PHYTOGEN PSC 355 AND PSC 952 CONVENTIONAL, EARLY MATURING PICKER VARIETIES

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Abstract

Phytogen Seed Co., LLC is the most recent entrant into the Southern cottonseed market. The initial varieties to be offered have been licensed from public and private breeding concerns. In the 1998 and 1999 university trials from TX to NC, PSC355 demonstrated broad adaptation, high yield potential, early maturity, and excellent fiber quality. PSC952 is also high yielding, but it is slightly latter maturing and taller than PSC355. Both varieties are conventional, hairy leaf, picker varieties.

Introduction

Phytogen Seed Co., LLC is a joint venture between Mycogen (an affiliate of Dow AgroSciences) and J.G. Boswell, Co.to develop conventional and transgenic varieties. Mycogen has an extensive library of Bt and other pest resistance genes along with a strong patent position in transgenic plant technology to warrant the legal use of these genes in cotton. Phytogen has field breeding stations in CA, MS, and GA to develop proprietary cotton varieties. The CA breeding program has recently released highly competitive Acala and Pima varieties, but the Southern programs are still in the preliminary stages of variety development.

Until the Southern breeding programs become productive, Phytogen's varietal offerings in the South will be licensed from various universities and private breeders. PSC355 was developed from the H10-35-05 germplasm that was developed at MSU-DREC by Drs. Bob Bridge and Steve Calhoun from the cross DES 949/ Acala 1517-88 (Creech, Bridge, and Calhoun, 1999). PSC355 inherited early maturity, broad adaptation, high yield, and yield stability from DES 949 and excellent fiber quality from Acala 1517-88. PSC952 was developed by American Cotton Breeders, Inc. from the cross Quickie/ ST 453// Arkot 8596-23. PSC952 was about 4-5 days later maturing and 2 inches taller than PSC355.

All comparative data presented herein are summaries of university picker trials from Texas to North Carolina in 1998 and 1999. The Head-to-Head procedure in Agrobase (Agronomix Software, Inc.) was used to summarize these data. Whenever they occurred in the same trial as the control Phytogen variety, the data of competitor varieties were transformed to percentages of that respective Phytogen variety and statistical significance of each comparison was determined by T tests. Since the means depended on which trials were in common with the control, the data were normalized as percentages. The overall percent of control for each variety was then transformed back to a mean equivalent basis of the overall control variety mean.

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Discussion

Yield

Forty-four varieties were compared to PSC355 in head-to-head comparisons (data not shown) and 25 were chosen for more extensive analysis. These 25 varieties consisted of the top yielding 10 varieties and 17 of the top 19. Seventeen of the bottom 25 varieties were excluded from this list to reflect that comparisons were made with the best competitors.

PSC355 was the highest yielding variety when averaged over all university trials in 1998 and 1999 (Table 1). Though numerically lower, the lint yields of SG747 and PM1218B/R were the only ones not significantly lower than PSC355. Of the 102 university trials with PSC355, the competitors were in the same trial an average of only 64 times where they averaged 8.8% (91 # lint/ acre) less than PSC355. Notably, PSC355 was significantly higher yielding than even the best new competitor varieties.

In the head-to-head comparisons with PSC952, only the early maturing PSC355, PM1218B/R, and SG747 were significantly higher yielding (data not shown). Since the earliest maturing varieties were also the highest yielding (correlation=0.66), the yield of the slightly latter maturing PSC952 was compared to competitors of similar maturity (Table 2). PSC952 was not significantly different from the best new competitors, but it was significantly higher than most of the others. The difference in mean equivalents between the PSC355 and PSC952 comparisons were due to 2 different, though partially overlapping, sets of trials in which varieties were in common with the respective Phytogen control variety. Though slightly different, the correlation between the mean equivalents was still high at 0.90.

Maturity, Plant Height, and Leaf Pubescence

Maturity was measured at different universities either as percent first harvest from sequential harvests or as percent open bolls from boll counts. These 2 measures were treated as the same in head-to-head comparisons.

DP388 was the only variety significantly earlier maturing than PSC355 at 77.5% first pick (Table 3). Though not significant, PSC355 was slightly earlier than ST474 and slightly later than PM1218B/R. The average for 10 varieties

classified as early maturing was 73.0% first pick. PSC355 was similar in maturity to the early maturing variety SG747.

PSC952 was significantly later than PSC355. If days to maturity are equated with differences in percent first harvest, then PSC952 was about 4-5 days later than PSC355. PSC952 was similar in maturity to the early-mid maturing variety SG501. The average for % first pick of 11 varieties classified as early-mid maturing was 69.4%.

