IMPACT OF BLENDING VARIOUS PROPORTIONS OF PLANTING SEED OF HIGH-YIELDING UPLAND AND HIGH-QUALITY PIMA COTTON GENOTYPES IN SOUTH CAROLINA

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Introduction

During the 2018 and 2019 growing seasons, a total of 48 *G. barbadense* (Pima cotton) genotypes were evaluated in a replicated field trials at the Clemson PDREC in Florence, SC to determine their adaptation to South Carolina and their future use as Pima breeding parents. On average, the lint yield of these Pima genotypes were about half the yield of the Upland check varieties; however, the fiber quality was significantly greater and a net return analysis revealed no differences among several of the high-yielding, higher-quality Pima genotypes and the Upland checks (Holladay et al., 2021, 2022). Moreover, we also observed that some of the Pima genotypes had scattered "Upland cotton looking plants" within their populations, and these plants appeared to be more prolific with larger bolls. Objectives: To determine the impact of blending a high-yielding upland cotton variety with a high-quality Pima accession in various proportions in the field; and to evaluate the response of these Upland/Pima blends on fiber yield/quality, earliness, management, and net returns.

Materials and Methods

A replicated field trial was conducted at the 2020 & 2021 Pee Dee Research and Education Center located in Florence, SC during the 2020 and 2021 growing seasons. Seed of a high-yielding Upland variety (DP 1646B2XF) was blended with the seed of a high-quality Pima genotypes (PHY 881RF and E14) in various proportions before planting. Blend proportions consisted of seven blend ratios of Upland:Pima seed [0:100 (100% upland), 25:75, 33:67, 50:50, 67:33, 75:25, and 100:0 (100% Pima)]. Seed were planted on April 30, 2020 and April 29, 2021 at a seeding rate of 55,000 seed/acre and arranged in a Randomized Complete Block Design with 4 replications. Plots consisted of four-row plots by 40 feet in length on 38 inch row spacing. All plots were harvested with a spindle-type cotton picker modified for small plot research. A seed cotton grab-sample was collected from each plot at harvest, air-dried, weighed and ginned in Florence, SC on a small laboratory 10-saw gin. Each subsample of lint was sent to Texas Tech University for HVI fiber quality analysis and net returns calculated using the Cotton Incorporated loan calculator tool. All data were analyzed using Analysis of Variance (ANOVA). Means were separated using Fishers protected LSD at the 0.05 level of probability.

Results & Conclusions

Preliminary results from the blending trials are presented in **Tables 1 and 2.** The 100% DP 1646B2XF treatment and the 75%/25% DP 1646B2XF/PHY 881RF treatment produced the highest yields during the 2020 growing seasons with 1010 and 827 lbs lint/acre, respectively. The 100% DP 1646B2XF treatment had the highest lint yield in 2021. In both years, increasing the ratio of the Pima variety proportionally reduced the lint yield of the Upland variety as the level of Pima increased. The 100% Pima treatment had lower gin turnout than the 100% DP 1646B2XF treatment, and blending did not appear to impact gin turnout in the 2020 growing season, but reduced gin turnout in 2021 with a 50% blend or greater ratio of Pima. Fiber quality was consistently improved by adding higher ratios of Pima to the final plant population, but economic analysis did not reveal a benefit to blending Pima genotypes with Upland cotton in South Carolina.

Table 1. Lint Yield, Gin Turnout, and Loan Value of Upland (DP 1646B2XF) and Pima (PHY 881RF) Varieties Blended at Various Ratios and Grown in Florence, SC in 2020

Blend Ratio	Lint Yield (lb/acre)	Gin Turnout (%)	Fiber Length (in.)	Fiber Uniformity (%)	Fiber Strength (g/tex)	Fiber Elongation	Fiber Micronaire	Net Return ($/acre)
100% DP 1646B2XF	**1010**	**43.6**	1.24	84.1	29.9	**6.6**	4.1	**453.30**
75% DP 1646B2XF 25% PHY 881RF	**827**	**44.3**	1.26	83.8	31.1	**6.5**	4.1	**373.00**
67% DP 1646B2XF 33% PHY 881RF	654	**44.1**	1.28	83.2	32.4	6.4	3.9	289.80
50% DP 1646B2XF 50% PHY881RF	596	**43.1**	1.24	83.1	32.6	**6.4**	4.0	268.30
33% DP 1646B2XF 67% PHY 881RF	461	**43.6**	1.31	84.3	36.2	6.2	4.0	208.80
25% DP 1646B2XF 75% PHY881RF	369	**42.9**	1.33	83.6	35.8	6.2	4.0	166.30
100% PHY881RF	210	40.8	**1.41**	**86.6**	**43.1**	5.7	4.1	94.80
LSD (0.05)	189	1.9	0.04	1.5	2.0	0.2	NS	85.08
CV	22	3.0	1.86	1.2	3.9	2.7	5.3	21.62
Trial Mean	590	43.2	1.29	84.1	34.4	6.3	4.0	264.86

Means in bold do not significantly differ at the 0.05 level of probability.

Table 2. Lint Yield, Gin Turnout, and Loan Value of Upland (DP 1646B2XF) and Pima (PHY 881RF and E14) Varieties Blended at Various Ratios and Grown in Florence, SC in 2021

	Lint Yield (lb/acre)	Gin Turnout (%)	Fiber Length (in.)	Fiber Uniformity (%)	Fiber Strength (g/tex)	Fiber Elongation	Fiber Micronaire	Net Return ($/acre)
Variety (V)								
PHY 881RF	1330	43.7	1.34	81.1	38	7	4.3	146.3
E14	1520	42	1.29	81.2	34.5	6.7	4.3	295.2
LSD (0.05)	*182*	*0.3*	*0.04*	*NS*	*1.5*	*0.2*	*NS*	*68.9*
Blend Ratio (BR)								
100% DP 1646B2XF	**2073**	**45.3**	1.25	**81.8**	31.5	**7.3**	4.5	**533.40**
75% DP 1646B2XF 25% Pima	1702	**43.8**	1.29	**82.0**	34.4	**6.9**	4.4	367.10
67% DP 1646B2XF 33% Pima	1554	**43.8**	1.30	80.5	34.3	**7.0**	4.3	276.30
50% DP 1646B2XF 50% Pima	1524	43.6	1.30	**81.2**	35.5	**6.9**	4.3	270.90
33% DP 1646B2XF 67% Pima	1259	42.2	**1.34**	80.7	37.2	**6.9**	4.3	57.30
25% DP 1646B2XF 75% Pima	1203	41.8	**1.35**	80.8	37.8	6.7	4.2	89.40
13% DP 1646B2XF 87% Pima	1061	41.7	**1.36**	80.7	**38.9**	6.6	4.3	126.90
100% Pima	1022	40.6	**1.37**	**81.4**	**40.5**	6.3	4.3	44.80
LSD (0.05)	*306*	*1.4*	*0.05*	*0.9*	*2.5*	*0.3*	*NS*	*155.20*
V x BR LSD (0.05)	NS	1.7	NS	NS	NS	0.4	NS	155.30
CV	19	2.9	4.19	1.1	7.1	3.8	4.2	57.40
Trial Mean	1425	42.8	1.32	81.1	36.3	6.8	4.3	220.70

References

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