



UT Cotton Agronomy
Department of Plant Sciences
University of Tennessee



Tennessee Cotton Variety Trial Results | 2015

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Introduction

The University of Tennessee Cotton Agronomy Program provides an unbiased evaluation of experimental and commercial varieties available for production in Tennessee each year. The 2015 program consisted of three major types of trials: the Official Variety Trials (OVTs), large replicated on-farm variety trials, and the County Standard Trials (CSTs). The OVTs are small plot, replicated variety trials typically located on AgResearch and Education Centers and are composed of experimental and commercial varieties. The large replicated on-farm trials and CSTs are large plot variety trials located throughout the Western and Central regions of Tennessee and are only composed of major commercial cultivars. Six OVTs, four large replicated trials, and 14 CSTs were conducted during the 2015 season (Fig.1). Information reported from these trials includes yield, fiber quality data, and Commodity Credit Corporation (CCC) Loan values. Additionally, selected in-season measurements of growth and development are also reported from the OVTs. A glossary is included at the end of this report to define technical terms and abbreviations used.

This publication is intended to help cotton producers identify varieties that are high yielding, stable in yield performance across years, and produce high quality fiber; therein, included information should provide those in the seed industry, crop consultants, and the UT Extension service insight into varietal adaptation of all tested varieties to Tennessee field environments.

General Procedures

Official Variety Trials

Six OVTs were planted in the 2015 growing season and five were harvested. These included three locations on University of Tennessee Research and Education Centers and three locations on production fields. Seed of commercial cultivars and experimental strains was provided by the respective companies. In all, 36 varieties were submitted. Each variety was randomly assigned to four plots at each location arranged in a randomized complete block design. Individual plots consisted of two 30 ft rows. Soil samples were collected prior to planting and fertilizer and lime were applied according to test results and UT recommendations. At planting, a systemic insecticide and fungicide were applied in-furrow.

Between 120 and 130 days after planting (DAP), plant height, node of first fruiting branch, total nodes, nodes above cracked boll to the highest harvestable boll (NACB) were counted in each plot. Relative maturity of the entries was estimated by assuming 50 DD60s (degree-days, base 60 F) per main-stem node to open successive first-position bolls, up to the highest harvestable boll. Plots were spindle-picked between 140 and 150 DAP. Weed and pest control measures were uniformly applied to all plots per UT-recommendations. Seed cotton was harvested from each plot by a two row picker outfitted with an in-basket, catch-and-weigh system. Each plot was subsequently harvested, weighed, sub-sampled and dumped into the basket during picking. Subsamples from each location were then air-dried, bulked by varietal entry and weighed prior to ginning.

Large Plot Variety Trials

Four large replicated CI trails and fourteen CSTs were conducted in the 2015 growing season. These included one location on the West Tennessee Research and Education Center, one location on the Ames Plantation Research and Education Center, and twelve locations on production fields. Seed of commercial varieties was provided by each respective company. In all, 14 varieties were submitted. Each variety was planted in a single plot at each location and was maintained per the individual producer's production practices. Plot size ranged from four to eight rows wide and 300 to 2500 ft+ in length depending on producer equipment and field size.

At harvest, plots were picked with the producer's equipment. If using a basket-style picker, weights were collected by catching harvested plots from the picker with a weighing boll buggy prior to dumping into the

module builder. If using an on-board round module picker, modules were wrapped at the end of each plot and weighed on a set of transportable scales. Regardless of picker type, an 8-12 lb sub-sample was collected after the picked plot weight was determined. These samples were then air dried and weighed prior to ginning.

Ginning

Samples were ginned at the University of Tennessee Cotton MicroGin located at the West Tennessee Research and Education Center in Jackson, TN. This is a 20-saw gin equipped with a stick machine, inline cleaners, and two lint cleaners. No heat was applied at ginning. Lint yields on a per-plot basis were then calculated from gin turnouts and harvested plot areas. A subsample of lint from each ginned sample was submitted to the USDA Cotton Classing Office in Memphis, TN for HVI analysis.

Statistical analysis

Due to by-location bulking of the OVT samples prior to ginning, calculation of mean separation of fiber quality parameters between varieties at each OVT location was not possible. Mean separation of fiber quality was calculated, however, for the combined dataset including all analyzed locations by considering location as replication. Mean separation of OVT variety yield by location was calculated by a PROC MIXED model (SAS Institute, Inc., Cary, NC) considering replication to be random. Combined analysis was also calculated by a PROC GLM model, with location and replication nested in location considered to be random. Mean separation of fiber quality and lint yield for the CST combined dataset was calculated by considering location as replication. This analysis was calculated by a PROC GLM model considering replication as a random factor and variety as a fixed factor. Similarly, the replicated CI trials were analyzed considering location and replication nested in location to be random.

Seed Sources

Companies which participated in the 2015 University of Tennessee Cotton Variety Testing Program and their subsequent entries are listed below:

- American Cotton Breeders, Inc. 5210 88th Street, Lubbock, TX 79424
NG 3405 B2XF AMDG 7824
NG 3406 B2XF
- Bayer CropScience, 311 Poplar View Lane West, Collierville, TN 38017
ST 4747 GLB2 BX 1531 GLT
ST 4946 GLB2 BX 1532 GLT
ST 5115 GLT ST 4949 GLT
ST 5032 GLT ST 4848 GLT
BX 1634 GLT
- Croplan Genetics, 8700 Trail Lake Dr., Suite 100, Memphis, TN 38125
CG 3475 B2XF
- Crop Production Services, 3005 Rocky Mountain Ave., Loveland, CO 80538
DG 3385 B2XF DG CT15426 B2XF
DG CT14515 B2RF DG 2570 B2RF
- International Seed Technology, 7950 NW 53rd St. Suite 337, Miami, FL 33166
BRS 286 BRS 335
BRS 293
- Monsanto, P.O. Box 157, Scott, MS 38772
DP 1518 B2XF DP 1311 B2RF
DP 1522 B2XF DP 1321 B2RF
DP 1612 B2XF MON 15R513 B2XF
DP 1614 B2XF

(continued on next page)

Seed Sources (continued)

- PhytoGen Seed Co., P.O. Box 27, Leland, MS 38756
PHY 222 WRF PHY 444 WRF
PHY 312 WRF PHY 487 WRF
PHY 333 WRF PHY 495 W3RF
PHY 339 WRF PHY 496 W3RF
PHY 427 WRF PHY 499 WRF
- Seed Source Genetics, 5159 FM 3354, Bishop, TX 78343
SSG UA 222 SSG HQ 210 CT

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Finally, we would like to recognize the USDA-AMS Cotton Division Classing Office in Memphis, TN which provided the fiber quality data reported herein and all who were involved in plot establishment, maintenance and harvest. Thank you.

2015 Official Variety Trial Results



Table 1. 2015 Official variety trial details.

Location	Planting Date	Soil Type	Tillage	Fertility	Irrigation	Harvest Date
Ames	05/06/2015	Memphis Silt Loam	No-Till	80-var P&K	None	11/13/2015
Huntersville	06/05/2015	Calloway Silt Loam	No-Till	80-var P&K	None	10/23/2015
Halls*	05/14/2015	-----N/A-----				
MREC ¹	05/06/2015	Collins Silt Loam	No-Till	88-0-90-10	None	11/05/2015
Ridgely	05/05/2015	Reelfoot Silt Loam	No-Till	90- var P&K	None	10/30/2015
WTREC ²	05/04/2015	Collins Silt Loam	No-Till	90-0-0-0	None	10/20/2015

¹ Milan Research and Education Center, Milan, TN

² West Tennessee Research and Education Center, Jackson, TN.

Table OVT1. Average lint yield, gin turnout, and fiber quality of 36 entries in the 2015 Tennessee Official Variety Trials averaged over the Grand Junction, Huntersville, Milan, and Ridgely locations, listed by yield rank.

