Arizona Upland Cotton Variety Testing Program

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Abstract

Ten field experiments were conducted across the cotton growing areas of Arizona in 1993 for the purpose of evaluating Upland cotton varieties in terms of adaptability and performance. Five commercial cottonseed companies participated in the program. Two varieties were submitted from each company at each location. Experiments were conducted on grower-cooperator fields in each case. Locations used in the program spanned the range of conditions common to cotton producing areas of the state from about 500 ft. to 4,000 ft. elevation. Results indicated a broad range of adaptability and competitiveness on the part of each of the participating companies and their representative varieties. Each of the companies offers a compliment of varieties that can serve to match various production strategies commonly employed in the state as well as showing a strong capacity to be regionally adaptive.

Introduction

With the increasing number of commercial cottonseed companies operating in Arizona, there is a corresponding interest level on the part of growers relative to adaptability and performance of available varieties. 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. With this serving as a basis of consideration, an Upland variety testing program was initiated in 1992 involving the University of Arizona Cooperative Extension System, farmer-cooperators in six counties, and five commercial cottonseed companies.

Methods

An Upland variety testing program was conducted at ten locations in 1993 (Parker Valley, Mohave Valley, Buckeye, Gila Bend, Queen Creek, Maricopa, Coolidge, Marana, Sulfur Springs Valley, and Safford), which involved five commercial cottonseed companies (Delta Pine, Stoneville, Sure-Gro (Arizona Processing), Chembred, and Hy-Performer). At each location, each participating company submitted two varieties, for a total of 10 varieties at each location. All tests were conducted on grower-cooperator fields, with plots (individual varieties) being a minimum of eight (with the exception of Marana, it being six) 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, and procedures outlined by the SAS Institute.

Results

Yield analyses revealed significant effects associated with location differences, which is not at all surprising given the wide range in environmental conditions experienced among locations (Tables 1 - 10). Elevation differences ranged from approximately 500 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.

From the results however, a basic set of conclusions and summary statements can be offered, which are consistent with the 1993 project:

1. It is apparent that each of the five commercial cottonseed companies participating in this project have strong varieties which offer optimum yield and quality characteristics. The existence of several competitive companies in this regard, with a broader listing of varieties, should be a benefit to Arizona producers.

2. Each of the five companies have varieties which are applicable to the broad range in conditions present in Arizona (150 to 4,000 ft. elevation). Also, there is presently a listing of varieties which can serve to fit into several production strategies being employed in Arizona. The various production strategies range from a very short season approach, such as following a vegetable or grain crop or at higher elevation, to a long, full-season production system.

Summary

No given variety exhibited any clear dominance across test locations in 1993. Rather, a strong balance among representative varieties and companies was found across the locations and conditions under which the tests were conducted this past year. This illustrates the wider range of varieties Arizona growers have to choose from in matching their own conditions, production strategies, and management than has commonly been available in the past.

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. The pursuit of the "ideal cotton variety", such as many describe as one which will germinate and emerge in 50 F soil; be salt tolerant; be resistant to seedling disease; withstand the ravages of insect pests such as lygus, pink bollworm, and whitefly; exhibit a high degree of heat tolerance; produce a large top crop; maintain growth late in the season; and consistently produce 4 to 5 bales/acre, is not available at present, but we're still looking for it. This is not to say, however, that the varieties that are available are not strong, well-adapted varieties. This project illustrates that there are a good number of viable varieties for Arizona given proper placement and management.

Acknowledgements

The valuable cooperation, land, and resources provided by Mohave Farms, Pacific Farms, H-Four Farms, J.S. Stephens and Sons, Thelander Farms, University of Arizona Demonsrtation Farm (Maricopa Ag. Center), Prechel Farms, EVCO Farms, Layton Farms, and Ed Curry Farms is highly appreciated. The support and participation of the participating companies in this project (Delta and Pine Land Co., Stoneville, Suregrow, Chembred, and Hy Performer seed companies) is gratefully acknowledged.

