

## E. PLANT BREEDING PROJECTS

### Variety Selection Tests

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#### Experiment station variety tests

The Plant Breeding Department with the Agricultural Extension Service cooperating conducted an extensive program in 1965 to evaluate new strains produced in the research program of the Arizona Experiment Station. The program involved tests on the Experimental Station Farms and at selected locations over the cotton producing area of the state. Data summarizing yield potential, fiber characteristics, and spinning performance are presented. Most of the cotton growing areas of the state experienced cooler than average spring and received relatively little rainfall until December.

Growers cooperating were: J.G. Boswell Co., Jack Bennet, Bruce Church Co., Jack Curry, Farmers Investment Co., Tom Gaddis, J.L. Hodges, John Kai, Norman Knox, Allen McFadden, Jim Miller, John Warren, Wilbur Wuertz, and Curtis Brothers.

#### Regional variety tests

These tests are part of a Regional Variety Testing Program conducted in cooperation with California, New Mexico and Texas (District 6). Several experimental strains from the four states are included along with most of the commercial varieties grown in the area. Results of these tests are summarized in Table 1 and show yield results for both Marana and Cotton Research Center, Phoenix. Verticillium Wilt was very severe in the Marana test, therefore, strains having good wilt tolerance, such as Hopicala, Deltapine 5540, 1517V and Arizona 6020, made the highest yields. At the Cotton Research Center, wilt was not a factor and varieties such as Deltapine Smooth Leaf, Stoneville 7A and 213 lead in production.

#### Advanced strains test

Nine experimental strains selected for tolerance to Verticillium Wilt and for high fiber quality were planted in a number of small plot tests with grower cooperators as well as on the Experimental Farms at Marana and Phoenix. Also included in these tests were three commercial varieties, Deltapine Smooth Leaf, Hopicala, and 44-10. Some tests were not harvested due to erratic stands, rust and root rot damage or other conditions causing extreme variation within the test area. All tests were picked by hand. Lint percent and other laboratory measurements were determined from clean, hand-picked samples processed in the fiber laboratory at Tucson. Fiber quality determinations have not yet been completed.

Table 1. Regional Variety Tests at Marana and Cotton Research Center  
1965

Entry	Lint/acre lbs.		Fiber Measurements - Marana only						
	C.R.C.	Marana	UFI	M	Unif. Ratio	Pressley 1/3"	Micro- naire	Bolls/lb. seed cotton	% lint
6020 (Ariz.)	1021	1135	1.12	.91	82	3.58	4.50	63	36.7
Deltapine 5540	1101	1090	1.01	.73	72	3.18	3.86	75	38.6
Hopicala	1083	1028	1.09	.89	82	3.85	4.31	63	38.0
1517V	1028	1024	1.15	.90	78	3.75	4.34	65	36.9
E-364 (Tex.)	1073	1021	1.12	.87	78	3.75	4.42	66	36.4
5909 (Ariz.)	1016	992	1.09	.89	82	3.98	4.58	67	36.9
Deltapine 7139	1139	987	1.03	.35	79	3.17	4.57	82	37.4
Bl415 (N. Mex.)	987	961	1.11	.91	82	3.83	4.65	66	35.4
Stoneville 213	1206	957	1.06	.81	77	2.97	4.79	77	38.4
4-42	950	956	1.09	.87	80	3.91	4.20	59	38.3
Deka1b 5156	1067	952	1.12	.91	82	3.68	4.44	60	36.4
McNair 1032	1074	920	0.99	.78	79	3.23	4.71	75	37.1
1517D	1051	879	1.17	.97	83	3.92	4.53	68	34.4
EA 12302 (Calif.)	1074	877	1.10	.91	83	3.92	4.56	67	34.9
Auburn 56	1083	853	1.01	.78	76	3.04	4.32	73	35.8
Deltapine S.L.	1203	846	1.05	.77	73	3.13	4.48	79	38.6
Stoneville 7A	1215	838	1.08	.81	75	2.96	4.87	78	38.0
Carolina Queen	1102	827	1.04	.78	76	3.01	4.74	72	38.5
EA 67-2 (Calif.)	1071	800	1.10	.39	81	3.85	4.29	65	35.6
Strain A (Calif.)	1155	684	1.08	.84	78	3.69	4.22	73	35.3
Ave.	1085	931							
L.S.D. .05	105	76							
C.V.	8.5%	7.0%							

Yield results are summarized in Table 2. At Marana under severe wilt conditions, nearly all of the experimental strains outyielded the commercial varieties. This was the only location where wilt was severe enough to seriously affect yield. Under non-wilt conditions, Deltapine Smooth Leaf, with one exception was the top yielding entry.

