

Arizona Upland Cotton Variety Testing Program, 1998

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Abstract

Ten field experiments were conducted in major cotton growing areas of Arizona in 1998 for the purpose of evaluating Upland cotton varieties in terms of adaptability and performance. Eight commercial cottonseed companies participated in the program. A maximum of two varieties were submitted by each company at each location. Experiments were conducted on a commercial level on grower-cooperator fields in most cases. Locations used in the program spanned the range of conditions common to cotton producing areas of the state from about 100 ft. to 4,000 ft. elevation. Each of the participating seed companies offer a compliment of varieties that can serve to match various production strategies commonly employed in the state. The 1998 cotton season was a very difficult one for many cotton producing areas in AZ below ~2,000 ft. elevation, characterized by a cool wet spring, late planting, a delayed crop, and a strong monsoon season that reduced fruit retention in many cases. Many varieties commercially available performed well at several locations demonstrating good adaptation to Arizona conditions.

Introduction

Cotton farmers in Arizona are always very interested in the performance of new and established varieties. Growers are also interested in the adaptability and performance of varieties in their area. Not only is there an interest on the part of farmers regarding objective, unbiased data describing cotton varieties, but the commercial seed companies are also motivated to support the development and operation of an independently based variety testing program for the state of Arizona. A statewide Upland variety testing program was conducted in 1998 involving the University of Arizona Cooperative Extension System, farmer-cooperators in eight counties, and eight commercial cottonseed companies. The objective of the project is test commercially available varieties under commercial conditions at several representative cotton-growing locations in Arizona. Variety evaluation is conducted in terms of growth and development patterns, yield, and quality.

Methods

An Upland variety testing program was conducted at ten locations in 1998 (Yuma Valley, Parker Valley, Mohave Valley, Buckeye, Gila Bend, Stanfield, Coolidge, Marana, Sulfur Springs Valley, and Safford), involving six commercial cottonseed companies (Delta Pine, Stoneville, Sure-Grow, J&S Research, Paymaster-Hartz, AgriPro, Germains, and AgrEvo (Fibermax)). At each location, each participating company submitted a maximum of two varieties, for a total of 16 varieties per location. Most tests were conducted on grower-cooperator fields, with plots (individual varieties) being a minimum of four rows wide (38 to 40 inch spacings), and extending the full length of the irrigation run. All treatments (varieties) were arranged in a randomized complete block design with four replications in each case. Yield estimates were made by harvesting a minimum of the entire two, centermost rows, of each plot. Resulting seedcotton weights were obtained from each plot by the use of electronic scales placed at the end of the field. Subsamples of seedcotton were ginned for turnout estimates, and lint samples were subjected to HVI analysis. All data was analyzed statistically in a manner consistent with the experimental design by use of analysis of variance methods (Steel and Torrie, 1980), and procedures outlined by the SAS Institute (SAS, 1988).

Results

Yield analyses revealed significant effects associated with location, which is not at all surprising given the wide range in environmental conditions experienced among locations (Tables 1 - 10). Elevation differences ranged from approximately 100 to 4,000 ft. above sea level. Ranges in dates of planting, in relation to optimal dates for each location, and insect infestations also contributed to location and regional differences.

Results are representative of the variety performances among the locations utilized and of the growing season experienced in 1998. There are several points that are worthy of noting with respect to the 1998 results:

- In general, the transgenic varieties performed very well in relation to the other varieties at each location. In all cases, complete measures were taken to accomplish pink bollworm (*Pectinophora gossypiella* (Saunders)) control. However, differences in the yield of Bt varieties (e.g. DP 33b) in comparison to similar varieties or their recurrent (non-transgenic) parents, appeared to be due to differences in insect (pink bollworm) damage and not due to agronomic differences. These results are consistent with those provided from studies conducted in 1996, 1997, and 1998 comparing new transgenic varieties with their recurrent parents (Silvertooth et al., 1997 and Silvertooth and Norton, 1998).
- Several non-transgenic varieties yielded very well among locations in 1998. For example, STV 474 performed well in 1998 at many locations. This variety has also demonstrated good yielding potential in this project over the past several years. This type of demonstration of consistency in performance is important to consider in variety selection.
- The 1998 cotton season in Arizona was marked by a cool, wet spring that resulted in substantial delays in planting and poor early season vigor. This followed by a crop that in many areas was delayed in maturity, sometimes up to one month. Poor fruit retention was experienced in many areas, due in part to a strong monsoon season (the combination of heat and humidity commonly result in reductions in fruit retention), and also in some cases to heavy and sustained infestations of lygus bugs.

