To study these phenomena, bract drop was categorized into five distinct types. Those were as follows:

Type 1 - Bracts are persistent through boll maturity. (*G. hirsutum* type)

Type 2 - Bract drop is variable.

Type 3 - Bracts are dropped during late boll maturity.

Type 4 - Bracts drop soon after anthesis.

Type 5 - Bracts are dropped before anthesis. (*G. armourianum* type)

Due to the possibility of *G. armourianum* D_{2-1} chromosomes pairing with the similar or homologous chromosomes of *G. hirsutum* D chromosomes in mieosis, the number of D_{2-1} chromosomes carrying the caducous bract trait can vary from zero to four per cell. If the effect is additive, no caducous genes (four D chromosomes) would produce a type 1 plant. Four D_{2-1} chromosomes with the caducous trait (no D chromosomes) would produce a Type 5 plant. It is possible to have the whole range of D_{2-1} chromosome numbers producing plants with Type 1 through Type 5.

The hypothesis regarding the presence or absence of caducous bract carrying genes could also explain the difference in appearance of the plants. More D_{2-1} chromosomes would give more traits of *G. armourianum*, while the D chromosomes would produce *G. hirsutum*-like plants. Further studies of the progenies of these different bract drop and plant types will be made in 1981 to see if they segregate in any identifiable ratios.

AN INVESTIGATION OF COTTON YIELD AND ENVIRONMENTAL STABILITY THROUGH JOINT REGRESSION ANALYSIS

Vernon Shattuck and B. Brooks Taylor

An investigation into the dynamics of genotype - environmental interaction is of importance when projecting the economic worth of cotton varieties. Joint regression analysis may be employed as an aid in characterizing the stability of cultivars when comparing them over a series of environments. The sensitivity of a genotype may be determined by regressing the performance of a cultivar at various testing sites against the pooled performances of other lines at each specific location. By using a sufficient number of varieties at each site, the pooled mean yield is an assessment of that particular growing regime. Deviations of the regression slope from one (one denotes average environmental stability) reflects the magnitude of stability. A regression slope of less than one infers a greater range in adaptation of the specific variety to the environment than a slope exceeding one. The ideal standard variety should possess a regression slope of less than one. This insures the consistancy of that standard over contrasting environmental conditions.

With each years yield data, 1979 and 1980, each cultivars stability for lint yield per acre was compared employing regression analysis against the remaining entries at each test site. The entries evaluated included DPL-70, ST-213, DPL-61 and ST-825. The testing areas of 1979 were situated in the Mohave Valley, Casa Grande, Coolidge, La Palma, Buckeye and Solomon. These same varieties were examined independently the following year, 1980, in a similar experiment at varying locations within the state.

We did find substantial diversity for lint yield between the testing sites. There was a consistantly high mean yield of entries at Casa Grande, compared to other locations during the two years.

A factorial analysis of variance of tests in 1979 failed to detect any variety - environment interaction.

Only one variety, DPL-70, was characterized as having a regression slope significantly less than one. This suggests that DPL-70 exhibited an enhanced buffering capacity to resist changes in lint yield when grown under differing environmental conditions in 1979. In 1980, DPL-70 was estimated to give an average cultivar stability response. The apparent shift towards greater environmental sensitivity may be due to varying yield responses in different seasons or to the testing technique. Consistant yield stability trends were recorded for ST-213 and ST-825 during each year. The stability parameters generated in 1980 for all four lines implied they exhibited average sensitivity to changes in environment.

The application of regression analysis as an indicator of plant sensitivity to environment should be approached with caution. Under appropriate conditions it may be meaningfully applied as an aid in plant selection. The results of this study indicate that DPL-70, ST-213, DPL-61 and ST-825 appear to contain adequate environmental stability for lint yield. They would make adequate testers to measure new cotton entries against.

Table 1. Joint regression slopes for lint yield pounds per acre (first pick) of four cotton varieties grown in Arizona during 1979 and 1980.

Variety	Regression Slope 1979	1980
DPL-70	0.71 ± .11	1.06 ± .13
ST-213	0.75 ± .20	0.91 ± .10
DPL-61	0.86 ± .22	1.13 ± .11
ST-825	1.12 ± .26	1.08 ± .10

SHORT STAPLE VARIETY DEMONSTRATION

Bruce Church Ranch - Poston — Agent-in-Charge - Don Howell

Variety	Turnout[1] %	Lint Yield/Acre First Pick	Lint Yield/Acre Total	Plants/A x 1000
DPL-70	33.5	1029 a[2]	1246	52.6 a[2]
DPL-7120	33.4	948 ab	1114	46.0 a
DPL-61	32.4	871 bc	1064	39.6 a
McNair 235	31.9	866 bc	1041	55.6 a
ST-825	31.8	849 bc	980	32.0 a
ST-213	29.6	819 bc	975	38.6 a
McNair 220	30.4	716 c	915	36.6 a

1/ Turnouts are based on laboratory gin results.

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

C.V.: Stand = 13.1%; Yield = 8.96%.

CROP HISTORY

SOIL TYPE: Silty Clay - Silty Clay Loam.
PREVIOUS CROP: Cotton.
TILLAGE: Disk, chisel, irrigation, disk, landplane, disk, list, mulch.
PLANTING: March 28 at 16 lbs/A in moisture under cap.
HERBICIDE: Treflan at 1 1/2 pts/A, sprayed on, disked in 4" depth. Layby: None.
FERTILIZER: Preplant: None. Layby: 100 units of NH_3 water run. 160 units of NH_3 injected.
IRRIGATION: 1 preirrigation + 11 more irrigations on solid rows ending September 9. Total water use 4.7 AF.
INSECTICIDE: 4 applications for Heliothis.
DEFOLIATION: Def-6 at 2 pts/A + Accelerate at 1 pt/A on September 27.
HARVEST: First Pick on October 15; Second Pick on November 20, 1980.