Yield Rank	Variety	Lint Yield (lb/ac)	Gin Turnout (%)	Mic	Fiber Length (in.)	Strength (g/tex)	Uniformity (%)
1	PHY 333 WRF	1519	38.4	4.2	1.21	31.6	83.9
2	PHY 499 WRF	1519	38.5	4.6	1.19	32.8	84.3
3	ST 4747 GLB2	1499	38.4	4.4	1.21	31.4	82.1
4	DP 1614 B2XF	1483	39.8	4.6	1.22	30.6	84.0
5	NG 3405 B2XF	1476	38.2	4.4	1.17	28.8	83.0
6	PHY 222 WRF	1475	37.9	4.5	1.18	31.1	83.2
7	DG CT15426 B2XF	1446	39.2	4.6	1.18	30.7	83.8
8	PHY 339 WRF	1444	37.4	4.2	1.20	32.1	83.5
9	ST 5115 GLT	1434	38.0	4.2	1.21	32.6	83.5
10	DP 1522 B2XF	1433	38.1	4.6	1.21	31.8	84.2
11	AMDG 7824	1430	38.4	4.3	1.18	28.9	83.2
12	NG 3406 B2XF	1428	37.8	4.4	1.18	31.0	83.7
13	PHY 444 WRF	1420	37.9	4.1	1.25	32.0	83.9
14	ST 4949 GLT	1418	39.2	4.4	1.19	31.7	83.3
15	DP 1612 B2XF	1402	37.1	4.5	1.22	33.2	84.3
16	PHY 312 WRF	1402	37.9	4.3	1.21	31.7	83.5
17	BX 1634 GLT	1399	38.2	4.5	1.21	33.2	84.1
18	ST 5032 GLT	1399	37.3	4.2	1.23	32.8	83.2
19	DP 1518 B2XF	1372	37.6	4.1	1.21	30.3	83.4
20	ST 4848 GLT	1366	38.1	4.3	1.19	30.8	83.4
21	ST 4946 GLB2	1362	37.4	4.5	1.18	33.2	83.0
22	MON 15R513 B2XF	1360	37.6	4.4	1.23	32.0	83.9
23	PHY 495 W3RF	1347	38.5	4.5	1.19	33.3	84.3
24	PHY 496 W3RF	1344	38.2	4.4	1.22	32.3	83.9
25	BRS 335	1330	36.7	4.3	1.19	32.9	82.9
26	DG CT14515 B2RF	1329	38.4	4.4	1.21	34.0	83.8
27	CG 3475 B2XF	1324	36.5	4.5	1.19	31.6	84.1
28	SSG HQ 210 CT	1319	36.4	4.5	1.19	33.5	84.0
29	PHY 427 WRF	1317	36.7	4.1	1.19	32.3	83.4
30	BX 1532 GLT	1291	40.0	4.4	1.19	30.9	83.3
31	DG 3385 B2XF	1275	37.4	4.6	1.20	32.1	84.1
32	PHY 487 WRF	1253	37.1	4.3	1.18	31.9	83.4
33	SSG UA 222	1253	36.2	4.2	1.24	31.3	83.0
34	BRS 293	1242	37.0	4.5	1.19	34.0	82.9
35	BX 1531 GLT	1221	38.4	4.5	1.19	31.8	82.9
36	BRS 286	1189	36.1	4.3	1.19	33.6	82.7
Average		1376	37.8	4.4	1.20	31.9	83.5
LSD ($p \leq 0.05$)		206	2.0	0.3	0.04	1.8	1.2

Tennessee AgResearch data of Raper et al. (2015).

Table OVT2. Lint yield, gin turnout, and fiber quality of 35 entries for the Grand Junction location of the 2015 Tennessee Official Variety Trial listed by trial yield rank.

Yield Rank	Variety	Lint Yield (lb/ac)	Gin Turnout (%)	Mic	Fiber Length (in.)	Strength (g/tex)	Uniformity (%)
1	ST 4747 GLB2	2098	39.1	4.2	1.20	30.3	81.5
2	DP 1614 B2XF	2098	40.9	4.6	1.19	29.5	82.6
3	PHY 444 WRF	2003	39.1	3.8	1.23	31.2	82.0
4	DG CT14515 B2RF	1999	39.0	4.2	1.19	31.8	83.0
5	PHY 333 WRF	1989	38.3	4.2	1.18	30.0	83.1
6	NG 3406 B2XF	1942	38.5	4.4	1.17	29.0	82.7
7	ST 5115 GLT	1934	38.2	3.9	1.20	32.7	82.7
8	BX 1532 GLT	1924	42.1	4.1	1.16	29.6	82.1
9	DP 1518 B2XF	1909	37.9	3.8	1.19	31.0	82.7
10	BX 1634 GLT	1895	37.7	4.4	1.17	32.4	83.4
11	DG CT15426 B2XF	1883	39.7	4.4	1.13	28.0	82.8
12	BX 1531 GLT	1872	42.0	4.2	1.16	30.7	81.2
13	ST 4949 GLT	1845	40.5	4.2	1.17	31.0	82.0
14	PHY 339 WRF	1839	35.3	4.2	1.18	31.4	83.1
15	AMDG 7824	1837	37.9	4.1	1.14	26.7	81.9
16	NG 3405 B2XF	1819	37.9	4.1	1.13	26.0	82.1
17	PHY 499 WRF	1800	37.4	4.5	1.15	33.7	84.2
18	PHY 312 WRF	1798	37.3	4.1	1.21	30.0	83.1
19	DP 1612 B2XF	1792	36.9	4.4	1.20	32.5	83.1
20	PHY 495 W3RF	1761	39.6	4.3	1.15	32.6	83.1
21	ST 4848 GLT	1729	39.3	4.1	1.15	30.2	82.1
22	PHY 496 W3RF	1722	39.1	4.3	1.14	31.2	82.5
23	ST 4946 GLB2	1715	36.5	4.3	1.15	33.0	81.6
24	ST 5032 GLT	1687	35.6	3.9	1.21	32.9	82.2
25	SSG HQ 210 CT	1686	34.3	4.4	1.15	31.0	82.9
26	SSG UA 222	1684	35.4	4.0	1.21	30.2	82.6
27	BRS 335	1680	34.7	4.1	1.18	32.0	83.2
28	MON 15R513 B2XF	1660	37.3	4.5	1.21	31.2	83.0
29	DP 1522 B2XF	1648	36.7	4.4	1.18	30.9	82.7
30	PHY 487 WRF	1622	34.7	3.9	1.14	30.5	81.7
31	PHY 222 WRF	1608	37.2	4.5	1.16	30.1	82.4
32	BRS 293	1602	36.1	4.3	1.15	32.1	80.6
33	BRS 286	1597	33.7	4.2	1.18	33.2	81.8
34	CG 3475 B2XF	1595	33.9	4.4	1.16	30.0	83.4
35	DG 3385 B2XF	1585	37.3	4.7	1.17	30.4	83.3
36	PHY 427 WRF	1528	34.3	3.8	1.15	32.0	83.4
Average		1789	37.5	4.2	1.17	30.9	82.6
LSD ($p \leq 0.05$)		295					

Tennessee AgResearch data of Raper et al. (2015).

Table OVT3. Lint yield, gin turnout, and fiber quality of 36 entries for the Huntersville, TN location of the 2015 Tennessee Official Variety Trial listed by trial yield rank.

Yield Rank	Variety	Lint Yield (lb/ac)	Gin Turnout (%)	Mic	Fiber Length (in.)	Strength (g/tex)	Uniformity (%)
1	PHY 333 WRF	1512	40.9	4.2	1.25	33.9	85.0
2	PHY 222 WRF	1505	39.0	4.6	1.21	32.8	84.7
3	PHY 339 WRF	1439	38.8	4.1	1.22	33.6	83.6
4	DP 1522 B2XF	1393	39.8	4.8	1.24	32.1	85.4
5	CG 3475 B2XF	1376	39.0	4.7	1.21	33.1	85.8
6	ST 4949 GLT	1345	42.3	4.4	1.19	31.7	84.3
7	ST 5032 GLT	1344	38.9	4.0	1.26	33.4	83.9
8	PHY 499 WRF	1342	39.7	4.8	1.21	34.5	85.8
9	ST 4747 GLB2	1255	40.3	4.4	1.22	32.6	81.9
10	NG 3406 B2XF	1253	39.3	4.4	1.19	32.2	84.9
11	DP 1612 B2XF	1218	38.4	4.4	1.27	35.2	86.2
12	DP 1614 B2XF	1216	41.8	4.5	1.28	31.9	85.5
13	PHY 444 WRF	1214	39.8	3.8	1.31	33.3	85.4
14	AMDG 7824	1180	40.4	4.4	1.18	29.5	84.0
15	PHY 312 WRF	1166	38.5	4.3	1.23	33.3	84.4
16	NG 3405 B2XF	1163	40.4	4.3	1.18	29.0	83.4
17	PHY 495 W3RF	1065	40.0	4.6	1.20	34.0	86.3
18	BX 1634 GLT	1058	40.1	4.4	1.24	34.8	85.3
19	ST 5115 GLT	1050	38.8	4.2	1.22	33.8	84.0
20	MON 15R513 B2XF	1001	37.9	4.3	1.25	32.1	85.1
21	ST 4946 GLB2	997	38.1	4.6	1.20	35.2	83.8
22	SSG UA 222	988	37.7	4.1	1.32	33.3	84.2
23	PHY 427 WRF	945	36.3	4.0	1.19	33.1	83.7
24	DG 3385 B2XF	945	39.2	4.7	1.26	33.8	85.7
25	DG CT15426 B2XF	943	40.3	4.7	1.23	32.3	85.3
26	PHY 496 W3RF	933	38.1	4.5	1.26	33.9	85.7
27	SSG HQ 210 CT	932	36.5	4.8	1.20	35.8	85.1
28	DP 1518 B2XF	890	39.2	4.2	1.28	30.3	85.6
29	ST 4848 GLT	829	39.1	4.5	1.22	31.1	85.3
30	BX 1532 GLT	786	41.7	4.5	1.22	32.8	84.3
31	PHY 487 WRF	776	37.6	4.6	1.18	32.6	84.1
32	BRS 335	775	37.0	4.3	1.20	35.8	83.5
33	BRS 286	766	36.6	4.4	1.18	34.8	83.8
34	DG CT14515 B2RF	758	39.1	4.5	1.26	35.4	85.0
35	BX 1531 GLT	738	40.2	4.6	1.20	32.5	83.9
36	BRS 293	687	37.4	4.5	1.21	37.5	83.8
Average		1077	39.1	4.4	1.23	33.3	84.7
LSD ($p \leq 0.05$)		333					

Tennessee AgResearch data of Raper et al. (2015).

Table OVT4. Lint yield, gin turnout, and fiber quality of 36 entries for the Milan, TN location of the 2015 Tennessee Official Variety Trial listed by trial yield rank.