Summary

Cotton breeders, farmers, and agronomists are constantly in the process of critiquing and reviewing conventional varieties with respect to possible improvements. Regional adaptability of varieties is a factor of interest to any cotton-producing region, Arizona being no exception. The companies and varieties under review in this program are the products of rather intense screening and evaluation under Arizona conditions. This project illustrates that there are a number of good varieties for many locations and conditions in Arizona given proper placement and management.

Acknowledgements

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References

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Table 1. Lint yields from 1998 Mohave County Variety Test, AVI KWA'AME Farms. ¶

Variety	Color Grade	Micronaire	Staple 1/32 in.	Strength gm/Tex	Length 1/100 in.	Length Uniformity (%)	Lint Yield (lbs lint/acre)
Stoneville BXN 47	21	5.1	37	29.0	1.15	83	943 a*
Stoneville 474	21	5.2	37	29.7	1.16	83	936 ab
Sure Grow 821	21	5.1	37	28.0	1.15	83	931 ab
Phytogen PSC569	21	5.4	37	32.1	1.16	83	895 ab
Deltapine 33B	21	4.9	38	30.5	1.18	82	881 abc
Sure Grow 125	21	5.0	37	27.2	1.15	83	860 abc
AgriPro AP6101	21	4.9	39	31.7	1.22	83	841 bcd
Deltapine 32B	21	5.3	37	29.1	1.14	82	791 cde
Germain 9033	21	4.8	38	32.9	1.18	83	753 def
Phytogen PSC952	21	4.8	36	28.4	1.13	83	706 efg
Paymaster 1560BG	21	5.2	36	28.9	1.13	84	692 fg
AgriPro AP4103	21	5.3	38	32.1	1.19	83	679 fg
Paymaster 60792	21	4.7	35	28.1	1.10	82	638 g
AgrEvo FM989	21	4.5	37	32.4	1.16	83	489 h
AgrEvo FM832	21	4.5	39	32.8	1.20	83	441 h
LSD ($\alpha=0.05$)†							98
OSL‡							0.0001
C.V. (%)§							9.01

¶Planted 21 April

Harvested 6 October

*Means followed by the same letter are not significantly different according to a Duncan's Multiple Range Test.

†LSD = Least Significant Difference

‡ OSL = Observed Significance Level

§ C.V. = Coefficient of Variation (%)

Table 2. Lint yields from 1998 LaPaz County Variety Test, CRIT Farms. ¶

Variety	Color Grade	Micronaire	Staple 1/32 in.	Strength gm/Tex	Length 1/100 in.	Length Uniformity (%)	Lint Yield (lbs lint/acre)
Sure Grow 821	21	5.3	36	30.1	1.10	83	943 a*
Deltapine 5415	21	4.7	36	30.5	1.13	81	938 ab
AgriPro AP6101	21	5.1	37	31.5	1.16	82	934 ab
Stoneville BXN 47	31	5.2	36	29.1	1.11	82	902 abc
Phytogen PSC569	21	5.5	35	32.4	1.08	82	880 abc
Paymaster 72106	21	5.2	35	28.5	1.09	82	865 abc
Stoneville 474	31	5.1	34	28.6	1.07	82	861 abc
AgriPro AP7115	21	4.9	35	28.3	1.10	82	837 abc
Deltapine 33B	21	5.1	36	29.2	1.12	82	812 abcd
Sure Grow 180	31	4.8	36	29.3	1.11	82	802 bcd
Deltapine 32B	21	5.3	35	30.1	1.10	82	795 cd
Germaines 9033	31	5.2	35	31.8	1.10	82	765 cde
AgrEvo FM989	31	5.0	36	31.0	1.13	81	695 def
Paymaster 1560BG	31	5.2	35	29.1	1.09	83	674 def
Phytogen PSC952	41	5.1	35	29.3	1.08	82	638 ef
AgrEvo FM832	31	4.7	38	32.8	1.18	83	564 f
LSD ($\alpha=0.05$)†							138
OSL‡							0.0001
C.V. (%)§							10.27

