BREEDING CULTIVARS AND GERMPLASM WITH ENHANCED YIELD AND QUALITY, 2005

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Introduction

The classical breeding component of the University of Georgia Cotton Improvement Program works to develop germplasm with traits that can be used to meet the requirements of both producers and consumers. Higher and more stable yields combined with the fiber properties requested by the yarn and textile manufacturers are the goals for profitable production and processing to support the Georgia Cotton Industry. The objective of this report is to update progress made toward meeting these goals during the 2005 season.

Materials and Methods

The F6 material (Advanced Trials 1 & 2) were conducted at the William Gibbs Research Farm, near Tifton, GA. These trials consisted of 20-25 experimental entries and two checks planted in three replicate, randomized complete block designs. The F7 material and later material was grown as part of the 2005 University of Georgia Official Variety Trials (Day et al., this volume). Prior to machine harvest of all trials, 25 unweathered, open bolls from the middle of the fruiting zone was harvested from each plot, and were subsequently ginned on a 10-saw laboratory model gin to determine lint fraction. Fiber samples were submitted to the Cotton Incorporated Textile Services Laboratory for HVI analysis, while Official Variety Trial fiber was subjected to HVI analysis at a commercial testing laboratory.

Results and Discussion

The hand off of the classical breeding component from Dr. May to Dr. Chee in the Spring of 2005 occurred at an inopportune time to insure that the field research was fully covered. Only the field work with the F6 and later generations was continued because of the resource conflicts and time constraints.

Field emergence of the 2005 Advanced (F6) yield trials (ATs) were very poor for some of the lines that were tested so additional commercial lines were used to replant the blank plots. The standard checks, DeltaPEARL and FiberMax FM 958, were planted at the first planting. The ATs revealed a number of promising lines with lint yields exceeding those of the checks (Table 1). Fiber quality measures were not returned in time for this publication, however, previous testing indicated that the fiber quality measures were acceptable. AT 1 was extremely variable with a CV of 31% which decreases our ability to properly select the true winners in the test; a CV of around 10% is more desirable. None of the germplasm lines were significantly better than the best

check and the trial will be repeated. AT 2 was a good test with a CV of 8% showing 6 germplasm lines that were significantly better than the best check; GA 2004232, GA 2004263, GA 2004303, GA 2004356, GA 2004371, and GA 2004392. These lines will be promoted to multi-location testing. In the 2004 preliminary yield trials (Lubbers et al., this volume), only 4 of these 6 winners in AT 2 performed significantly better than the checks. The other two (GA 2004263 and GA 2004392) did exceed the checks in 2004 but not significantly. They were simply selected as the best of their particular preliminary yield trial. Proper selection pressure during the breeding cycle needs to be considered so that the breeding program is efficient yet does not discard valuable lines.

GA2002209 and GA2003156 were consistently the best performers of the four GA lines in the Earlier Maturity Strains Trial (Day et al., this volume) and will be given additional testing for possible release as a germplasm line or cultivar. Further testing is needed for the five GA lines in the Later Maturity Strains Trial (Day et al., this volume) since their performance was inconsistent over the three testing locations (Midville, Plains, and Tifton).

GA2002167 was the most consistent performer overall of the GA lines in the Dryland and Irrigated Earlier Maturity Variety Trials (Day et al., this volume) with GA2003118 and GA2001078 leading the GA lines in the Dryland and Irrigated Later Maturity Variety Trials (Day et al., this volume). Of course, overall comparisons of the conventional GA lines with the transgenic commercial cultivars in the UGA Official Variety Trials should not be made since the relative performance is confounded by the presence of the Bt trait in most of the commercial cultivars.

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References

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Table 1. Results of 2005 Advanced (F6) Trials.

2005 AT 1 Tifton		
ENTRY	**Lint Yield**	**Lint Fraction**
FM 960 BR	**1065**	0.3675
DP 444 BR	**1061**	0.4060
GA 2004168	**1029**	0.4060
DP 555 BR	**961**	0.3875
GA 2004108	**958**	0.4245
GA 2004089	**957**	0.4175
FM 958	**945**	0.4015
GA 2004054	**933**	0.3715
DP 455 BR	**927**	0.4095
ST 4892 BR	**908**	0.4215
GA 2004155	**871**	0.4325
GA 2004088	**859**	0.4080
GA 2004142	**846**	0.4495
GA 2004055	**839**	0.4065
GA 2004174	**807**	0.4345
GA 2004030	713	0.3875
DP 491	711	0.3995
FM 958 LL	701	0.3800
GA 2004022	690	0.3920
ST 5599 BR	630	0.3760
GA 2004201	628	0.4340
GA 2004192	585	0.4355
GA 2004079	526	0.3650
DeltaPEARL	440	0.3975
LSD0.10	**345**	**0.0244**

2005 AT 2 Tifton		
ENTRY	**Lint Yield**	**Lint Fraction**
GA 2004263	**1764**	0.4615
GA 2004232	**1759**	0.4392
GA 2004303	**1727**	0.4254
GA 2004356	**1723**	0.4023
GA 2004392	**1643**	0.3975
GA 2004371	**1622**	0.4297
GA 2004284	1471	0.4350
GA 2004430	1463	0.4169
GA 2004413	1454	0.4246
GA 2004416	1389	0.4107
GA 2004230	1385	0.4194
GA 2004358	1379	0.4324
DeltaPEARL	1378	0.4195
DP 444 BR	1356	0.4127
GA 2004269	1250	0.4190
GA 2004268	1248	0.4209
FM 958	1244	0.4017
DP 455 BR	1220	0.4309
ST 4892 BR	1150	0.4020
DP 555 BR	1146	0.4082
ST 5599 BR	1091	0.3749
FM 960 BR	1089	0.3863
FM 958 LL	1045	0.3892
DP 491	907	0.4007
LSD0.10	**156**	**0.0152**

DeltaPEARL and FiberMax FM 958 are the chosen check varieties for comparison purposes.