Arizona Upland Cotton Variety Testing Program, 2000

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Abstract

Each year the University of Arizona conducts variety trials across the state to evaluate the performance of upland cotton varieties. These tests provide unbiased data on the performance of varieties when tested side-by-side under typical production practices. In 2000, we planted a total of ten trials, one in the southwestern region (Yuma county), six in the central region (MoHave, La Paz, Maricopa, and Pinal counties), one in the southern region (Pima county), and two in the eastern region (Graham and Cochise counties). We tested six to ten commercially available varieties in each test. The purpose of this report is to present the results of our 2000 tests conducted in southwestern, central and southern Arizona. Lee Clark presents results from eastern Arizona in two companion reports in this publication. The results show that many varieties performed well at several locations, indicating good adaptation to Arizona conditions. The highest yielding varieties did not always produce the most value per acre, clearly demonstrating the importance of both yield and fiber quality in determining the value of the crop. Growers should carefully weigh the costs and benefits of yield, quality, and transgenic technology when selecting varieties.

Introduction

Each year the University of Arizona conducts variety trials across the state to evaluate the performance of upland cotton varieties. These trials provide many segments of the cotton industry with unbiased data on yield, fiber quality, and agronomic performance of commercially available varieties when tested side-by-side under typical production practices.

The Arizona Upland Cotton Variety Trial is our most intensive testing program. The tests in this program are conducted at several locations throughout the cotton producing regions of the state, usually on grower's fields. The test plots are large-scale "strip plots" that are replicated and randomized using proper field-plot techniques. Several seed companies enter the varieties they feel have the best chance of producing high yields of good quality fiber. The results of these trials are the closest possible to obtaining "on-farm" experience with a particular variety.

The purpose of this report is to present the results of our 2000 tests conducted in southwestern, central and southern Arizona. Lee Clark presents results from Eastern Arizona in a companion report in this publication.

Methods

Locations and varieties: We planted trials at eight locations in 2000 – one in the southwestern region (Wellton), six in the central region (Parker, MoHave, Buckeye, Maricopa, Coolidge, and Stanfield), and one in the southern region (Marana). Six to ten varieties were planted at each site. Varieties included in the 2000 tests were submitted to the university by the cooperating seed companies that included Deltapine, Paymaster, Stoneville, Sure-Grow, Buttonwillow Research, and AgriPro.

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Experimental design and test protocols: Most tests were conducted on grower-cooperator fields, and all cultural decisions, including planting date, fertilizer regimes, pest control, irrigation, defoliation, and harvest date were made by the grower. The tests at Maricopa and Marana were located on research farms, but production practices typical for the area were used in making all cultural decisions. Insect control regimes were followed for conventional varieties in all tests. Plots were a minimum of four rows wide (38 to 40 inch spacing), and extended the full length of the irrigation run. All treatments (varieties) were arranged in a randomized complete block design with three or four replications. At least two rows per plot were machine harvested and the seed cotton from each plot was weighed at the field. Sub-samples (10 to 15 lbs each) of the harvested seedcotton were ginned for turnout estimates, and lint yield was calculated from the seedcotton and turnout data. Lint from the grab samples was sent to the Phoenix classing office for HVI fiber quality analysis. Average premium or discount on the lint for each variety was determined by applying the CCC loan schedule to the HVI data collected from each plot. Price was determined by using the base value for Arizona (50.45 cents per pound) and adding or subtracting the proper premium or discount to the base value and value per acre was determined by multiplying lint yield by the price per pound.

Statistical analysis: An analysis of variance was conducted for each test (Steel and Torrie, 1980). Protected LSDs were used to estimate statistical differences among varieties. The six locations in the central region (Parker, MoHave, Buckeye, Maricopa, Stanfield, and Coolidge) contained seven varieties in common. A combined analysis of variance across all six central locations was conducted for those seven varieties to obtain performance data on a regional scale. Replications and locations were considered random effects and varieties fixed. The entry by location mean square was used to determine statistical significance among varieties and to calculate LSDs across locations.

Results and Discussion

In central Arizona, DP565 produced the highest yields and the greatest value per acre across all locations, averaging 1686 lbs/A lint yield with a value of $867 per acre (Table 1). Among the transgenic varieties in the test ST4892BR, ST4691B, and DP458BR produced the highest yields and highest value per acre. DP565 and PM1560BR produced the best fiber quality resulting in a premium of slightly over one cent per pound. Data for the six individual trials included in the region are presented in Table 2 through Table 7.