¶Planted 15 April

Harvested 3 November

*Means followed by the same letter are not significantly different according to a Duncan's Multiple Range Test.

†LSD = Least Significant Difference

‡ OSL = Observed Significance Level

§ C.V. = Coefficient of Variation (%)

Table 3. Lint yields from 1998 Yuma County Variety Test, Yuma Valley Agricultural Center.¶

Variety	Color Grade	Micronaire	Staple 1/32 in.	Strength gm/Tex	Length 1/100 in.	Length Uniformity (%)	Lint Yield (lbs lint/acre)
Sure Grow 125	21	4.7	36	28.4	1.11	82	774 a*
AgriPro AP7115	21	4.4	35	28.8	1.08	81	750 ab
Stoneville 474	21	4.9	36	29.1	1.12	82	677 bc
Sure Grow 821	21	4.7	36	29.9	1.13	82	643 cd
Deltapine 20B	21	4.3	36	27.9	1.11	82	642 cd
Paymaster 1560BG	21	5.0	35	29.5	1.10	83	619 cd
AgriPro AP6101	21	4.6	37	31.3	1.15	82	601 cde
Paymaster 2106	21	5.3	35	27.0	1.09	82	589 de
Deltapine 32B	21	4.8	36	30.1	1.11	82	534 ef
Phytogen PSC569	21	4.8	36	30.5	1.12	82	528 ef
Germaines 303	21	4.6	36	30.5	1.13	82	489 f
Germaines 9033	21	4.4	36	31.8	1.12	82	476 fg
Phytogen PSC952	21	4.4	36	31.2	1.14	82	476 fg
AgrEvo FM989	21	4.2	36	32.0	1.12	81	474 fg
AgrEvo FM832	21	4.2	37	31.7	1.15	82	395 g
LSD ($\alpha=0.05$)†							85
OSL‡							0.0001
C.V. (%)§							8.75

¶Planted 17 April

Harvested 24 September

*Means followed by the same letter are not significantly different according to a Duncan's Multiple Range Test.

†LSD = Least Significant Difference

‡ OSL = Observed Significance Level

§ C.V. = Coefficient of Variation (%)

Table 4. Lint yields from 1998 Maricopa County Variety Test, Paloma Ranch.¶

Variety	Color Grade	Micronaire	Staple 1/32 in.	Strength gm/Tex	Length 1/100 in.	Length Uniformity (%)	Lint Yield (lbs lint/acre)
Stoneville BXN 47	31	4.2	37	30.8	1.16	82	833 a*
Phytogen PSC569	21	4.1	37	30.9	1.17	81	828 a
Stoneville 474	41	4.4	37	30.3	1.14	82	744 ab
Paymaster 72106	21	4.0	37	29.6	1.14	80	689 bc
AgriPro AP6101	21	3.5	39	30.3	1.22	82	681 bcd
Deltapine 33B	31	3.5	37	30.8	1.17	82	666 bcde
Sure Grow 125	31	4.0	37	28.3	1.14	81	657 bcde
Sure Grow 248	21	4.0	38	31.1	1.19	81	612 cde
Phytogen PSC952	31	3.7	37	29.0	1.13	82	597 cdef
Germaines 9033	31	3.6	37	32.8	1.17	82	571 cdef
Deltapine 90B	31	3.8	37	32.6	1.17	82	567 cdef
Germaines 303	31	3.5	38	31.6	1.18	81	561 def
Paymaster 1560BG	21	4.0	37	30.6	1.14	82	545 ef
AgriPro AP4103	31	3.6	38	33.6	1.20	80	485 fg
AgrEvo FM989	31	3.7	39	32.7	1.21	83	384 g
AgrEvo FM832	31	3.5	39	31.6	1.22	81	370 g
LSD ($\alpha=0.05$)†							122
OSL‡							0.0001
C.V. (%)§							12.0

¶Planted 17 April

Harvested 17 December

*Means followed by the same letter are not significantly different according to a Duncan's Multiple Range Test.

