least significant difference at the 0.05 level.

Table 3. Root galling and population density of root-knot nematode for ten varieties when Vydate CLV was applied

Entry	Galls/ root	No. of root-knot nematode per 500 cm3 soil
Dyna-Gro 2570B2RF	19.3	267
Deltapine 1044B2RF	15	347
Deltapine 174RF	19	560
Deltapine 0935B2RF	11.3	2193
NexGen 3348B2RF	13.7	667
NexGen 4010B2RF	9	1245
PhytoGen 367WRF	11	525
PhytoGen 375WRF	16	284
Stoneville 4288B2F	12	0
Stoneville 5458B2RF	6	260

Table 4. Effect of Vydate CLV and variety on population density of root-knot nematode

Entry	Vydate CLV oz/acre	No. of root-knot nematode per 500 cm3 soil
PhytoGen 375WRF	0	1453 a
Stoneville 5458B2RF	0	640 b
PhytoGen 375WRF	17	347 b
Stoneville 5458B2RF	17	260 b