Effects of Date of Planting on the Lint Yield of Several Cotton Varieties Planted at Four Locations in Arizona, 1988

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ABSTRACT

Field experiments were carried out at 4 locations in Arizona to evaluate the effects of planting date on the lint yield of several varieties of cotton. One pima and eleven upland varieties were planted on 5 dates at 2 locations and 1 pima and nine upland varieties were planted on 5 dates at a third location. At a fourth location, 1 pima and 3 upland varieties were planted on 4 dates. General trends in lint yields indicate an advantage in yield potential from full-season type varieties, particularly when they are planted early. Full-season varieties, however, diminish rather quickly with regard to yield potential, when planting is delayed in comparison to varieties that are considered mid-or shorter-season varieties.

INTRODUCTION

A series of field experiments were carried out at 3 locations (Maricopa, Marana, and Safford University of Arizona Agricultural Centers) beginning in 1985 to evaluate the effects of planting date on the lint yield of several varieties of cotton (Kittock et al., 1987; and Kittock et al., 1988). A similar set of experiments was conducted in 1988 at the same locations, although another location was added at Yuma. General trends in the data collected from 1985 to 1987 have shown that the greatest yield potential is provided by planting full-season type upland varieties and pima as early as is reasonable, when there are sufficiently warm conditions. The studies also showed that the full-season type varieties diminish quite rapidly in terms of yield potential with delayed plantings (late April through May). Many mid- or shorter-season (more determinate) type varieties have shown consistent yield potentials across a greater span of time of planting than their full-season type counterparts.

Results from the studies showed that all cotton varieties have a general tendency of growing taller and more vegetatively, but that they yield less with each delayed planting. That information is of value to cotton growers faced with a delayed planting or replanting situation with regard to variety selection, and also in terms of general crop management due to the vegetative/reproductive balance that is altered as a function of planting date.

METHODS

One pima and 11 upland cotton varieties were planted on 5 dates at the Maricopa and Marana Agricultural Centers. One pima and 9 upland varieties were planted on 5 dates at the Safford Agricultural Center. At the Yuma Valley Agricultural Center, 1 pima and 3 upland varieties were planted on 4 dates. Varieties used in each of the 1988 experiments had shown some promise within a range of production conditions in previous experiments comparing varieties. In each experiment, varieties were selected so as to provide a compliment of full-, mid-, and shorter-season type varieties. It should also be pointed out that all experiments were carried out in a full-season format, so that the benefit towards yield expression was given to all varieties by planting date combinations before irrigation termination. All plots were seeded at a rate of 65,000 seeds per acre.

RESULTS

Lint yields from the 4 1988 experiments are shown in Tables 1, 2, 3, and 4. Statistical procedures for comparing means are provided within a given planting date only (within columns).

General trends in the 1988 results were consistent with those shown by Kittock et al. (1987 and 1988) for the previous 3 years and 3 locations of similar experiments. Taller, more full-season type varieties performed best at earlier planting dates. That was particularly true for varieties such as DPL 90, DPL 77, and pima S-6. More-intermediate and short-growing varieties performed best when planted later in comparison to other types of cotton varieties. General trends in increased plant height as a function of date of planting was also found in the 1988 experiments (data not shown), which is also consistent with the previous years of experimental results.

Trends for varieties and planting date combinations shown for Maricopa in 1988 (Table 1) exemplify the pattern developed over the 13 site-years of data. DPL 90 has consistently shown strong, full-season yielding potential at all locations. However, as shown for each of the 1988 experiments, there are several other varieties that are competitive with DPL 90. That is particularly interesting in terms of the range of elevations among the locations--varieties such as DPL 90 had strong yield potentials at Safford, which has the highest elevation (approximately 2,800 feet).

Results for Marana (Table 2) show only 4 planting dates. A 5 April planting was carried out but was lost to hail on 15 April. Conditions that followed at Marana (as well as other locations) were generally wet and cool, and not conducive to good stand establishment or strong cotton vigor. That situation prevented a tighter sequencing in terms of planting dates. It is also interesting to note the levels of statistical significance observed for each date of planting comparing varietal yield responses at Marana and Safford (Tables 2 and 3). Real differences among varieties were hardly statistically significant at the 27 April planting at Marana (Table 2), or from the first 4 planting dates at Safford. Nonetheless,a review of yield trends within varieties across dates of planting is worthwhile.

The information provided from the experiments has a potential benefit to growers faced with a delayed or replanting situation and a need to make a variety selection. The study provides implications concerning vegetative plant growth patterns (taller, lower-yielding plants) when related to later planting dates that are important for crop management considerations. Control of factors such as water, nitrogen fertility, and insect pest control (just to name a few) can be particularly critical with delayed plantings of most varieties, but particularly with taller-growing, full-season types. We certainly see stronger yield potentials with earlier planting dates for pima S-6, and very substantial losses in yield potential with delayed plantings at all elevations.