Several varieties produced good yields at Marana (Table 8). PM1560BR produced the highest yields, best fiber quality and highest value of all six varieties in the test. Heavy and frequent rain in October delayed harvest at Marana by about 30 days and, most likely, decreased overall yields and discolored the fiber, resulting in poorer grades at this location.

The top yielding and highest value variety at Wellton was ST4691B followed by BR9801, SG747, ST4892BR, ST474, and BXN47 (Table 9). ST4691B, ST4892BR, and BXN47 are all related to ST474. ST474 has shown good yields in several tests in previous years as well as in this test in 2000 (Silvertooth et al, 1999, Moser et al, 2000). SG747 has also produced good yields in this test in 2000 (Moser et al, 2000). DP451BR and DP388 produced the best fiber quality in this trial.

Variety selection has become more complicated in the last five years with the increasing importance of fiber quality in the market and with the advent of transgenic technology. In our tests, for example, the value of the crop depended on both lint yield and fiber quality; the highest yielding varieties did not always produce the highest value per acre (see Table 2 through Table 8).

The introduction of high yielding varieties with transgenic traits has been a great benefit to Arizona growers. However, new conventional varieties also are being developed and released. Although we only have one year of data on the newest varieties, results from our tests indicate that these conventional varieties may possess very good yield potential (Table 1). Thus, the cost and benefits of transgenic technology relative to the potentially greater yield and value of new conventional varieties should be considered when making variety selections.

Many sources of information on variety performance are publicly available to the industry. The data presented in this report are a good source of information on the performance of these varieties, and they represent a solid starting point for determining the actual performance of a given variety on each individual farm. Other sources of

information should be considered when selecting varieties. Seed companies also provide performance data for their varieties. Other growers in the area may have experience with a particular variety. If possible, more than one year of data should be considered in evaluating the performance of a particular variety.

Once the decision to try a new variety is made, incorporating that new variety into each cultural program should proceed in increments. Growers should test it on a limited scale at first to see, first-hand, how the variety performs on their own farm and to gain experience on the cultural needs of the variety.

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Table 1. Lint yield and fiber quality traits of seven upland-cotton varieties across six central Arizona locations (Parker, MoHave, Buckeye, Maricopa, Stanfield, and Coolidge) in 2000.

					Fiber Quality					
Brand	**Variety**	**Value[1]**	**Lint Yield[2]**	**Gin Turnout**	**Mic**	**Fiber Length**	**Staple Length**	**Uniformity index**	**Fiber Strength**	**Premium[3]**
		($/acre)	(lbs/A)	(%)		(in)	(32nds)		(g/tex)	(points)
Deltapine	DP 565	867*	1686*	35.4	4.9	1.18	37.8	82.9	29.8	104
Stoneville	ST 4892 BR	792	1635	36.2	5.1	1.11	35.6	82.7	27.9	-189
Deltapine	DP 458 BR	796	1594	34.7	5.1	1.13	36.3	82.1	28.9	-45
Stoneville	ST 4691 B	796	1572	35.0	4.9	1.11	35.5	81.6	26.2	18
Sure-Grow	SG 747	743	1564	36.3	5.3	1.09	35.1	82.6	26.4	-304
Sure-Grow	SG 501 BR	725	1488	34.7	5.2	1.10	35.2	83.4	28.7	-182
Paymaster	PM 1560 BR	769	1486	34.9	4.6	1.13	36.2	82.0	28.1	143
LSD		18	35	0.7	0.1	0.02	0.6	0.6	0.8	

[1]Value of lint per acre based on CCC loan schedule of discounts and premiums and assuming a base value of 50.45 cents per pound.
[2]Means followed by an '*' are not significantly different than the top-yielding or highest value variety at $P<0.05$.
[3]Average premium or discount applied to the lint based on CCC loan schedule.

Table 2. Lint yield and fiber properties of eight upland-cotton varieties at Parker, Arizona in 2000.

