lationship to the standard germination values. Laboratory "cool germ" tests, in which seed is germinated at temperatures marginal for adequate seedling development (58-62F) often provide a more accurate prediction of field stand density. Interestingly, across an array of different cultivars and various seed lots which were produced in different years, we find that the cool germ test results are highly correlated with the standard germination tests. The actual predicted germination percentage is some 15 to 20% less for the cool germ test, however.

Almost without exception, lots which performed well in the standard germination test, but were variations to the rule and performed relatively poorly in the cool germ test were found to exhibit significant cracked seed damage. The point at which obvious differences in cool test performance became apparent was approximately 15 to 18% cracked seed, as judged by actual visual inspection of duplicate lots of dry seed. These microscopic seed evaluations revealed a broad range in the degree of seed damage. Large cracks (3/16") at a tangent to the narrow axis of the seed were rather obvious fractures attributable to damage incurred during mechanical processing steps; picking, ginning or delinting procedures. These large breaks in the seed coat were found to severely compromise the seeds' viability and germination potential under field conditions. When from 15% to 50% of the seed lot showed evidence of cracked seed coats, field emergence was highly negatively correlated ($r = 0.61^*$) with numbers of cracked seed. Nearly 40% of the variability in field emergence was explainable by the percentage of cracked seed in the lot alone. In these instances, the standard germination test results bore no relation to the field performance results whatsoever. Small, microscopic cracks had little effect on seed performance.

A further laboratory test was evaluated in an effort to provide some measure of the possible detrimental effects of fungal pathogens on cottonseed performance. This is the accelerated aging test, in which representative seed lots are held at high relative humidity (98%) and high temperature (100F) for several days, after which the seed performance is tested by standard laboratory germination compared with unaged seed lots. Our previous tests had indicated that the accelerated aging test was largely separating out seed lots which had fungal contamination. Carry-over seed without fungicide treatments, or seed which had only a "light" fungicide coating were especially liable to loss of germinability following the accelerated aging test. When all seed was uniformly fungicide treated, significant differences in germination and vigor of seed lots which had the same standard germination were seen. Cracked seed were especially prone to invasion by fungi during storage; and these seed performed poorly after accelerated aging. The accelerated aging test appears to have the most promise as a method, in conjunction with conventional germination tests, to enable seedsmen to identify lots which will best "carry over" for planting the following season.

We have developed a method to evaluate cottonseed coat strength. After we identified cracked and damaged seed as major determinants in poor seed performance under environmental stress, we realized it would be difficult to modify or improve upon accepted practices in cotton picking and seed handling in order to minimize such damage. We designed an instrument to evaluate the resistance of cottonseed to cracking damage during handling. This instrument utilized a Dillon force gauge to measure pressure applied to individual cottonseed by means of a lever action pin. A wide variation in cottonseed coat strength has been found depending upon variety, year of production and location of production. We believe this instrument will enable us to detect seed lots which may have weak seed coats before harvest; these can be "flagged" for special handling to try to minimize damage during processing. Seed lots already harvested can be quickly evaluated for the degree of probable seed coat damage they may have sustained, in order that profitable planting and storage decisions may be made.

In summary, we are confident that coordinated application of selected seed germination and vigor tests under development will provide considerable assistance as inputs into the identification and use of high quality plant seed by seedsmen and growers in the future.

THE EFFECT OF CULBAC SEED COATING ON EMERGENCE OF COTTON SEED

R.G. McDaniel and B. B. Taylor

The data illustrates that Culbac seed treatments, either liquid or powder, at low concentrations tended to improve the germination percentage of short staple cotton at both field locations, in Table 1. The best seed treatment combination - Culbac powder at the low concentration, resulted in nearly 22% more seedlings emerging at Marana, AZ. High concentrations of Culbac showed no effect or were detrimental to seedling emergence.

Tests of the same Culbac formulation on two Deltapine cottonseed lots gave markedly different results. The first lot, January bottom pick had been subjected to field weathering; and was expected to be of inferior quality. October botton pick, obtained from the same production field, was considered to be top quality seed. Additionally the field variability at Safford was much greater than we anticipated, resulting in less reliable field data than we would have desired. The high standard errors in the Safford tests reflect this problem.

Relatively high vigor, cold tolerant cotton - Deltapine 70 - was hurt by the Culbac treatment, especially the powder form. As all treatment conditions were held identical, this underlines the different varietal responses one may encounter; when the same Culbac treatment was beneficial to the lower quality, less stress resistant Acala type cotton.