Yield Rank	Variety	Lint Yield (lb/ac)	Gin Turnout (%)	Mic	Fiber Length (in.)	Strength (g/tex)	Uniformity (%)
1	BRS 335	1006	38.2	4.4	1.14	33.6	83.7
2	DG CT15426 B2XF	990	40.4	4.7	1.17	33.1	84.8
3	ST 4848 GLT	956	37.6	4.5	1.16	31.5	83.2
4	PHY 427 WRF	947	37.2	4.5	1.16	31.5	84.0
5	PHY 499 WRF	938	37.8	4.8	1.15	30.9	84.0
6	DP 1614 B2XF	921	38.9	4.6	1.19	35.0	85.7
7	DP 1518 B2XF	907	37.2	4.7	1.21	32.4	83.7
8	ST 4949 GLT	871	39.5	4.5	1.18	33.7	86.2
9	DG CT14515 B2RF	869	38.9	4.7	1.16	31.5	84.5
10	PHY 312 WRF	852	38.1	4.5	1.14	30.1	82.7
11	ST 5115 GLT	850	37.4	4.6	1.17	35.3	84.3
12	ST 4747 GLB2	836	36.8	4.5	1.15	32.4	83.5
13	BX 1634 GLT	833	38.2	4.3	1.18	32.8	83.3
14	MON 15R513 B2XF	817	38.0	4.6	1.18	34.3	85.1
15	BRS 293	814	37.9	4.1	1.16	33.0	82.7
16	SSG HQ 210 CT	810	39.0	4.6	1.18	33.0	83.3
17	PHY 339 WRF	807	38.7	4.5	1.20	32.9	86.5
18	ST 4946 GLB2	806	37.4	4.5	1.19	32.5	84.9
19	DP 1522 B2XF	795	38.1	4.4	1.19	33.5	85.3
20	NG 3406 B2XF	776	37.5	4.6	1.13	31.0	83.4
21	NG 3405 B2XF	768	36.6	4.7	1.20	33.7	85.7
22	PHY 222 WRF	761	38.0	4.4	1.19	31.7	83.6
23	PHY 444 WRF	761	37.0	4.6	1.15	31.1	83.0
24	PHY 333 WRF	759	36.5	4.6	1.18	33.7	84.8
25	PHY 496 W3RF	757	38.0	4.4	1.15	33.3	83.5
26	DG 3385 B2XF	751	38.1	4.6	1.19	34.7	83.4
27	AMDG 7824	740	36.2	4.5	1.15	30.0	84.8
28	DP 1612 B2XF	735	35.4	4.7	1.18	32.1	84.0
29	PHY 495 W3RF	734	37.5	4.9	1.14	31.9	83.6
30	BRS 286	719	37.7	4.4	1.18	33.2	83.7
31	SSG UA 222	671	35.9	4.4	1.17	32.9	84.1
32	PHY 487 WRF	657	38.1	4.6	1.16	32.4	84.4
33	ST 5032 GLT	622	37.2	4.6	1.16	33.6	83.8
34	CG 3475 B2XF	603	37.3	4.5	1.13	30.8	82.5
35	BX 1532 GLT	587	36.9	4.4	1.14	31.2	84.0
36	BX 1531 GLT	529	36.3	4.2	1.18	33.7	85.6
Average		793	37.7	4.5	1.17	32.6	84.1
LSD (p<0.05)		354					

Tennessee AgResearch data of Raper et al. (2015).

Table OVT5. Lint yield, gin turnout, and fiber quality of 36 entries for the Ridgely, TN location of the 2015 Tennessee Official Variety Trial listed by trial yield rank.

Yield Rank	Variety	Lint Yield (lb/ac)	Gin Turnout (%)	Mic	Fiber Length (in.)	Strength (g/tex)	Uniformity (%)
1	NG 3405 B2XF	2064	37.8	4.7	1.20	31.4	83.5
2	PHY 499 WRF	1995	39.2	4.6	1.21	30.2	83.0
3	DG CT15426 B2XF	1969	36.5	4.7	1.19	31.9	83.4
4	AMDG 7824	1965	39.2	4.5	1.23	30.5	83.7
5	MON 15R513 B2XF	1964	37.0	4.5	1.22	32.6	83.6
6	PHY 496 W3RF	1962	37.7	4.5	1.27	31.7	83.5
7	PHY 487 WRF	1957	38.0	4.5	1.21	32.6	84.3
8	ST 4848 GLT	1951	36.6	4.4	1.20	31.2	82.8
9	ST 5032 GLT	1943	37.6	4.7	1.21	32.1	83.6
10	ST 4946 GLB2	1931	37.4	4.6	1.19	31.4	83.6
11	PHY 222 WRF	1921	37.4	4.4	1.17	30.4	82.5
12	ST 5115 GLT	1903	37.7	4.6	1.21	31.3	83.7
13	DP 1522 B2XF	1896	37.7	4.6	1.22	32.5	84.4
14	BX 1532 GLT	1868	39.2	4.5	1.18	30.2	83.5
15	BRS 293	1867	36.5	4.6	1.21	32.5	84.2
16	DP 1612 B2XF	1864	37.7	4.7	1.19	32.0	83.7
17	BRS 335	1860	36.9	4.6	1.19	31.0	81.9
18	SSG HQ 210 CT	1849	35.8	4.2	1.22	33.6	83.9
19	PHY 427 WRF	1847	39.1	4.4	1.24	31.7	83.0
20	PHY 495 W3RF	1828	36.8	4.6	1.21	33.3	83.4
21	PHY 333 WRF	1816	38.1	4.3	1.19	30.8	83.6
22	BX 1634 GLT	1811	36.7	4.6	1.21	32.5	83.7
23	ST 4747 GLB2	1805	37.6	4.6	1.20	31.3	83.0
24	PHY 312 WRF	1792	37.8	4.6	1.20	31.7	83.0
25	DP 1518 B2XF	1783	36.2	4.2	1.15	29.7	82.0
26	BX 1531 GLT	1745	35.3	4.6	1.21	32.2	83.5
27	NG 3406 B2XF	1739	35.7	4.3	1.18	31.7	83.6
28	CG 3475 B2XF	1723	35.7	4.3	1.20	31.8	83.0
29	PHY 444 WRF	1701	35.8	4.6	1.20	31.5	84.4
30	DP 1614 B2XF	1696	37.8	4.6	1.18	30.5	84.0
31	DG 3385 B2XF	1694	35.0	4.4	1.18	32.0	83.4
32	DG CT14515 B2RF	1690	36.5	4.6	1.18	34.9	83.3
33	PHY 339 WRF	1689	36.9	4.4	1.20	31.4	83.8
34	BRS 286	1675	36.3	4.2	1.22	32.9	82.6
35	SSG UA 222	1668	35.9	4.6	1.19	30.4	82.1
36	ST 4949 GLT	1612	34.5	4.6	1.21	32.5	83.7
Average		1835	37.1	4.5	1.20	31.7	83.4
LSD ($p \leq 0.05$)		285					

Tennessee AgResearch data of Raper et al. (2015).

Table OVT6. Lint yield, gin turnout, and fiber quality of 30+ entries for the WTREC, TN location of the 2015 Tennessee Official Variety Trial listed by trial yield rank.

Yield Rank	Variety	Lint Yield (lb/ac)	Gin Turnout (%)	Mic	Fiber Length (in.)	Strength (g/tex)	Uniformity (%)
1	PHY 312 WRF	1806	39.0	4.6	1.22	32.0	85.1
2	DP 1612 B2XF	1701	38.3	4.7	1.18	32.8	84.8
3	PHY 333 WRF	1673	39.3	4.5	1.19	32.4	83.1
4	CG 3475 B2XF	1640	37.1	4.8	1.15	32.2	85.1
5	DP 1522 B2XF	1616	39.7	4.9	1.19	32.2	85.1
6	DP 1614 B2XF	1603	40.4	5.0	1.20	31.7	84.8
7	ST 5032 GLT	1570	39.3	4.1	1.23	33.1	84.1
8	PHY 495 W3RF	1497	42.1	4.7	1.17	33.6	85.4
9	ST 4949 GLT	1470	41.3	4.5	1.19	31.6	83.7
10	DP 1518 B2XF	1446	39.0	4.3	1.24	31.9	83.5
11	NG 3406 B2XF	1446	39.6	4.7	1.18	32.2	84.9
12	PHY 499 WRF	1431	39.0	4.9	1.18	34.5	84.9
13	PHY 427 WRF	1430	37.7	4.4	1.17	31.9	82.9
14	DG 3385 B2XF	1390	38.2	4.7	1.18	31.2	84.0
15	PHY 496 W3RF	1386	39.6	4.7	1.13	33.1	83.2
16	ST 4747 GLB2	1380	39.3	4.6	1.21	32.9	82.8
17	PHY 487 WRF	1374	37.3	4.6	1.13	34.1	83.1
18	PHY 222 WRF	1369	36.3	4.8	1.20	30.5	85.3
19	MON 15R513 B2XF	1366	38.4	4.7	1.22	31.6	84.1
20	PHY 339 WRF	1366	37.9	4.4	1.24	32.0	84.9
21	ST 4848 GLT	1361	40.1	4.9	1.20	32.7	84.5
22	ST 4946 GLB2	1361	36.8	4.6	1.19	33.6	84.0
23	DG CT15426 B2XF	1328	39.8	4.7	1.17	31.0	83.8
24	BX 1634 GLT	1327	39.9	4.6	1.20	34.8	83.0
25	PHY 444 WRF	1297	39.0	4.1	1.30	32.8	84.9
26	NG 3405 B2XF	1294	38.2	4.6	1.13	29.3	82.9
27	ST 5115 GLT	1259	38.3	4.6	1.17	30.7	82.3
28	BX 1532 GLT	1176	42.6	4.5	1.19	30.3	83.6
29	DG CT14515 B2RF	1069	36.8	4.7	1.23	35.1	84.6
30	BX 1531 GLT	1035	40.2	4.6	1.17	32.2	84.1
Average		1416	39.0	4.6	1.19	32.3	84.1
LSD (p<0.05)		194					

.†Conventional varieties were excluded from analysis due to a suspected mid-season broadcast application of glyphosate. This location data was subsequently excluded from the overall average.

