Replicated Dryland Cotton Seeding Rate and Planting Pattern Demonstration

Cooperator: AG-CARES - Lamesa Cotton Growers/Texas Agricultural Experiment Station/Texas Cooperative Extension, Lamesa, TX - 2003

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Summary: Significant differences were not observed for a majority of the characteristics measured (Tables 1 and 2). Lint turnout ranged from 25.1% to 26.6%. Lint yields varied from a low of 345 lb/acre (6 seed/row-ft, solid planting) to a high of 389 lb/acre (4 seed/row-ft, solid planting). Generally speaking, lint yields tended to decrease with higher seeding rates regardless of planting pattern. Lint loan values varied from a low of $0.4805/lb (6 seed/row-ft, solid planting) to a high of $0.5360/lb (2 seed/row-ft, 2X1 planting pattern). Higher seeding rates tended to reduce loan value of the harvested lint. Micronaire ranged from a low of 4.8 units (2 seed/row-ft, solid and 2X1 planting patterns) to a high of 5.0 units (6 seed/row-ft, solid and 2X1 planting patterns). With higher seeding rates, micronaire values were increased. Lower seeding rates produced lower micronaire lint which was not discounted in the loan chart. Staple ranged from 32.8 (32nds inch) for the 6 seed/row-ft, solid pattern to a high of 34.4 for the 4 seed/row-ft, 2X1 pattern. Staple was reduced by higher seeding rates due to increased plant competition for water and nutrients. No differences were noted for other fiber properties. After adding lint and seed value, total value/acre ranged from a low of $203.78 (6 seed/row-ft, solid planting) to a high of $242.85 (2 seed/row-ft, solid planting). When subtracting ginning and seed and technology fees (Table 3), the net value/acre ranged from $202.20 (2 seed/row-ft, solid planting) to $149.00 (6 seed/row-ft, solid planting), a difference of $53.20. These data indicate that significant differences were not observed in terms of net value/acre due to number of seed planted per acre for the 2X1 planting pattern; however, for the solid planting pattern, the 6 seed/row-ft significantly reduced net value/acre when compared to the 2 and 4 seed/row-ft.

Objective: The objective of this project was to compare yields, gin turnout, fiber quality, and economics of 2, 4, and 6 seed per row of foot in a solid planing pattern and in a 2X1 planting pattern (plant 2 rows and skip 1).

Materials and Methods:

Variety:	AFD 3511RR
Experimental design:	Randomized complete block with 3 replications
Seeding rate:	2, 4, and 6 seeds per row-foot in 40-inch row spacing (John Deere Max Emerge vacuum planter)
Planting patterns:	Each seeding rate was planted to solid and 2X1 planting patterns. For ease of planting, all plots were seeded in a solid pattern and, after seedling emergence, cultivator sweeps were used to destroy seedling plants in the skip row.
Plot size:	16 rows by 300 ft long
Planting date:	June 11
Weed management:	Treflan was applied preplant incorporated at 1.5 pt/acre across all plots on April 30. Roundup WeatherMax herbicide was applied on July 2 at 22 oz/acre with 17 lbs/100 gallons of Ammonia Sulfate. Plots were cultivated on July 14 and August 5.

Rainfall:

April:	0.42"	July:	0.00"
May:	4.50"	August:	2.29"
June:	1.80"	September:	1.67"

Total moisture: 10.68"

Insecticides:	No insecticides were applied at this site. This location is in an active boll weevil eradication zone, but no applications were made by the Texas Boll Weevil Eradication Program.
Fertilizer management:	No fertilizers were applied at this site.
Harvest aids:	Gramoxone Max was applied at 26 oz/acre on November 17.
Harvest:	Plots were harvested on November 19 using a commercial John Deere 7445 with field cleaner bypassed. Harvested material was dumped into a weigh wagon with integral digital 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 A&M Center at Lubbock to determine gin turnouts.
Fiber analysis:	Lint samples were submitted to the International Textile Center (ITC) at Texas Tech University for HVI analysis, and USDA loan values were determined for each plot.
Ginning costs and seed values:	Ginning costs were based on $2.25 per cwt. of bur cotton and $125/ton for seed value. Ginning costs do not include checkoff.

Seed costs: Seed costs were based on the 2, 4, and 6 seed per row-foot for the solid and 2X1 (66.6% of solid planting rate) planting patterns.

Results and Discussion: Significant differences were not observed for a majority of the characteristics measured (Tables 1 and 2). Lint turnout ranged from 25.1% to 26.6%. Lint yields varied from a low of 345 lb/acre (6 seed/row-ft, solid planting) to a high of 389 lb/acre (4 seed/row-ft, solid planting). Generally speaking, lint yields tended to decrease with higher seeding rates regardless of planting pattern. Lint loan values varied from a low of $0.4805/lb (6 seed/row-ft, solid planting) to a high of $0.5360/lb (2 seed/row-ft, 2X1 planting pattern). Higher seeding rates tended to reduce loan value of the harvested lint. Micronaire ranged from a low of 4.8 units (2 seed/row-ft, solid and 2X1 planting patterns) to a high of 5.0 units (6 seed/row-ft, solid and 2X1 planting patterns). With higher seeding rates, micronaire values were increased. Lower seeding rates produced lower micronaire lint which was not discounted in the loan chart. Staple ranged from 32.8 (32nds inch) for the 6 seed/row-ft, solid pattern to a high of 34.4 for the 4 seed/row-ft, 2X1 pattern. Staple was reduced by higher seeding rates due to increased plant competition for water and nutrients. No differences were noted for other fiber properties. After adding lint and seed value, total value/acre ranged from a low of $203.78 (6 seed/row-ft, solid planting) to a high of $242.85 (2 seed/row-ft, solid planting). When subtracting ginning and seed and technology fees (Table 3), the net value/acre ranged from $202.20 (2 seed/row-ft, solid planting) to $149.00 (6 seed/row-ft, solid planting), a difference of $53.20. These data indicate that significant differences were not observed in terms of net value/acre due to number of seed planted per acre for the 2X1 planting pattern; however, for the solid planting pattern, the 6 seed/row-ft significantly reduced net value/acre when compared to the 2 and 4 seed/row-ft. Planting patterns tended to have no effect on overall profitability. Due to excellent weather conditions after planting and no excessive rainfall and/or wind events, no substantial stand losses were encountered. Under normal conditions producers might expect to see stand reductions due to sand fighting, environmental damage, etc. Additional multi-site and multi-year applied research is needed to evaluate seeding rates and planting patterns across a series of environments.