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Table 1. Means for cotton lint yields taken from date of planting by variety test at Maricopa Agricultural Center, 1988.

Variety	Date of Planting 4 April	25 April	9 May	23 May	6 June
DPL 90	1947 A*	1679 AB	1298 ABC	1435 AB	694 BCD
DPL 77	1836 AB	1641 ABC	1151 BC	1250 BCD	252 F
DPL 50	1849 AB	1859 A	1425 AB	1615 A	748 AB
DPL 20	1721 B	1608 ABC	1519 A	1459 AB	945 A
STV 506	1852 AB	1765 A	1378 AB	1355 ABCD	519 CDE
STV 825	1899 AB	1696 A	1293 ABC	1376 ABC	486 DE
STV 112	1764 AB	1339 CD	1527 A	1570 A	548 BCDE
BR 110	1775 AB	1348 CD	1371 AB	1484 AB	454 EF
DES 119	1782 AB	1704 A	1141 BC	1268 BCD	474 E
NK 111	1933 A	1656 ABC	1467 AB	1422 AB	708 BC
GER 510	1479 C	1362 BCD	970 C	1114 CD	537 BCDE
PIMA S-6	1371 C	1201 D	997 C	1101 D	243 F
$LSD_{0.05}$	195	331	342	265	212
CV (%)	8	15	18	13	27

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

Table 2. Means for cotton lint yields taken from date of planting by variety test at Marana Agricultural Center, 1988.

Variety	Date of Planting 27 April	13 May	27 May	9 June
DPL 90	1298 AB*	1356 ABC	896 C	933 ABC
DPL 77	1234 B	1122 DE	850 C	693 CD
DPL 50	1359 A	1568 A	1138 AB	1001 AB
DPL 20	1243 AB	1417 AB	1206 A	1147 A
STV 506	1376 A	1413 AB	1130 AB	952 ABC
STV 825	1305 AB	1317 BCD	1247 A	946 ABC
STV 112	1413 A	1433 AB	1266 A	1006 AB
BR 110	1221 AB	1069 EF	909 C	651 D
DES 119	1197 AB	1368 ABC	1187 AB	990 AB
NK 111	1375 A	1324 BCD	1017 BC	1012 AB
GM 510	1228 AB	1170 CDE	925 C	863 BCD
PIMA S-6	103 B	887 F	484 D	273 E
$LSD_{0.05}$	239	212	176	264
CV (%)	13	12	12	21
OSL§	.33	.0001	.0001	.0001

*Means followed by the same letter within a column are not significantly different at the observed significance level according to a Fisher's LSD.
§Observed significance level (probability of a greater P value).

Table 3. Means for cotton lint yields taken from the date of planting by variety experiment, Safford, Ag. Center, 1988.

Variety	Date of Planting				
	April 8	April 21	May 6	May 20	June 3
	lbs lint acre^{-1}				
DPL 90	1288 A*	958 AB	1256 A	901 AB	630 BCD
GC 510	1193 AB	1109 A	1012 AB	1040 A	855 AB
NK 111	1099 ABC	1181 A	1145 AB	873 B	775 AB
BR 110	1081 ABC	839 AB	978 AB	779 B	390 CD
DPL 50	1052 ABC	869 AB	1143 AB	823 AB	952 A
DES 119	1046 ABC	710 B	1189 A	845 AB	720 AB
STV 112	1028 ABC	962 AB	1203 A	849 AB	662 ABC
STV 506	922 BC	825 AB	1147 AB	871 AB	602 BCD
DPL 20	885 C	837 AB	1173 A	869 AB	650 ABC
Pima S-6	906 BC	610 B	867 B	732 B	320 D
$LSD_{0.05}$	305	388	306	232	318
CV (%)	20	30	19	19	33
OSL§	0.21	0.15	0.28	0.44	0.01

*Means followed by the same letter within a column are not significantly different at the observed significance level (OSL) according to a Fisher's LSD.
§Observed significance level (probability of a greater F value).

Table 4. Means for cotton lint yields taken from the date of planting by variety experiment, Yuma Valley Ag. Center, 1988.

Variety	Date of Planting			
	February 29	March 10	March 17	April 4
	lbs lint acre^{-1}			
DPL 90	1307 A*	1254 A	1275 A	1041 A
DPL 77	1354 A	1318 A	1235 AB	1033 A
DPL 50	834 B	1042 B	1088 B	988 A
Pima S-6	835 B	815 C	856 C	608 B
$LSD_{0.05}$	178	182	178	164
CV (%)	10	10	10	11.2

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