†LSD = Least Significant Difference

‡ OSL = Observed Significance Level

§ C.V. = Coefficient of Variation (%)

Table 5. Lint yields from 1998 Maricopa County Variety Test, Buckeye, H-4 Farms.¶

Variety	Color Grade	Micronaire	Staple 1/32 in.	Strength gm/Tex	Length 1/100 in.	Length Uniformity (%)	Lint Yield (lbs lint/acre)
Phytogen PSC569	31	5.6	34	29.3	1.06		1568 a*
Sure Grow 248	31	5.0	36	32.0	1.13		1539 ab
Sure Grow 821	31	5.2	36	29.3	1.13		1507 abc
Deltapine 33B	21	5.1	37	30.0	1.15		1493 bc
Stoneville 474	41	5.4	35	28.6	1.10		1483 bc
AgriPro AP6101	31	4.9	38	32.4	1.20		1458 cd
Stoneville BXN 47	31	5.1	35	28.5	1.09		1442 cd
AgriPro AP4103	31	5.2	37	32.0	1.16		1413 de
Deltapine 90B	31	5.2	37	34.0	1.15		1404 de
Germaines 303	31	4.9	37	32.5	1.16		1355 ef
Phytogen PSC952	31	4.9	36	27.8	1.12		1354 ef
Germaines 9033	31	4.9	37	32.9	1.15		1351 ef
AgrEvo IF1000	31	4.9	37	32.6	1.17		1323 f
Paymaster 1560BG	31	5.1	35	29.0	1.10		1250 g
Paymaster 60792	31	4.7	34	27.1	1.06		1238 g
AgrEvo FM832	31	4.6	37	32.0	1.17		1168 h
LSD ($\alpha=0.05$)†							65
OSL‡							0.0001
C.V. (%)§							2.80

¶Planted 7 April

Harvested 5 December

*Means followed by the same letter are not significantly different according to a Duncan's Multiple Range Test.

†LSD = Least Significant Difference

‡ OSL = Observed Significance Level

§ C.V. = Coefficient of Variation (%)

Table 6. Lint yields from 1998 Pinal County Variety Test, Ollerton Farms, Stanfield.¶

Variety	Color Grade	Micronaire	Staple 1/32 in.	Strength gm/Tex	Length 1/100 in.	Length Uniformity (%)	Lint Yield (lbs lint/acre)
Stoneville 474	21	5.3	36	30.3	1.12		1307 a*
Phytogen PSC569	21	5.3	35	32.6	1.10		1208 b
Deltapine 90B	21	4.8	37	34.6	1.15		1202 b
Paymaster 72106	21	5.3	35	26.8	1.09		1199 b
Deltapine 33B	21	4.7	37	30.2	1.14		1194 b
Paymaster 1560BG	21	5.3	36	30.6	1.11		1175 bc
Stoneville BXN47	21	5.2	35	28.4	1.10		1165 bcd
Phytogen PSC952	21	4.9	35	30.2	1.10		1149 bcd
Sure Grow 125	21	5.0	34	29.2	1.07		1102 cde
Sure Grow 180	21	5.2	36	28.3	1.13		1091 def
AgriPro AP6101	21	5.3	35	26.9	1.08		1064 ef
Germaines 9033	21	4.7	38	32.6	1.18		1063 ef
AgrEvo FM989	21	4.9	37	31.0	1.14		1049 ef
Germaines 303	21	4.5	38	32.3	1.19		1037 ef
AgriPro AP4103	21	5.0	36	30.0	1.13		1013 fg
AgrEvo FM832	21	4.6	39	34.4	1.22		949 g
LSD ($\alpha=0.05$)†							84
OSL‡							0.0001
C.V. (%)§							5.24

¶Planted 20 April

Harvested 21 November

*Means followed by the same letter are not significantly different according to a Duncan's Multiple Range Test.

