QUALITY OF PIMA COTTON SEED AS AFFECTED BY FIELD WEATHERING AND IMMATURE SEED

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The effect of field weathering and late set bolls on the quality of Pima cotton planting seed were evaluated in this study. Seed of Pima S-5 were hand-harvested in October (control) and sucessively in November, December, and January from bolls opened before October (field weathered seed) and from bolls opened after October harvest (late set seed).

Each seed lot was planted in the field at the Cotton Research Center, Phoenix, Marana Experiment Farm and Safford Experiment Farm. Seedlings were counted as they emerged (potential stand), the surviving plants were determined at the end of test period as well as the relative number of days to 50 percent emergence (ET-50).

The results of the standard germination test and field emergence parameters averaged for 3 locations are presented in table 1. The standard germination tests were similar for all seed groups, except for weathered seed harvested in January which had a significantly lower value. Surviving and potential stands were highest for weathered seed harvested in November and lowest for late set seed harvested in January. The time required for 50% emergence (ET-50) was also shortest for November harvested seed and longest for late set seed harvested in January. Those results are in agreement with previous studies which indicate that earlier harvested seed are of better quality than those weathered in the field or matured at a late date.

There were no significant relations between standard germination test and field emergence parameters (Table 2).

Seed from each harvest date was planted at two rates, 50 seed per 30 feet of row and 150 seed per 30 feet of row, at the Marana Experiment Farm.

Results show that yield per acre from late set seed harvested in November was significantly less than other seed lots (Table 3). Although differences in yield among seed lots was not related to the standard germination test or field emergence parameters (Table 4), yield of the high planting rate was 300 pounds per acre greater than the lower planting rate.

The relatively high soil temperature during seed emergence (Table 4) may have masked deleterious affects of weathered and immature seed on seed performance.

At Marana, fast, with seven days of planting, and slow, two to three weeks following planting, emerging seed were marked during the emergence period. Three to five plants in each of 10 replications were so identified and the stand thinned to avoid plant competition. In the fall each plant was hand harvested and the weight of seed cotton recorded (Table 5). The yield of the fast emerging plants was significantly greater than the slow emergers. The yield advantage (22 percent) for the fast emergers may be low, since the emergence period occurred under near optimum field conditions. These results emphasize the contribution of field conditions and seed quality to final yield.

TABLE 1. Results of Pima cotton seed standard germination test, surviving stand, potential stand and ET-50 for field weathered and late set seed. Field emergence values are averaged for Phoenix, Marana and Safford.

Seed source	St. germ. (%)	Av. surviving stand (%)	Av. Potential stand (%)	ET-50 (days)
October	82[a]*	42	46	11
Weathered				
November	85[a]	49	54	10
December	84[a]	37	41	11
January	66 [b]	47	50	11
Late Set				
November	85[a]	43	48	11
December	89[a]	45	50	11
January	85[a]	31	34	12

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

TABLE 2. Regression values of Pima cotton seed from field emergence parameters averaged for Phoenix, Marana and Safford versus standard germination test for weathered and late set seed.

Emergence parameters	standard germination	
	sign.	r values
Av. surviving stand	$.68^{ns}$	-.170
Av. potential stand	$.65^{ns}$	-.180
Av. ET-50	$.99^{ns}$	-.004

TABLE 3. Yields of Pima cotton from field weathered and late set seed at two planting densities, 50 seeds/30' row (40000 seeds/acre) and 150 seeds/30' row (120000 seeds/acre).

Seed source	Yields (lbs/acre)		
	50 seeds/30' row	150 seeds/30' row	Mean
October	1502.8	1742.4	1611.7^{a*}
Weathered			
November	1894.8	1916.6	1894.8^{a}
December	1807.7	2526.4	2156.2^{a}
January	1590.0	1829.5	1698.8^{a}
Late Set			
November	1437.4	1524.6	1481.0^{b}
December	2069.1	2069.1	2069.1^{a}
January	1568.1	2265.1	1916.6^{a}
mean	1698.8	1982.0	1851.3

*Means 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 4. Mean soil temperature for 4 weeks following planting at Marana and Safford. Soil temperatures were measured at seed depth (approximately 2" deep).

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

TABLE 5. Yields of Pima cotton from fast and slow emerging plants for weathered and late set seeds. Each value is an average of 10 replications each of which is an average of 3 individual plants.

Seed Source	Yields(grams/plant Fast emerg.	Slow emerg.	Mean
October	82.3	55.7	69.0
Weathered			
November	79.0	59.0	69.0
December	69.8	65.4	68.0
January	102.2	63.7	82.9
Late Set			
November	71.8	69.6	70.2
December	71.6	58.2	65.4
January	61.4	51.6	56.5
mean	76.8a*	60.4 b	69.0ab

*Means followed by the same letter on botton row are not significantly different at the .01 level according to the Student-Newman-Keul's Test.

Quality of Commercial Seed Produced in 1979
for Planting in 1980 in Arizona

			Phoenix		Marana		Safford		
	% Std. Germ.	% Cool Germ.	ET-50	% Stand	ET-50	% Stand	ET-50	% Stand	Ave. Stand
DPL-55	99	67	9	62	9	59	18	34	47
ST-825	93	62	9	38	9	60	18	40	46
DPL-70	100	72	8	62	9	59	18	34	52
ST-213	91	32	9	56	10	63	18	33	51
DPL-41	96	33	8	45	10	55	17	26	42
ST-256	83	16	8	70	9	57	17	40	55
DPL-7120	91	49	10	32	10	52	20	31	38
ST-506	75	43	9	49	9	62	18	30	47
DPL-61	87	16	8	67	9	64	16	51	60
Ave	91	43	9	53	9	59	18	35	

Prejudging Cottonseed Quality

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There is general agreement among seedsmen, scientists and cotton growers that the standard germination test as applied to cottonseed, may leave much to be desired with regard to an accurate estimation of seedling emergence under actual field conditions. We have been evaluating a number of alternative measures of cottonseed viability and vigor which may find useful application as additions to or replacements for the standard germination test.

Data gathered across several seasons with extra long staple cottons indicate that, unless field conditions at planting time are nearly ideal, and soil borne pathogens are not abundant, or their effects largely negated through fungicide seed treatments, field performance of seed bears little re-