2023 UGA
On-Farm Cotton Variety
EVALUATION PROGRAM

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The UGA On-Farm Cotton Variety Evaluation Program continues to be a successful program with 24 individual trials throughout the cotton producing regions of Georgia. This program would not be possible without UGA county Extension agents, our industry partners (Americot, BASF Corporation, Bayer CropScience, Nutrien, and WinField United), the Georgia Cotton Commission, Cotton Incorporated, and grower cooperators. Since the implementation of this program it has made a tremendous impact on variety selection for our growers from year to year.

Program Description

In 2010, the UGA cotton agronomists implemented this variety testing program. Our industry partners were asked to provide their most well-suited varieties for Georgia. Historically, the varieties evaluated in this trial have accounted for nearly 75% of the planted acreage in Georgia in the same year. These varieties were planted in replicated trials in growers' fields throughout cotton-producing regions of Georgia through coordination with the county Extension agents. The trials were managed and replicated by the grower with the assistance of the coordinating county agent to achieve realistic and statistically sound results.

Seedcotton samples from each variety were collected upon harvest of each trial and ginned at the UGA MicroGin to provide realistic values for lint percentage and fiber quality. A major benefit of this program is that a wide range of yield environments, with trial averages ranging from 779 to 1,886 lb per acre in 2023. This approach allows for a consistent assessment across yield environments which account for multiple factors including planting date, harvest date, grower management, soil types, rainfall amounts/timing/patterns, degree of irrigation, etc. Not only that, but it could provide evidence that some varieties perform better in certain situations or yield environments. This could justify planting a certain variety, but it is of paramount importance to place these varieties only where they are competitive.

Variety Selection Considerations

Choosing a cotton variety is one of the most important decisions a grower makes, as many other management decisions are influenced as a result. Trait packages can directly influence nematode, insect, disease, and weed management strategies. Additionally, other variety characteristics including leaf pubescence or growth habit can influence these decisions as well. Not to mention that varieties differ in response to plant growth regulators. Although variety selection influences all of these decisions, the biggest decision that is influenced is the maximum genetic potential of that variety for a particular field in a given year. In the 2023 UGA On-Farm Cotton Variety Evaluation Program, it was determined that, on average, improper variety selection could cost a grower up to $127 of potential return per acre. This was calculated based on the average price of cotton in 2023 and the difference between the top and bottom yielding variety in this trial in the same year. Although the variety selection decision does not directly cost the grower anything, substantial losses could occur from improper variety selection and planting.

When choosing a variety, growers must consider the most yield limiting factor in their field. Growers may experience multiple yield limiting factors in a single field, which could include any agronomic practice or negative influences of nematodes, diseases, insects, or weeds. However, one of the most yield limiting factors in Georgia is the ability to utilize irrigation in a timely manner. Not unique to this year's trials, there are varieties that perform better in irrigated environments. Dryland cotton production is far more dependent on rainfall, and there might be varieties that perform better in those environments. Soil type also influences the availability of water, which is why it is beneficial to have these trials in both dryland and irrigated environments across different soil types. Additionally, other factors have a direct impact on yield potential in certain fields. Growers should take trait packages (nematode, disease, insect, or herbicide tolerance), seed quality information, and seed treatments into account so that their needs are met for their specific production environments.

Individual Trial Information

On-farm replicated variety trials were planted in growers' fields in each of the counties listed in Table 1. These counties can also be found highlighted in Figure 1. Additional information on planting, defoliation, and harvest dates can be found in Table 2.

Each year, the participation of county agents, grower cooperators, and the UGA MicroGin make this program possible, and their cooperation is always appreciated. When evaluating variety selection, growers should look to their local UGA county agent for their expertise in this area, as well as other production decisions throughout the growing season.

Table 1. On-farm variety trial locations for 2023.