Tennessee AgResearch data of Raper et al. (2015).

Table OVT7. Plant height (inches), total number of nodes, height to node ratio, and nodes above cracked boll of 36 entries in the 2015 Tennessee Official Variety Trials, listed in alphabetical order. †

Variety	Height	Nodes	Height:Node	NACB¹
	in	no.	ratio	no.
AMDG 7824	48.9	19.3	2.6	6.4
BRS 286	50.1	21.2	2.4	7.0
BRS 293	50.0	20.2	2.5	7.0
BRS 335	48.6	20.9	2.3	7.3
BX 1531 GLT	50.9	19.9	2.6	7.0
BX 1532 GLT	48.1	19.4	2.5	6.7
ST 4949 GLT	49.7	19.7	2.5	7.6
ST 4848 GLT	48.4	19.3	2.5	5.9
BX 1634 GLT	48.1	20.0	2.4	6.8
CG 3475 B2XF	47.1	19.6	2.4	5.9
DG 3385 B2XF	46.6	19.7	2.4	6.2
DG CT14515 B2RF	50.9	20.0	2.5	7.7
DG CT15426 B2XF	51.1	19.3	2.7	6.9
DP 1518 B2XF	47.4	19.3	2.5	7.2
DP 1522 B2XF	49.0	20.6	2.4	7.0
DP 1612 B2XF	50.1	20.2	2.5	6.8
MON 15R513 B2XF	50.4	20.1	2.5	7.3
DP 1614 B2XF	49.9	19.5	2.6	6.6
NG 3405 B2XF	50.6	19.9	2.6	7.2
NG 3406 B2XF	50.8	19.9	2.6	7.6
PHY 222 WRF	46.7	18.8	2.5	6.8
PHY 312 WRF	48.3	18.8	2.6	6.0
PHY 333 WRF	51.4	19.5	2.7	7.3
PHY 339 WRF	54.0	19.5	2.8	8.0
PHY 427 WRF	48.5	19.7	2.5	6.5
PHY 444 WRF	49.5	19.9	2.5	7.0
PHY 487 WRF	53.4	19.8	2.7	7.8
PHY 495 W3RF	50.7	20.1	2.6	7.6
PHY 496 W3RF	50.0	19.7	2.6	7.3
PHY 499 WRF	48.8	19.6	2.5	6.1
SSG HQ 210 CT	49.5	20.1	2.5	6.8
SSG UA 222	48.1	19.9	2.4	6.9
ST 4747 GLB2	47.2	19.9	2.4	7.4
ST 4946 GLB2	48.0	19.5	2.5	6.6
ST 5032 GLT	47.8	20.0	2.4	7.3
Average	35.4	19.3	1.8	6.2

¹ NACB = nodes above highest 1st position cracked boll to the highest harvestable boll.

†Averages calculated from Ames, Milan and Ridgely locations.

Tennessee AgResearch data of Raper et al. (2015).

Table OVT8. Lint yield, gin turnout, and fiber quality of 19 like-entries averaged across the 2014-2015 Tennessee Official Variety Trials.

Yield Rank	Variety	Lint Yield (lb/ac)	Gin Turnout (%)	Mic	Fiber Length (in.)	Strength (g/tex)	Uniformity (%)
1	PHY 333 WRF	1587	40.5	4.2	1.17	31.0	81.7
2	ST 4747 GLB2	1419	38.1	4.3	1.17	29.7	80.4
3	PHY 312 WRF	1405	37.8	4.2	1.19	30.6	82.3
4	PHY 499 WRF	1387	39.3	4.5	1.16	32.5	82.8
5	ST 4946 GLB2	1385	38.1	4.5	1.15	32.0	82.1
6	ST 5115 GLT	1378	38.1	4.1	1.16	31.1	82.1
7	PHY 495 W3RF	1357	39.5	4.3	1.16	32.8	83.2
8	PHY 339 WRF	1353	37.6	4.1	1.17	31.2	82.6
9	PHY 444 WRF	1316	38.3	3.8	1.23	31.5	82.0
10	PHY 427 WRF	1293	36.7	4.0	1.16	31.4	82.0
11	PHY 487 WRF	1275	37.3	4.2	1.14	30.8	81.8
12	BX 1531 GLT	1205	39.3	4.4	1.16	29.9	81.9
13	BX 1532 GLT	1188	41.0	4.2	1.16	29.8	82.0
14	SSG UA 222	1170	36.9	4.2	1.21	30.8	81.9
15	SSG HQ 210 CT	1165	35.7	4.4	1.15	32.5	82.6
16	DG CT14515 B2RF	1159	37.7	4.3	1.18	32.4	82.3
17	BRS 335	1127	36.0	4.3	1.16	31.8	81.4
18	BRS 293	1115	36.4	4.5	1.16	33.2	82.4
19	BRS 286	1027	35.7	4.3	1.15	32.3	81.5
Average		1279	37.9	4.3	1.17	31.4	82.1
LSD ($p \leq 0.05$)		116	1.5	0.2	0.03	1.3	1.0

Tennessee AgResearch data of Raper et al. (2014).

Tennessee AgResearch data of Raper et al. (2015).

Table OVT9. Lint yield, gin turnout, and fiber quality of 9 like-entries averaged across the 2013-2015 Tennessee Official Variety Trials.

Yield Rank	Variety	Lint Yield (lb/ac)	Gin Turnout (%)	Mic	Fiber Length (in.)	Strength (g/tex)	Uniformity (%)
1	PHY 333 WRF	1625	39.9	4.0	1.17	31.6	82.0
2	PHY 339 WRF	1463	37.1	4.0	1.18	31.1	82.7
3	ST 4946 GLB2	1456	37.4	4.5	1.16	32.0	82.6
4	PHY 444 WRF	1419	38.2	3.6	1.25	32.0	82.3
5	PHY 499 WRF	1419	38.7	4.3	1.15	31.1	82.4
6	PHY 427 WRF	1379	36.4	4.1	1.17	31.5	82.0
7	PHY 487 WRF	1378	36.9	4.0	1.14	30.6	81.7
8	SSG UA 222	1302	36.4	4.1	1.22	31.0	82.4
9	SSG HQ 210 CT	1259	35.3	4.3	1.15	32.6	82.3
Average		1411	37.4	4.1	1.18	31.5	82.3
LSD ($p \leq 0.05$)		89	1.1	0.2	0.02	1.1	0.9

Tennessee AgResearch data of Wiggins et al. (2013).

Tennessee AgResearch data of Raper et al. (2014).

Tennessee AgResearch data of Raper et al. (2015).

2015 Large Plot Replicated Variety Trial Results



Large strip trials placed in production fields provide valuable information across variable environments. If properly placed, results will match randomized and replicated small plots within the same environment. However, the variable nature of production fields in the Mid-South and Southeast has raised concerns over the consistency of strip trials across the cotton belt. The trials included below were supported in part by Cotton Inc Core Project No. 15-929 as a means of producing statistically sound, reliable variety data in a production environment. General information on these trials can be found in Table 2. Averages across all of these trials are included below in Table LVAR1. Also included below are specific location plot maps including plot layouts, soil map units, and aerial images as well as location yield averages.

Table 2. General plot information for the 2015 Tennessee Large Plot Replicated Trials.

Location	County	Planting Date	Harvest Date	Soil Type	Tillage	Irrigation
Alamo	Crockett	05/01/2015	10/23/2015	Grenada Silt Loam	No-Till	Pivot
Huntersville	Madison	05/06/2015	10/16/2015	Memphis Silt Loam	No-Till	None
Mason	Fayette	05/14/2015	10/20/2015	Calloway Silt Loam	Conservation	None
Milan	Gibson	05/04/2015	10/19/2015	Falaya Silt Loam	Conventional	Pivot

Table LVAR1. Average lint yield, gin turnout, fiber quality and CCC loan value of 8 entries averaged across all four of the 2015 locations of the Tennessee Large Plot Replicated Variety Trials.

