VARIETY PERFORMANCE IN 2008 MISSISSIPPI STATE COTTON VARIETY TRIALS

P. M. Thaxton
W.E. Clark
Susan Shi
Mississippi State University
Stoneville, MS
Ted P. Wallace
Mississippi State University
Mississippi State, MS
N.W. Buehring
North Mississippi Research and Extension Center
Verona, MS

Abstract

To aid Mississippi cotton producers in variety selection decisions, cotton varieties are tested and evaluated annually at locations across the state representing a wide range of soil and climatic conditions. 2008 Mississippi cotton variety trials were conducted at nine locations, which are divided into the Delta and Hill regions of the state. Forty-Seven varieties were divided into two groups, OVT and NEW, which stand for outstanding variety test and new entry test respectively. Preliminary performance, including yield, fiber quality and the Gross Return value of each variety, are presented in this report.

Introduction

All test plots consisted of two rows, 40 feet in length, with a row spacing of 38 or 40 inches. Experimental design for each trial consisted of a Randomized Complete Block with 4 replications. Recommended management practices were followed in each test. The on-farm cooperators decided planting dates, fertilizer rates, amount of supplemental irrigation, defoliation dates, insect and weed control strategies, and harvest dates.

The OVT was conducted at five Delta locations (Stoneville, Clarksdale, Rolling Fork, Tribbett, Tunica) and four Hill locations (Miss. State, Senatobia, Raymond, and Verona). NEW entry test was conducted at four locations: Stoneville, Tribbett, Miss. State, and Verona. Commercial varieties DP445BG/RR, DP434RR, ST5599BR, and PHY370WR were designated as check varieties in the tests.

Varieties were evaluated under standard management practices, including chemical control of weeds and insects with conventional herbicides and insecticides. For transgenic varieties, any potential advantage due to trans-genes was not evaluated.

Estimation of lint percentage, boll size, seed index (weight in grams of 100 fuzzy seed), and fiber properties was based upon handpicked 50-boll samples from 4 replications at each location. Samples were ginned on a 10-inch laboratory saw gin. HVI fiber property determinations were made by Starlab, Inc., Knoxville, TN. Yield determinations were based on the weight of seed cotton mechanically harvested from two-row plots and the seed cotton weight of the hand-picked samples. 2008 Crop Cotton Loan Evaluation Program (Larry Falconer, 2008) was used to calculate the Gross Return value. Calculations were based on fiber properties, lint yield and a seed value of $225/ton. Gross Return Value provides a figure that incorporates both yield and fiber quality. Results from this research are intended to be an aid for the growers to select varieties for next growing season. Certain data will also be of interest to ginners, millers, and other sectors of cotton industry.

Results and Conclusions

The 2008 growing season could be described as “nearly” normal. Some locations experienced medium water stress during early season. Plant bugs and spider mites were also problems at several locations, especially at Stoneville, and most likely had an impact on yield; even though insecticides were sprayed over ten times. Due to rainy weather at some locations, harvest was delayed much later than normal and it postponed the fiber analysis process, therefore, some data of some locations are not included in this report. Yield for Raymond was not reported due to potash deficiency and for Rolling Fork due to late application of herbicide effecting plant health.

The results of OVT were presented in Table 1, and 2; NEW entry Test results were reported in Table 3, and 4. All result value represent least squares means.

Table 1. Average[1] lint yield[2] and fiber[3] quality traits over locations in the 2008 Mississippi State University Cotton Variety Trials.

