NORTHEAST TEXAS COTTON VARIETY AND PLANT POPULATION EVALUATION – 2017

David R. Drake
Texas A&M AgriLife Extension Service
Commerce, TX
Jennifer Lopez
Amy D. Braley
Scott Stewart
Texas A&M University – Commerce
Commerce, TX

Introduction and Abstract

Variety selection and seeding rate are two important decisions faced by cotton producers in the beginning of the season. Given higher seed prices producers may consider planting lower populations to save cost but a poor stand and lower populations could also limit the return on investment. Twelve commercial cotton varieties were planted near Commerce, TX in the 2017 growing season. Replicated 4 row plots were seeded at a high rate and then thinned to two populations in a split plot design. Plots were 40 ft long with rows on 38 inch spacing. The average per acre plant populations were 55,057 for the high rate and 28,505 for the lower rate. Soil moisture was abundant at planting and establishment and the dryland plots received above average late summer precipitation. Rows were harvested by pulling fiber in October with seed cotton ginned on an experimental saw gin. The average yields ranged from 1524 lbs to 989 lbs per acre. Eight varieties attained higher yields at the higher population and the other 4 had higher yields at lower populations. The higher population treatment had statistically significant differences in lint yield and plant populations. The lower population treatments did not have statistical differences in yield or plant population. Only one variety PHY 312 WRF had a statistically significant ($P<0.05$) difference between lint yields at the two seeding rates. Based on these results, a general plant population between 40,000-50,000 plants per acre would achieve the greatest yields with these 12 varieties.

Materials and Methods

Plots were seeded on May 17, 2017 as 4 row plots, 40 ft in length, on 38 inch spacing. A two row cone planter was used with individual seed packets containing 8 seeds per row foot or a population of 110,000 plants per acre. Varieties were planted in a randomized complete block design with 4 replications. Seeding rates were established as a split plot design with two rows each thinned to one of two target populations 55,000 and 27,500 plants per acre within 2 weeks of seedling emergence. Seeds were treated with an industry standard insecticide and fungicide. Seedlings were sprayed for thrips at the 1-2 true leaf stage. Plots were top dressed with 150 units of N near first square. Plots were harvested by hand pulling seed cotton from 8 ft of row from each plot. Final populations were determined by counting the number of plants harvested in 8 ft. At least two replications were ginned to determine lint turnout. Fiber samples were sent to the Texas Tech Fiber Lab for quality determination by HVI. Yield analysis was done with ANOVA between varieties and for yield differences between the populations of each variety.

Results and Discussion

The average yields ranged from 1524 lbs to 989 lbs per acre. Tables 1 and 2 show the yield, turnout, and plant population for the high and low population treatments, respectively. Eight varieties attained higher yields at the higher population and the other 4 had higher yields at lower populations. See Table 3. The higher population treatment had statistically significant differences in lint yield and plant populations. The lower population treatments did not have statistical differences in yield or plant population. Only one variety PHY 312 WRF had a statistically significant ($P<0.05$) difference between lint yields at the two seeding rates.

Table 1. Dryland evaluation of 12 cotton varieties near Commerce, TX in 2017. Population seeded at 8 seeds per ft. or 110,000 seeds per acre and thinned to a uniform stand with a target of 55,000 plants per acre. Row spacing of 38 inches with split plots 2 rows X 40 ft.

Variety	Lint Yield lbs/acre	Lint Turnout (hand pulled)	Plant Population Plts/acre
DP 1646 B2XF	1524 a	0.434	45564
PHY 499 WRF	1393 ab	0.436	34818
DP 1725 B2XF	1292 abc	0.455	44274
FM 2007 GLT	1276 bc	0.408	51152
ST 4946 GLB2	1253 bc	0.420	64907 a
PHY 312 WRF	1198 bc	0.431	65337 a
PHY 330 W3FE	1194 bcd	0.448	60608 a
ST 4949 GLT	1142 cd	0.450	59319 a
FM 1953 GLTP	1121 cd	0.412	60609 a
ST 4848 GLT	1082 cd	0.439	56740 a
ST 5517 GLTP	1071 d	0.406	62328 a
PHY 333 WRF	989 d	0.430	55021 a
Average	1211	0.431	55057
P > F	0.0003	0.0001	0.0001
$LSD_{(0.05)}$	247	0.011	11669
CV	14.3	1.51	14.9

Table 2. Dryland evaluation of 12 cotton varieties near Commerce, TX in 2017. Population seeded at 8 seeds per ft. or 110,000 seeds per acre and thinned to a uniform stand with a target of 27,500 plants per acre. Row spacing of 38 inches with split plots 2 rows X 40 ft.