					Fiber Quality					
Company	Variety	Value[1]	Lint Yield[2]	Gin Turnout	Mic	Fiber Length	Staple Length	Uniformity index	Fiber Strength	Premium[3]
		($/acre)	(lbs/A)	(%)		(in)	(32nds)		(g/tex)	(points)
Deltapine	DP565	878*	1758*	33.5	5.0	1.19	38.0	82.8	29.6	-50
Stoneville	ST4892BR	813*	1682*	34.2	5.2	1.11	35.5	82.3	27.0	-213
Stoneville	ST4691B	844*	1615*	33.1	4.9	1.11	35.8	81.5	25.9	183
Deltapine	DP458BR	765	1612*	33.0	5.3	1.11	35.8	81.3	27.2	-300
SureGrow	SG501BR	751	1585	33.5	5.4	1.09	34.8	82.8	28.4	-304
Deltapine	DP451BR	727	1461	30.1	5.0	1.13	36.8	82.8	26.4	-70
SureGrow	SG747	690	1461	34.5	5.3	1.09	34.9	81.9	26.7	-324
Paymaster	PM1560BR	773	1440	33.4	4.7	1.12	36.0	82.5	27.7	321
LSD		72	150	1.1	0.3	0.05	1.4	1.3	2.2	

[1]Value of lint per acre based on CCC loan schedule of discounts and premiums and assuming a base value of 50.45 cents per pound.
[2]Means followed by an '*' are not significantly different than the top-yielding or highest-value variety at $P<0.05$.
[3]Average premium or discount applied to the lint based on CCC loan schedule.

Table 3. Lint yield and fiber properties of seven upland-cotton varieties at MoHave, AZ, 2000.

					Fiber Quality					
Brand	**Variety**	**Value[1]**	**Lint Yield[2]**	**Gin Turnout**	**Mic**	**Fiber Length**	**Staple Length**	**Uniformity index**	**Strength**	**Premium[3]**
		($/acre)	(lbs/A)	(%)		(in)	(32nd)		(g/tex)	(points)
Stoneville	ST4892BR	885	1830*	36.1	5.0	1.12	36.0	82.3	27.7	-210
Deltapine	DP565	980*	1822*	35.6	4.7	1.19	37.8	82.8	29.2	335
Stoneville	ST4691B	937	1771	35.1	4.5	1.13	36.5	81.8	26.1	190
Deltapine	DP458BR	927	1733	34.5	4.8	1.14	36.5	82.0	28.5	305
SureGrow	SG747	857	1720	36.2	5.2	1.12	36.0	82.8	25.9	-60
SureGrow	SG501BR	835	1675	35.3	5.1	1.11	35.5	83.0	28.1	-60
Paymaster	PM1560BR	866	1621	34.6	4.4	1.15	37.0	82.0	28.0	295
LSD		28	56	NS	0.2	0.02	0.7	0.9	1.1	

[1]Value of lint per acre based on CCC loan schedule of discounts and premiums and assuming a base value of 50.45 cents per pound.
[2]Means followed by an '*' are not significantly different than the top-yielding or highest-value variety at P<0.05.
[3]Average premium or discount applied to the lint based on CCC loan schedule.

Table 4. Lint yield and fiber properties of eight upland-cotton varieties at Buckeye, AZ, 2000.

					Fiber Quality					
Brand	**Variety**	**Value[1]**	**Lint Yield[2]**	**Gin Turnout**	**Mic**	**Length (100ths)**	**Length (32nds)**	**Uniformity index**	**Strength**	**Premium[3]**
		($/acre)	(lbs/A)	(%)		(in)	(in)		(g/tex)	(points)
Deltapine	DP565	763*	1471*	35.8	4.9	1.15	36.6	81.0	29.3	140
Stoneville	ST4892BR	744*	1444*	36.1	4.9	1.09	34.7	81.3	26.8	110
Deltapine	NuCottn33B	746*	1439*	33.7	4.8	1.13	36.3	81.0	28.7	140
SureGrow	SG747	672	1439*	36.0	5.1	1.07	34.1	81.0	25.6	-380
Deltapine	DP458BR	684	1427*	35.0	5.1	1.11	35.8	81.0	29.4	-255
Stoneville	ST4691B	681	1346	35.1	4.6	1.08	34.8	79.8	25.3	10
SureGrow	SG501BR	620	1329	34.8	5.1	1.07	34.2	82.3	27.0	-380
Paymaster	PM1560BR	653	1265	33.6	4.4	1.11	35.7	80.3	27.1	120
LSD		40	77							

[1]Value of lint per acre based on CCC loan schedule of discounts and premiums and assuming a base value of 50.45 cents per pound.
[2]Means followed by an '*' are not significantly different than the top-yielding or highest-value variety at P<0.05.
[3]Average premium or discount applied to the lint based on CCC loan schedule.