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Table 1. Results from the replicated cotton seeding rate and planting pattern demonstration, AG-CARES, Lamesa, TX 2003.

Variety	Lint turnout	Seed turnout	Bur cotton yield	Lint yield	Seed yield	Lint loan value	Lint value	Seed value	Total value	Ginning cost	Seed and tech fee	Net value	
	%	%	lb/acre	lb/acre	lb/acre	$/lb	$/acre	$/acre	$/acre	$/acre	$/acre	$/acre	
2 seed/ft solid	26.6	46.0	1431	381	659	0.5291	201.65	41.20	242.85	32.21	8.45	202.20	a
2 seed/ft 2x1	25.1	46.2	1459	367	675	0.5360	196.97	42.20	239.17	32.84	5.63	200.70	a
4 seed/ft 2x1	25.4	45.9	1486	378	682	0.5215	197.07	42.67	239.74	33.44	11.26	195.04	a
4 seed/ft solid	25.8	45.3	1503	389	682	0.4998	193.75	42.63	236.38	33.82	16.89	185.66	a
6 seed 2x1	26.1	46.6	1476	386	689	0.4953	191.30	43.06	234.36	33.23	16.89	184.25	a
6 seed solid	26.4	46.3	1306	345	605	0.4805	165.96	37.82	203.78	29.39	25.34	149.00	b
Test average	25.9	46.1	1444	374	665	0.5104	191.12	41.60	232.71	32.49	14.08	186.14	
CV, %	6.2	3.4	7.1	7.0	7.0	4.4	7.0	7.1	6.8	7.1	--	7.5	
OSL	0.8650	0.9454	0.2831	0.4106	0.3321	0.0859	0.0851	0.3324	0.1056	0.2843	--	0.0087	
LSD 0.10	NS	NS	NS	NS	NS	0.034	19.98	NS	23.63	NS	--	20.76	

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

Assumes:
$2.25/cwt ginning cost.
$125/ton for seed.
Value for lint based on CCC loan value from grab samples and ITC HVI results.

Table 2. HVI fiber property results from the replicated cotton seeding rate and planting pattern demonstration, AG-CARES, Lamesa, TX 2003.

Variety	Micronaire	Staple	Uniformity	Strength	Elongation	Leaf	Rd	+b	Color grade	
	units	32^{nds} inches	%	g/tex	%	grade	reflectance	yellowness	color 1	color 2
2 seed/ft 2x1	4.8	34.1	82.6	30.8	5.4	1.3	75.4	7.5	3.6	1.0
2 seed/ft solid	4.8	34.0	82.4	31.8	5.4	2.3	73.8	7.4	4.0	1.0
4 seed/ft 2x1	4.9	34.4	82.4	31.7	5.4	1.6	74.6	7.3	4.0	1.0
4 seed/ft solid	4.9	33.3	81.9	31.6	5.4	2.0	75.1	7.5	4.0	1.0
6 seed 2x1	5.0	33.6	82.3	30.4	5.6	2.0	74.5	7.4	4.0	1.0
6 seed solid	5.0	32.8	81.1	30.3	5.7	1.6	74.7	7.3	4.0	1.0
Test average	4.9	33.7	82.1	31.1	5.5	1.8	74.7	7.4	3.9	1.0
CV, %	2.1	1.4	0.5	2.4	4.3	31.4	1.1	3.3	5.9	--
OSL	0.1428	0.0232	0.0098	0.1137	0.5166	0.4180	0.3747	0.8686	0.4651	--
LSD 0.10	NS	0.7	0.6	NS	NS	NS	NS	NS	NS	--

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

Table 3. Seed costs for solid vs. skip row study, AGCARES, Lamesa, TX 2003.

AFD 3511R 4450 seed/lb	Number of seed/50 lb bag	Total seed/acre	Number of acres/bag	Seed and tech fee	Seed and tech fee
				$/bag	$/field acre
2 seed/ft solid	222,500	26136	8.51	71.90	8.45
4 seed/ft solid	222,500	52272	4.26	71.90	16.89
6 seed/ft solid	222,500	78408	2.84	71.90	25.34
2 seed/ft 2x1 skip	222,500	17422	12.77	71.90	5.63
4 seed/ft 2x1 skip	222,500	34845	6.39	71.90	11.26
6 seed/ft 2x1 skip	222,500	52267	4.26	71.90	16.89
		13068 row-ft/acre for 40" rows			seed drop on 2x1 skip uses a 0.6666 factor