Trial Number	County	Environment	Trial Average (lb/acre)
1	Mitchell	Dryland	779
2	Atkinson	Dryland	796
3	Irwin	Dryland	908
4	Colquitt	Dryland	1,004
5	Telfair	Dfyland	1,031
6	Grady	Dryland	1,061
7	Turner	Dryland	1,096
8	Tattnall	Dryland	1,158
9	Burke	Dryland	1,177
10	Sumter	Irrigated	1,187
11	Macon	Irrigated	1,194
12	Seminole	Irrigated	1,200
13	Dooly	Irrigated	1,219
14	Worth	Irrigated	1,283
15	Coffee	Irrigated	1,356
16	Effingham	Irrigated	1,359
17	Toombs	Irrigated	1,362
18	Burke	Irrigated	1,371
19	Miller	Irrigated	1,436
20	Cook	Irrigated	1,436
21	Mitchell	Irrigated	1,496
22	Pulaski	Irrigated	1,548
23	Colquitt	Irrigated	1,591
24	Oconee	Dryland	1,886

Note. Trials are listed by number in ascending order based on trial average. These trial numbers can be correlated to those in the following tables.

Interpretation of Results

Although the UGA On-Farm Cotton Variety Evaluation program is conducted annually, it only demonstrates variety performance in each respective year. Therefore, these results document variety performance in 2023 and do not intend to predict variety performance for future years. To determine variety stability, it is best to evaluate variety performance over multiple years with as much data as possible. It is difficult to make proper variety decisions based on one year of data or a single trial.

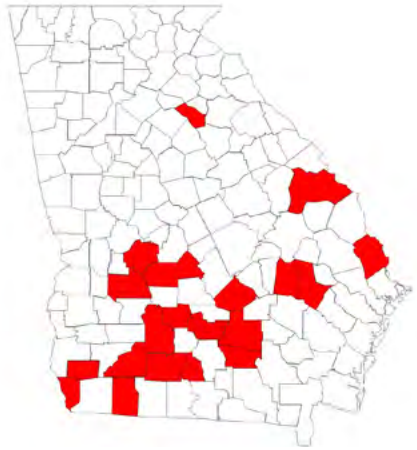

Figure 1. Counties Represented in the 2023 On-Farm Variety Evaluation Program.
Note. Counties with a trial are highlighted in red.

Although the On-Farm Variety Evaluation Program helps provide data on variety performance across a wide range of environments, the Statewide Variety Testing Program can also assist in variety selection. They have the ability to look at far more varieties, so this can assist with decisions on newer varieties or varieties that have not been tested in the on-farm program. The Statewide Variety Testing results for cotton over the past several years can be found at https://swvt.uga.edu.

Naturally, growers are inclined towards basing decisions on the trial locations closest to their farms; however, geographically close locations can greatly vary in yield based on crop management. For example, the lowest yielding location in 2023 was in Mitchell County, with an average yield of 779 lb per acre, and a trial in the same county yielded nearly twice as much (1,496 lb per acre). Environment and management both play huge roles in variety performance. Although certain varieties may perform better in certain environments, the frequency at which varieties are one of the higher yielding varieties can be an indicator of that variety's stability. Noting performance and stability across a wide range of environments can provide growers with great information for variety decisions.

The two methods of data analysis presented include observing above average performing varieties and statistical significance of lint yield when averaged across all locations. A wide range of environments was represented in the 2023 On-Farm Cotton Variety Evaluation Program, which is demonstrated in Table 1. Yield environments ranged from 779 to 1,886 lb per acre and included both irrigated and dryland environments across the cotton producing regions of Georgia. With this wide range of environments represented, growers should be able to determine which variety has the best fit in their environment.

Table 3 shows yields for all 24 environments in 2023, with yields averaged over all locations. The top yielding varieties across all environments were ST 5091 B3XF, AR 9831 B3XF, DP 2333 B3XF, and ST 4595 B3XF. These varieties yielded above average in 92, 67, 54, and 75% of the locations, respectively. Also of note when looking across all locations is that five of the numerically highest yielding varieties all performed above the location average over 50% of the time.

Table 4 shows the locations that yielded below the overall trial average of 1,248 lb per acre. The top yielding variety in below average locations was ST 5091 B3XF, yielding above the location average 86% of the time. There were five other varieties in the top yielding group for below average locations, including DP 2333 B3XF, AR 9831 B3XF, DP 2038 B3XF, ST 4595 B3XF, and DG 3799 B3XF. In terms of variety stability, the top yielding group in below average yield environments performed above the location average 43%–86% of the time, with six of the top seven yielding varieties yielding above average 50% of the time or more in below average yield environments.

