AgriLIFE EXTENSION
Texas A&M System

Replicated Seeding Rate Research Trial with Four Different Cotton Varieties

Cooperator: Cheuvront Farms

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Gaines County

Summary: There was no significant interaction between varieties and seeding rates for lint turnout, seed turnout, bur cotton yields, lint loan values, and ginning costs, which indicates that the response was consistent with all seeding rates. Lint turn out ranged from a high of 29.8% for FM 9170B2RF to a low of 28.7% for DP 1044B2RF. Lint loan values ranged from a low of $0.4907/lb (ST 5458B2RF) to a high of $0.5426/lb (FiberMax 9170B2F). There was a significant interaction between varieties and seeding rates for lint yield, seed yield, lint value, seed value, total value, seed and technology costs, and net value, which indicates that the response was not consistent with all seeding rates. FiberMax 9170B2RF at a seeding rate of 2 seed/ft had the highest lint yield (1052 lb/acre), seed yield (1625 lb/acre), lint value ($569.31 per acre), seed value ($243.70 per acre), total value ($813.01 per acre), and net value ($681.84 per acre). ST 5458B2RF had the lowest loan value ($0.4907/lb), and this contributed to ST 5458B2RF at seeding rates of 2.5 and 3.5 seed/ft having the lowest lint values per acre. After adding lint and seed value, and subtracting ginning, seed and technology fee costs, the net value/acre ranged from a high of $681.84 (FiberMax 9170B2F at a seeding rate of 2 seed/ft) to a low of $466.43 (Phytogen 367WRF at a seeding rate of 3.5 seed/ft), a difference of $215.41. There was no significant interaction between varieties and seeding rates for the HVI fiber quality parameters measured. Focusing solely on varieties, all of the HVI fiber quality parameters, except for leaf, were significantly different. Focusing solely on seeding rates, micronaire was the only HVI fiber quality parameter that was significantly different.

Objective: The objective of this project was to compare agronomic characteristics, yields, gin turnout, fiber quality, and economic returns of four transgenic cotton varieties

in combination with four seeding rates under irrigated production in Gaines County.

Materials and Methods:

Varieties: Deltapine 1044B2RF, FiberMax 9170B2F, PhytoGen 367WRF, Stoneville 5458B2F

Experimental design: Randomized complete block with 3 replications

Seeding rates:
2 seeds/row-ft in 36-inch row spacing
2.5 seeds/row-ft in 36-inch row spacing
3 seeds/row-ft in 36-inch row spacing
3.5 seeds/row-ft in 36-inch row spacing

Plot size: 6 rows by variable length of the field (655ft to 2449ft long)

Planting date: 6-May

Irrigation: This location was under a LESA center pivot.

Harvest: Plots were harvested on 6 & 7-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.

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 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 $300/ton. Ginning costs did not include checkoff.

Seed and technology fees: Seed and technology costs were calculated using the appropriate seeding rate (2, 2.5, 3, or 3.5 seed/row-ft) for the 36 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:

There was no significant interaction between varieties and seeding rates for lint turnout, seed turnout, bur cotton yields, lint loan values, and ginning costs, which indicates that the response was consistent with all seeding rates (Table 1). Lint turn out ranged from a high of 29.8% for FM 9170B2RF to a low of 28.7% for DP 1044B2RF. Seed turn out ranged from a high of 45.8 for DP 1044B2RF to a low of 44.3 for Phytogen 367WRF. Bur cotton yields averaged 2953 lb/acre with a high of 3084 lb/acre for DP 1044B2RF, and a low of 2856 lb/acre for FM 9170B2RF. Lint loan values ranged from a low of $0.4907/lb (ST 5458B2RF) to a high of $0.5426/lb (FiberMax 9170B2F).

