EFFECTS OF LATE HARVEST ON QUALITY OF UPLAND COTTON PLANTING SEED

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This report is a continuation of a study on the effects of field weathering and late set bolls on quality of upland cotton planting seed. Seeds of Deltapine 70 used in these experiments were harvested during 1978 as (1) October open bolls - considered the control, (2) weathered - October open bolls left in the field until harvest in November, December or January and (3) late set - bolls maturing and harvested during November, December, and January. Standard germination and cold germination tests were run on samples of these seeds and compared with surviving stand, potential stand and estimated time for 50% emergence of final stand - ET50. Those field emergence parameters were evaluated on randomized complete block designs with 10 replications each at Marana, Phoenix, and Safford. During emergence counts at the U of A Marana experiment station, all seeds penetrating the soil surface during the first week were labeled as fast emerging plants. Seeds requiring 2-3 weeks to break the soil surface were classified as slow emergers. At the end of the growing season, these marked plants grown under similar competitive effects were hand harvested to evaluate the relations of yields and speed of emergence. The value for each seed group was the mean of 10 replications each of which was an average of 3 to 5 individual plants. Field tests at Marana utilizing a randomized complete block design with six replications was machine harvested to evaluate the effects of October harvest, weathering, late set and planting density on yield.

There was no significant difference among the standard germination values of weathered or late set seeds (Table 1). The cold germination test, however, was significantly higher for seeds harvested earlier - October, November - than those harvested in December or January. Although not as pronounced the same general trend can be observed on the average values of surviving stand, potential stand and ET50.

The regression values presented on Table II suggest that cold germination test is a much better indicator of field performance than standard germination. The standard germination test not only failed to show any differences in quality among the original seed groups but also was negatively related with all parameters indicators of better emergence capacity. These observations point out the weakness of standard germination as a predictive test of field performance. On the other hand, the trend observed on cold germination testing and field emergence are in agreement with previous results that seeds harvested in October or November are usually of better quality than those set late or weathered in the field.

The differences in field emergence observed during the 1980 crop year were not sufficient to produce any significant differences in yields among the seed groups at either 50 seeds/30 foot row or at 150 seeds/30 foot row (Figure 1). Apparently the lack of adverse conditions during the emergence period enabled the lower quality seeds to emerge and grow at higher rates than would be expected if they had been subjected to the usual low temperatures of early planting. As it can be seen on Table III, the mean daily temperatures during the 4 weeks following planting were well above 55°F, which is considered a bottom limit for optimum germination and emergence. At either planting density there were no observable relationships between yields and germination tests or percent emergence and speed of emergence in the field. Nevertheless there was a highly significant difference between the two planting rates (Figure 1). On the average, planting 150 seed/30 foot row yielded 10 to 15% more than 50 seeds/30 foot row.

Average yields of fast and slow emergent plants for each seed group is presented in Figure 2. Here again, no differences in yield were observed among weathered and late set seeds or early and late harvest. However, the overall yields of fast emergent plants was 15-20% higher than slow emergent ones, which is significant at the .01 level.

These preliminary results indicate that speed of emergence has a direct effect on yields; it also suggests that a test that can predict the speed of germination of a seed lot could be a good indicator of the yield potential of that seed lot. In this sense, the similar values of ET-50 for the different seed groups are in agreement with the lack of differences in yields among those groups.

The overall observations presented in this report also emphasize the importance of early planting if we want to detect differences in field performance of seed lots of different quality. From the producers point of view, these results indicate that the effect of planting lower quality seeds tends to be less harmful with better weather conditions during planting and emergence. However, the differences in seed quality appear to be extremely important when early planting or unusual weather patterns produce cool nights during germination and emergence.

Table 1. Results from standard and cold germination tests, and survival stand, potential stand and ET-50 values averaged for Marana, Phoenix and Safford.

Seed Source	Std. Germ (%)	Cold Germ (%)	Av. Surv. Stand (%)	Av. Pot Stand (%)	Av. ET-50 (days)
October	92[a]	77[ab]	62	69	9
Weathered					
November	94[a]	81[a]	68	74	9
December	94[a]	44 [b]	60	66	9
January	95[a]	45 [b]	58	64	9
Late Set					
November	94[a]	66[ab]	62	67	9
December	91[a]	60[ab]	61	68	10
January	91[a]	44 [b]	58	64	9
	CV=5.78	CV=33.07			

Values followed by the same letter within a column are not significantly different at the .05 level according to the Student-Newman-Keul's Test.

Table 2. Regression values of Field Emergence Paremeters average for Phoenix, Marana and Safford versus standard and cold germination tests from weathered and late set seeds.