Yield Rank	Variety	Lint Yield (lb/ac)	Gin Turnout (%)	Mic	Fiber Length (in.)	Strength (g/tex)	Unif (%)	HVI Color	Loan Value (¢/lb)
1	PHY 444 WRF	1309	39.1	3.7	1.29	33.0	84.6	31	55.60
2	DP 1518 B2XF	1212	38.3	4.0	1.21	31.4	83.1	41	54.80
3	PHY 312 WRF	1198	37.5	4.2	1.23	32.9	84.3	41	54.90
4	DP 1522 B2XF	1194	38.1	4.6	1.20	32.2	84.4	31	55.45
5	DG 3385 B2XF	1193	38.5	4.6	1.19	31.0	84.4	31	55.25
6	PHY 333 WRF	1142	38.6	4.2	1.22	33.1	83.8	41	54.85
7	ST 4946 GLB2	1124	36.8	4.6	1.20	33.8	84.2	41	54.80
8	ST 5115 GLT	1116	36.8	4.1	1.19	32.8	82.8	31	55.40
	Average	1186	38.0	4.2	1.22	32.5	84.0	41	55.10
	LSD (p≤0.05)	63	0.6	0.2	0.01	0.8	0.6	-	-

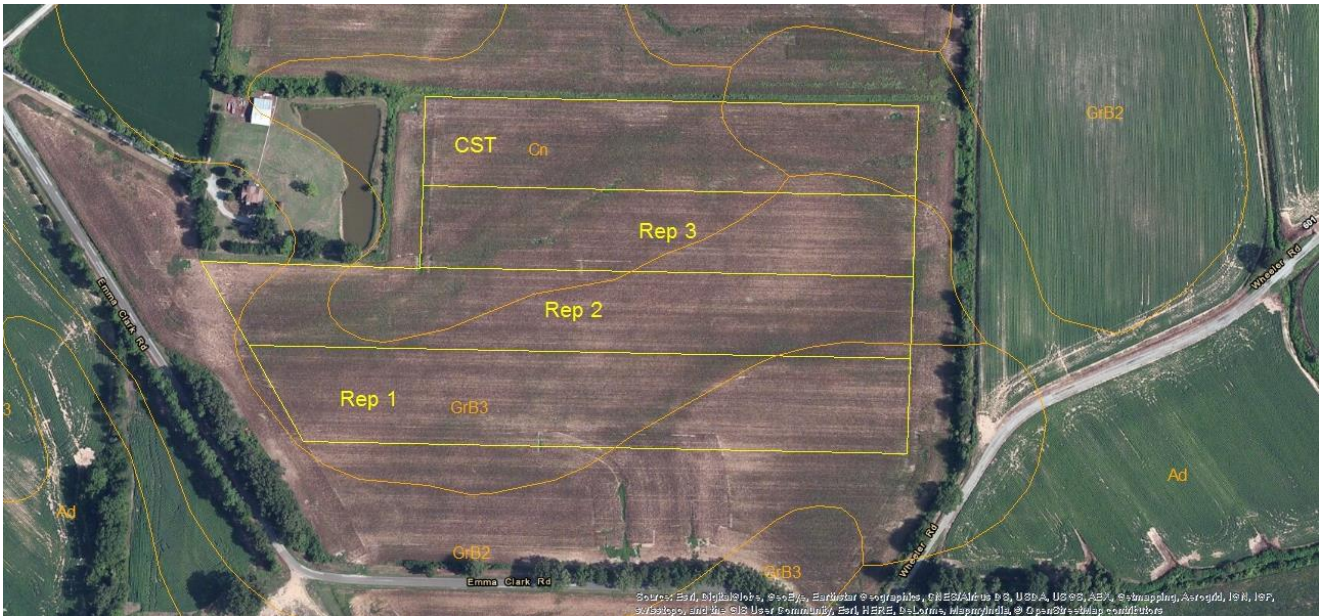


Figure 1: Plot layout, soil map units, and aerial imagery of the 2015 Alamo Large Plot Replicated Trial.

Table LVAR2. Average lint yield, gin turnout, fiber quality and CCC loan value of 8 entries averaged across the 3 replications of the Alamo location of the Tennessee Large Plot Replicated Variety Trials.

Yield Rank	Variety	Lint Yield (lb/ac)	Gin Turnout (%)	Fiber Length (in.)	Strength (g/tex)	Unif (%)	HVI Color	Loan Value (¢/lb)
1	DG 3385 B2XF	1237	38.9	4.6	30.1	84.1	31	55.25
2	PHY 444 WRF	1208	38.8	3.9	31.8	84.3	31	55.60
3	DP 1518 B2XF	1162	38.3	4.1	31.0	83.4	41	54.80
4	PHY 312 WRF	1142	37.5	4.4	32.1	84.2	41	54.75
5	DP 1522 B2XF	1126	37.8	4.8	30.8	84.1	31	55.25
6	ST 4946 GLB2	1025	37.8	4.6	33.7	83.6	41	54.70
7	PHY 333 WRF	990	38.3	4.3	32.5	83.8	41	54.65
8	ST 5115 GLT	984	36.3	4.0	32.6	82.5	31	55.35
	Average	1109	38.0	4.3	31.8	83.8	31	55.04
	LSD (p<0.05)	113	0.9	0.4	1.3	1.0		-



Figure 2: Plot layout, soil map units, and aerial imagery of the 2015 Huntersville Large Plot Replicated Trial.

Table LVAR3. Average lint yield, gin turnout, fiber quality and CCC loan value of 8 entries averaged across the 3 replications of the Huntersville location of the Tennessee Large Plot Replicated Variety Trials.

Yield Rank	Variety	Lint Yield (lb/ac)	Gin Turnout (%)	Mic	Fiber Length (in.)	Strength (g/tex)	Unif (%)	HVI Color	Loan Value (¢/lb)
1	PHY 444 WRF	1471	40.3	3.6	1.30	33.6	84.6	31	55.50
2	DP 1518 B2XF	1341	39.3	3.7	1.21	31.0	82.4	41	54.70
3	DP 1522 B2XF	1340	39.3	4.3	1.18	31.9	84.0	31	55.40
4	PHY 333 WRF	1337	39.4	3.9	1.22	32.4	84.0	41	54.90
5	PHY 312 WRF	1333	38.2	4.1	1.24	32.7	84.2	31	55.60
6	DG 3385 B2XF	1285	39.2	4.4	1.18	31.6	83.6	31	55.35
7	ST 4946 GLB2	1282	37.3	4.3	1.21	34.5	83.9	41	54.70
8	ST 5115 GLT	1273	37.9	3.9	1.18	33.1	82.2	31	55.40
	Average	1333	38.9	4.0	1.21	32.6	83.6	31	55.19
	LSD (p<0.05)	155	1.4	0.6	0.03	1.3	1.5		-

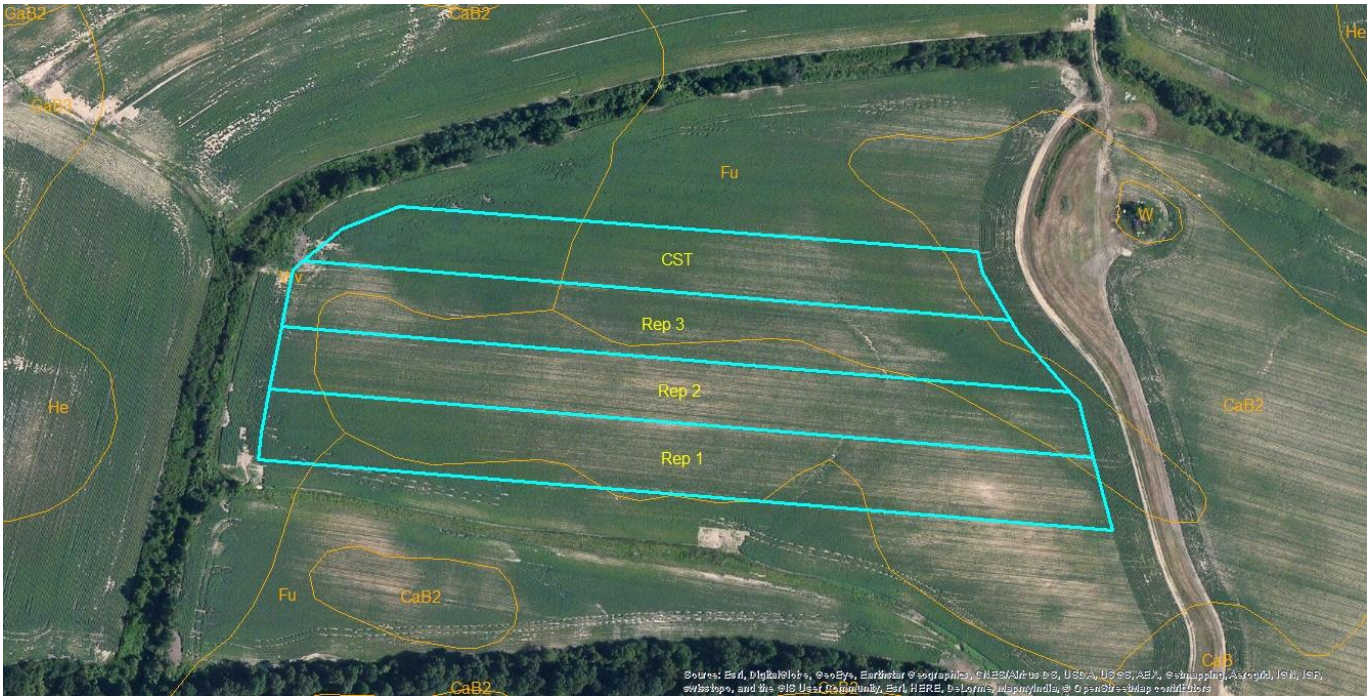


Figure 3: Plot layout, soil map units, and aerial imagery of the 2015 Mason Large Plot Replicated Trial.

Table LVAR4. Average lint yield, gin turnout, fiber quality and CCC loan value of 8 entries averaged across the 3 replications of the Mason location of the Tennessee Large Plot Replicated Variety Trials.