Variety	Lint Yield	Lint Percent	Seed Index	Boll Size	Length	Uniformity Index	Strength	Elongation	Micronaire	Gross Return
	lb/a	%	g	g	inch	%	g/tex	%	mic	$/a
ST 5458 B2RF	1481	41.18	10.38	5.41	1.18	83.58	30.44	6.59	4.88	1014
FM 1740 B2F	1480	42.83	10.57	5.44	1.17	84.29	29.53	6.61	4.75	1013
PHY 375 WRF	1396	42.35	9.84	4.98	1.14	83.66	28.00	6.65	4.51	952
DG 2570	1373	41.47	9.90	5.41	1.15	84.11	29.18	7.14	4.64	937
PHY 370 WR -- CK	1358	41.44	10.02	5.06	1.13	83.86	30.70	7.08	4.78	932
ST 5599 BR -- CK	1343	40.60	10.68	5.72	1.16	83.44	31.75	6.54	4.84	921
DP 0924 B2RF	1312	41.26	9.55	4.79	1.14	83.83	28.74	6.93	4.80	895
ST 4498 B2RF	1309	40.21	9.77	5.20	1.15	84.05	31.34	7.36	4.48	898
PHY 485 WRF	1306	40.20	9.66	4.75	1.17	84.43	31.03	7.47	4.89	896
DP 434 RR -- CK	1275	41.60	9.96	5.10	1.19	84.35	26.71	6.71	4.42	869
DP 445 BG/RR -- CK	1274	41.48	9.89	5.04	1.17	84.45	31.33	7.06	4.65	874
AM 1550 B2RF	1273	40.88	10.01	5.11	1.14	83.66	27.13	6.72	4.54	868
DP 174 RF	1272	43.62	9.85	5.53	1.19	83.94	26.93	6.71	4.69	867
DP 0935 B2RF	1263	42.14	10.19	5.69	1.15	83.98	28.46	6.68	4.71	861
PHY 315 RF	1258	42.24	9.97	5.14	1.16	83.60	28.39	6.53	4.58	857
DP 555 BG/RR	1256	43.23	8.38	4.58	1.16	83.04	29.54	6.11	4.51	858
NG 3331 B2RF	1256	40.57	10.04	5.15	1.14	84.43	31.04	7.01	5.05	839
CG 4020B2RF	1251	40.15	9.89	4.79	1.19	84.16	26.26	6.64	4.41	853
CG 3220B2RF	1248	40.85	10.03	4.98	1.15	83.68	27.28	6.81	4.63	851
AM 1532 B2RF	1244	39.85	9.87	4.79	1.18	84.14	26.31	6.62	4.37	848
ST 4554 B2RF	1219	39.41	10.25	5.11	1.16	83.75	29.84	7.39	4.68	834
CG 3020B2RF	1211	39.07	9.88	4.82	1.15	83.83	26.48	6.76	4.28	827
DP 141 B2RF	1209	40.19	9.19	4.87	1.22	83.64	29.92	6.66	4.48	827
NG 4377 B2RF	1207	40.61	9.64	5.12	1.14	84.08	29.10	6.94	4.83	823
DG 2520	1206	39.73	9.91	4.77	1.19	83.86	26.62	6.67	4.39	822
PHY 425 RF	1191	39.58	10.13	4.94	1.17	84.66	30.73	7.52	5.05	796
DP 164 B2RF	1186	39.54	9.36	4.92	1.20	84.00	29.70	6.46	4.62	811
ST 5327 B2RF	1186	40.79	9.35	4.60	1.16	84.19	30.10	6.91	4.47	811
CG 3035RF	1181	42.23	9.86	5.35	1.15	84.10	28.59	7.15	4.62	805
FM 840 B2F	1180	39.03	10.36	5.39	1.24	85.60	31.43	6.72	4.45	812
DP 161 B2RF	1168	39.25	8.95	4.55	1.21	84.73	31.48	6.73	4.56	803
CG 3520B2RF	1166	39.15	9.52	4.42	1.17	83.89	25.84	6.83	4.41	795
NG 4370 B2RF	1160	39.76	9.88	5.00	1.15	84.17	29.77	6.91	4.67	794
DP 121 RF	1160	42.62	9.48	4.93	1.15	84.09	30.51	7.03	4.92	796
ST 4427 B2RF	1158	39.25	9.92	4.60	1.15	83.90	29.75	6.59	4.58	792
DP 143 B2RF	1101	39.34	9.77	5.12	1.24	83.87	27.76	6.31	4.33	751
[4]FM 1735 LLB2	1258	~	~	~	~	~	~	~	~	
[4]FM 835 LLB2	1162	~	~	~	~	~	~	~	~	
MEAN	1253	40.77	9.83	5.03	1.17	84.03	29.10	6.82	4.62	856
REPS	24	24	24	24	20	20	20	20	20	24

[1]Least squares means.
[2]Yield data of Raymond and Rolling Fork location are not included due to high variation.
[3]Fiber data of Tunica is not included, as well as yield data and fiber data of Verone, since the data were not available at the time the statistics was done.
[4]The Least squares means for this entry were not estimated due to too many missing values. The yield value is the average of other locations.

Table 2. Average[1] lint yield[2] for each location in 2008 Mississippi State University Cotton Variety Trials.