Table 5. Lint yield and fiber properties of ten upland-cotton varieties at Maricopa, AZ, 2000.

					Fiber Quality					
Company	**Variety**	**Value[1]**	**Lint Yield[2]**	**Gin Turnout**	**Mic**	**Fiber Length**	**Staple Length**	**Uniformity index**	**Fiber Strength**	**Premium[3]**
		($/acre)	(lbs/A)	(%)		(in)	(32nd)		(g/tex)	(points)
Deltapine	DP565	804*	1490*	35.1	4.7	1.15	36.7	83.3	29.8	350
AgirPro	AP 7126	721	1456*	36.0	5.1	1.14	36.3	82.0	27.6	-90
SureGrow	SG747	651	1433*	35.7	5.6	1.07	34.0	83.7	25.4	-500
Deltapine	DP458BR	739	1381	34.1	4.9	1.11	36.0	82.3	28.9	305
AgirPro	AP 9257	736	1375	34.3	4.8	1.10	35.3	82.7	28.5	310
Stoneville	ST4892BR	667	1337	35.4	5.2	1.11	35.7	84.3	28.8	-60
SureGrow	SG501BR	609	1279	34.3	5.3	1.09	35.0	84.3	28.8	-285
Paymaster	PM1560BR	680	1274	34.2	4.6	1.11	35.7	82.0	28.8	295
Stoneville	ST4691B	625	1269	32.3	5.2	1.08	34.7	82.3	26.5	-120
LSD		36	73	NS	0.3	0.03	1.0	1.1	1.6	

[1]Value of lint per acre based on CCC loan schedule of discounts and premiums and assuming a base value of 50.45 cents per pound.
[2]Means followed by an '*' are not significantly different than the top-yielding or highest-value variety at P<0.05.
[3]Average premium or discount applied to the lint based on CCC loan schedule.

Table 6. Lint yield and fiber properties of eight-upland cotton varieties at Stanfield, AZ, 2000.

					Fiber Quality					
Brand	**Variety**	**Value[1]**	**Lint Yield[2]**	**Gin Turnout**	**Mic**	**Fiber Length**	**Staple Length**	**Uniformity index**	**Strength**	**Premiuim[3]**
		($/acre)	(lbs/A)	(%)		(in)	(32nd)		(g/tex)	(points)
Stoneville	ST4691B	865	1827*	36.9	5.3	1.13	36.5	82.3	27.8	-314
Deltapine	DP565	920*	1822*	36.4	5.0	1.23	39.3	83.8	31.0	0
Stoneville	ST4892BR	855	1793*	37.2	5.6	1.13	36.3	83.3	29.0	-275
SureGrow	SG747	827	1732	37.0	5.6	1.12	36.0	83.0	27.2	-270
Paymaster	PM1560BR	858	1722	36.6	5.0	1.15	37.0	83.0	28.9	-60
AgirPro	AP 6101	865	1714	34.6	5.2	1.20	38.5	83.5	30.9	0
Deltapine	DP458BR	816	1704	35.7	5.3	1.16	37.3	83.3	30.3	-255
SureGrow	SG501BR	786	1560	35.1	5.2	1.13	36.3	84.3	30.8	-5
LSD		29	59	0.9	0.2	0.04	1.2	1.0	1.2	

[1]Value of lint per acre based on CCC loan schedule of discounts and premiums and assuming a base value of 50.45 cents per pound.
[2]Means followed by an '*' are not significantly different than the top-yielding or highest-value variety at P<0.05.
[3]Average premium or discount applied to the lint based on CCC loan schedule.

Table 7. Lint yield and fiber properties of seven upland-cotton varieties at Coolidge, AZ, 2000.