There was a significant interaction between varieties and seeding rates for lint yield, seed yield, lint value, seed value, total value, seed and technology costs, and net value, which indicates that the response was not consistent with all seeding rates (Table 2). FiberMax 9170B2RF at a seeding rate of 2 seed/ft had the highest lint yield (1052 lb/acre), seed yield (1625 lb/acre), lint value ($569.31 per acre), seed value ($243.70 per acre), total value ($813.01 per acre), and net value ($681.84 per acre). FiberMax 9170B2RF at a seeding rate of 3 seed/ft had the lowest lint yield (800 lb/acre) and total value ($622.29). FiberMax at a seeding rate of 3.5 seed/ft had the lowest seed yield (1236 lb/acre) and seed value ($185.40). In *Table 1* ST 5458B2RF had the lowest loan value ($0.4907/lb), and this contributed to ST 5458B2RF at seeding rates of 2.5 and 3.5 seed/ft having the lowest lint values per acre. After adding lint and seed value, and subtracting ginning, seed and technology fee costs, the net value/acre ranged from a high of $681.84 (FiberMax 9170B2F at a seeding rate of 2 seed/ft) to a low of $466.43 (Phytogen 367WRF at a seeding rate of 3.5 seed/ft), a difference of $215.41.

There was no significant interaction between varieties and seeding rates for the HVI fiber quality parameters measured (Table 3 & 4). Focusing solely on varieties, there were several differences observed in HVI fiber quality parameters (Table 3). Micronaire values ranged from a low of 4.7 for FiberMax 9170B2RF to a high of 5.2 for Stoneville 5458B2F and Deltapine 1044B2RF. Staple averaged 33.6 across all varieties with a low of 33.0 for Stoneville 5458B2RF and a high of 34.1 for Deltapine 1044B2RF. Percent uniformity ranged from a high of 81.1% for Deltapine 1044B2RF to a low of 79.9% for Stoneville 5458B2RF. Strength values averaged 30.7 g/tex with a high of 32.0 g/tex for Deltapine 1044B2RF and a low of 29.9 g/tex for Phytogen 367WRF. Elongation ranged from a high of 10.3% for Deltapine 1044B2RF to a low of 7.9% for FiberMax 9170B2F. Values for reflectance (Rd) and yellowness (+b) averaged 78.4 and 9.9, respectively.

Focusing solely on seeding rates, micronaire was the only HVI fiber quality parameter that was significantly different (Table 4). 2 seed/ft had a micronaire of 4.9, which the other seeding rates had a micronaire of 5.0.

Conclusions:

These data indicate that substantial differences can be obtained in terms of net value/acre due to the combination of different varieties with various seeding rates. Several difference in HVI properties were observed when we solely looked at variety performance. Whereas, micronaire was the only HVI perameter that we observed as being different among seeding rates. During the 2011 growing season Gaines County experienced above normal temperatures and very little rainfall. The environmental conditions prior to and during the growing season were a limiting factor in the varieties performance overall. 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 and seeding rates across a series of environments.

Acknowledgements:

Appreciation is expressed to Cheuvront Farms for the use of his land, equipment and labor for this demonstration.

Disclaimer Clause:

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Table 1. Harvest results that had a signficant difference between varieties, Cheuvront Farms, Seminole, TX, 2011.

Variety	Lint turnout	Seed turnout	Bur cotton yield	Lint loan value	Ginning cost
	-------- % --------		lb/acre	$/lb	$/acre
FM 9170B2RF	29.8	45.7	2856	0.5426	85.68
DP 1044B2RF	28.7	45.8	3084	0.5248	92.53
PHY 367WRF	29.7	44.3	2884	0.5202	86.51
ST 5458B2RF	29.4	45.6	2987	0.4907	89.60
Test average	29.4	45.3	2953	0.5196	88.58
OSL	0.0459	0.0364	0.0126	<0.0001	0.0126
LSD	0.9	1.2	146	0.0098	4.37

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.

Assumes:
$3.00/cwt ginning cost.
$300/ton for seed.
Value for lint based on CCC loan value from grab samples and FBRI HVI results.

Table 2. Harvest results with a signficant interaction between varieties and seeding rate, Cheuvront Farms, Seminole, TX, 2011.