Variety	STONEVILLE Lint Yield lb/a	CLARKSDALE Lint Yield lb/a	TRIBBETT Lint Yield lb/a	TUNICA Lint Yield lb/a	MISS. STATE Lint Yield lb/a	SENATOBIA Lint Yield lb/a	OVER LOCATIONS Lint Yield lb/a
ST 5458 B2RF	1331	2027	1370	1400	1193	1568	1481
FM 1740 B2F	1368	1727	1405	1462	1304	1615	1480
PHY 375 WRF	1237	1769	1169	1591	1105	1507	1396
DG 2570	1247	1797	1210	1619	974	1393	1373
PHY 370 WR -- CK	1236	1731	1252	1379	1042	1506	1358
ST 5599 BR -- CK	1245	1765	1302	1163	1117	1467	1343
DP 0924 B2RF	1198	1593	1345	1367	1057	1313	1312
ST 4498 B2RF	1151	1602	1220	1497	952	1432	1309
PHY 485 WRF	1124	1544	1409	1203	1167	1387	1306
DP 434 RR -- CK	1391	1679	1274	987	971	1344	1275
DP 445 BG/RR -- CK	1120	1554	1166	1421	862	1520	1274
AM 1550 B2RF	1136	1524	1110	1567	911	1392	1273
DP 174 RF	1524	1815	1337	772	899	1283	1272
DP 0935 B2RF	1232	1576	1155	1200	1085	1332	1263
[3]FM 1735 LLB2	1290	1603	1231	1218	947	~	1258
PHY 315 RF	1151	1705	1201	1004	1144	1341	1258
DP 555 BG/RR	1373	1958	1114	852	1365	875	1256
NG 3331 B2RF	1187	1745	1213	1130	1128	1132	1256
CG 4020 B2RF	1124	1478	1199	1348	992	1364	1251
CG 3220 B2RF	1120	1605	1072	1435	873	1386	1248
AM 1532 B2RF	1110	1532	1237	1310	886	1390	1244
ST 4554 B2RF	1104	1602	1142	1243	911	1314	1219
CG 3020 B2RF	954	1466	1312	1272	974	1286	1211
DP 141 B2RF	1205	1551	1125	1041	1172	1160	1209
NG 4377 B2RF	1081	1467	1129	1175	1073	1318	1207
DG 2520	1070	1347	1174	1341	859	1443	1206
PHY 425 RF	1350	1456	1224	849	1055	1212	1191
DP 164 B2RF	1142	1742	1118	1058	917	1140	1186
ST 5327 B2RF	1214	1553	1019	1179	786	1363	1186
CG 3035 RF	1167	1621	1088	1082	952	1178	1181
FM 840 B2F	1097	1511	1087	1188	916	1281	1180
DP 161 B2RF	1295	1699	1025	1054	850	1084	1168
CG 3520 B2RF	861	1338	1071	1326	904	1493	1166
[3]FM 835 LLB2	1339	1569	878	1158	864	~	1162
NG 4370 B2RF	1056	1482	1154	1144	1037	1088	1160
DP 121 RF	1117	1498	1144	1027	853	1321	1160
ST 4427 B2RF	1169	1558	1021	1168	830	1202	1158
DP 143 B2RF	1149	1295	984	1061	996	1123	1101
MEAN	1191	1607	1176	1218	998	1321	1253
LSD (.10)	129	179	167	161	183	152	
R-square	0.73	0.60	0.49	0.75	0.54	0.67	
CV (%)	9.20	9.49	12.12	11.21	15.56	9.70	
REPS	4	4	4	4	4	4	24

[1]Least squares means.
[2]Data of Verona is not included, as the data was not available at the time the statistics was done. Yield data of Rolling Fork and Raymond are not included due to high variation.
[3]The Least squares means for this entry at Senatobia location were not estimated due to too many missing values.

Table 3. Average[1] lint yield and fiber quality traits over locations in New Entry Test in the 2008 Mississippi State University Cotton Variety Trials.

Variety	Lint Yield lb/a	Lint Percent %	Seed Index g	Boll Size g	Length inch	Uniformity Index %	Strength g/tex	Elongation %	Micronaire mic	Gross Return $/a
BCSX 0727 B2F	1340	42.00	8.83	4.99	1.17	83.58	28.44	6.91	4.81	913
BCSX 0888 LLB2	1292	40.63	10.55	5.36	1.19	84.33	31.91	6.68	4.89	887
DP 434 RR -- CK	1255	41.96	9.57	5.23	1.20	84.19	27.07	6.91	4.53	856
BCSX 0102 LL B2	1243	39.32	11.18	5.66	1.25	85.64	33.78	6.71	4.73	856
ST 5599 BR -- CK	1227	40.45	10.56	5.71	1.17	82.97	31.77	6.58	4.76	841
BCSX 0704 B2F	1210	38.93	10.76	5.62	1.23	84.76	29.53	6.78	4.63	829
BCSX 0721 B2F	1202	43.04	8.89	4.75	1.20	84.73	29.50	7.56	4.77	824
PHY 370 WR -- CK	1161	40.93	9.93	4.84	1.14	84.03	30.90	7.12	4.60	797
BCSX 0187 LLB2	1140	40.81	10.05	5.63	1.17	83.56	30.34	6.23	4.58	780
DP 0935 B2RF	1137	42.67	9.90	5.34	1.16	83.66	28.21	6.79	4.58	775
DP 0924 B2RF	1112	40.62	9.78	4.90	1.15	83.95	28.85	6.95	4.89	758
BCSX 0614 B2F	1070	38.37	10.39	5.61	1.22	84.89	29.49	6.92	4.44	731
DP 445 BG/RR -- CK	1049	40.89	9.73	4.98	1.17	84.47	30.63	7.23	4.67	720
MISCOT 8921-11	1048	38.83	10.53	5.22	1.18	84.43	30.42	7.23	4.63	717
MISCOT 0020-31n	997	37.81	10.20	5.30	1.20	84.28	31.95	6.77	4.64	684
STG 210	973	39.26	9.18	5.02	1.14	83.08	30.95	6.97	4.80	666
STG LINWOOD	919	40.50	10.01	4.81	1.14	84.24	32.47	7.38	5.12	613
MEAN	1140	40.41	10.00	5.23	1.18	84.16	30.37	6.92	4.71	779
REPS	12	12	12	12	12	12	12	12	12	12