We were, in fact, surprised and discouraged by the Deltapine results, as the differences my initial scan of the data showed between treatment levels turned out to be negative, rather than positive. It seems clear to me that the recommended levels of Culbac for cottonseed treatment may be too high. At least with our method of application, our varieties, our soil types, and these lots of Culbac. Lots of variables to look at.

TABLE 1. Summary: 1980 Cottonseed Treatment Emergence Studies
Marana and Safford, AZ 1980

Seed Treatment		Marana		Safford	
Culbac Concentration	Cotton Variety	ET-50	% Stand	ET-50	% Stand
Control	Acala 1517	8.5	47.3	16.2	32.7
liquid, high	Acala 1517	11.0	48.9	23.7	32.0
liquid, low	Acala 1517	11.3	50.1	16.7	35.7
powder, high	Acala 1517	9.9	52.0	17.2	26.7
powder, low	Acala 1517	9.9	56.6	15.2	34.2
Control	DP-70 Oct.	6.7	78.3	14.3	53.8
liquid, high	DP-70 Oct.	7.4	59.1	13.7	42.7
liquid, low	DP-70 Oct.	7.4	64.5	17.5	50.0
powder, high	DP-70 Oct.	8.0	61.3	15.8	48.0
powder, low	DP-70 Oct.	7.5	62.9	14.8	45.5
Control	DP-70 Jan. Bot	6.7	70.6	17.1	47.4
liquid, high	DP-70 Jan. Bot	7.5	62.4	15.2	49.8
liquid, low	DP-70 Jan. Bot	6.6	54.6	14.7	45.8
powder, high	DP-70 Jan. Bot	7.9	50.9	18.9	42.0
powder, low	DP-70 Jan. Bot	7.3	50.3	14.8	41.7

Culbac Formulation and Seed Treatment Protocol

Recommended rates as per Cowman (See Culbac"plant" booklet).

a) Liquid: 2¼ fl oz per 50 lb of cottonseed (with 1 pint H_2O)

b) Powder: 2 oz dry wt per 50 lb seed

Our rates, as scaled down from above.

High rate (identical with recommendation)

a) Liquid: 0.18 ml per 60 g seed with 1.25 ml H_2O

b) Powder: 0.15 g powder per 60 g seed

Low rate (one-half the recommended rate)

a) Liquid: High rate diluted 1:1 with H_2O

b) Powder: One-half the high rate was used

Method of treatment.

A pre weighed seed sample was placed in a beaker; a measured amount of Culbac treatment was added, the beaker was covered with parafilm and the treatment mixed with the seed by inverting the beaker 3 or 4 times. Treated seed was immediately dispersed into a 8 by 14 cm brown paper seed packet, stood upright to enable rapid seed drying, and planted a week or so later.

Foliar Application of Culbac to Cotton

A foliar application of Culbac was applied to cotton at the University of Arizona Experimental Farm, Marana, Arizona. Four rates of Culbac were applied to two rows of cotton fifty feet in length. Each treatment was replicated six times. Treatments were arranged in a randomized complete block design. Flower counts were taken five days following treatment.

Results are as follows:

Treatment	Average Flower Count per 1/1000 per acre
Culbac 16 oz. per acre	16.0
Culbac 8 oz. per acre	18.0
Culbac 4 oz. per acre	17.7
Check	15.7

PIMA COTTON FUNGICIDE AND SYSTEMIC INSECTICIDE

SEED TREATMENT DEMONSTRATION

Delbert Householder - Thatcher   Agent-in-Charge - Ron Cluff

Treatment	Yield of Seed Cotton per Acre First Pick	Total	Stand Count April 28	May 1	Nov.18
Captan + Vitavax + Disyston	2026 a[1/]	2800	44 a[1/]	53 a[1/]	51 a[1/]
Captan + Vitavax	1989 a	2785	42 a	55 a	53 a
Captan + Vitavax + Othene	1964 a	2760	36 a	51 a	51 a

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

C.V.: Yield = 4.9%
C.V. Stand Count: April 28 = 9.85%; May 1 = 4.79%; Nov. 18 = 3.15%.

CROP HISTORY

SOIL TYPE:	Clay Loam. PREVIOUS CROP: Cotton.
TILLAGE:	Plowed, Drag, Listed.
PLANTING:	April 16 at 20 lbs/A under cap.
HERBICIDE:	None. FERTILIZER: None.
IRRIGATION:	1 preirrigation + 6 more irrigations on solid rows ending September 3. Total water use 4 AF.
INSECTICIDE:	Sprayed 4 times for Pink Boll Worms.
DEFOLIATION	None.
HARVEST:	First Pick on October 10; Second Pick on November 17, 1980.