Table 3 shows fiber and spinning test results for the 1965 crop. The fiber measurements were made in the laboratory at Tucson from samples grown at Marana. The spinning tests were made at the USDA Spinning Laboratory, College Station, Texas, using fiber produced at the Cotton Research Center, Phoenix. In general the spinning quality of these strains is excellent. All but one produced yarns as strong or stronger than 4-42. One experimental strain, 5915, produced stronger yarn than Hopicala, which also continues to give excellent spinning performance.

Tables 4,5,6,7, and 8 show lint percents, boll size, seed size, seeds per boll, and seed-lint ratio for the various strains at several locations. The differences among strains and locations are rather large and no attempt to explain the causes will be made here. All these measurements are more or less related. Perhaps the number of seeds per boll is one of the most important factors. It has often been observed that a reduced number of seeds per boll results in smaller bolls, larger seeds, and therefore a lower gin turnout or higher seed-lint ratio. Of course there are inherent differences among varieties for these characteristics but these inherent differences are frequently smaller than that caused by environment acting upon a single variety. These tables show the differences found but offer little explanation for the underlying causes. An explanation of these causes and their relationship should be very valuable in a cotton improvement program.

Table 2. Yield of Lint in Pounds Per Acre of  
Advanced Strains Tests

Entry	Marana	Phoenix	Roll	Casa Grande	Horn	Buckeye	Dysart	Chandler	Queen Creek	Average All tests
	← sounds →									
5805	1054	1088	1481	1347	1378	972	1354	863	1560	1233
5909	972	1055	1305	1159	1179	986	1264	704	1477	1122
5915	1107	1099	1375	1214	1257	889	1270	767	1469	1161
6016	1169	1178	1409	1283	1285	1033	1441	807	1595	1244
6017	1027	1193	1444	1348	1198	1183	1347	733	1649	1236
6020	1171	1042	1443	1184	1103	989	1278	734	1549	1166
6022	1139	1026	1379	1198	1188	888	1121	811	1384	1126
6024-11	1193	1115	1545	1360	998	947	1216	792	1458	1180
6024-2	1160	1069	1343	1212	1004	980	1106	689	1403	1107
Hopicala	1009	1126	1539	1477	1327	960	1372	825	1628	1251
44-10	682	1085	1635	1334	1207	1008	1220	796	1424	1155
Deltapine Smooth Leaf	803	1290	1746	1450	1603	1191	1673	869	1818	1382
Ave.	1040	1114	1470	1297	1227	1002	1305	782	1534	1197
LSD 05	67	84	187	95	241	153	116	94	110	
C.V.	5.6%	6.5%	9.9%	6.3%	13.6%		13.2%	7.7%	10.3%	5.6%

Table 3. Fiber and Spinning Results\*  
Advanced Strains Tests.

Entry	Fiber Laboratory					Spinning Data				
	Fiber Length			Strength	Micronaire	Yarn Strength			Waste %	Appearance Index
	UHI	M	Unif. Ratio	1/8" Pressley		22's	50's	Break Factor		
5909	1.09	.91	84	3.86	4.61	149	57	3064	6.40	115
5915	1.15	.92	80	3.76	4.80	150	59	3125	5.19	115
6016	1.11	.89	80	3.56	4.67	137	54	2857	5.40	115
6017	1.11	.87	78	3.61	4.34	143	54	2923	5.19	120
6020	1.13	.93	82	3.61	4.57	145	56	2995	5.20	115
6024-11	1.10	.89	81	3.55	4.62	141	55	2926	4.21	115
6024-2	1.07	.84	79	3.66	4.65	141	55	2926	5.59	120
Hopicala	1.08	.88	81	3.82	4.36	148	58	3078	6.41	110
4-42	1.09	.87	80	3.91	4.20	140	55	2915	5.41	115
Deltapine Smooth Leaf	1.03	.75	73	3.10	4.34	119	44	2409	4.59	115

\*Fiber Laboratory Data on Marana Test  
 Spinning Samples Grown at Cotton Research Center, Phoenix.

