



2013 UGA Uniform Cotton Variety Performance Evaluation Program

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The UGA Cotton Variety Performance Evaluation Program was yet again a huge success in 2013, with more than 17 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 2013 industry leaders (Americot, Bayer CropScience, Croplan Genetics, Dyna-Gro, Dow AgroSciences and Monsanto Company), the Georgia Cotton Commission, Cotton Incorporated and cooperating growers. The implementation of this program has undoubtedly helped to address a primary need of Georgia cotton growers and will make an incalculable impact on the 2014 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 established this variety testing program in 2010. Our 2013 industry representatives (Americot, Bayer CropScience, Croplan Genetics, Dyna-Gro, Dow AgroSciences and Monsanto Company) were asked to provide commercially available cotton varieties that they considered their best-adapted varieties for Georgia. This uniform list of 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 or 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 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 yield environments, ranging from less than 640 to more than 1,514 lbs./A environments in 2013 alone. This approach allows variety assessment with respect to stability and performance across a wide range of yield environments, which encompasses factors such as planting date, harvest date, grower management, soil types, rainfall amounts/timing/patterns, degree of irrigation, etc. Additionally, this method provides evidence to support performance of a variety in particular situations; some varieties may be less consistent performers across the entire host of environments but may be competitive in certain situations or specific yield environments. In these cases, growers could justify planting such varieties; however, it is very important to position these varieties only in similar environments where they are likely to be competitive.

Variety Selection Considerations

There are several factors a grower may consider when selecting a cotton variety to plant. Variety selection is extremely important to a grower's profitability, as this decision sets the maximum genetic yield potential for a particular field for a given year. Other practices primarily help to preserve that genetic potential throughout the season. In the 2013 UGA On-Farm Cotton Variety Performance Evaluation Program, it was clear that improper variety selection could cost a grower an average of \$77 to \$234 per acre, depending on the error in variety selection. Variety selection decisions in and of themselves do not cost the grower anything; however, substantial losses could result from improper selection.

Growers should also consider the most yield-limiting factor in their fields when making variety decisions. Yield-limiting factors could include any agronomic or production practice, and could influence how a particular variety performs relative to others. Although water was not generally limited during 2013, the most common yield-limiting factor in South Georgia is water. In Georgia, we often observe that some varieties are only competitive in high-yield potential or heavily irrigated situations where water can be applied at appropriate amounts and in a timely manner. These same varieties may not be the best performers in fields with larger pivots that struggle to apply appropriate rates in a timely manner. Yields in dryland environments largely depend on rainfall amounts, frequency and timing. Soil type also determines water availability to the crop, which could also influence which varieties are most competitive in these situations. Lastly, growers should always observe technology packages, seed quality information, and seed treatments of particular brands and varieties to ensure that these factors meet their needs.

Individual Trial Information

On-farm replicated variety trials were planted in growers' fields in each of the counties listed in Table 1. UGA county agents implemented and conducted these trials with their local cooperating growers. Additionally, Andy Knowlton (UGA Microgin manager / operator) managed the ginning and processing of all cotton samples in this program. The participation of county agents, cooperating growers and the UGA Microgin were all critical to the success of this program, and their cooperation was truly appreciated. Local county agents are a valuable resource when it comes to variety selection, and growers should look to their expertise for these and other agronomic decisions.

Table 1. On-farm trials that included all 2013 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)
On-Farm Trials Managed According to a Roundup Ready Flex System			
1	Wayne	Dryland	640
2	Grady	Dryland	742
3	Crisp	Dryland	755
4	Jeff Davis	Dryland	846
5	Irwin	Irrigated	1039
6	Telfair	Irrigated	1087
7	Washington	Irrigated	1134
8	Burke	Dryland	1152
9	Berrien	Irrigated	1177
10	Pulaski	Irrigated	1241
11	Early	Dryland	1256
12	Midville	Irrigated	1326
13	Evans	Irrigated	1363
14	Midville	Dryland	1366
15	Cook	Dryland	1462
16	Worth	Irrigated	1477
17	Evans	Dryland	1514