The locations that yielded above the overall average (Table 5) saw trends similar to that of the overall results. The top yielding variety in above average yield environments was AR 9831 B3XF, performing above average 90%

of the time. Of interest is that in above average yield environments in 2023, ST 5091 B3XF and ST 4595 B3XF were extremely consistent, yielding above average 100% of the time. Relative to stability, this was followed by DP 2038 B3XF (60%) and DP 2333 B3XF (60%). This indicates that six out of the seven numerically highest yielding varieties in above average yield environments yielded above average 60% of the time or more.

Turnout and fiber quality parameters for each variety, averaged across all locations, is found in Table 6. Statewide, 2023 was a good year in terms of fiber quality which can largely be attributed to the phenomenal harvest conditions we had. The seedcotton samples taken from the 2023 On-Farm Cotton Variety Evaluation Program and ginned at the UGA MicroGin mirror that. Averaged across locations, no variety was in the discount range relative to micronaire, fiber strength for every variety was strong, uniformity was intermediate, and color grades were standard for what we expect to see in Georgia. As these varieties represented the majority of cotton production in 2023 and will be planted on many acres in 2024, these parameters bode well for cotton producers in our state.

Variety selection is a complex decision that should be made using data from replicated trials as well as multiple years and environments. Your local UGA county Extension agent is an excellent resource for this and other production decisions as well. They can provide more information and should be consulted when making this important decision.

Table 2. Planting, Defoliation, and Harvest Dates for Each Variety Trial Location in 2023.

Trial Number	Planting Date	Defoliation Date	Harvest Date
1	5/3	11/1	11/20
2	5/8	10/23	11/9
3	5/19	11/15	11/30
4	5/15	10/24	11/14
5	5/17	10/31	11/29
6	6/5	11/8	12/8
7	5/27	10/31	11/30
8	5/16	11/16	11/30
9	5/10	9/22	11/30
10	5/12	10/18	11/2
11	6/1	11/3	11/14
12	6/8	11/4	12/7
13	5/5	10/17	11/2
14	5/18	10/16	11/1
15	5/8	10/6	10/25
16	5/16	10/25	11/10
17	5/8	10/5	10/19
18	6/5	11/3	11/30
19	5/30	11/4	11/20
20	4/25	11/21	10/10
21	5/4	10/2	10/24
22	5/26	10/18	11/14
23	5/30	11/1	11/20
24	5/17	10/17	11/9

Note. Trials are listed by number in ascending order based on trial average. These trial numbers corrspond to Table 1 and the following tables.

Table 3. Lint Yields of 10 Varieties Evaluated in 2023 Analyzed Across Location.

	Yield by Variety										
Trial Number	ST 5091 B3XF	AR 9831 B3XF	DP 2333 B3XF	ST 4595 B3XF	DP 2038 B3XF	DG 3799 B3XF	NG 3195 B3XF	AR 9371 B3XF	NG 4190 B3XF	DG 3528 B3XF	*Trial Average*
1	**874**	717	752	**833**	**784**	713	**882**	729	740	770	***779***
2	**798**	**845**	**891**	**831**	**801**	791	752	**811**	744	695	***796***
3	**980**	**939**	892	890	**930**	858	**948**	867	887	889	***908***
4	**1060**	**1010**	997	**1011**	**1073**	**1094**	**1017**	940	956	879	***1004***
5	**1073**	966	975	982	**1043**	**1053**	**1196**	941	**1066**	1018	***1031***
6	976	**1175**	**1087**	986	**1134**	**1215**	1037	1021	1016	966	***1061***
7	**1213**	1074	**1230**	1088	**1251**	**1186**	920	966	987	1039	***1096***
8	**1263**	1080	**1264**	**1193**	1085	1077	**1199**	1126	**1188**	1109	***1158***
9	**1350**	1134	1155	**1216**	1085	1099	**1231**	1095	**1217**	**1188**	***1177***
10	1121	**1271**	**1451**	**1237**	**1331**	1187	1051	1070	**1192**	963	***1187***
11	**1272**	**1453**	1150	**1264**	1029	1156	1173	**1321**	1140	986	***1194***
12	**1310**	**1296**	**1247**	1145	**1239**	**1283**	1149	**1205**	1074	1048	***1200***
13	**1306**	1219	1154	**1297**	1211	1157	**1227**	**1314**	1137	1173	***1219***
14	**1245**	1148	**1278**	1204	**1321**	**1287**	1236	1199	**1274**	1194	***1238***
15	**1422**	**1383**	1310	**1444**	1246	1235	1355	**1571**	**1395**	1197	***1356***
16	**1411**	**1577**	**1460**	**1439**	**1397**	1198	1305	**1402**	1225	1175	***1359***
17	**1468**	1322	**1677**	**1389**	1090	1322	1344	**1381**	**1447**	1182	***1362***
18	**1428**	**1450**	1331	**1404**	**1460**	**1436**	**1374**	1264	1327	1236	***1371***
19	**1542**	**1507**	1339	**1539**	**1468**	1433	1404	**1470**	1321	1336	***1436***
20	**1549**	**1599**	**1492**	**1490**	1484	1486	**1506**	1471	1414	1403	***1489***
21	**1541**	**1497**	1483	**1603**	1453	1453	1494	1452	1474	**1513**	***1496***
22	**1622**	**1580**	**1647**	**1561**	**1628**	**1573**	1505	1492	1462	1414	***1548***
23	**1676**	**1829**	**1730**	**1692**	**1648**	**1669**	1454	1484	1368	1358	***1591***
24	**1888**	**1963**	**2020**	**1919**	**1927**	1765	1776	1853	**1906**	1842	***1886***
Average Yield Over All Trials	1308	1293	1292	1277	1255	1238	1231	1227	1207	1149	
LSD ($p = 0.1$)	a	ab	ab	abc	bcd	cde	de	de	e	f	
% of trials											
Above Trial Average	92	67	54	75	67	38	38	33	29	8	