[1]Least squares means.

Table 4. Average[1] lint yield[2] for each location in the New Entry Test in the 2008 Mississippi State University Cotton Variety Trials.

Variety	STONEVILLE Lint Yield lb/a	TRIBBETT Lint Yield lb/a	MISS. STATE Lint Yield lb/a	OVER LOCATIONS Lint Yield lb/a
BCSX 0727 B2F	1174	1524	1321	1340
BCSX 0888 LLB2	1384	1223	1269	1292
DP 434 RR -- CK	1410	1220	1135	1255
BCSX 0102 LL B2	1297	1276	1154	1243
ST 5599 BR -- CK	1319	1254	1108	1227
BCSX 0704 B2F	1302	1187	1142	1210
BCSX 0721 B2F	1134	1323	1149	1202
PHY 370 WR -- CK	1248	1055	1180	1161
BCSX 0187 LLB2	1255	969	1195	1140
DP 0935 B2RF	1178	988	1244	1137
DP 0924 B2RF	1285	931	1120	1112
BCSX 0614 B2F	1084	1016	1111	1070
DP 445 BG/RR -- CK	1171	1029	947	1049
MISCOT 8921-11	1206	916	1021	1048
MISCOT 0020-31n	1056	873	1061	997
STG 210	1150	826	942	973
STG LINWOOD	1089	815	852	919
MEAN	1220	1084	1115	1140
LSD (.10)	188	198	141	
R-square	0.50	0.68	0.72	
CV (%)	13.01	15.40	10.70	
REPS	4	4	4	12

[1]Least squares means.
[2]Data of Verona is not included, as the data was not available at the time the statistics was done.

At the bottom of by location data tables are summary of statistics, which are very important in interpreting the test results. Despite efforts to provide a uniform test environment, all experiments are subject to a certain degree of error due to variation between plots arising from differences in soil type, fertility, insect damage, weed pressure, etc. Therefore, yield potential (and performance with respect to other characteristics) cannot be measured with complete accuracy. By conducting replicated trials we can account for or remove some, but not all of the effect of non-uniform conditions among plots. As a result, the mean performance of some varieties may be numerically different, but not statistically different when variability in the test is taken into account. The Least Significant Difference (LSD) value estimates the smallest difference between two varieties that should be considered something other than natural variation.

The coefficient of variation (CV) is a measure of relative precision of a given trial and is generally considered to be an estimate of the amount of unexplained variation in that trial. In general, the higher the CV value, the less precise a given trial. The R2 value is another measure of relative precision. The higher the R2 value, the more precise a given trial.

For the results of over locations, only the averages were presented but not the statistics. Because the growing conditions at these locations are different due to the soil texture, the rainfall, the management level, and so on, the interactions between locations and entries are highly significant.

In any single year or location, a given variety may perform extremely well or extremely poorly due either to chance variation or to its response to environmental conditions in that particular site and year. In order to avoid being misled by performance in a single year and location, it is wise to base variety selection decisions on as many environments as possible. While it is hoped that newer varieties will perform better than older varieties, this is not always the case. Greater confidence can be put in varieties that have performed well over two or more years than can be put in varieties that are in their first year of testing. Producers should consider these new varieties/technologies as not being thoroughly evaluated until multiple year, multiple locations results are available.

These tests do not encompass all growing and environmental conditions in the state, but they provide a guide to producers in selecting among varieties best suited for their growing conditions. The soil texture of each location can be found in the test location information box.

References

2008 Crop Cotton Loan Evaluation Program, developed by Dr. Larry Falconer, Extension Economist, Texas A & M University, Corpus Christi, TX.