Table 2. Lint yields of 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. Variety yields within a column (location) that are highlighted in red are not significantly different from the top yielding variety (the top yielding variety is underlined) according to LSD at $P \leq 0.1$. The percent of trials that a particular variety was the top yielder, or was statistically no different from the top yielder (for the 15 trials where statistical analysis could be conducted), 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					16
DP 1050 B2RF	557	788	706	341	1,076	1,128	1,242	1,321	1,255	1,332	1,326	1,400	1,418	1,607	1,653	1,510	1,517	1,222	20	73
DP 1137 B2RF	325	760	661	303	1,155	1,091	1,253	1,178	1,256	1,277	1,313	1,440	1,394	1,465	1,626	1,681	1,642	1,219	33	80
DP 1252 B2RF	373	684	717	830	1,080	1,256	1,153	1,186	1,175	1,373	1,382	1,442	1,545	1,487	1,480	1,582	1,605	1,215	20	73
CG 3787 B2RF	348	892	691	354	1,120	1,048	1,035	1,219	1,317	1,397	1,340	1,375	1,539	1,453	1,450	1,660	1,611	1,215	13	67
NG 5315 B2RF	378	676	750	824	1,141	1,053	1,054	1,238	1,207	1,261	1,338	1,302	1,390	1,424	1,370	1,555	1,569	1,166	0	53
PHY 499 WRF	709	700	310	385	945	1,151	1,129	1,076	1,203	1,195	1,192	1,346	1,369	1,315	1,613	1,294	1,519	1,144	7	40
PHY 339 WRF	366	831	362	344	1,021	1,012	1,141	1,176	1,240	1,009	1,156	1,275	1,388	1,248	1,466	1,470	1,457	1,133	0	47
DG 2610 B2RF	399	678	666	751	1,061	1,087	1,100	1,162	1,105	1,275	1,241	1,365	1,241	1,309	1,424	1,520	1,508	1,129	0	27
ST 6448 GLB2	575	736	363	821	1,002	1,067	1,248	1,013	1,136	1,221	1,230	1,268	1,200	1,302	1,269	1,442	1,567	1,115	7	20
PHY 575 WRF	580	856	689	392	934	988	1,230	1,009	1,035	1,061	1,306	1,221	1,341	1,308	1,406	1,410	1,422	1,099	0	13
ST 4946 GLB2	335	671	796	372	975	1,053	934	1,086	1,184	1,337	1,106	1,217	1,347	1,241	1,427	1,351	1,418	1,097	0	33
FM 1944 GLB2	529	633	350	340	958	1,112	1,090	1,156	1,014	1,157	1,142	1,265	1,185	1,228	1,351	1,254	1,334	1,064	0	20
Trial Average	640	742	755	846	1,039	1,087	1,134	1,152	1,177	1,241	1,256	1,326	1,363	1,366	1,462	1,477	1,514			
LSD ($p \leq 0.1$)	102	---	148	69	58	132	113	189	146	181	---	80	172	78	115	127	54	45		

Table 3. Lint yields of 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 highlighted in red indicate that that variety was one of the numerically top three varieties in that particular trial. The percent of trials that a particular variety was the top yielding variety 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 the Top 3
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17			
DP 1050 B2RF	657	788	706	841	1,076	1,128	1,242	1,324	1,253	1,332	1,326	1,400	1,418	1,607	1,659	1,510	1,517	1,222	18	47
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Interpretation of Results

The UGA On-Farm Cotton Variety Performance Evaluation Program illustrates variety performance in the environments represented in each respective year. This and other information is also represented in the online UGA Cotton Variety Performance Calculator, which can be found at www.ugacotton.com. The results illustrated in both of these resources only represent variety performance, and do not intend to predict variety performance in 2014 and beyond.

There are two methods of data analysis presented in the tables above (observing non-significance from the top yielder, or observing the three top 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 yield-limiting or 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 across planting dates, harvest dates, grower management, rainfall patterns or amounts, degree of irrigation, etc. Observing variety performance for consistency and stability over a range of environments will usually provide growers with better information from which to make their decisions.

There is a wide range of environments illustrated in the tables, which provides a much more robust approach when analyzing variety performance. When observing the data illustrated in the tables, 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 2013. 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 planted in order to be competitive. Although the varieties that illustrated a high degree of stability in 2013 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 only 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 positioning becomes more important. Typically, environments averaging less than 1,000 lbs./A indicate that some level of drought stress was encountered during the season. In 2013, however, environments averaging below 1,000 lbs./A were primarily the result of excessive waterlogging, thus resulting in lower yields. Therefore, observing multi-year data would be a good strategy for determining dryland (or low-yield potential) variety decisions for 2014.

In 2013, DP 1050 B2RF, DP 1137 B2RF and DP 1252 B2RF were the top-performing varieties in more than 20 percent of trials where statistical analysis could be conducted. In these same trials, DP 1050 B2RF, DP 1137 B2RF, DP 1252 B2RF and CG 3787 B2RF performed statistically similar to the top variety in more than 65 percent of trials. Additionally, NG 5315 B2RF, PHY 499 WRF and PHY 339 WRF performed similarly to the top variety in 40 to 53 percent of trials. When observing the top three varieties in all 17 trials, DP 1050 B2RF, DP 1137 B2RF, DP 1252 B2RF and CG 3787 B2RF were the top varieties in 18 to 29 percent of trials and performed within the top three varieties in 47 to 53 percent of trials. NG 5315 B2RF and PHY 499 WRF performed within the top three varieties in 24 percent of trials.

The 2013 season should be defined as one of the wettest seasons on record. Environments averaging less than 1,000 lbs./A resulted in substantial variability, which was observed in higher-yielding trials as well. Due to the large variability and excessive rainfall, neither performance in drought-stressed environments nor trends regarding variety positioning into particular environments could be observed; therefore, growers are strongly encouraged to evaluate multi-year data, especially when making decisions for dryland environments that typically encounter some level of drought stress.

Variety decisions can often be complex, but these decisions should be made using as many replicated trials, environments and years as possible. Your local county agent is an excellent resource for more information about this program and should be consulted when making variety selection decisions for 2014. Additionally, growers are strongly encouraged to observe data from the Official Variety Trials (OVT) using the UGA Cotton Variety Performance Calculator at www.ugacotton.com and www.swvt.uga.edu, as these trials contain many more varieties than can be accommodated in the on-farm trials. Some brands offer additional competitive varieties than are included in the on-farm trials and are also worthy of consideration.