Both PSC355 and PSC952 were moderately tall and hairy varieties as determined by the University of Arkansas in 1998-99 (data not shown). The plant height of PSC355 was similar to that of ST474, while that of PSC952 was about 2 inches taller. (Note: PSC952 will need PGR applications in conditions conducive to rank growth). The visual rating for leaf pubescence indicated that both PSC355 and PSC952 were similar to ST474 and STBXN47 in leaf hairs.

Fiber Quality

As with maturity, the fiber quality mean equivalents reported were from head-to-head comparisons with PSC355 as the control variety (Table 4). The average micronaire of PM1218B/R, SG747, and ST474 (4.87) was slightly higher than that of PSC355 (4.81) and PSC952 (4.82). The micronaire of these Phytogen varieties was similar to that of SG105 and PM1440.

The staple lengths of FiberMax varieties (average 36.7) were the only ones that were greater than 2% longer than PSC355 (35.5). The staple length of PSC355 was slightly above average and similar to that of SG747 and SG501. The staple for PSC952 (34.8) was similar to ST474 (34.7) in being significantly shorter.

As with length the strength of the FiberMax varieties were excellent. The strengths of FM989 and FM832 (average 32.0 g/tex) were the only ones that were greater than 2% stronger than PSC355 (30.4 g/tex). The strength of PSC355 was significantly higher than the other varieties and similar to that of SG501. The strength of PSC952 was slightly above average at 28.6 g/tex and was similar to that of SG105 and DP388.

At 82.6%, the uniformity index of PSC355 was better than average and similar to the Sure-Grow and FiberMax varieties. The uniformity of PSC952 was equal to the overall average. The elongation of PSC355 was significantly higher than all other varieties, while that of PSC952 was also among the best.

The excellent fiber package of PSC355 was most similar to that of SG501, but with better elongation. The fiber quality of PSC355 was second only to that of the FiberMax varieties. Spinning tests are being conducted to determine how well PSC355 spins relative to other varieties. The fiber package of PSC952 was most similar to that of ST474 in being ”average”.

Summary

Phytogen’s debut early maturing cotton varieties are PSC355 and PSC952. PSC355 was developed from germplasm licensed from Mississippi State University and PSC952 was licensed from Americot. In head-to-head comparisons from TX to NC in 1998 and 1999, PSC355 was the overall highest yielding variety and PSC952 was among the highest yielding early-mid maturing varieties. The early maturing PSC355 was 4-5 days earlier than PSC952 and it was a few inches shorter in average plant height.

The fiber quality of PSC355 was excellent (similar to SG501), but that of PSC952 was more average. The micronaire of both varieties was slightly higher than average, but it was not significantly different from the other high yielding varieties. The length of PSC355 was above average while that of PSC952 was slightly below average. The strength and uniformity index for PSC355 were among the best while those for PSC952 were equal to the average. The elongation of PSC355 was significantly higher than all other varieties while that of PSC952 was only slightly less superior. The spinning qualities of both varieties are being determined.

References

Creech, J.B., R.R. Bridge, and D.S. Calhoun. 1999. Release of DES 607 and licensing of H10-35-05. Proceedings Beltwide Cotton Conferences. Vol. 1, p 472.

Table 1. Head-to-head comparisons with PSC 355 for lint yield over 1998-99 university trials with calculated mean equivalents (ME).

Variety	Common Trials (N)	% of Control (%)	Signif @	Lint Yield ME (#/ acre)
PSC 355	**102**	**100**	**Control**	**1037**
SG 747	99	98.4	ns	1021
PM 1218 B/R	85	98.1	ns	1018
SG 105	89	96.6	*	1002
ST X9901 B	24	95.1	*	986
SG 501	80	94.7	**	982
FM X052	25	93.5	**	970
ST 474	93	93.2	**	967
SG 125	98	93.1	**	966
SG 501 B/R	36	93.1	**	966
PM 1560 B	96	92.4	**	958
DP X8C27	30	92.0	**	954
DP 388	65	91.9	**	953
DP 20 B	86	91.7	**	951
DP 428 B	79	91.3	**	947
PM X0425	23	91.3	**	947
FM 832	29	90.7	**	941
ST BXN47	97	90.6	**	940
PM 1440	63	89.7	**	930
DP 33 B	62	86.6	**	898
DP 436 R	71	85.0	**	882
DP 425 R	80	84.5	**	876
FM 989	33	83.2	**	863
DP 458 B/R	28	80.1	**	831
Competitor Mean	64	91.2		946

@ */ ** significantly lower than control at 0.05 or 0.01; +/ + + significantly higher at 0.05 or 0.01; ns not significant

Table 2. Head-to-head comparisons of early-mid maturing varieties with PSC 952 for lint yield over 1998-99 university trials with calculated mean equivalents (ME).

