



2011 UGA Uniform Cotton Variety Performance Evaluation Program

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The UGA Cotton Variety Performance Evaluation Program was a huge success in 2011, with 15 individual trials throughout Georgia's cotton belt. The success of this program was largely attributable to the dedication of our UGA county Extension agents, our industry leaders (Bayer CropScience, Dow AgroSciences and Monsanto Company), the Georgia Cotton Commission and cooperating growers. The implementation of this program has undoubtedly helped to address a current need of Georgia cotton growers and will make an incalculable impact on the 2012 growing season and beyond. A special thanks to all who participated in or contributed to this program, including all cooperating growers.

Program Description

The UGA Extension cotton agronomists decided to establish this variety testing program beginning in 2010. Our industry leaders (Bayer CropScience, Dow AgroSciences and Monsanto Company) were asked to provide three of their commercially available cotton varieties that were their best-adapted varieties for Georgia. This uniform list of CORE varieties was planted in replicated trials in growers' fields throughout Georgia's cotton belt, as arranged by the county agents. The trials were replicated and managed/maintained by the grower with the assistance of participating county Extension agents in order to achieve realistic and statistically sound results. A seed cotton sample of each variety was collected at harvest and ginned at the UGA Microgin to provide a more realistic value for lint percentage and fiber quality. Additionally, the design of this program allowed for a much broader assessment of variety performance across a wide range of environments, ranging from less than 200 to more than 1,600 lbs/A yield environments in 2011 alone. This approach illustrates how variety performance can change across a range of environments, which provides information on how to place varieties in environments where they will likely be competitive. The results of the 2011 program are provided below. For better interpretation of this data, contact your local county Extension agent.

Individual Trial Information

On-farm replicated variety trials were planted in growers' fields in each of the counties listed in Tables 1 and 2. The county agents who implemented and conducted these trials with their local cooperating growers include the following: Brent Allen, Scott Carlson, Don Clark, Jim Crawford, Brian Cresswell, Shane Curry, Mike Dollar, Phillip Edwards, Tim Flanders, Mark Frye, Mitchell May, Jennifer Miller, Tim Moore, Cliff Riner, Peyton Sapp, David Spaid and Brian Tankersley. Their participation was critical to the success of this program, and their cooperation was truly appreciated.

Table 1. County trials that included all of the CORE varieties. These trials are listed by number in ascending order based on the trial average (yield environment). These trial numbers can be correlated to those listed in the following tables.

Trial Number	County	Environment	Trial Average (lbs/A)
<u>On-Farm Trials Managed According to a Roundup Ready Flex System</u>			
1	Johnson	<u>Dryland</u>	193
2	Ben Hill	<u>Dryland</u>	337
3	Wayne (<u>Madry</u>)	<u>Dryland</u>	732
4	Evans	<u>Dryland</u>	741
5	Appling	<u>Dryland</u>	749
6	Candler	<u>Dryland</u>	893
7	Wayne (<u>Noland</u>)	<u>Dryland</u>	916
8	Berrien	<u>Dryland</u>	1190
9	Jefferson	Irrigated	1366
10	Early	Irrigated	1470
11	Decatur	<u>Dryland</u>	1520
12	Miller	Irrigated	1555
13	Evans	Irrigated	1621
14	Burke	Irrigated	1632
15	Tift	Irrigated	1639
<u>On-Farm Trials Managed According to a Liberty-Based System</u>			
1	Worth	<u>Dryland</u>	348
2	Evans	<u>Dryland</u>	762
3	Appling	<u>Dryland</u>	793
4	Early	Irrigated	1229
5	Effingham	<u>Dryland</u>	1311

Table 2. Lint yields of CORE varieties analyzed by location and across locations. Individual trials or locations are listed by number from left to right in ascending order based on the individual trial average. These trial numbers can be correlated to those described in Table 1. Means within a column (location) that are underlined and in bold font are not significantly different from the top yielding variety (as indicated with an asterisk) according to Fisher's Protected LSD at P<0.05. The percent of trials that a particular variety was the top yielder, or was statistically no different than the top yielder, is listed in the far right columns.