Yield Rank	Variety	Lint Yield (lb/ac)	Gin Turnout (%)	Mic	Fiber Length (in.)	Strength (g/tex)	Unif (%)	HVI Color	Loan Value (¢/lb)
1	PHY 444 WRF	1254	38.4	4.1	1.31	34.1	85.2	31	55.75
2	DP 1518 B2XF	1188	38.4	4.4	1.22	32.1	83.5	41	54.65
3	PHY 312 WRF	1155	37.5	4.6	1.24	33.6	85.3	31	55.60
4	ST 4946 GLB2	1105	36.6	5.1	1.20	34.5	85.3	31	53.00
5	ST 5115 GLT	1093	36.7	4.5	1.20	32.8	83.4	31	55.35
6	PHY 333 WRF	1090	39.2	4.5	1.22	33.6	84.3	31	55.50
7	DP 1522 B2XF	1079	38.1	5.1	1.20	33.9	84.7	31	52.90
8	DG 3385 B2XF	1064	38.3	5.0	1.20	31.0	85.7	31	55.55
	Average	1128	37.9	4.7	1.22	33.2	84.7	31	54.79
	LSD (p<0.05)	111	1.0	0.2	0.03	1.5	1.4		-



Figure 4: Plot layout, soil map units, and aerial imagery of the 2015 Milan Large Plot Replicated Trial.

Table LVAR5. Average lint yield, gin turnout, fiber quality and CCC loan value of 8 entries averaged across the 3 replications of the Milan location of the Tennessee Large Plot Replicated Variety Trials.

Yield Rank	Variety	Lint Yield (lb/ac)	Gin Turnout (%)	Mic	Fiber Length (in.)	Strength (g/tex)	Unif (%)	HVI Color	Loan Value (¢/lb)
1	PHY 444 WRF	1303	38.8	3.4	1.27	32.3	84.3	31	53.75
2	DP 1522 B2XF	1233	37.4	4.3	1.22	32.2	84.7	41	54.75
3	DG 3385 B2XF	1184	37.8	4.3	1.18	31.1	84.0	31	55.45
4	PHY 312 WRF	1164	36.7	3.8	1.21	33.4	83.5	41	54.85
5	DP 1518 B2XF	1158	37.0	3.7	1.21	31.5	83.0	41	54.65
6	PHY 333 WRF	1152	37.5	4.0	1.23	33.8	83.3	41	54.85
7	ST 5115 GLT	1113	36.2	3.8	1.20	32.8	83.2	31	55.5
8	ST 4946 GLB2	1085	35.6	4.5	1.19	32.4	84.0	41	54.75
	Average	1174	37.1	4.0	1.21	32.4	83.8	31	54.82
	LSD ($p \leq 0.05$)	138	1.4	0.4	0.03	1.7	1.3		-

2015 County Standard Trial Results



Table CST1. Average lint yield, gin turnout, fiber quality and CCC loan value of 14 entries calculated from nine locations of the 2015 Tennessee County Standard Trials.

Yield Rank	Variety	Lint Yield (lb/ac)	Gin Turnout (%)	Mic	Fiber Length (in.)	Strength (g/tex)	Unif (%)	HVI Color	Loan Value (¢/lb)
1	PHY 312 WRF	1325	37.8	4.2	1.22	33.1	84.8	41	54.95
2	DP 1522 B2XF	1277	38.6	4.7	1.19	32.1	84.5	41	54.75
3	PHY 444 WRF	1276	39.0	3.7	1.29	33.2	85.2	31	55.75
4	DP 1518 B2XF	1236	38.7	4.1	1.21	31.5	83.1	41	54.80
5	DP 1321 B2RF	1231	38.5	4.6	1.18	32.4	84.3	41	54.75
6	DG 3385 B2XF	1210	38.9	4.7	1.18	30.9	84.4	31	55.25
7	PHY 333 WRF	1209	38.7	4.3	1.21	32.5	84.0	41	54.75
8	ST 4747 GLB2	1208	37.2	4.3	1.23	32.7	83.3	41	54.65
9	DP 1311 B2RF	1186	39.4	4.2	1.19	31.0	83.2	41	54.80
10	PHY 495 W3RF	1181	39.8	4.3	1.17	34.0	84.8	41	54.70
11	ST 4946 GLB2	1162	37.0	4.6	1.20	33.6	84.5	31	55.50
12	ST 5032 GLT	1157	36.5	4.0	1.24	33.2	83.9	41	54.85
13	DG 2570 B2RF	1144	37.1	4.6	1.19	32.7	84.3	31	55.45
14	ST 5115 GLT	1059	37.0	4.1	1.19	33.3	83.0	31	55.55
	Average	1204	38.2	4.3	0.02	32.6	84.1	41	55.04
	LSD ($p \leq 0.05$)	91	1.0	0.2	0.02	1.0	0.7		-

Table CST2. Results from the 2015 Carroll County, Tennessee County Standard Trial.

Yield Rank	Variety	Lint Yield			Mic	Fiber Length (in.)	Strength		HVI Color	Loan Value (¢/lb)
		(lb/ac)	Gin Turnout (%)				(g/tex)	Unif (%)		
1	PHY 444 WRF	1041	39.8	4.4	1.26	37.0	86.4	31	55.70	
2	DP 1518 B2XF	1035	38.7	4.6	1.15	30.9	82.7	41	54.25	
3	PHY 312 WRF	1016	38.8	4.7	1.18	33.2	84.7	41	54.80	
4	PHY 333 WRF	1007	37.8	4.9	1.16	33.5	82.9	41	54.50	
5	DP 1321 B2RF	971	37.6	5.3	1.12	33.5	83.9	41	50.55	
6	DG 2570 B2RF	926	38.2	5.0	1.14	33.1	83.9	31	52.75	
7	DG 3385 B2XF	899	39.1	5.4	1.11	29.2	83.6	41	50.15	
8	DP 1522 B2XF	893	37.8	5.2	1.15	32.3	83.9	41	51.95	
9	ST 4946 GLB2	892	37.2	5.2	1.16	33.9	84.0	41	52.10	
10	ST 4747 GLB2	871	35.4	5.0	1.15	31.5	82.5	41	51.85	
11	PHY 495 W3RF	849	39.1	4.8	1.14	36.8	84.9	41	54.70	
12	DP 1311 B2RF	830	38.7	4.5	1.17	31.6	83.5	41	54.55	
13	ST 5032 GLT	817	36.5	4.9	1.16	33.8	83.5	41	54.60	
14	ST 5115 GLT	785	38.2	4.8	1.18	34.2	83.8	41	54.70	
Average		917	38.1	4.9	1.16	33.2	83.9	41	53.37	

Grower: Renfroe Farms

Agent: Kenny Herndon

Table CST3. Results from the 2015 Crockett County, Tennessee County Standard Trial.

Yield Rank	Variety	Lint Yield			Mic	Fiber Length (in.)	Strength		HVI Color	Loan Value (¢/lb)
		(lb/ac)	Gin Turnout (%)				(g/tex)	Unif (%)		
1	DG 3385 B2XF	1259	39.6	4.6	1.2	29.7	84.2	31	55.10	
2	DP 1321 B2RF	1234	38.2	4.8	1.17	32.1	83.9	31	55.30	
3	PHY 444 WRF	1209	39.3	3.7	1.29	31.2	84.6	31	55.60	
4	DP 1311 B2RF	1167	39.7	4.2	1.18	30.1	82.9	41	54.50	
5	DP 1522 B2XF	1161	38.2	4.9	1.19	30.5	83.9	31	55.15	
6	ST 4747 GLB2	*	38.1	4.2	1.21	32.5	83.4	41	54.80	
7	PHY 312 WRF	1088	37.3	4.4	1.22	32.9	84.2	41	54.75	
8	PHY 495 W3RF	*	39.3	4.3	1.19	33.7	85.2	41	54.90	
9	DG 2570 B2RF	1084	35.7	4.6	1.21	31.8	83.9	31	55.35	
10	DP 1518 B2XF	1082	38.5	4.1	1.20	31.1	83.2	31	55.50	
11	ST 4946 GLB2	1065	38.4	4.1	1.23	33.0	82.5	31	55.45	
12	ST 5115 GLT	957	36.9	4.0	1.18	34.1	83.0	31	55.55	
13	PHY 333 WRF	956	38.6	4.4	1.21	33.2	83.8	41	54.70	
14	ST 5032 GLT	940	35.6	4.2	1.26	33.2	83.2	41	54.85	
Average		1100	38.1	4.3	1.21	0.0	32.1	31	55.11	

Grower: Kevin Earnheart

Agent: Richard Buntin

*Lint yield data for these entries not collected.

Table CST4. Results from the 2015 Dyer County, Tennessee County Standard Trial.

Yield Rank	Variety	Lint Yield			Mic	Fiber Length (in.)	Strength		HVI Color	Loan Value (¢/lb)
		(lb/ac)	Gin Turnout (%)				(g/tex)	Unif (%)		
1	PHY 312 WRF	1814	37.9	3.8	1.23	33.7	84.8	41	54.95	
2	PHY 444 WRF	1590	38.6	3.5	1.31	33.0	85.0	31	55.60	
3	ST 5032 GLT	1570	36.7	3.8	1.23	32.2	84.2	41	54.90	
4	DP 1522 B2XF	1561	37.8	5.1	1.19	32.4	84.9	41	52.15	
5	DG 2570 B2RF	1555	37.6	4.6	1.21	32.7	85.6	31	55.55	
6	ST 4747 GLB2	1549	37.2	4.2	1.24	32.4	82.8	51	51.20	
7	DP 1518 B2XF	1543	39.4	4.2	1.20	31.4	84.0	41	54.90	
8	PHY 333 WRF	1542	35.9	4.1	1.22	31.2	84.5	41	54.90	
9	ST 4946 GLB2	1535	37.6	4.9	1.16	34.2	84.6	41	54.70	
10	DP 1311 B2RF	1523	39.6	4.1	1.18	28.8	83.9	41	54.40	
11	DP 1321 B2RF	1477	37.1	4.2	1.22	31.6	85.3	51	51.50	
12	DG 3385 B2XF	1452	39.4	4.9	1.18	30.7	84.8	31	55.25	
13	PHY 495 W3RF	1382	41.2	4.3	1.17	33.0	84.9	41	54.70	
14	ST 5115 GLT	1257	36.3	4	1.19	33.3	83.4	41	54.85	
Average		1525	38.0	4.3	1.21	32.2	84.5	41	54.25	

Grower: Alan and Keith Sims

Agent: Tim Campbell

Table CST5. Results from the 2015 Fayette County, Tennessee County Standard Trial.

