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General Characteristics of Selected Cotton Varieties

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ld usually receives the primary consideration when selecting a cotton variety, but other varietal characteristics also merit consideration. Maturity, seedling vigor, fiber properties and disease resistance are additional characteristics that deserve some consideration. Several studies of yield, earliness, fiber properties and plant populations have been published (1, 2, 3, 4, 9). These data are presented to select varietal differences in seed, seed/boll, boll size, percent linters, protein, gossypol, plant height and disease characteristics.

The performance of a variety can be influenced by seed quality, planting date, cultural practices, fertilization, irrigation, weather, plant populations and weed and insect control. The characteristics of a variety are determined by the genotype or inherent potential of the plants that make up any given variety. Under ideal growing conditions and the most

careful ginning, the quality of the variety cannot exceed the upper limits imposed by heredity.

Seed Size and Number Seed Per Pound

Seed size is described as the seed index, which is the weight in grams of 100 seed. The average seed index of ten varieties over a three-year period (4) in 12 Delta environments is presented in Table 1. These measurements were made on fuzzy seed (gin-run), and seed-index values ranged from 9.1 for Deltapine 41 to 11.4 for Coker 310. In comparing varieties, Deltapine 41 had about 1000 more seed per pound than did Coker 310, which means, at a planting rate of 15 lbs/A, a potential for 15,000 more plants per acre for Deltapine 41 if both varieties are seeded at the same rate (lbs/A).

The average number of seed per pound of 15 cotton varieties in three Delta environments is presented in Table 2. These data represent varietal difference for both fuzzy and acid-delinted seed and show that, on the average, there are about 700 more seed per pound in acid-delinted seed than in fuzzy seed. These data indicate that seed size differs by locations, but the varietal rankings remain relatively the same. These data again show that Deltapine 41 has about 1000 more seed per pound than Coker 310. The average number of seed per pound from acid-delinted, uncleaned samples of the three test environments in 1981 range from 4,509 to 5,738. The column labeled "breeders" represented cleaned and treated acid-delinted seed furnished by breeders for testing in 1981. The number of seed per pound in these breeder samples ranged from 4,460 to 5,483. The number of seed per

Table 1. General characteristics of ten cotton varieties.^{1/}

Variety	Lint percent	Seed index	Seed/lb ^{2/} fuzzy seed	Seed/boll	Boll size grams	Bolls/lb
DES 422	38.9	10.2	4,450	28.1	4.70	97
Stoneville 825	38.1	10.7	4,243	27.6	4.78	95
DES 56	37.8	10.6	4,283	28.0	4.78	95
Deltapine 41	41.3	9.1	4,989	30.4	4.71	96
Stoneville 506	37.0	10.9	4,165	28.0	4.84	94
Stoneville 213	37.9	10.6	4,283	29.2	4.98	91
McNair 235	37.9	10.7	4,243	27.7	4.78	95
Deltapine 55	39.5	9.9	4,586	29.9	4.89	93
Coker 315	38.0	11.0	4,127	29.3	5.20	87
Coker 310	36.8	11.4	3,982	30.4	5.48	83

^{1/} Three-year average (1979-81) of twelve Delta environments (Stoneville 6, Tunica 3, Summer 3).

^{2/} Gin-run fuzzy seed.

pound of a given variety may vary due to the environment in which the seed are grown and the amount of cleaning they receive.

The relative differences in seed size of cotton varieties may require the use of different planter plates or sprocket ratios to insure the proper planting rate. The germination and vigor of planting seed also should be measured to determine seed quality. In 1981, approximately 72% of the planting seed emerged to healthy plants when high vigor seed with a germination of 90% were planted.

Boll Size and Number Seed Per Boll

Data presented in Table 1 show that boll size (grams/boll) ranged from 4.70 to 5.48 which represented 97 bolls/lb for the smallest-bolled variety and 83 bolls/lb for the

largest-bolled variety (4). If yield estimates are attempted by boll counts, the relative genetic differences in boll size between varieties should be considered. In addition, environmental factors cause boll size to vary within a year (early vs. late bolls), from year to year and from location to location. The number of seed per boll of the ten varieties ranged from 27.6 to 30.4 (Table 1).

Linters

The average percent linters of 15 cotton varieties grown in three Delta environments in 1981 is presented in Table 3. The average percent linters in these tests ranged from 14.46 to 19.56, with Stoneville 213, Deltapine NSL and Stoneville 825 having the highest percentages. These data are in agreement with those from Mississippi Delta tests

(Arkansas, Louisiana, Missouri, Mississippi) in 1979 (Table 4), which showed Stoneville 213 and Stoneville 825 as having the highest percent linters. The average percent linters was 17.16, 15.48 and 17.16 respectively, for the Stoneville, Tunica and Sumner environments in 1981. Seed grade, which is a visual estimate of the amount of linters on seed, ranged from 3.2 for Stoneville 213 to 4.4 for Deltapine 61.