Variety	Common Trials (N)	% of Control (%)	Signif @	Lint Yield ME (#/ acre)
FM X052	25	103.6	ns	1018
ST X9901 B	23	103.6	ns	1018
SG 501 B/R	33	102.1	ns	1003
PSC 952	**98**	**100**	**Control**	**983**
SG 501	54	99.7	ns	980
DP 428 B	46	96.3	ns	946
DP X8C27	8	96.3	ns	946
FM 832	60	96.3	*	946
PM 1440	73	95.4	**	938
DP 458 B/R	56	94.4	**	928
DP 33 B	66	92.9	**	913
DP 436 R	43	91.6	**	900
FM 989	64	91.3	**	897
DP 425 R	47	90.9	**	893
Average	50	96.7		951

@ */ ** significantly lower than control at 0.05 and 0.01; +/ + + significantly higher at 0.05 and 0.01; ns not significant

Table 3. Head-to-head comparisons with PSC355 for % first pick/open over 1998-99 university trials with calculated mean equivalents (ME).

Variety	Common Trials (N)	% of Control (%)	T-test Signif @	% 1st Pick ME (#/ acre)	Relative Maturity
DP 388	26	105.4	+ +	77.5	VE
PM 1218 B/R	31	102.9	ns	75.7	E
SG 125	30	101.3	ns	74.5	E
SG 747	31	100.5	ns	73.9	E
PSC 355	**31**	**100**	**Control**	**73.5**	**E**
SG 105	31	99.3	ns	73.0	E
PM 1560 B	31	99.0	ns	72.8	E
ST 474	31	98.1	ns	72.1	E
DP 20 B	29	97.6	ns	71.8	E
PM X0425	5	97.4	ns	71.6	E
ST BXN47	31	97.2	ns	71.5	E
FM X052	5	96.5	ns	70.9	E-M
SG 501 B/R	9	96.5	*	70.9	E-M
PM 1440	21	96.2	ns	70.7	E-M
DP X8C27	15	95.8	ns	70.4	E-M
DP 436 R	30	95.0	**	69.8	E-M
DP 428 B	31	94.4	**	69.4	E-M
ST X9901 B	4	93.9	ns	69.0	E-M
PSC 952	**17**	**93.4**	**0**	**68.7**	**E-M**
SG 501	24	93.3	*	68.6	E-M
DP 425 R	29	92.1	**	67.7	E-M
DP 33 B	20	91.5	**	67.3	E-M
FM 989	10	84.7	*	62.3	M
FM 832	11	76.8	**	56.5	M
DP 458 B/R	12	75.3	**	55.4	M
Average	21.8	95.0		69.8	

@ */ ** significantly lower than control at 0.05 and 0.01; +/ + + significantly higher at 0.05 and 0.01; ns not significant

Table 4. Head-to-head comparisons with PSC355 for fiber quality over 1998-99 university trials with calculated mean equivalents (ME).

Variety	Mic (units)	Staple (32's)	Strength (g/ tex)	Unif. (%)	Elong. (%)
PSC 355	**4.81**	**35.5**	**30.4**	**82.6**	**7.3**
PSC 952	**4.82**	**34.8**	**28.9**	**82.1**	**7.0**
DP 20 B	4.47	34.9	26.7	81.6	7.0
DP 33 B	4.64	35.2	27.6	81.6	6.4
DP 388	4.59	34.7	29.0	81.6	7.0
DP 425 R	4.75	35.0	26.4	81.4	6.6
DP 428 B	4.66	35.5	25.8	81.6	6.4
DP 436 R	4.64	35.6	26.6	81.8	6.9
DP 458 B/R	4.85	35.1	29.3	81.5	6.7
DP X8C27	4.90	34.6	25.8	81.8	6.3
FM 832	4.52	37.8	31.7	82.8	6.1
FM 989	4.51	36.0	32.3	82.5	6.0
FM X052	4.46	36.9	29.1	82.2	5.4
PM 1440	4.83	34.9	28.0	81.8	6.1
PM 1560 B	4.86	35.1	28.7	82.4	6.6
PM X0425	4.77	35.9	28.2	82.2	6.7
PM1218B/R	4.90	34.5	26.7	81.9	6.5
SG 105	4.81	35.7	28.5	82.8	6.6
SG 125	4.69	35.8	27.4	82.4	7.0
SG 501	4.75	35.5	30.9	82.8	6.7
SG 501 B/R	4.79	34.9	29.2	82.4	7.0
SG 747	4.87	35.6	27.4	82.4	7.1
ST 474	4.86	34.7	27.9	82.1	6.4
ST BXN47	4.69	35.0	28.0	81.9	6.3
ST X9901 B	4.57	35.4	27.3	81.3	6.4
Average	4.72	35.4	28.3	82.1	6.6