Table 4. Lint Percentages for the Advanced Strains Tests

Entry	Marana	Phoenix	Casa Grande	Horn	Buckeye	Dysart	Chandler	Ave.	Difference Range
	← percent →								
5805	37.6	33.5	35.9	34.3	35.4	33.8	34.1	34.9	4.1
5909	37.4	33.6	36.3	34.7	36.8	34.5	33.0	35.2	4.4
5915	37.3	33.6	36.1	33.8	36.1	34.6	33.0	34.9	4.3
6016	37.2	34.2	36.4	33.3	37.4	34.9	34.6	35.4	4.1
6017	38.8	36.4	38.5	35.4	38.6	36.9	35.9	37.2	3.4
6020	36.9	32.3	35.7	34.5	34.6	33.3	32.3	34.2	4.6
6022	37.0	32.4	36.3	33.7	35.8	33.9	33.8	34.7	4.6
6024-11	37.1	34.1	37.6	36.0	36.6	35.5	34.2	35.9	3.0
6024-2	36.3	32.4	36.2	32.6	34.1	32.7	33.0	33.9	3.9
Hopicala	37.5	34.5	37.4	35.4	37.2	34.6	34.1	35.8	3.4
44-10	36.5	33.7	35.7	33.7	37.0	34.2	33.7	34.9	3.3
Deltapine Smooth Leaf	38.4	36.4	38.5	37.7	38.8	36.8	35.0	37.4	3.8
Ave.	37.3	33.9	36.7	34.6	36.5	34.6	33.9		3.4

Table 5. Boll Size for the Advanced Strains Tests

Entry	Marana	Phoenix	Casa Grande	Horn	Buckeye	Dysart	Chandler	Ave.	Difference Range
	← number of bolls per pound of seed cotton →								
5805	63	64	61	70	75	60	64	65	15
5909	67	70	67	72	75	68	72	70	8
5915	65	70	68	75	78	70	68	70	13
6016	62	62	62	73	71	64	62	65	11
6017	69	71	68	70	78	70	70	71	10
6020	63	68	70	77	76	71	69	70	13
6022	68	71	69	75	75	69	69	71	7
6024-11	61	66	67	77	75	68	64	68	16
6024-2	62	66	64	76	74	65	65	67	14
Hopicala	63	67	63	75	78	65	64	68	15
44-10	61	58	59	71	67	58	63	62	10
Deltapine Smooth Leaf	82	79	79	87	85	77	86	82	10
Ave.	66	68	66	75	76	67	68		10

Table 6. Seed Size for the Advanced Strains Tests

Entry	Marana	Phoenix	Casa Grande	Horn	Buckeye	Dysart	Chandler	Ave.	Difference Range
	← weight of 100 seeds in grams →								
5805	13.4	14.5	13.8	13.6	14.2	15.1	15.0	14.2	1.7
5909	12.6	13.5	14.0	14.1	13.4	13.8	14.4	13.7	1.8
5919	13.8	14.2	13.8	13.5	14.3	14.1	14.8	14.1	1.3
6016	13.6	14.6	13.8	13.5	14.1	14.2	14.6	14.0	1.1
6017	13.3	14.2	13.7	14.4	14.2	13.8	14.6	14.0	1.3
6020	13.9	15.1	14.0	13.1	14.7	15.0	16.0	14.5	2.9
6022	13.5	14.7	13.4	13.7	14.2	14.4	14.8	14.1	1.4
6024-11	13.3	13.6	13.5	13.4	14.1	13.2	14.5	13.6	1.3
6024-2	13.8	14.7	14.4	13.8	14.9	15.1	14.9	14.5	1.3
Hopicala	13.1	14.0	13.4	13.7	13.8	14.8	14.7	13.9	1.7
44-10	13.3	15.8	14.6	14.1	14.5	15.8	15.3	14.8	2.5
Deltapine Smooth Leaf	10.0	11.0	10.4	10.0	10.5	10.8	10.8	10.5	1.0
Ave.	13.1	14.2	13.6	13.4	13.9	14.2	14.5		1.4