Oil, Nitrogen and Gossypol Content of Seed

Seed data of cotton varieties evaluated in the 1979 Delta Region Variety Testing Program (Arkansas, Missouri, Mississippi and Louisiana) are presented in Table 4. The average percent of oil in the eleven varieties evaluated ranged from 18.0 for Deltapine 41 to 20.0 for Stoneville 213.

Table 2. Average number of seed per pound of 15 cotton varieties grown in three Delta environments in 1981.

Variety	Stoneville, MS		Tunica, MS		Sumner, MS		Average ^{1/}		Breeder's
	fuzzy	acid-delinted	fuzzy	acid-delinted	fuzzy	acid-delinted	fuzzy	acid-delinted	
DES 422	4,540	5,279	4,540	5,188	4,017	4,680	4,365	5,049	5,012
Stoneville 213	4,540	5,437	4,495	5,341	3,913	4,729	4,316	5,169	4,590
DES 56	4,283	5,072	4,680	5,309	4,165	4,829	4,376	5,070	4,830
McNair 235	4,323	5,016	4,680	5,341	3,752	4,386	4,252	4,914	4,794
Stoneville 825	4,540	5,404	4,540	5,372	3,913	4,680	4,331	5,152	4,460
McNair 220	4,090	4,656	4,585	5,248	3,721	4,345	4,132	4,749	5,050
Deltapine 41	4,881	5,675	5,536	6,135	4,779	5,404	5,065	5,738	5,483
Coker 315	3,982	4,704	4,323	4,778	3,721	4,365	4,009	4,616	4,978
Deltapine 55	4,729	4,704	4,881	5,820	4,203	4,881	4,604	5,135	4,632
Deltapine 62	4,053	4,855	4,451	5,129	3,815	4,609	4,106	4,864	4,526
Deltapine NSL	4,495	5,404	4,778	5,570	4,203	5,072	4,492	5,349	4,892
Stoneville 506	4,243	4,934	4,829	5,604	3,815	4,472	4,296	5,004	4,800
Coker 3131	4,017	4,585	4,203	4,778	3,632	4,165	3,951	4,509	4,799
HAS 2344	4,407	5,159	4,829	5,570	4,203	4,989	4,480	5,239	5,248
Coker 310	3,913	4,540	4,323	4,934	3,783	4,407	4,006	4,627	4,908
Average	4,336	5,028	4,645	5,341	3,976	4,667	4,319	5,012	
Difference		692		696		691		693	

^{1/} Represents uncleaned and untreated acid-delinted seed from three Delta environments.

^{2/} Represents cleaned and treated acid-delinted seed furnished by breeders for testing in 1981.

Table 3. Average percent linters of 15 cotton varieties grown in three Delta environments in 1981.

Variety	Stoneville, MS	Tunica, MS	Sumner, MS	Average
DES 422	16.3	14.3	17.0	15.86
Stoneville 213	19.1	18.8	20.8	19.56
DES 56	16.2	12.9	16.5	15.20
McNair 235	16.0	14.7	16.9	15.86
Stoneville 825	19.0	18.3	19.6	18.96
McNair 220	14.4	14.4	16.7	15.17
Deltapine 41	16.9	11.5	17.9	15.43
Coker 315	18.1	16.6	16.4	17.03
Deltapine 55	16.3	19.2	16.7	17.40
Deltapine 62	19.8	15.2	20.8	18.60
Deltapine NSL	20.8	16.6	20.7	19.36
Stoneville 506	16.3	16.0	17.2	16.50
Coker 3131	14.6	13.7	15.1	14.46
HAS 2344	17.6	15.9	18.7	17.40
Coker 310	16.0	14.1	15.5	15.20
Average	17.16	15.48	17.76	16.80

Three Delta environments: Stoneville, Tunica, and Sumner.

