NORTHEAST TEXAS COTTON ROW SPACING BY PLANT POPULATION EVALUATION – 2019

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Introduction and Abstract

Rising costs have forced cotton producers to look for ways to maintain yields while reducing input costs. Producers have considered different varieties, seeding rates and row spacing. However, poor stands resulting in lower than intended plant populations could reduce producers' profitability. This study was conducted at the CCRI Farm in Fairlie, Texas. 4 replications of 2 row by 30 ft plots of DeltaPine 1646 B2XF were planted at 60,000 plants per acre on June 7, 2019. High soil moisture levels delayed planting and negatively impacted stand emergence. After emergence, plots were thinned to the desired planting rate and row spacing with plots thinned to final stand by June 19, 2019. Seeding rates of 35,000 plants per acre and 50,000 plants per acre were assessed by 30" skip row, 30" row, 40" row spacing and 25,000 plants per acre at 60" row spacing. Rows were harvested by removing bolls by hand beginning in October with the average yields ranged from 478.5 lbs to 266.0 lbs per acre. 60" row spacing yielded significantly different from 40" 50k. There were no significant differences between the other treatments. Replications 1, 2, and 3 were assessed by Texas Tech Fiber Lab for quality determination by HVI. There were no significant differences in quality.

Materials and Methods

Plots were seeded on June 7, 2019 as 2 row plots, 30 ft in length, at 60,000 plants per acre with a two-row plot planter. Variety DeltaPine 1646 B2XF was planted in a randomized complete block design with 4 replications. After emergence, plots were thinned to the desired planting rate and row spacing with plots thinned to final stand by June 19, 2019. Seeding rates of 35,000 plants per acre and 50,000 plants per acre were assessed by 30" row, 40" row, 30" skip row and 25,000 plants per acre at 60" row spacing. Plots were side-dressed on row with 10 gallons of 10-34-0 per acre. Plots were side-dressed on row with 100 units N as ammonium nitrate on July 17, 2019. Rows were harvested by removing bolls by hand beginning in October. Between 11' and 17' 5" of row was harvested per plot depending on row spacing to equal a thousandth of an acre. Final populations were determined by counting the number of plants harvested and multiplying by 1000. Lint was deburred by hand. All four replications were ginned to determine lint yield and lint turnout. Yield analysis was done with ANOVA for yield differences between the populations of each treatment. Replications 1 through 3 were assessed by Texas Tech Fiber Lab for quality determination by HVI.

Results and Discussion

The average yields ranged from 478.5 lbs to 266 lbs per acre. 60" row spacing was significantly different from 40" 50k but otherwise there were no significant differences in yields between treatments. 60" row spacing was also significantly different from 30" 35k, 30" 50k, and 40" 50k in regards to boll set. 60" set the fewest number of bolls. With the exception of 40" 35k, treatments with higher plant populations produced with higher yields. There were no significant differences in quality between treatments. Net return over seed cost ranged from $187.95 down to $98.21 with 60" rows returning the least.

Delayed planting and wet conditions hampered stand establishment and reduced yields. Additionally, when comparing row spacing, plant population must be considered. When increasing row spacing or decreasing the total number of rows, planting rate should be increased to make fair comparisons. Reduction in potential yields can be offset by the potential savings of reduced input costs and harvest/planting efficiency with reduced rows. In this study, the population of the 60" row spacing was too low to be considered feasible.

Table 1. Dryland evaluation of yield based on row spacing by plant population in Fairlie, TX in 2019. Seeding rates of 35,000 plants per acre and 50,000 plants per acre were assessed by 30" skip row, 30" row, 40" row spacing and 25,000 plants per acre at 60" row spacing.