Yield Rank	Variety	Lint Yield			Mic	Fiber Length (in.)	Strength		HVI Color	Loan Value (¢/lb)
		(lb/ac)	Gin Turnout (%)				(g/tex)	Unif (%)		
1	PHY 312 WRF	1308	37.6	4.6	1.25	33.2	87.0	31	55.70	
2	DP 1518 B2XF	1301	38.3	4.3	1.24	32.1	84.4	41	54.75	
3	PHY 444 WRF	1255	37.4	3.9	1.30	33.5	85.7	31	55.75	
4	ST 5115 GLT	1208	37.1	4.5	1.21	33.2	83.4	31	55.40	
5	DP 1311 B2RF	1203	38.7	4.3	1.23	30.8	84.5	31	55.25	
6	DP 1321 B2RF	1180	38.7	5.0	1.22	33.7	84.7	41	52.20	
7	ST 4747 GLB2	1180	36.0	4.6	1.24	32.1	83.1	41	54.65	
8	DG 3385 B2XF	1152	38.4	5.0	1.20	30.3	86.1	21	53.30	
9	DP 1522 B2XF	1136	38.8	5.2	1.20	34.0	85.7	31	53.00	
10	ST 4946 GLB2	1133	36.1	5.0	1.20	32.6	85.6	31	52.95	
11	PHY 495 W3RF	1126	38.6	4.3	1.18	33.0	84.2	31	55.50	
12	PHY 333 WRF	1123	39.3	4.6	1.23	32.1	84.8	31	55.45	
13	ST 5032 GLT	1104	34.6	4.5	1.28	33.6	85.6	31	55.60	
14	DG 2570 B2RF	1042	37.5	4.7	1.23	33.1	85.3	31	55.60	
Average		1175	37.7	4.6	1.23	32.7	85.0	31	54.65	

Grower: Bradley Moore

Agent: Jeff Via

Table CST6. Results from the 2015 Gibson County, Tennessee County Standard Trial.

Yield Rank	Variety	Lint Yield (lb/ac)	Gin Turnout (%)	Mic	Fiber Length (in.)	Strength (g/tex)	Unif (%)	HVI Color	Loan Value (¢/lb)
1	DP 1522 B2XF	1245	37.7	4.3	1.22	32.2	84.7	41	54.75
2	ST 4747 GLB2	1229	36.4	4.2	1.25	34.1	83.5	41	54.85
3	ST 5032 GLT	1213	38.8	3.5	1.22	31.3	83.4	31	55.35
4	PHY 312 WRF	1156	36.3	4.0	1.22	33.6	84.5	41	54.95
5	DP 1321 B2RF	1128	37.2	4.3	1.18	31.6	84.2	41	54.75
6	PHY 444 WRF	1126	37.3	3.1	1.28	31.1	84.6	31	52.05
7	DP 1518 B2XF	1117	36.2	3.6	1.20	31.7	81.9	41	54.50
8	DG 3385 B2XF	1116	36.9	4.2	1.18	31.4	83.4	31	55.50
9	DP 1311 B2RF	1114	35.6	4.1	1.23	32.4	82.8	41	54.70
10	PHY 333 WRF	1095	37.2	3.6	1.23	33.2	82.7	41	54.60
11	ST 5115 GLT	1025	35.9	3.9	1.17	32.2	82.4	31	55.35
12	ST 4946 GLB2	996	34.4	4.6	1.18	30.6	84.5	31	55.25
13	PHY 495 W3RF	942	36.9	3.6	1.2	33.6	85.5	41	54.90
14	DG 2570 B2RF	920	34.7	3.9	1.19	33.2	83.5	31	55.55
Average		1102	36.5	3.9	1.21	32.3	83.7	41	54.79

Grower: Hedrick Shoaf

Agent: Philip Shelby

Table CST7. Results from the 2015 Hardeman County, Tennessee County Standard Trial.

Yield Rank	Variety	Lint Yield (lb/ac)	Gin Turnout (%)	Mic	Fiber Length (in.)	Strength (g/tex)	Unif (%)	HVI Color	Loan Value (¢/lb)
1	DP 1522 B2XF	1566	40.0	4.7	1.22	30.7	84.5	41	54.55
2	PHY 444 WRF	1553	39.1	3.7	1.29	32.8	83.8	31	55.50
3	DP 1321 B2RF	1542	38.9	4.4	1.20	32.1	84.6	41	54.75
4	ST 4946 GLB2	1494	38.6	4.3	1.25	33.7	84.9	41	54.80
5	DP 1311 B2RF	1471	41.8	4.1	1.18	29.3	82.9	41	54.35
6	DP 1518 B2XF	1450	39.6	3.9	1.21	30.7	82.9	41	54.50
7	PHY 312 WRF	1448	37.0	4.1	1.22	32.6	84.9	41	54.90
8	ST 5115 GLT	1429	37.2	3.8	1.21	30.8	82.7	31	55.20
9	PHY 495 W3RF	1417	40.0	4.3	1.16	32.7	83.7	41	54.55
10	PHY 333 WRF	1410	40.1	4.1	1.23	31.4	84.6	31	55.60
11	DG 3385 B2XF	1355	39.0	4.5	1.22	31.5	83.5	31	55.35
12	ST 5032 GLT	1297	36.4	3.8	1.27	32.7	84.9	41	54.90
13	DG 2570 B2RF	1263	38.7	4.4	1.14	32.5	81.6	31	55.15
14	ST 4747 GLB2	1252	37.7	4.0	1.22	31.9	83.2	41	54.80
Average		1425	38.9	4.2	1.22	31.8	83.8	41	54.92

Grower: Ames Plantation

Agent: Lindsay Griffin

Table CST8. Results from location 1 of the 2015 Madison County, Tennessee County Standard Trials.

Yield Rank	Variety	Lint Yield (lb/ac)	Gin Turnout (%)	Mic	Fiber Length (in.)	Strength (g/tex)	Unif (%)	HVI Color	Loan Value (¢/lb)
1	PHY 495 W3RF	1456	43.2	4.4	1.17	34.0	85.1	31	55.55
2	DP 1522 B2XF	1435	39.3	4.4	1.18	32.0	84.9	41	54.75
3	PHY 444 WRF	1395	39.3	3.7	1.33	33.3	85.4	31	55.75
4	DG 2570 B2RF	1384	37.2	4.5	1.18	31.3	84.6	31	55.45
5	DP 1311 B2RF	1379	42.0	4.1	1.17	31.7	82.8	41	54.60
6	DG 3385 B2XF	1369	39.5	4.7	1.18	31.0	84.3	31	55.45
7	ST 4747 GLB2	1360	37.4	4.3	1.23	33.7	84.0	41	54.80
8	DP 1518 B2XF	1336	38.5	3.7	1.21	31.2	82.2	41	54.70
9	PHY 312 WRF	1318	38.2	4.0	1.22	33.4	83.6	41	54.85
10	PHY 333 WRF	1304	39.9	4.2	1.22	32.4	84.4	41	54.90
11	ST 5032 GLT	1304	36.8	3.8	1.24	33.4	83.5	41	54.85
12	ST 4946 GLB2	1299	38.0	4.6	1.21	33.8	84.3	31	55.50
13	DP 1321 B2RF	1294	38.0	4.4	1.17	32.6	83.0	31	55.30
14	ST 5115 GLT	1151	37.5	3.5	1.18	34.0	82.1	31	55.30
Average		1342	38.9	4.2	1.21	32.7	83.9	36	55.13

Grower: Chris Couch

Agent: Jake Mallard

Table CST9. Results from location 2 of the 2015 Madison County, Tennessee County Standard Trials.

Yield Rank	Variety	Lint Yield (lb/ac)	Gin Turnout (%)	Mic	Fiber Length (in.)	Strength (g/tex)	Unif (%)	HVI Color	Loan Value (¢/lb)
1	PHY 312 WRF	1550	38.2	4.2	1.20	33.3	83.5	41	54.85
2	PHY 333 WRF	1366	39.7	4.3	1.18	32.3	83.0	41	54.65
3	DP 1522 B2XF	1341	39.1	4.6	1.19	31.9	83.0	31	55.35
4	PHY 495 W3RF	1298	39.4	4.6	1.17	34.2	84.3	41	54.70
5	ST 4747 GLB2	1190	38.0	4.5	1.25	34.1	83.4	41	54.70
6	PHY 444 WRF	1188	39.7	4.1	1.28	33.1	85.6	31	55.75
7	DP 1518 B2XF	1168	39.6	4.3	1.23	31.8	84.0	41	54.75
8	ST 5032 GLT	1138	36.8	4.0	1.21	35.5	83.3	41	54.85
9	DG 2570 B2RF	1137	36.7	4.7	1.22	33.7	85.6	31	55.60
10	DG 3385 B2XF	1061	38.2	4.8	1.17	31.7	83.5	31	55.30
11	DP 1321 B2RF	1061	39.3	4.8	1.17	32.4	84.4	31	55.40
12	DP 1311 B2RF	1003	40.3	4.4	1.16	31.2	82.4	41	54.45
13	ST 4946 GLB2	996	36.6	4.5	1.17	33.8	85.1	31	55.55
14	ST 5115 GLT	920	36.9	4.4	1.18	34.8	82.0	41	54.60
Average		1173	38.5	4.4	1.20	33.1	83.8	41	55.04

Grower: West TN REC

Agent: Jake Mallard

Table CST10. Results from location 3 of the 2015 Madison County, Tennessee County Standard Trials.