Emergence Parameters	Standard Germ.		Cold Germ.	
	Sign	r value	Sign	r value
Average Surv. Stand	6%	-.685	n.s.	.554
Average Pot. Stand	1%	-.902	1%	.818
Average ET-50	2%	.788	4%	-.723

Table 3. Mean soil temperatures at Marana and Safford for 4 weeks following planting. Soil temperatures were measured at seed depth (2" deep).

Days After Planting	Mean soil temperature (°F)	
	Marana	Safford
1	73	73
2	76	76
3	77	78
4	81	79
5	80	76
6	78	70
7	72	65
8	64	72
9	66	76
10	74	78
11	79	79
12	77	79
13	79	74
14	70	75
15	67	76
16	73	80
17	73	81
18	78	84
19	83	80
20	82	81
21	84	83
22	80	81
23	80	82
24	78	73
25	78	77
26	72	76
27	76	83
28	--	78

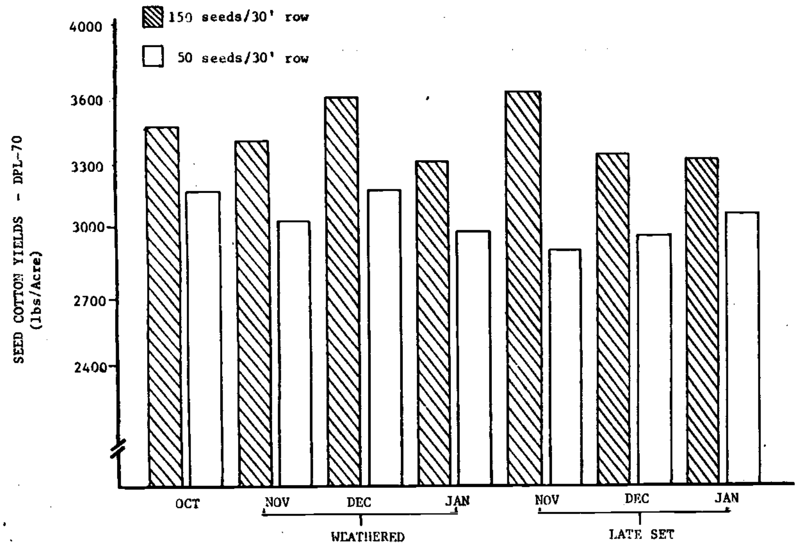

Figure 1. Seed cotton yields of weathered and late set seeds at two planting densities, 150 seeds/30' row (120,000 seeds/acre) and 50 seeds/30' row (40,000 seeds/acre).

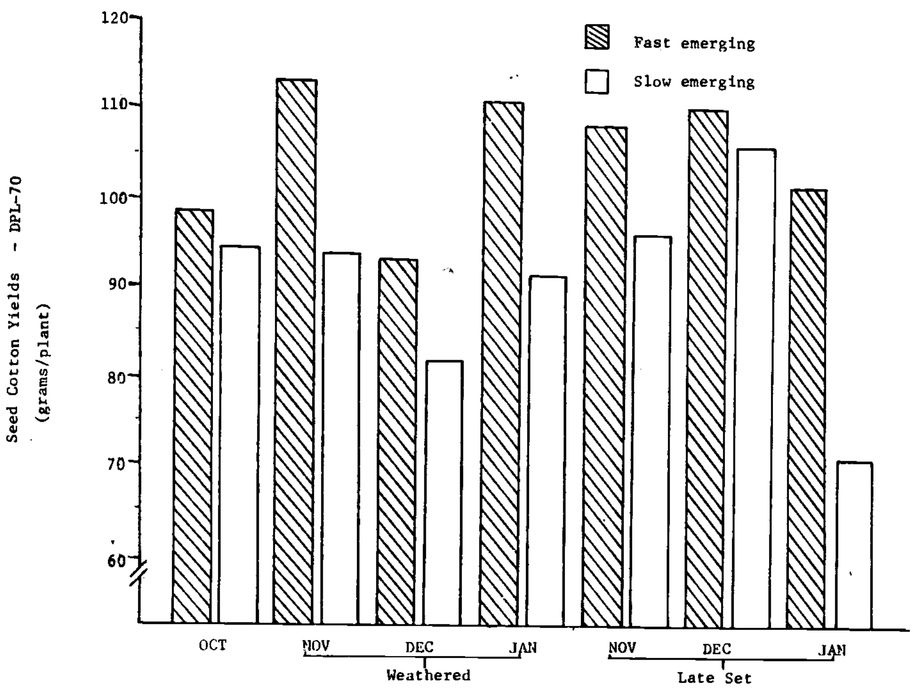

Figure 2. Seed cotton yields of fast and slow emerging plants of weathered and late set seeds. Fast emerging plants emerged within a week after planting and slow emergers within an additional two weeks.