†LSD = Least Significant Difference

‡ OSL = Observed Significance Level

§ C.V. = Coefficient of Variation (%)

Table 7. Lint yields from 1998 Pinal County Variety Test, Lee Smith Farms, Coolidge.¶

Variety	Color Grade	Micronaire	Staple 1/32 in.	Strength gm/Tex	Length 1/100 in.	Length Uniformity (%)	Lint Yield (lbs lint/acre)
Deltapine 90B	21	4.6	37	30.7	1.16		1798 a*
AgriPro AP6101	21	5.1	38	29.9	1.18		1790 a
Stoneville BXN 47	21	5.2	36	26.8	1.13		1747 ab
Germaines 303	21	4.7	37	29.1	1.16		1725 abc
Stoneville 474	21	5.0	36	26.8	1.11		1720 abc
Phytogen PSC569	21	4.9	36	30.3	1.12		1717 abc
Sure Grow 248	21	4.4	37	31.2	1.17		1674 abcd
Sure Grow 821	21	4.7	36	28.4	1.13		1650 bcd
AgriPro AP4103	21	5.0	37	29.4	1.16		1645 bcd
Germaines 9033	21	4.8	37	32.5	1.14		1634 bcd
IF1000	21	4.7	37	29.9	1.15		1629 bcd
Deltapine 33B	21	4.8	37	29.0	1.14		1613 cd
Phytogen PSC952	21	5.0	35	27.2	1.10		1609 cd
Paymaster PMX60792	21	4.6	35	25.4	1.08		1577 d
Paymaster 1560BG	21	4.9	36	27.9	1.11		1575 d
AgrEvo FM832	21	4.5	38	31.4	1.19		1400 e
LSD ($\alpha=0.05$)†							118
OSL‡							0.0170
C.V. (%)§							9.98

¶Planted 13 April

Harvested 15 October 1998

*Means followed by the same letter are not significantly different according to a Duncan's Multiple Range Test.

†LSD = Least Significant Difference

‡ OSL = Observed Significance Level

§ C.V. = Coefficient of Variation (%)

Table 8. Lint yields from 1998 Pima County Variety Test, Marana Agricultural Center.¶

Variety	Color Grade	Micronaire	Staple 1/32 in.	Strength gm/Tex	Length 1/100 in.	Length Uniformity (%)	Lint Yield (lbs lint/acre)
Stoneville 474	21	5.0	37	28.4	1.16		1190 a
Paymaster 1560BG	21	5.1	36	27.6	1.12		1041 b
Sure Grow 501	21	4.7	37	30.3	1.15		1000 bc
Sure Grow 125	21	4.6	38	26.8	1.18		996 bc
Germaines 120	21	4.4	35	25.0	1.09		985 bc
Paymaster PMX60792	21	4.8	36	26.9	1.12		955 bc
AgriPro AP7115	21	4.2	35	25.3	1.10		917 cd
Stoneville 373	21	4.3	38	27.1	1.18		914 cd
AgrEvo FM 989	21	4.8	37	33.3	1.16		846 d
AgrEvo FM 832	21	4.5	39	32.5	1.22		837 d
Phytogen PSC952	21	4.6	36	27.7	1.11		826 d
Deltapine 33B	21	4.6	37	28.6	1.17		669 e
AgriPro AP6101	21	5.0	37	25.7	1.15		650 e
Deltapine 32B	21	4.7	37	29.2	1.17		649 e
Phytogen PSC569	21	4.6	37	32.3	1.16		622 e
Germaines 303	21	4.6	38	29.3	1.20		443 f
LSD ($\alpha=0.05$)†							100
OSL‡							0.0001
C.V. (%)§							7.1

¶Planted 23 April

Harvested 28 October 1998

*Means followed by the same letter are not significantly different according to a Duncan's Multiple Range Test.