Variety	Trial Number															Average Yield Over All Trials	Top Yielding Variety % of Trials	N.S. from Top Yielding Variety
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
PHY 499 WRF	<u>227</u>	<u>430*</u>	<u>898</u>	<u>803*</u>	<u>835*</u>	<u>1012*</u>	917	<u>1380*</u>	1344	<u>1606</u>	<u>1714*</u>	<u>1648*</u>	<u>1773</u>	<u>1737</u>	<u>1713</u>	<u>1202*</u>	47	87
DP 1137 B2RF	<u>215</u>	344	<u>917*</u>	<u>785</u>	<u>823</u>	923	958	<u>1295</u>	<u>1445</u>	<u>1626*</u>	<u>1495</u>	<u>1599</u>	<u>1799*</u>	<u>1774*</u>	<u>1746*</u>	<u>1183</u>	33	80
DP 1050 B2RF	<u>228*</u>	310	821	<u>792</u>	<u>821</u>	945	927	1160	1369	<u>1564</u>	<u>1529</u>	<u>1593</u>	<u>1775</u>	<u>1677</u>	<u>1733</u>	1150	7	60
DP 1048 B2RF	<u>216</u>	304	705	<u>782</u>	<u>765</u>	810	891	1261	1385	<u>1542</u>	<u>1467</u>	1530	1654	<u>1698</u>	<u>1705</u>	1114	0	47
ST 5458 B2RF	163	371	699	<u>743</u>	<u>743</u>	940	<u>1060*</u>	1185	1382	1399	<u>1532</u>	<u>1541</u>	<u>1656</u>	1607	1550	1105	7	40
FM 1740 B2F	147	305	635	726	<u>715</u>	<u>975</u>	928	1113	<u>1428</u>	1461	<u>1585</u>	<u>1541</u>	1507	1633	<u>1626</u>	1088	0	40
ST 4288 B2F	<u>202</u>	340	590	671	<u>789</u>	878	995	1188	<u>1453*</u>	1367	<u>1495</u>	1437	1489	1568	1558	1068	7	27
PHY 375 WRF	189	316	729	700	608	820	850	1126	<u>1431</u>	<u>1473</u>	<u>1479</u>	<u>1645</u>	1516	1525	1063	0	27	
PHY 565 WRF	148	318	592	671	641	733	722	1000	1060	1191	<u>1381</u>	1465	1418	1467	1588	960	0	7
Trial Average	193	337	732	741	749	893	916	1190	1366	1470	1520	1555	1621	1632	1639			
P-value	0.0008	0.0001	<u><.0001</u>	0.0013	0.0082	<u><.0001</u>	<u><.0001</u>	<u><.0001</u>	<u><.0001</u>	0.0010	0.1674	0.0301	0.0001	0.0014	0.0065	<u><.0001</u>		

Table 3. Lint yields of CORE varieties analyzed by location and across location. Individual trials or locations are listed by number from left to right in ascending order based on the individual trial average. These trial numbers can be correlated to those described in Table 1. Means within a column (location) that are underlined and in bold font indicate that that variety was numerically one of the top three varieties in that particular trial. The percent of trials that a particular variety was the top yielding variety (as indicated with an asterisk), within the top two yielding varieties or within the top three yielding varieties is listed in the far right columns.

Variety	Trial Number															Average Yield Over All Trials	Top Yielding Variety	Within Top 2	Within Top 3
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15				
	Lint Yield (Lbs/A)															% of Trials			
PHY 499 WRF	<u>227</u>	<u>430*</u>	<u>898</u>	<u>803*</u>	<u>835*</u>	<u>1012*</u>	917	<u>1380*</u>	1344	<u>1606</u>	<u>1714*</u>	<u>1648*</u>	<u>1773</u>	<u>1737</u>	<u>1713</u>	<u>1202*</u>	47	73	87
DP 1137 B2RF	215	<u>344</u>	<u>917*</u>	<u>785</u>	<u>823</u>	923	<u>958</u>	<u>1295</u>	<u>1445</u>	<u>1626*</u>	1495	<u>1599</u>	<u>1799*</u>	<u>1774*</u>	<u>1746*</u>	<u>1183</u>	33	53	80
DP 1050 B2RF	<u>228*</u>	310	<u>821</u>	<u>792</u>	<u>821</u>	<u>945</u>	927	1160	1369	<u>1564</u>	1529	1593	<u>1775</u>	<u>1677</u>	<u>1733</u>	<u>1150</u>	7	27	53
DP 1048 B2RF	<u>216</u>	304	705	782	765	810	891	<u>1261</u>	1385	1542	1467	1530	1654	<u>1698</u>	1705	1114	0	0	27
ST 5458 B2RF	163	<u>371</u>	699	743	743	940	<u>1060*</u>	1185	1382	1399	<u>1532</u>	1541	1656	1607	1550	1105	7	13	27
FM 1740 B2F	147	305	635	726	715	<u>975</u>	928	1113	1428	1461	<u>1585</u>	1541	1507	1633	1626	1088	0	13	13
ST 4288 B2F	202	340	590	671	789	878	<u>995</u>	1188	<u>1453*</u>	1367	1495	1437	1489	1568	1558	1068	7	13	13
PHY 375 WRF	189	316	729	700	608	820	850	1126	<u>1431</u>	1473	1479	<u>1645</u>	1516	1525	1536	1063	0	7	13
PHY 565 WRF	148	318	592	671	641	733	722	1000	1060	1191	1381	1465	1418	1467	1588	960	0	0	0
Trial Average	193	337	732	741	749	893	916	1190	1366	1470	1520	1555	1621	1632	1639				

Table 4. Lint yields of CORE varieties for Liberty-based systems analyzed by location and with locations combined. Individual trials or locations are listed from left to right by number in ascending order based on the individual trial average. These trial numbers can be correlated to those described in Table 1. Means within a column (location) that are underlined and in bold font are not significantly different from the top yielding variety (indicated by an asterisk) according to Fisher's Protected LSD at $P < 0.05$ or 0.1. The percent of trials that a particular variety was the top yielder, or was statistically no different than the top yielder, is listed in the far right columns.