Table 4. Seed characteristics of 11 cotton varieties in Mississippi Delta tests in 1979.^{1/}

Variety	% Oil	% Nitrogen	% Free		Seed grade	% Floaters	Acid-delinted seed index	Seed/lb ^{2/}
			Gossypol	% Linters				
Deltapine 41	18.0 d	3.29 c	1.08 bc	11.7 bcd	4.3 ab	4.4 bc	9.0 e	50,444
Deltapine 55	19.2 bc	3.25 cde	1.21 a	12.1 bc	3.8 bc	3.8 bc	9.5 d	47,789
DES 56	20.2 b	3.29 c	1.25 a	11.6 bcd	3.8 bc	2.2 c	9.9 bc	45,858
Stoneville 825	18.8 c	3.14 fg	1.25 a	13.4 a	3.5 cd	5.6 ab	9.9 bcd	45,858
McNair 235	20.3 ab	3.26 cd	1.06 c	11.2 cd	3.8 bc	6.7 a	9.6 cd	47,292
Deltapine 61	19.3 bc	3.10 g	1.05 c	11.5 bcd	4.4 a	3.4 c	9.5 d	47,789
Stoneville 213	19.0 c	3.19 ef	1.20 a	13.5 a	3.2 d	4.3 bc	10.0 bc	45,400
Coker 310	20.2 b	3.21 def	1.13 b	12.2 b	3.4 cd	3.6 bc	10.1 b	44,950
Coker 304	20.7 ab	3.29 c	1.12 b	12.1 bc	3.9 abc	2.7 c	10.1 b	44,950
Paymaster 303	21.0 a	3.36 b	.95 d	11.1 d	3.6 cd	3.9 bc	11.3 a	40,177
Acala SJ-5	20.7 ab	3.45 a	.84 e	9.9 e	3.6 cd	3.9 bc	11.2 a	40,535

^{1/} Regional Cotton Variety Tests, 1979. USDA publication A106.28:979. Data compiled by H. H. Ramey, Jr., N. J. Acres, and M. K. Barringer. Data represents the average of tests conducted at Marianna and Clarkedale, Arkansas; Stoneville and Tunica, Mississippi; Portageville, Missouri; and St. Joseph, Louisiana in 1979.

^{2/} Calculated from acid-delinted seed index.

for Paymaster 303. The percent nitrogen ranged from 3.10 for Deltapine 61 to 3.45 for Acala SJ-5. The percentage of nitrogen multiplied by 6.25 is an approximation of the percentage of protein. The percent free gossypol ranged from 0.84 for Acala SJ-5 to 1.25 for DES 56 and Stoneville 825.

Floaters

Seed that float in water are considered immature, and a higher percentage indicates more immaturity within a variety. The percent floaters in this study ranged from 2.2% for DES 56 to 6.7% for McNair 235. These data represent values obtained from uncleaned seed, and the immature seed (floaters) are usually removed by proper cleaning and processing (8). Seed of some varieties also have a thinner seed coat, which may present a problem in ginning and processing as they will have more cracked seed and potential vigor deterioration.

Plant Height

The average plant height of several varieties is presented in Table 5. The three-year average of 11 varieties shows that plant height ranged from 39.4 to 44.4 inches. The plant height of a variety may vary from year to year and location to location, depending on the environmental conditions encountered. However, these data represent the relative height differences between varieties at Stoneville.

Fusarium Wilt

The average percent *Fusarium* wilt as reported by Kappelman et al. (5, 6, 7) for the Regional *Fusarium* Wilt Screening Test, Tallassee, Alabama is presented in Table 6. This test is very helpful to breeders in obtaining unbiased estimates of

Table 5. Average plant height of 15 varieties grown at Stoneville, MS over a 3-year period (1979-81).

Variety	1979	1980	1981	3-year average
	----- (inches) -----			
Deltapine 62 ^{1/}	52.2	40.6	40.4	44.4
Stoneville 825	49.2	38.6	43.6	43.8
Coker 310	49.8	39.1	41.2	43.4
Coker 315	50.7	39.3	40.0	43.3
Stoneville 213	49.0	37.9	41.2	42.7
Deltapine 55	48.6	35.4	41.4	41.8
DES 56	46.0	36.9	40.3	41.1
Deltapine 41	46.0	34.8	40.6	40.5
McNair 235	44.6	36.5	40.5	40.5
DES 422	44.1	35.6	39.7	39.8
Stoneville 506	43.5	34.9	39.8	39.4
Coker 3131	-	38.4	41.9	-
McNair 220	-	-	39.1	-
HAS 2344	-	-	40.6	-
Deltapine NSL	-	-	43.1	-

^{1/} Data for Deltapine 61 used for 1979 and 1980.

Table 6. Average percent *Fusarium* wilt in the Regional *Fusarium* Wilt Screening Test, Tallassee, Alabama, 1979-81.