					Fiber Quality					
Company	Variety	Value[1]	Lint Yield[2]	Gin Turnout	Mic	Fiber Length	Staple Length	Uniformity index	Fiber Strength	Premiuim[3]
		($/acre)	(lbs/A)	(%)		(in)	(32nd)		(g/tex)	(points)
Deltapine	DP565	859*	1755*	36.2	5.1	1.20	38.5	84.0	30.2	-150
Stoneville	ST4892BR	787	1728*	38.5	5.1	1.12	35.5	83.0	28.4	-488
Deltapine	DP458BR	850*	1708*	36.3	5.0	1.15	36.5	82.5	29.4	-70
SureGrow	SG747	765	1608	38.5	5.3	1.11	35.5	83.0	27.5	-288
Stoneville	ST4691B	834*	1603	37.4	4.9	1.10	35.0	82.0	25.8	160
Paymaster	PM1560BR	785	1593	37.0	4.5	1.13	36.0	82.0	28.2	-115
SureGrow	SG501BR	747	1499	35.5	5.2	1.11	35.5	83.5	29.2	-60
LSD		38	76	1.0	0.4	0.06	2.1	2.8	2.7	

[1]Value of lint per acre based on CCC loan schedule of discounts and premiums and assuming a base value of 50.45 cents per pound.
[2]Means followed by an '*' are not significantly different than the top-yielding or highest-value variety at P<0.05.
[3]Average premium or discount applied to the lint based on CCC loan schedule.

Table 8. Lint yield and fiber properties of six upland-cotton varieties at Marana, AZ, 2000.

					Fiber Quality					
Company	**Variety**	**Value[1]**	**Lint Yield[2]**	**Gin Turnout**	**Mic**	**Length (100ths)**	**Length (32nds)**	**Uniformity Index**	**Strength**	**Premium[3]**
		($/acre)	(lbs/A)	(%)		(in)	(in)		(g/tex)	(points)
Paymaster	PM1560BR	742*	1414*	35.6	4.6	1.13	36.5	80.8	27.8	209
Stoneville	BXN47	692*	1410*	36.2	5.1	1.15	36.8	81.0	28.0	-153
SureGrow	SG501BR	667*	1407*	35.3	5.2	1.11	35.5	82.0	27.2	-301
SureGrow	SG747	648	1384*	36.5	5.3	1.13	36.3	81.0	27.0	-370
Deltapine	DP565	712*	1372*	35.5	4.6	1.18	37.3	80.5	28.5	140
Deltapine	DP458BR	655	1249	35.1	4.6	1.14	36.5	81.8	29.3	191
LSD		74	119	NS	0.3	0.02	1.1	NS	NS	

[1]Value of lint per acre based on CCC loan schedule of discounts and premiums and assuming a base value of 50.45 cents per pound.
[2]Means followed by an '*' are not significantly different than the top-yielding or highest-value variety at $P<0.05$.
[3]Average premium or discount applied to the lint based on CCC loan schedule.

Table 9. Lint yield and fiber properties of nine upland cotton varieties at Wellton, AZ in 2000.

					Fiber Quality					
Company	Variety	Value[1]	Lint Yield[2]	Gin Turnout	Mic	Length (100ths)	Length (32nds)	Uniformity index	Strength	Premium[3]
		($/acre)	(lbs/A)	(%)		(in)	(in)		(g/tex)	(points)
Stoneville	ST4691B	925*	1784*	35.8	5.0	1.12	36.0	81.5	25.0	130
Buttonwillow Research	BR9801	836	1660	35.4	5.1	1.15	36.8	83.0	28.4	-16
SureGrow	SG747	813	1649	34.6	5.1	1.11	35.8	82.0	24.9	-118
Stoneville	ST4892BR	811	1639	34.6	5.1	1.11	35.8	82.3	26.2	-101
Stoneville	ST474	806	1638	35.6	5.2	1.11	35.8	82.5	26.3	-118
Stoneville	BXN47	831	1616	35.3	4.9	1.13	36.5	82.8	25.4	101
Buttonwillow Research	BR9802	761	1564	35.1	5.3	1.09	35.3	83.3	27.1	-186
Deltapine	DP451BR	814	1544	34.5	4.7	1.13	36.5	81.5	24.9	230
Deltapine	DP388	810	1541	34.1	4.7	1.12	36.0	82.0	27.1	204
SureGrow	SG821	767	1480	35.3	4.8	1.12	35.8	82.5	27.3	139
LSD		62	94	NS	0.2	0.02	0.9	ns	1.7	252

[1]Value of lint per acre based on CCC loan schedule of discounts and premiums and assuming a base value of 50.45 cents per pound.
[2]Means followed by an '*' are not significantly different than the top-yielding or highest-value variety at P<0.05.
[3]Average premium or discount applied to the lint based on CCC loan schedule.