Short Staple Variety Demonstration Summary, Maricopa Agricultural Center, 1989-1991

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ABSTRACT

Short staple variety trials have been conducted for three years on the demonstration farm, at the Maricopa Agricultural Center. Twenty varieties, received from various seed companies, were entered into the test in 1989, 19 varieties in 1990, and 10 varieties in 1991. Yields ranged from 3353 to 4679 lbs. seedcotton/acre in 1989, 829 to 1428 lbs. lint/acre in 1990 and 1099 to 1246 lbs. lint/acre in 1991. Results form the statistical analysis showed significant differences among varieties for all three years. Differences among varieties in 1989 showed no clear trends with respect to maturity types. In 1990, those varieties that were medium to early season maturity types yielded higher than full season maturity types. The results in 1991 showed medium maturity types yielding in the highest ranking of the test without exception, while the performance of the full season maturity types was mixed. An additional test with narrow row spacing (30 inches) was included in 1991 with 5 varieties. Yields ranged from 947 to 1117 lbs. lint/acre. No significant differences were detected among varieties.

INTRODUCTION

Short staple variety demonstrations have been conducted at the Maricopa Agricultural Center for the last three years. With the ongoing introduction of new varieties close attention is paid to variety testing results as a method of determining the potential of these new varieties in relation to the historical performance of older, more established varieties. Caution should be taken in making comparisons, however, on the basis of one years results. Weather conditions are perhaps the single largest factor influencing yield, and the differences from year to year greatly affect the outcome of variety tests. The variability of weather factors such as heat unit accumulation and precipitation for the last 5 years is well documented by Brown and Russell, 1992. Weather conditions will favor some varieties over others to the extent that they diminish or lengthen the effective growing season. In this regard the maturity type of each variety will in large part determine its ability to adapt to the season length dictated by the weather. Other factors influenced by the weather such as insect pressure and disease problems can also favor certain varieties based on their inherent resistance to such factors. Therefore, a comparison of varieties based on several years results which includes the general weather conditions for each year is needed to develop a realistic evaluation.

Narrow row cotton has received much attention in recent years and research in Arizona has been directed toward its effectiveness in direct comparison with standard row width production under several management scenarios (Silvertooth et al., 1990; Silvertooth et al., 1991; Silvertooth et al., 1992). A variety comparison was established this year to identify varieties well suited to a narrow row (30 inches) system.

MATERIALS AND METHODS

This study was conducted on the demonstration farm, at the University of Arizona, Maricopa Agricultural Center. Planting dates for 40 inch row studies were 6 April, 10 April, and 26 April for 1989, 1990, and 1991 respectively.

Heat units accumulated since January 1 at planting were 601, 494, and 638 for 1989, 1990, and 1991 respectively. The experiment was arranged as a randomized complete block design with one main factor (varieties), and 4 blocks. Plots consisted of six, 40 inch rows, on 850 ft. runs. The field was managed in a manner that provided full yield expressions to all varieties. The four middle rows, of each six row plot, were picked, and weights were recorded by use of under-wheel trailer scales. With the exception of 1989, subsamples of seedcotton were ginned for turnout determination.

Planting date for the 30 inch row study in 1991 was 26 April with 638 heat units accumulated since January 1. The experiment was arranged as a randomized complete block design with one main factor (varieties), and 4 blocks. Plots consisted of 4, 30 inch rows, of 850 ft. runs. The field was managed in a manner that provided full yield expression to all varieties. All four rows, of each four row plot, were picked, and weights were recorded by use of under-wheel trailer scales. Subsamples of seedcotton were ginned for turnout determination.

RESULTS AND DISCUSSION

Results of the statistical analysis show significant differences, in yield, among varieties for each year (Table 1, 2, and 3). Yields in 1989 ranged from 3353 to 4679 lbs. seedcotton/acre, for S 55 and DPL 90 respectively. Weather conditions in 1989 were very favorable throughout the year providing good opportunity for full season varieties to reach full potential. No distinguishable yield trends, however, were observed with respect to maturity types.

Yields in 1990 ranged from 829 to 1428 lbs. lint/acre, for STV 110 and STV 1324 respectively. Lint yields were decidedly lower for the full season maturity type varieties, compared with the medium to early season maturity varieties. The poor performance of the full season varieties in this study is most probably explained by the unique weather conditions that prevailed during the 1990 growing season. High temperatures in late June, followed by humid conditions and associated high night temperatures, caused substantial fruit loss due to carbohydrate stress related abortion which led to a tendency for the plants to become excessively vegetative. It is apparent that this situation favored the medium to early season type varieties, possibly because they were able to establish a fruit set earlier in the season before high temperature weather conditions were experienced and also, because of their more determinate nature and ability to complete a fruiting cycle faster than full season varieties, they were perhaps less affected by the negative impact of increased vegetative growth tendencies which were commonly experienced.