Variety	Lint Yield lbs/acre	Lint Turnout (hand pulled)	Plant Population Plts/acre
ST 5517 GLTP	1299 a	0.406	30519
PHY 499 WRF	1290 a	0.436	26122
ST 4848 GLT	1267 a	0.439	32669
DP 1725 B2XF	1258 a	0.455	25791
ST 4949 GLT	1180 a	0.450	26221
DP 1646 B2XF	1178 a	0.434	23729
ST 4946 GLB2	1180 a	0.420	28800
PHY 312 WRF	1135 a	0.431	31379
PHY 330 W3FE	1085 a	0.448	23729
FM 2007 GLT	1075 a	0.408	25791
FM 1953 GLTP	1046 a	0.412	29660
PHY 333 WRF	1039 a	0.430	29660
Average	1167	0.431	28505
P > F	0.056	0.0001	0.098
LSD $_{(0.05)}$	N.S.	0.011	N.S.
CV	18.9	1.51	12.5

Table 3. Dryland evaluation of 12 cotton varieties near Commerce, TX in 2017. Population seeded at 8 seeds per ft. or 110,000 seeds per acre and thinned to a uniform stand. Lint yields at higher and lower populations with significance of the difference and the average yield of both from the eight replicated plots.

Variety	Lint Yield lbs/acre	Higher Plant Population Plts/acre	Lint Yield lbs/acre	Lower Plant Population Plts/acre	P>F Of yield between populations	Average Yield lbs/acre With combined replications
Increased Yield with **Higher** Population						
DP 1646 B2XF	1524 a	45564	1178 a	23729	0.18	1351
PHY 499 WRF	1393 ab	34818	1290 a	26122	0.26	1341
DP 1725 B2XF	1292 abc	44274	1258 a	25791	0.99	1275
ST 4946 GLB2	1253 bc	64907 a	1180 a	28800	0.09	1204
FM 2007 GLT	1276 bc	51152	1075 a	25791	0.12	1175
PHY 312 WRF	1198 bc	65337 a	1135 a	31379	**0.001**	1167
PHY 330 W3FE	1194 bcd	60608 a	1085 a	23729	0.14	1139
FM 1953 GLTP	1121 cd	60609 a	1046 a	29660	0.18	1084
Increased Yield with **Lower** Population						
ST 5517 GLTP	1071 d	62328 a	1299 a	30519	0,46	1185
ST 4848 GLT	1082 cd	56740 a	1267 a	32669	0.41	1174
ST 4949 GLT	1142 cd	59319 a	1180 a	26221	0.22	1161
PHY 333 WRF	989 d	55021 a	1039 a	29660	0.47	1014
Average	1211	55057	1167	28505		1189
P > F	0.0003	0.0001	0.056	0.098		0.06
LSD $_{(0.05)}$	247	11669	N.S.	N.S.		N.S.
CV	14.3	14.9	18.9	12.5		16.9

Table 4. Fiber characteristics from a dryland evaluation of 12 cotton varieties near Commerce, TX in 2017. Fiber quality data based on HVI analysis of two samples sent to the Texas Tech Fiber Lab in Lubbock, TX. Loan values were calculated by using the 2017 Cotton Inc. loan calculator with a standard fiber color and leaf of 41-4.

Variety	Mike	Length	Uniformity	Strength	Color and leaf grade as ginned	Loan price
ST 5517 GLTP	4.65 ab	1.12 b	83.05 a	32.10 bc	31-2, 41-3	$54.65
DP 1646 B2XF	4.55 ab	1.27 a	85.00 a	32.05 bc	41-1, 41-2	$54.60
FM 2007 GLT	4.65 ab	1.19 ab	83.75 a	33.30 ab	41-1, 41-3	$54.48
PHY 499 WRF	4.90 ab	1.12 b	84.75 a	33.75 ab	41-4, 51-5	$54.08
ST 4949 GLT	4.90 ab	1.12 b	82.75 a	30.85 c	41-4, 51-3	$53.70
PHY 312 WRF	4.85 ab	1.17 ab	84.85 a	32.55 abc	31-2, 41-5	$53.65
DP 1725 B2XF	4.90 ab	1.13 b	84.20 a	32.65 abc	41-3, 51-4	$53.23
ST 4946 GLB2	5.30 a	1.13 b	83.50 a	33.65 ab	41-2, 51-3	$53.18
FM 1953 GLTP	4.35 b	1.18 ab	83.15 a	32.10 bc	31-2. 41-3	$53.05
PHY 330 W3FE	4.45 ab	1.12 b	83.70 a	34.40 a	41-2, 41-3	$53.05
ST4848 GLT	5.05 ab	1.13 b	83.50 a	33.35 ab	41-2. 61-1	$52.88
PHY 333 WRF	4.25 b	1.18 ab	84.70 a	34.05 ab	41-1, 42-3	$52.80
Average	4.73	1.15	83.91	32.90		$53.61
P > F	0.023	0.015	0.278	0.002		0.85
LSD $_{(0.05)}$	0.505	0.072	N.S.	1.28		N.S.
CV	4.84	2.83	1.08	3.9		2.5

Means followed by the same letter are not statistically different.

Conclusions

- Higher populations resulted in higher lint yields with 8 of the 12 varieties and a higher lint yield average than the lower population treatment. The higher population treatment also had statistically significant differences among varieties and populations
- The lower population treatment did not show significant differences in variety and population. 4 of the 12 varieties had greater yields at lower populations.
- Based on this test a general plant population recommendation would be between 40,000 and 50,000 plants per acre.

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