Effects of Planting Date on the Yield of Cotton Varieties at Yuma, Arizona

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Abstract

A field experiment was conducted in Yuma, Arizona to evaluate the effects of planting date on cotton yields. Six Upland varieties were planted on 3 dates from 15 March to 24 April in 1991. Significant differences were found among varieties at the first planting date (15 March) with full season varieties yielding higher than medium and short season varieties. No differences were found among varieties at planting dates 8 April and 24 April. Significant differences were found among planting dates for all varieties. Weather conditions in March were abnormally cool and may have negatively influenced yields from the first planting date.

Introduction

This experiment was initiated at Yuma in 1988 and was continued in 1989 and 1991. Results from the experiments in 1988 and 1989 exhibited trends pointing toward a general reduction in yields for all varieties as planting date was delayed (Silvertooth et al.,; Malcuit et al., 1990). Exceptions to this trend were observed with very early planting dates when heat unit accumulations were slow and/or adverse weather conditions were present in which case yields from subsequent planting dates did not decline or in some cases increased.

Materials and Methods

This study was conducted at the University of Arizona, Yuma Valley Agricultural Center. Six Varieties (DPL 51, DPL 20, DPL 90, DPL 5415, DPL 5690, and CB 407) were planted at 3 Dates. Heat units accumulated after Jan. 1 for each planting date were a) 462 at 15 March, b) 682 at 8 April, and c) 904 at 24 April. A split plot experimental design was used with planting dates as the main plots and varieties as the sub plots.

Results

Significant differences among varieties were observed for the 15 March planting date (Table 1). A split between full season varieties and medium to short season varieties can be seen with full season varieties ranking higher in yield. No differences were observed among varieties at the 8 April or 24 April planting dates. Favorable weather conditions extending late into the fall may have helped the full season varieties to compete with shorter season varieties at the later planting dates.

Yield results among planting dates for each variety can be seen in Table 2. Temperatures were an average of 5 degrees below normal in Yuma during the month of March (Brown and Russell, 1992) and soil temperatures were 56°F at the first planting date, which is slightly below the acceptable range. Heat units accumulated 15 days after planting were only 78 compared to 199 in 1989 and 197 in 1990. In view of the cold weather conditions at the first planting date it would not be surprising to find no yield advantage to an earlier planting date in this case or that yields would be decreased. This is what we see in every case except for DPL 90 which is the most indeterminate full season variety in the test. The more indeterminate a variety is the more sensitive it is to delays in planting, and although yield may have suffered due to weather conditions during March, the negative impact could have been overshadowed by the greater advantage of a longer growing season. Yields for DPL 90

were significantly higher at the first planting date (15 March) than at the second (8 April) and third (24 April). As we move to varieties that are less indeterminate the advantage to earlier planting becomes less important and the impact of the early season weather conditions become more apparent. Yield results for DPL 5690 and CB 407, less indeterminate than DPL 90, showed no differences between the first and second planting date but were significantly higher for the first than the third. DPL 5415 and DPL 20, medium and short season varieties respectively, produced yields that were significantly lower at the first planting date than at the second and no differences were observed between the first and the third.

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References

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Table 1. Lint yield mean separations among varieties for each planting date from variety by planting date experiment at Yuma Valley Ag. Center, 1991.

		Yield lbs./acre		
		Planting Date (HUACC)[‡]		
Variety/Maturity Type		15 March (462)	8 April (682)	24 April (904)
DPL 51	Medium	1198 B*	1258	1092
DPL 20	Early	1118 B	1278	1158
DPL 90	Full	1378 A	1118	978
DPL 5415	Medium	1158 B	1318	1058
DPL 5690	Med-Full	1338 A	1318	1018
CB 407	Med-Full	1338 A	1278	938
LSD 0.05		105	NS	NS
OSL		.0002	.13	.11

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

‡ HUACC, Heat units (86/55 °F thresholds) accumulated since 1 Jan.

Table 2. Lint yield mean separations among planting dates for each variety from variety by planting date experiment at Yuma Valley Ag. Center, 1991.

Planting Date (HUACC)[f]	Yield lbs./acre Varieties DPL 51	DPL 20	DPL 90	DPL 5415	DPL 5690	CB407
15 March (462)	1198 AB*	1118 B	1378 A	1158 B	1338 A	1338 A
8 April (682)	1258 A	1278 A	1118 B	1318 A	1318 A	1278 A
24 April (904)	1092 B	1158 B	978 B	1058 B	1018 B	938 B
LSD 0.05	130	65	210	120	287	144
OSL	.05	.002	.01	.005	.06	.001

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

[f] HUACC, Heat units (86/55°F thresholds) accumulated since 1 Jan.