†LSD = Least Significant Difference

‡ OSL = Observed Significance Level

§ C.V. = Coefficient of Variation (%)

Table 9. Lint yields from 1998 Graham County Variety Test, Darren Carpenter Farms.¶

Variety	Color Grade	Micronaire	Staple 1/32 in.	Strength gm/Tex	Length 1/100 in.	Length Uniformity (%)	Lint Yield (lbs lint/acre)
AgriPro AP6101	31	4.6	38	31.5	1.19	82	1268 a*
Stoneville BXN 47	31	4.6	36	28.2	1.12	82	1263 a
Stoneville 373	41	4.6	37	26.8	1.14	82	1250 ab
Sure Grow 501	41	4.5	36	31.9	1.12	83	1218 ab
AgrEvo FM989	41	4.5	38	31.3	1.18	83	1218 ab
Sue Grow 248	41	4.6	38	31.3	1.18	82	1197 ab
Phytogen PSC952	41	4.9	37	28.0	1.14	82	1193 ab
Deltapine 90RR	31	4.5	36	31.2	1.11	81	1160 ab
Germaines 9033	31	4.7	36	32.2	1.14	83	1122 ab
AgriPro AP7115	31	4.4	36	29.0	1.12	82	1121 ab
Paymaster 1560BG	31	4.6	36	28.7	1.12	83	1121 ab
AgrEvo FM832	31	4.0	39	32.0	1.20	81	1109 ab
Deltapine 90B	31	4.6	37	33.0	1.13	82	1088 ab
Germaines 120	31	4.4	36	28.0	1.13	83	1087 ab
Phytogen PSC569	31	4.8	35	30.9	1.10	81	1044 b
LSD ($\alpha=0.05$)†							NS
OSL‡							0.5053
C.V. (%)§							10.74

¶Planted 28 April

Harvested 30 October

*Means followed by the same letter are not significantly different according to a Duncan's Multiple Range Test.

†LSD = Least Significant Difference

‡ OSL = Observed Significance Level

§ C.V. = Coefficient of Variation (%)

Table 10. Lint yields from 1998 Cochise County Variety Test, Schmidt Farms, Kansas Settlement.¶

Variety	Color Grade	Micronaire	Staple 1/32 in.	Strength gm/Tex	Length 1/100 in.	Length Uniformity (%)	Lint Yield (lbs lint/acre)
AgrEvo FM989	21	3.3	38	31.7	1.17	82	1046 a*
1517-95	31	3.8	38	31.6	1.20	83	942 b
Paymaster 1560BG	31	3.6	36	27.2	1.10	81	925 bc
Deltapine 5409	31	3.5	38	28.3	1.15	82	919 bc
Stoneville 373	31	3.4	36	25.7	1.13	81	903 bc
Germaines 9033	31	3.4	37	31.8	1.17	82	901 bc
Sure Grow 501	31	3.7	37	31.5	1.16	83	890 bc
AgrEvo FM832	31	3.4	38	29.0	1.18	82	884 bcd
Sure Grow 125	31	3.4	38	26.8	1.15	82	877 bcde
1517-91	31	3.5	37	30.2	1.17	84	859 cdef
Stoneville 474	31	3.4	35	26.6	1.10	81	856 cdef
Deltapine 50	31	3.5	38	26.0	1.14	82	847 cdefg
Germaines 120	31	3.3	35	27.5	1.09	83	801 defg
Phytogen PSC569	31	3.7	37	29.7	1.14	82	794 efg
AgriPro AP6101	31	3.6	38	30.3	1.19	82	777 fg
AgriPro AP4103	31	3.6	37	28.4	1.15	81	766 g
LSD ($\alpha=0.05$)†							83
OSL‡							0.0004
C.V. (%)§							4.46

¶Planted 21 April

Harvested 3 November

*Means followed by the same letter are not significantly different according to a Duncan's Multiple Range Test.

†LSD = Least Significant Difference

‡ OSL = Observed Significance Level

§ C.V. = Coefficient of Variation (%)