Variety	1979	1980	1981	3-year average
	----- (%) -----			
Stoneville 825	51.2	82.8	14.3	49.4
Stoneville 213	64.5	68.8	11.4	48.2
Deltapine 41	26.0	52.3	9.8	29.4
Coker 315	25.9	44.2	4.5	24.9
Coker 310	34.9	35.2	1.7	23.9
DES 56	25.9	35.5	8.4	23.3
Deltapine 61	26.9	29.8	7.3	21.3
Deltapine 55	18.0	26.4	7.1	17.2
McNair 220	14.4	32.9	0.5	15.9
McNair 235	16.9	24.6	4.5	15.3
Stoneville 506	-	33.8	4.8	-
Coker 3131	-	36.0	11.8	-

Fusarium resistance for their varieties and experimental strains. The average *Fusarium* wilt over a three-year period, 1979-1981, ranged from 15.3 to 49.4%. Stoneville 825 and Stoneville 213 showed the highest percent wilting, and McNair 5 and McNair 220 showed the lowest. Stoneville 506 and Coker 31 have been evaluated for only two years. In similar tests at the

same location, DES 422 has shown about 7% less wilting than DES 56. Louisiana tests conducted on soils infested with *Fusarium* wilt and root knot nematode have indicated that Deltapine 26, Deltapine 41, Deltapine 61, DES 56, Stoneville 506 and Gumbo 500 perform better than other varieties under these conditions.

These data are presented to

demonstrate that varietal differences for traits other than yield, earliness and fiber properties may be useful in variety selection. The varieties used in these comparisons are those usually considered adapted to Mississippi.

Term Definitions

Boll size. The weight, in grams, per boll of seed cotton.

Lint percent. The weight of lint obtained from a sample of seed cotton, expressed as a percentage of the weight of seed cotton.

Linters. The weight of linters removed in the acid-delinting process, expressed as a percentage of the weight of the fuzzy seed.

Seed index. The weight of 100 seed, in grams (fuzzy or acid-delinted).

Seed grade. A visual estimate of the amount of linters on seed. Seed are

graded from 1 to 16; 1 = dense coating and 16 = no linters (naked seed).

Floater. The number of acid-delinted seed that float in water, expressed as a percentage of the number of seed in the sample. Seed that float in water usually are immature.

Free Gossypol. The gossypol in fuzzy seed as determined by AOCS Method Ba 7-58; expressed as a percentage of the mass of the kernel.

Nitrogen. The nitrogen in fuzzy

seed as determined by AOCS Method Ba 4-38; expressed as a percentage of the mass of the fuzzy seed. The percentage of nitrogen multiplied by 6.25 is an approximation of the percentage of protein.

Oil. The oil in fuzzy seed as determined by AOCS Method Aa 4-38; expressed as a percentage of the mass of the fuzzy seed.

Seed percent. 100 - lint percent.

Seed per boll = $\frac{\text{Seed \%} \times \text{Boll Size}}{\text{Seed Index}}$

References

Bridge, R. R., W. R. Meredith, Jr. and J. F. Chism. 1973. Influence of planting method and plant population on cotton. *Agron. J.* 65:104-109.

Bridge, R. R., J. F. Chism and G. R. Tupper. 1975. The influence of row spacing on cotton variety performance. *MAFES Bul.* 816. 3 p.

Bridge, R. R., B. L. Arnold, F. M. Bourland, N. W. Buehring and J. F. Chism. 1981. 1980 Mississippi cotton variety tests. *MAFES Bul.* 890. 7 p.

Bridge, R. R., B. L. Arnold, F. M. Bourland and J. F. Chism. 1982. 1981 Mississippi cotton variety tests. *MAFES Bul.* 901. 3 p.

5. Kappelman, A. J., Jr. 1979. 1979 Regional cotton *Fusarium* wilt test results. *Dep. Agronomy and Soils. Dep. Series No. 52, Agric. Exp. Stn., Auburn, Alabama.*

6. Kappelman, A. J., Jr. 1982. 1981 Regional cotton *Fusarium* wilt report. *Dep. Agronomy and Soils. Dep. Series No. 71, Agric. Exp. Stn., Auburn, Alabama.*

7. Kappelman, A. J., Jr. and D. P. Moore. 1981. Regional cotton *Fusarium* wilt test results. *Dep. Agronomy and Soils. Dep. Series No. 58, Agric. Exp. Stn., Auburn, Alabama.*

8. Ramey, H. H., Jr., N. J. Acres and M. K. Barringer. 1981. 1979 Regional cotton variety tests. *USDA Pub. A106.28:979.* 144 p.

9. Tupper, G. R., R. R. Bridge and W. I. Spurgeon. 1979. Influence of late planting dates on early maturing cotton. *MAFES Res. Rpt. No. 14:4.* 3 p.

10. Tupper, G. R., R. R. Bridge and W. I. Spurgeon. 1981. Influence of row spacing on new DES cotton varieties and strains. *MAFES Bul.* 891. 6 p.



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