Variety	Seeding Rate	Lint yield	Seed yield	Lint value	Seed value	Total value	Seed/technology cost	Net value	
		-------- lb/acre --------		---------- $/acre ----------					
FM 9170B2RF	2 seed/ft	1052	1625	569.31	243.70	813.01	41.30	681.84	a
DP 1044B2RF	2.5 seed/ft	910	1440	476.52	216.01	692.53	48.55	549.48	b
DP 1044B2RF	3.5 seed/ft	905	1450	479.23	217.50	696.73	67.97	534.63	bc
FM 9170B2RF	2.5 seed/ft	862	1345	460.29	201.69	661.98	51.63	523.76	bcd
ST 5458B2RF	2 seed/ft	897	1381	445.73	207.20	652.93	41.30	523.14	bcd
DP 1044B2RF	2 seed/ft	840	1346	445.20	201.89	647.10	38.84	518.03	bcd
DP 1044B2RF	3 seed/ft	881	1415	454.58	212.23	666.82	58.26	517.29	bcde
PHY 367WRF	2 seed/ft	848	1256	445.50	188.42	633.92	40.88	507.32	cdef
PHY 367WRF	3 seed/ft	883	1298	461.87	194.66	656.53	61.32	506.56	cdef
PHY 367WRF	2.5 seed/ft	850	1274	444.50	191.13	635.63	51.10	499.61	cdefg
ST 5458B2RF	3 seed/ft	900	1412	434.60	211.78	646.38	61.95	493.30	defg
FM 9170B2RF	3.5 seed/ft	841	1236	463.76	185.40	649.16	72.28	492.05	defg
ST 5458B2RF	2.5 seed/ft	866	1347	426.93	202.04	628.96	51.63	487.69	defg
FM 9170B2RF	3 seed/ft	800	1248	435.15	187.13	622.29	61.95	478.90	efg
ST 5458B2RF	3.5 seed/ft	876	1354	429.25	203.05	632.31	72.28	470.90	fg
PHY 367WRF	3.5 seed/ft	851	1275	433.40	191.33	624.74	71.55	466.43	g
Test average		879	1356	457	203	660	56	515.68	
OSL		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	--	<0.0001	
LSD		60	93	31.14	13.98	45.10	--	38.46	

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

Table 3. HVI fiber property results by variety, Cheuvront Farms, Seminole, TX, 2011.

Variety	Micronaire	Staple	Uniformity	Strength	Elongation	Leaf	Rd	+b
	units	32^{nds} inch	%	g/tex	%	grade	reflectance	yellowness
FM 9170B2RF	4.7	33.9	80.0	30.4	7.9	1.8	80.1	9.1
DP 1044B2RF	5.2	34.1	81.1	32.0	10.3	1.5	79.1	9.9
PHY 367WRF	4.8	33.2	80.3	29.9	9.7	1.8	78.0	10.0
ST 5458B2RF	5.2	33.0	79.9	30.4	8.8	1.8	76.4	10.4
Test average	5.0	33.6	80.3	30.7	9.2	1.7	78.4	9.9
OSL	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.6874	<0.0001	<0.0001
LSD	0.9	3.8	0.5	0.7	0.2	NS	0.7	0.2

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

LSD - least significant difference at the 0.05 level.

Table 4. HVI fiber property results by seeding rate, Cheuvront Farms, Seminole, TX, 2011.

Seeding Rate	Micronaire	Staple	Uniformity	Strength	Elongation	Leaf	Rd	+b
	units	32^{nds} inch	%	g/tex	%	grade	reflectance	yellowness
2 seed/ft	4.9	33.7	80.5	30.9	9.1	1.8	78.6	9.9
2.5 seed/ft	5.0	33.5	80.2	30.6	9.3	1.6	78.4	9.9
3 seed/ft	5.0	33.5	80.6	30.8	9.2	1.9	78.5	9.9
3.5 seed/ft	5.0	33.5	80.2	30.4	9.1	1.7	78.3	9.9
Test average	5.0	33.6	80.3	30.7	9.2	1.7	78.4	9.9
OSL	0.0174	0.4736	0.2122	0.5190	0.3419	0.7511	0.7667	0.9822
LSD	0.1	NS	NS	NS	NS	NS	NS	NS

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

LSD - least significant difference at the 0.05 level.