Note. Trials are listed vertically in order of increasing lint yield by location, with trial numbers being found in Table 1. Varieties that yielded above the trial average are bolded for each location. Overall average yields, statistical significance, and percent of the time a given variety performed above the trial average are listed in the bottom rows of the table. Yields followed by the same letter in the LSD row do not differ statistically.

Table 4. Lint Yields of 10 Varieties Evaluated in 2023 Analyzed Across *Below*-Average Yielding Locations (< 1,248 lb/acre).

	Yield (lb/acre) by Variety										
Trial Number	**ST 5091 B3XF**	**DP 2333 B3XF**	**AR 9831 B3XF**	**DP 2038 B3XF**	**ST 4595 B3XF**	**DG 3799 B3XF**	NG 3195 B3XF	NG 4190 B3XF	AR 9371 B3XF	DG 3528 B3XF	***Trial Average***
1	**874**	752	717	**784**	**833**	713	**882**	740	729	770	***779***
2	**798**	**891**	**845**	**801**	**831**	791	752	744	**811**	695	***796***
3	**980**	892	**939**	**930**	890	858	**948**	887	867	889	***908***
4	**1060**	997	**1010**	**1073**	**1011**	**1094**	**1017**	956	940	879	***1004***
5	**1073**	975	966	**1043**	982	**1053**	**1196**	**1066**	941	1018	***1031***
6	976	**1087**	**1175**	**1134**	986	**1215**	1037	1016	1021	966	***1061***
7	**1213**	**1230**	1074	**1251**	1088	**1186**	920	987	966	1039	***1096***
8	**1263**	**1264**	1080	1085	**1193**	1077	**1199**	**1188**	1126	1109	***1158***
9	**1350**	1155	1134	1085	**1216**	1099	**1231**	**1217**	1095	**1188**	***1177***
10	1121	**1451**	**1271**	**1331**	**1237**	1187	1051	1192	1070	963	***1187***
11	**1272**	1150	**1453**	1029	**1264**	1156	1173	1140	**1321**	986	***1187***
12	**1310**	**1247**	**1296**	**1239**	1145	**1283**	1149	1074	**1205**	1048	***1200***
13	**1306**	1154	**1219**	**1211**	**1297**	1157	**1227**	1137	**1314**	1173	***1219***
14	**1245**	**1278**	1148	**1321**	1204	**1287**	1236	**1274**	1199	1194	***1238***
Average Yield Over All Trials	1132	1109	1095	1094	1084	1083	1073	1044	1043	994	
LSD ($p = 0.1$)	a	ab	abc	abcd	abcd	abcd	bcd	cde	de	e	
% of trials											
Above Trial Average	86	50	50	71	57	43	50	36	29	7	

Note. Trials are listed vertically in order of increasing lint yield by location, with trial numbers corresponding to those in Table 1. Varieties that yielded above the trial average are bolded for each location. Overall average yields, statistical significance, and percent of the time a given variety performed above the trial average are listed in the bottom rows of the table. Yields followed by the same letter in the LSD row do not differ statistically.