Table 1. Lint yields for Mohave County variety trial (Mohave Farms, Mohave Valley).§

Variety	Yield (lbs. lint/acre)	
DPL 5415	968	a*
Sure Grow 501	787	b
Chembred 232	779	b
HyPerformer HS 44	742	b
Delta Pine 5690	713	b
HyPerformer HS 46	697	b
Sure Grow 1001	695	b
Stoneville LA 887	687	b
Stoneville KC 311	636	b
Chembred 333	605	b
C.V.(%)†	14.11	
OSL‡	0.0037	

§ Planted 8 April 1993
Harvested 14 September 1993
*Means followed by the same letter are not significantly different according to a Student-Newman-Keuls test.
† Coefficient of variation.
‡ Observed significance level.

Table 2. Lint yields for LaPaz County variety trial (Pacific Farms, Parker).§

Variety	Yield (lbs. lint/acre)	
Sure Grow 501	1525	a*
Chembred 232	1390	ab
Stoneville LA 887	1284	bc
HyPerformer HS 44	1212	bc
Chembred 333	1137	c
Delta Pine 5816	1102	c
HyPerformer HS 46	1101	c
Stoneville KC 311	1091	c
Delta Pine 5415	1069	c
Sure Grow 1001	1060	c
C.V.(%)†	11.10	
OSL‡	0.0002	

§ Planted 4 April 1993
Harvested 22 September 1993
*Means followed by the same letter are not significantly different according to a Student-Newman-Keuls test.
† Coefficient of variation
‡ Observed significance level.

Table 3. Lint yields for Maricopa County variety trial (Stephens and Sons, Gila Bend).§

Variety	Yield (lbs. lint/acre)	
Stoneville LA 887	1508	a*
Delta Pine 5415	1470	ab
Sure Grow 039	1439	ab
HyPerformer HS 44	1432	b
HyPerformer HS 46	1333	c
Sure Grow 1001	1292	cd
Delta Pine 5690	1282	cd
Chembred 1233	1281	cd
Stoneville KC 311	1271	cd
Chembred 407	1230	d
$LSD_{0.05}$	75	
OSL†	0.0001	
C.V.(%)‡	3.80	

§ Planted 19 April 1993
Harvested
*Means followed by the same letter are not significantly different.
† Observed significance level.
‡ Coefficient of variation.

Table 4. Lint yields for Maricopa County variety trial (H-Four Farms, Buckeye)§

Variety	Yield (lbs. lint/acre)	
Stoneville LA 887	1957	a*
Sure Grow 501	1947	a
Delta Pine 5415	1914	a
HyPerformer HS 44	1870	a
Delta Pine 5461	1867	a
HyPerformer HS 46	1758	b
Chembred 1233	1682	bc
Stoneville KC 311	1658	c
Sure Grow 1001	1655	c
Chembred 407	1628	c
$LSD_{0.05}$	90	
OSL†	0.0001	
C.V.(%)‡	2.74	

§ Planted 24 March 1993.
Harvested
*Means followed by the same letter are not significantly different.
† Observed significance level.
‡ Coefficient of variation.

Table 5. Lint yields for Maricopa County variety trial (Thelander Farms, Chandler)§

Variety	Yield (lbs. lint/acre)	
Sure Grow 1001	1502	a*
HyPerformer HS 44	1500	a
Delta Pine 5415	1499	a
Chembred 1233	1378	b
Stoneville KC 311	1332	bc
Chembred 407	1329	bc
Stoneville LA 887	1277	bcd
HyPerformer HS 46	1252	cd
Sure Grow 039	1217	d
Delta Pine 20	1077	e
$LSD_{0.05}$	107	
OSL†	0.0001	
C.V.(%)‡	5.50	

§ Planted 20 April 1993.
Harvested
*Means followed by the same letter are not significantly different.
† Observed significance level.
‡ Coefficient of variation.