Yields in 1991 ranged from 1099 to 1246 lbs./acre for DPL 5816 and DPL 5415, respectively. The 1991 season began with cold and wet weather which delayed planting about 2 weeks and inhibited some of the early growth and development of the crop. After the crop was established in May, weather conditions improved and remained excellent with warm and dry conditions extending into October. Although late planting and early season weather conditions effectively shortened the season, in favor of the medium season varieties, the full season varieties were able to take advantage of the warm and dry conditions in the fall to some extent.

The 30 inch row variety test revealed no significant differences among varieties (Table 4). Although experimental design does not allow for a statistical comparison of varieties between the 30 and 40 inch tests, the yields in the 30 inch test were observed to be lower overall.

References

Brown, P. and B. Russell. 1992. Weather Conditions during the 1991 Growing Season. Cotton, A University of Arizona Report. (This issue).

Silvertooth, J. C., T. F. Watson, L. I. Terry, and J. E. Malcuit. 1990. Evaluation of date of planting and irrigation termination of the yield of Upland and Pima cotton. Cotton, A College of Agricultural Report. University of Arizona. Series P-81:6-12.

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Table 1. Means for seedcotton yields taken from Upland variety test at Maricopa Agricultural Center, 1989.

Variety	Maturity Type	Yield lbs. seedcotton / acre
DPL 90	Full	4679 A*
DPL 51	Medium	4502 A
DPL 50	Medium	4565 A
C 40	Early	4515 AB
S 1001	Full	4515 AB
KC 311	Medium-Early	4459 ABC
DPX 28116B	Full	4459 ABC
STV 453	Medium	4447 ABC
DES 119	Medium	4421 ABC
STV 110	Full	4324 ABCD
HS 46	Early	4265 ABCDE
S 35	Early	4094 BCDEF
DPL 77	Full	4073 CDEF
STV 907	Medium	4053 CDEF
COKER 130	Medium-Early	3932 DEFG
BR 115	Full	3871 EFG
COKER 139	Medium-Early	3709 FGH
S 89	Medium-Early	3603 GH
GC 369	--	3544 GH
S 55	Medium-Early	3353 H
$LSD_{0.05}$		144
C.V.		7.2%

*Means followed by the same letter are not significantly different ($P \leq 0.05$) according to a Fisher's LSD.

Table 2. Means for cotton lint yields taken from Upland variety test at Maricopa Agricultural Center, 1990.

Variety	Maturity Type	Turnout (%)	Yield lbs. lint / acre
STV 1324	Medium	36	1428 A*
DES 119	Medium	33	1418 A
CB 219	Medium-Early	33	1344 AB
CB 232	Early	32	1325 AB
CB 1135	Medium	33	1300 ABC
ST 453	Medium-Early	33	1291 ABCD
S 55	Medium-Early	34	1265 ABCDE
STV 907	Early	30	1228 ABCDE
DPL 50	Medium	30	1220 ABCDE
HS 26	Medium-Early	31	1195 ABCDEF
HS 46	Early	33	1113 BCDEFG
DPL 90	Full	32	1069 CDEFG
DPL 77	Full	34	1062 CDEFG
S 1001	Full	32	1056 DEFGH
CB 407	Full	31	1036 EFGHI
SALCOT 10	Medium-Early	31	1029 EFGHI
1517-88	Medium	28	980 FGHI
S 89	Medium-Full	29	939 GHI
STV 110	Full	29	829 HI
C.V.			12.7

*Means followed by the same letter are not significantly different ($P \leq 0.05$) according to a Duncan multiple comparison procedure.

Table 3. Means for cotton lint yields taken from Upland variety test at Maricopa Agricultural Center, 1991.

Variety	Maturity type	Turnout (%)	Yield lbs. lint / acre
DPL 5415	Medium	31	1246 A*
S 1001	Full	32	1218 A
CB 1135	Medium-Full	33	1217 A
KC 311	Medium-Full	32	1211 AB
ST 453	Medium-Early	33	1207 AB
DPL 5690	Medium-Full	31	1200 ABC
DPL 90	Full	31	1125 BCD
STV 907	Early	34	1118 CD
C 40	Early	32	1110 D
DPL 5816	Full	33	1099 D
C.V.			4.7

*Means followed by the same letter are not significantly different ($P \leq 0.05$) according to a Duncan multiple comparison procedure.

Table 4. Means for cotton lint yields taken from Upland variety test (30 inch rows) at Maricopa Agricultural Center, 1991.

Variety\Maturity Type		Turnout (%)	Yield lbs. lint / acre
KC 311	Medium-Full	32	1117
DPL 5690	Medium-Full	31	1089
DPL 5415	Medium	31	1061
STV 453	Medium-Early	33	961
C 40	Early	32	947
LSD 0.05		--	NS