Table 5. Lint Yields of 10 Varieties Evaluated in 2023 Analyzed Across *Above*-Average Yielding Locations (> 1,248 lb/acre).

	Yield (lb/acre) by Variety										
Trial Number	AR 9831 B3XF	ST 5091 B3XF	DP 2333 B3XF	ST 4595 B3XF	AR 9371 B3XF	DP 2038 B3XF	DG 3799 B3XF	NG 3195 B3XF	NG 4191 B3XF	DG 3528 B3XF	*Trial Average*
15	**1383**	**1422**	1310	**1444**	**1571**	1246	1235	1355	**1395**	1197	***1356***
16	**1577**	**1411**	**1460**	**1439**	**1402**	**1397**	1198	1305	**1225**	1175	***1359***
17	1322	**1468**	**1677**	**1389**	**1381**	1090	1322	1344	**1447**	1182	***1362***
18	**1450**	**1428**	1331	**1404**	1264	**1460**	**1436**	**1374**	1327	1236	***1371***
19	**1507**	**1542**	1339	**1539**	**1470**	**1468**	1433	1404	1321	1336	***1436***
20	**1599**	**1549**	**1492**	**1490**	1471	1484	1486	**1506**	1414	1403	***1489***
21	**1497**	**1541**	1483	**1603**	1452	1453	1453	1494	1474	**1513**	***1496***
22	**1580**	**1622**	**1647**	**1561**	1492	**1628**	**1573**	1505	1462	1414	***1548***
23	**1829**	**1676**	**1730**	**1692**	1484	**1648**	**1669**	1454	1368	1358	***1591***
24	**1963**	**1888**	**2020**	**1919**	1853	**1927**	1765	1776	**1906**	1842	***1886***
Average Yield Over All Trials	1571	1555	1549	1548	1484	1480	1457	1452	1434	1366	
LSD ($p = 0.1$)	a	a	ab	ab	bc	c	c	c	c	d	
	% of trials										
Above Trial Average	90	100	60	100	40	60	30	20	30	10	

Note. Trials are listed vertically in order of increasing lint yield by location, with trial numbers corresponding to those in Table 1. Varieties that yielded above the trial average are bolded for each location. Overall average yields, statistical significance, and percent of the time a given variety performed above the trial average are listed in the bottom rows of the table. Yields followed by the same letter in the LSD row do not differ statistically.

Table 6. Turnout and Fiber Quality Data Averaged Across All 2023 On-Farm Variety Evaluation Locations.

	Variety									
Characteristic	DP 2038 B3XF	DP 2333 B3XF	ST 4595 B3XF	ST 5091 B3XF	NG 3195 B3XF	NG 4190 B3XF	DG 3528 B3XF	DG 3799 B3XF	AR 9371 B3XF	AR 9831 B3XF
Turnout	43.02%	41.93%	40.58%	40.29%	40.14%	39.29%	39.01%	39.69%	40.76%	40.29%
Color	31-2	41-1	31-2	41-1	31-2	41-1	41-1	31-2	41-1	31-2
Staple	36	37	37	37	37	37	38	38	37	36
Mic	4.3	4.4	4.3	4.1	4.2	4.1	4.0	4.2	4.3	4.5
Strength	30.2	30.0	30.4	29.9	30.5	30.5	30.5	31.6	29.9	30.8
Leaf	2.2	2.7	3.1	2.8	2.5	2.8	3.1	2.8	2.5	2.2
Rd	78.2	78.0	77.8	78.3	78.5	77.7	77.5	77.5	78.3	77.9
+B	7.5	7.0	7.3	7.1	7.1	6.9	7.2	7.8	7.1	7.5
Trash	0.2	0.3	0.4	0.3	0.3	0.3	0.4	0.4	0.3	0.3
Length	1.11	1.14	1.17	1.15	1.15	1.16	1.18	1.17	1.15	1.14
Uniformity	81.45	82.05	82.57	81.70	82.94	82.84	82.90	82.10	82.83	82.08
Loan value (¢/lb)	54.53	54.43	55.21	54.79	55.22	54.19	54.12	55.19	55.22	55.06

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