Table 7. The Number of Seeds Per Boll for the Advanced Strains Tests

Entry	Marana	Phoenix	Casa Grande	Horn	Buckeye	Dysart	Chandler	Ave.	Difference Range
	← number of seeds per boll →								
5805	33.4	32.4	34.2	31.7	27.5	32.8	31.2	31.9	5.9
5909	33.7	31.8	30.9	29.0	28.6	31.6	29.5	30.7	5.1
5915	31.8	20.2	31.2	29.3	25.8	30.2	20.4	29.8	6.0
6016	33.8	32.9	34.0	30.7	28.4	32.8	32.8	32.2	5.4
6017	30.6	28.6	31.2	28.9	25.1	29.5	28.8	29.0	6.1
6020	32.7	30.0	30.2	29.0	26.6	28.2	27.9	29.2	6.1
6022	30.6	29.3	31.4	31.3	27.4	30.2	29.6	30.0	4.0
6024-11	35.0	33.2	32.1	28.4	27.4	32.6	32.4	31.6	7.6
6024-2	33.5	31.8	31.3	29.3	27.1	31.3	31.4	30.8	6.4
Hopicala	34.3	31.8	33.9	29.3	26.6	31.1	31.8	31.2	7.7
44-10	35.5	33.0	33.2	30.2	29.4	32.8	30.8	32.1	6.1
Deltapine Smooth Leaf	34.3	33.2	33.8	32.4	30.9	34.9	31.6	33.0	4.0
Ave.	33.3	31.5	32.3	30.0	27.6	31.5	30.7		5.7

Table 8. The Seed-Lint Ratio for the Advanced Strains Tests

Entry	Marana	Phoenix	Casa Grande	Horn	Buckeye	Dysart	Chandler	Ave.	Difference Range
	← seed-lint ratio →								
5805	1.65	1.99	1.79	1.92	1.82	1.98	1.93	1.87	.34
5909	1.66	1.98	1.76	1.89	1.71	1.90	2.04	1.85	.38
5919	1.68	2.00	1.77	1.96	1.78	1.89	2.05	1.88	.37
6016	1.68	1.92	1.74	2.05	1.68	1.86	1.90	1.83	.37
6017	1.58	1.75	1.59	1.83	1.66	1.72	1.78	1.70	.25
6020	1.72	2.10	1.80	1.89	1.90	2.00	2.11	1.93	.39
6022	1.71	2.10	1.76	1.97	1.78	1.96	1.96	1.89	.39
6024-11	1.68	1.94	1.76	1.77	1.78	1.82	1.94	1.81	.26
6024-2	1.75	2.10	1.76	2.07	1.94	2.06	2.04	1.96	.35
Hopicala	1.68	1.89	1.68	1.86	1.70	1.90	1.95	1.81	.27
44-10	1.73	1.98	1.80	1.98	1.70	1.92	1.97	1.87	.28
Deltapine Smooth Leaf	1.61	1.75	1.60	1.65	1.58	1.72	1.87	1.68	.27
Ave.	1.68	1.96	1.73	1.90	1.75	1.89	1.96		.28

Other strains test

On the Curtis Farm located in the Safford area, the strains evaluated are primarily of New Mexico origin since they are environmentally oriented more toward New Mexico than Arizona. Presently the area also has a marketing advantage in producing these varieties. The data are presented in the accompanying table.

Table 9. Variety Yield Test - Curtis Farm, Safford, Arizona

Entry	Lint/acre	Lint%
Hopicala	1510	38.3
1517D	1412	36.2
6020	1412	36.9
9170	1358	37.3
1517V	1346	37.4
B1415	1334	37.5
8050	1324	36.3
8229	1314	38.6
8076	1312	38.7
8116	1291	37.4
8952	1290	36.5
B2242	1274	36.9
8861	1269	38.6
9765	1216	37.4
L.S.D. 05	84 lbs.	
01	112 lbs.	
C.V.	5.4%	