Treatment	Lint Yield lbs/acre	Lint Turnout (%)	Number of Bolls# of bolls/1000th of an acre	Plant Population plants/acre
30" 35k	424.5 ab	42.0 a	158.5 a	35,500 b
30" 50k	455.7 ab	43.0 a	164.8 a	43,750 a
40" 35k	377.7 ab	42.6 a	131.0 ab	26,000 c
40" 50k	478.5 a	43.3 a	163.3 a	39,750 ab
60"	266.0 b	43.2 a	91.9 b	25,375 c
Skip 35k	308.8 ab	42.5 a	122.5 ab	28,250 c
Skip 50k	364.2 ab	42.6 a	124.8 ab	32,750 b
Average	382.2	42.8	136.7	33,054
P > F	.0274	.1520	.0033	.0001
$LSD_{(0.05)}$	129.2	1.0	35.5	5423
CV	22.76	1.59	17.48	11.04

Table 2. Dryland evaluation of boll set based on row spacing by plant population in Fairlie, TX in 2019.

Treatment	Plant Population plants/acre	Plant Population plants/foot of row	Number of Bolls # of bolls/1000th of an acre	Bolls per Plant
30" 35k	35,500 b	2.04	158.5 a	4.46
30" 50k	43,750 a	2.51	164.8 a	3.77
40" 35k	26,000 c	1.99	131.0 ab	5.04
40" 50k	39,750 ab	3.04	163.3 a	4.11
60"	25,375 c	2.91	91.9 b	3.62
Skip 35k	28,250 c	2.43	122.5 ab	4.34
Skip 50k	32,750 b	2.82	124.8 ab	3.72
Average	33,054	2.53	136.7	4.15
P > F	.0001		.0033	
$LSD_{(0.05)}$	5423		35.5	
CV	11.04		17.48	

Table 3. Dryland evaluation of quality based on row spacing by plant population in Fairlie, TX in 2019. Lint was assessed by Texas Tech Fiber Lab for quality evaluation by HVI.

Treatment	Mic	Length	Uniformity	Strength	Loan Value
30" 35k	4.175 a	1.220 a	83.65 a	32.10 a	56.075 a
30" 50k	4.210 a	1.205 a	83.50 a	30.70 a	56.875 a
40" 35k	4.430 a	1.210 a	83.45 a	30.50 a	56.875 a
40" 50k	4.555 a	1.190 a	83.30 a	30.05 a	56.225 a
60"	4.197 a	1.213 a	83.73 a	31.17 a	56.383 a
Skip 35k	3.900 a	1.217 a	82.47 a	31.00 a	54.317 a
Skip 50k	3.990 a	1.200 a	82.93 a	31.93 a	55.667 a
Average	4.2081	1.2079	83.290	31.064	56.0595
P > F	.7281	.7702	.8193	.1266	.8477
LSD $_{(0.05)}$	.6958	.0464	2.148	1.570	4.4401
CV	12.19	2.04	1.37	2.68	4.21

Table 4. Evaluation of net return based on $2.04/1000 seeds ($469.20 per bag of cotton seed).

Treatment	Plant Population plants/acre	Lint Yield lbs/acre	Seed Cost $2.04/1000sd	Loan Value $/100lbs	Net Return $/acre
30" 35k	35,500 b	424.5 ab	$72.42	$56.075 a	$165.62
30" 50k	43,750 a	455.7 ab	$89.25	$56.875 a	$169.93
40" 35k	26,000 c	377.7 ab	$53.04	$56.875 a	$161.78
40" 50k	39,750 ab	478.5 a	$81.09	$56.225 a	$187.95
60"	25,375 c	266.0 b	$51.77	$56.383 a	$98.21
Skip 35k	28,250 c	308.8 ab	$57.63	$54.317 a	$110.10
Skip 50k	32,750 b	364.2 ab	$66.81	$55.667 a	$165.62

Conclusions

- Higher populations resulted in higher lint yields with the exception of 40" 35k (26,000 plants per acre).
- Delayed planting and high soil moisture hampered stand establishment resulting in reduced yields.
- Further research should include higher populations at 60" row spacing.
- Row spacing and plant population did not impact lint quality.

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