Table 6. Lint yields for Pinal County variety trial (Maricopa Ag Center).§

Variety	Yield (lbs. lint/acre)
Sure Grow 501	1567 a
Delta Pine 5415	1526 a
HyPerformer HS 44	1518 a
Chembred 407	1478 a
HyPerformer HS 46	1478 a
Stoneville LA 887	1461 a
Stoneville KC 311	1451 a
Delta Pine 5461	1409 a
Chembred 1233	1389 a
Sure Grow 1001	1387 a
C.V.(%)†	6.17
OSL‡	0.1234

§ Planted 6 April 1993.
Harvested 6 October 1993.
*Means followed by the same letter are not significantly different according to a Student-Newman-Keuls test.
† Coefficient of variation.
‡ Observed significance level.

Table 7. Lint yields for Pinal County variety trial (Prechel Farms, Coolidge).§

Variety	Yield (lbs. lint/acre)
Chembred 1233	1103 a*
Stoneville KC 311	1102 a
HyPerformer HS 44	1084 a
Delta Pine 5690	1075 a
Sure Grow 1001	1062 a
Chembred 407	1051 a
HyPerformer HS 46	999 a
Delta Pine 5415	996 a
Stoneville LA 887	983 a
Sure Grow 039	962 a
C.V.(%)†	6.97
OSL‡	0.0721

§ Planted 23 April 1993.
Harvested 29 November 1993.
*Means followed by the same letter are not significantly different according to a Student-Newman-Keuls test.
† Coefficient of variation.
‡ Observed significance level.

Table 8. Lint yields for Pima County variety trial (EVCO Farms, Marana).§

Variety	Yield (lbs. lint/acre)	
Sure Grow 501	1368	a*
Stoneville LA 887	1267	ab
Delta Pine 5415	1156	bc
HyPerformer HS 44	1135	bc
Sure Grow 404	1130	bc
Stoneville 506	1129	bc
Delta Pine 20	1122	bc
Chembred 333	1121	bc
HyPerformer HS 46	1096	bc
Stoneville KC 311	1049	c
Chembred 1233	1045	c
C.V.(%)†	7.97	
OSL‡	0.0010	

§ Planted 6 May 1993.
Harvested 2 November 1993.
*Means followed by the same letter are not significantly different according to a Student-Newman-Keuls test.
† Coefficient of variation.
‡ Observed significance level.

Table 9. Lint yields for Graham County variety trial (Layton Farms, Thatcher).§

Variety	Yield (lbs. lint/acre)	
Delta Pine 90	1386	a*
Delta Pine 5690	1382	a
Sure Grow 1001	1375	a
Chembred 1233	1365	ab
Chembred 407	1342	ab
HyPerformer HS 44	1287	ab
Stoneville 324	1252	b
HyPerformer HS 46	1252	b
Stoneville LA 887	1139	c
Sure Grow 034	1059	c
C.V.(%)†	4.36	
OSL‡	0.0001	

§ Planted 9 April 1993.
Harvested 26 October and 19 November 1993.
*Means followed by the same letter are not significantly different according to a Student-Newman-Keuls test.
† Coefficient of variation.
‡ Observed significance level.

Table 10. Lint yields for Cochise County variety trial (Ed Curry Farms, Sunsites).§

Variety	Yield (lbs. lint/acre)
Delta Pine 2056	438 a*
Acala B4442	426 a
Sure Grow 034	411 a
Stoneville 324	404 a
Delta Pine DPX 549	402 a
Stoneville 132	396 a
Chembred 232	392 a
Chembred 333	379 a
HyPerformer HS 44	317 a
HyPerformer HS 46	304 a
C.V.(%)†	10.39
OSL‡	0.1085

§ Planted 28 April 1993.
Harvested 30 November 1993.
*Means followed by the same letter are not significantly different according to a Student-Newman-Keuls test.
† Coefficient of variation.
‡ Observed significance level.