Variety	Trial Number					Average Yield Over All Trials	Top Yielding Variety	Top Yielding Variety	N.S. from Top Yielding Variety
	1	2	3	4	5				
	Lint Yield (Lbs/A)								
PHY 499 WRF	403*	837*	871*	1317*	1436*	973*	100	100	100
PHY 375 WRF	341	790	765	1266	1319	896	0	40	40
FM 1845 LLB2	325	827	849	1182	1297	896	0	40	40
FM 1773 LLB2	329	764	850	1176	1266	877	0	40	40
PHY 367 WRF	358	670	784	1276	1268	871	0	40	40
ST 4145 LLB2	334	757	697	1192	1322	860	0	20	20
PHY 565 WRF	343	686	733	1192	1271	845	0	0	0
Trial Average	348	762	793	1229	1311				
P-value	0.0037	0.0043	0.0135	0.0821	0.0003	0.0028			

Table 5. Lint yields of CORE varieties for Liberty-based systems analyzed by location and with locations combined. Individual trials or locations are listed by number in ascending order based on the individual trial average. These trial numbers can be correlated to those described in Table 1. Means within a column (location) that are underlined and in bold font indicate that that variety was one of the top three varieties in that particular trial. The percent of trials that a particular variety was the top yielding variety*, within the top two yielding varieties or within the top three yielding varieties is listed in the far right columns.

Variety	Trial Number					Average Yield Over All Trials	Top Yielding Variety	Within % of Trials	
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>			Top 2	Top 3
	Lint Yield (Lbs/A)								
PHY 499 WRF	<u>403*</u>	<u>837*</u>	<u>871*</u>	<u>1317*</u>	<u>1436*</u>	<u>973*</u>	100	100	100
PHY 375 WRF	341	<u>790</u>	765	<u>1266</u>	<u>1319</u>	<u>896</u>	0	0	60
FM 1845 LLB2	325	<u>827</u>	<u>849</u>	1182	1297	<u>896</u>	0	20	40
FM 1773 LLB2	329	764	<u>850</u>	1176	1266	877	0	20	20
PHY 367 WRF	<u>358</u>	670	784	<u>1276</u>	1268	871	0	40	40
ST 4145 LLB2	334	757	697	1192	<u>1322</u>	860	0	20	20
PHY 565 WRF	<u>343</u>	686	733	1192	1271	845	0	0	20
Trial Average	348	762	793	1229	1311				

Interpretation of Results

There are two methods of data analysis presented in the tables above (observing non-significance from the top yielder, or observing the top three performing varieties within a particular location). Keep in mind that it is always better to observe variety performance with as much data, and with as many locations / years of data, as possible. It is difficult, and unwise, to make variety selections based on information derived from a single trial or only a few trials.

Naturally, growers want to see which varieties performed best at the location(s) nearest to their farm. However, it is important to keep in mind that rainfall and weather variation from field-to-field and year-to-year can be quite large. An individual variety's performance can vary greatly between trials and can usually be related to rainfall or other environmental factors. Most varieties, if placed in specific environments, can perform very well; however, the frequency in which a variety performs at or near the top is the primary indicator of stability, which is the best predictor of how a variety may perform on any farm. Therefore, observing variety performance for consistency and stability over a range of environments will usually provide growers with better information from which to make their selections.

There is a very wide range of environments illustrated in the tables above, which provides a much more robust approach when analyzing variety performance. When observing the data illustrated in the tables above, there are several things to consider. An initial response may be to look at overall average yields across all trials. This may be an indicator of overall performance; however, there is a wide range of yield environments, even among the dryland environments in 2011. First look for varieties that suggest a high degree of stability (ones that frequently perform at or near the top in a wide range of yield environments). Secondly, some varieties may only perform well in particular similar environments, which may suggest the type of environment that a variety should be positioned in order to be competitive. Although the varieties that illustrated a high degree of stability in 2011 performed well across a wide range of environments, occasionally a variety may only consistently perform in higher yield environments, which would indicate that that variety may be competitive when grown in irrigated environments with higher yield potential. A similar effect has been observed in previous years for varieties that have better performance in lower yield environments, suggesting that these varieties may be competitive in dryland environments with lower yield potential. Most growers have some fields that are very productive, which are usually irrigated (with little to no constraints for timely water application) and have better soils. These same growers may also have some fields that are less productive on average (sandier soils, dryland, etc). This is where variety placement becomes more important.

Another consideration for variety selection is the variation in average yield potential within one's own operation. Knowing the primary yield-limiting factor in a particular farm or field may provide some indicator of the best varieties to try. The primary yield-limiting factor that influences variety decisions may include one or more of the following: water, nematodes, weed control, stand establishment, obtaining optimal plant height or canopy closure, etc. Your county agent is a valuable resource for variety selection, and can help navigate you through this process.