Yield Rank	Variety	Lint Yield (lb/ac)	Gin Turnout (%)	Mic	Fiber Length (in.)	Strength (g/tex)	Unif (%)	HVI Color	Loan Value (¢/lb)
1	PHY 312 WRF	1230	38.5	4.0	1.24	32.3	85.8	41	55.00
2	DG 3385 B2XF	1227	39.7	4.2	1.19	33.0	86.0	21	56.30
3	DP 1321 B2RF	1191	41.2	4.6	1.19	32.1	85.1	31	55.55
4	DP 1522 B2XF	1156	38.4	4.2	1.21	33.0	84.8	31	55.65
5	PHY 444 WRF	1131	40.1	3.5	1.30	33.7	85.3	31	55.60
6	ST 4747 GLB2	1098	38.2	4.0	1.24	32.0	83.8	41	54.80
7	DP 1518 B2XF	1090	39.5	4.0	1.21	32.6	82.8	41	54.70
8	PHY 333 WRF	1081	40.2	4.1	1.22	33.2	84.9	31	55.65
9	PHY 495 W3RF	1073	40.1	4.2	1.17	34.7	85.4	31	55.70
10	ST 4946 GLB2	1045	36.4	4.5	1.23	36.5	85.3	31	55.60
11	ST 5032 GLT	1027	36.2	3.8	1.26	33.4	83.8	41	54.85
12	DP 1311 B2RF	985	38.4	3.8	1.18	33.0	82.9	31	55.45
13	DG 2570 B2RF	982	37.5	4.7	1.18	32.9	84.6	21	55.90
14	ST 5115 GLT	802	36.6	3.9	1.19	32.7	84.0	31	55.60
Average		1080	38.6	4.1	1.22	33.2	84.6	31	55.45

Grower: Matt Griggs

Agent: Jake Mallard

Glossary

Bollgard: A single-gene trait which expresses the Cry1Ac protein from *Bacillus thuringiensis* (*Bt*) and provides resistance to certain lepidopteran pests such as tobacco budworm. Abbreviated **B** or **BG** in variety names.

Bollgard II: A two-gene trait which expresses the Cry1Ac and Cry2Ab2 proteins from *Bacillus thuringiensis* (*Bt*) and provides resistance to certain lepidopteran pests such as tobacco budworm. Abbreviated **BII** or **B2** in variety names.

Commodity Credit Corporation: An entity administered by the Farm Services Agency of the United States Department of Agriculture. Commonly abbreviated as CCC.

Color: See **HVI Color Grade**.

Conventional tillage: Systems in which the entire surface layer of soil is mixed or inverted by plowing, power tilling, or multiple disking before planting. Conventional tillage systems may also involve inter-row cultivation after planting.

County Standard Test: A large plot variety trial consisting of no-replications and only commercially available cotton varieties. Abbreviated as CST.

Coefficient of variation: A statistical estimate of experimental variability, calculated as the standard deviation divided by the mean, and expressed as a percentage. A relatively low CV indicates greater experimental precision. Abbreviated as CV.

Earliness: A measure of how rapidly a cotton crop reaches maturity. Relative earliness of varieties can be measured by the heat units needed to mature the highest harvestable boll. Earliness is under genetic control but is strongly influenced by crop management.

Gin turnout: Weight of lint as a percent of seedcotton weight, which is composed of lint, seed, trash, and excess moisture.

Glytol: A trait which provides tolerance to the herbicide glyphosate. Abbreviated **G** in variety names.

Heat Units: A measure of thermal time used to describe crop growth and development. Commonly abbreviated as *GDD* (growing degree days) or *DD60s* (degree-days above a threshold of 60° F).

High Volume Instrument: A classing instrument providing accurate measurements of fiber length, strength, micronaire, length uniformity, trash, and color. Abbreviated as HVI.

HVI Color Grade: Cotton color grade is a function of white reflectance (Rd) and yellowness (+b) of the lint sample. The HVI color code identifies the quadrant of the Nickerson-Hunter cotton colorimeter diagram in which Rd and +b values intersect (USDA, 1999). Color may be affected by moisture and temperature after boll opening, during harvest, ginning or storage.

Height to Node Ratio: A ratio of the main stem height divided by the total number of nodes. This measurement can provide insight into vegetative vigor.

Leaf Grade: The classer's leaf grade is a visual estimate of the amount of cotton plant leaf particles in a sample of lint. There are seven leaf grades represented by physical standards, plus a below grade designation. See **Trash**.

Length: Average fiber length of the longer one-half of the fibers sampled, in hundredths of an inch. Fiber length is under strong genetic control but may be reduced by environmental stress, nutrient deficiency, or fiber breakage. Staple expresses fiber length in 32nds of an inch.

Length (32nds)	Length (Inches)	Length (32nds)	Length (Inches)
24	0.79 & shorter	36	1.11 – 1.13
26	0.80 – 0.85	37	1.14 – 1.17
28	0.86 – 0.89	38	1.18 – 1.20
29	0.90 – 0.92	39	1.21 – 1.23
30	0.93 – 0.95	40	1.24 – 1.26
31	0.96 – 0.98	41	1.27 – 1.29
32	0.99 – 1.01	42	1.30 – 1.32
33	1.02 – 1.04	43	1.33 – 1.35
34	1.05 – 1.07	44 & +	1.36 & +
35	1.08 – 1.10		

Source: USDA (1999)

Lint yield: Weight of lint harvested per unit ground area (typically reported as pounds per acre).

Liberty Link: A trait which provides tolerance to the herbicide glufosinate. Abbreviated **LL** in variety names.

Least significant Difference: Least significant difference is the statistical estimate of the smallest difference between two means that are significantly different at a fixed p-value (usually 0.05).

Micronaire: A measure of fiber fineness or maturity. An airflow instrument measures the air permeability of a given mass of cotton lint compressed to a fixed volume. Low "mike" values indicate finer or less mature fibers. Mike is strongly influenced by boll load, leaf retention and environmental conditions (especially moisture supply) during boll maturation. Abbreviated as mike or mic. No decimal point is used by the USDA (1999) in reporting micronaire values, while others report values in tenths of units.

Market Value	HVI Micronaire
Low discount range	34 and below
Base range	35 – 36
Premium range	37 – 42
Base range	43 – 49
High discount range	50 and above

Source: USDA (1999)

Nodes above cracked boll: A measure of plant maturity measured by the number of nodes from the highest first-position cracked boll to the node of the highest harvestable boll. Abbreviated as NACB.

Nodes above white flower: A measure of the number of main-stem nodes above the uppermost white flower at first position, indicating relative crop maturity. An average NAWF count of 5 is used as a reference point of physiological cutout or last effective boll population. Abbreviated as NAWF.

No-till: A system in which a crop is planted directly into a seedbed not tilled since the previous crop and only the immediate seed zone is disturbed during planting. Other surface residues are not moved, and weed control is accomplished primarily with herbicides.

Official Variety Trail: A replicated small-plot test conducted at several locations to evaluate the adaptation of the most promising commercial cultivars for Tennessee. Abbreviated as OVT.

P-value: Observed significance level in an analysis of variance. It estimates the probability of error in concluding that differences truly exist among treatments (varieties).

Randomized Complete Block Design: An experimental design in which all treatments are randomly assigned to plots in separate within-field blocks (replications). This design increases the power of the trial to isolate treatment differences from inherent field variability.

Rd and +b: Measures of white reflectance (%) and of yellow pigmentation (Hunter's scale), respectively, in a sample of lint. Lower Rd values indicate grayer samples, while higher +b values indicate yellower samples. Field weathering can decrease reflectance, while excess moisture in storage can cause yellowing.

Roundup Ready: A trait which provides tolerance to a broadcast application of the herbicide glyphosate until the fifth true leaf reaches the size of a quarter. Subsequent glyphosate applications must be directed towards the base of the plant. Abbreviated **R** or **RR** in variety names.

Roundup Ready Flex: A trait which provides tolerance to a broadcast application of the herbicide glyphosate beyond the fifth true leaf stage. Abbreviated **F** or **RF** in variety names.

Seedcotton: Lint plus seed, trash and excess moisture.

Staple: A traditional term applied to lengths of fiber that require spinning or twisting in the manufacture of yarn. Staple also refers to the average length of the bulk fibers measured in 32nds of one inch. Cotton fiber considered with regard to its length.

short staple : less than 25 mm (<0.98 inches) medium

staple : 25 to 30 mm (0.98–1.18 inches)

long staple : 30 to 37 mm (1.18-1.46 inches)

extra long staple : 37mm and above (>1.46 inches)

Strength: Force required to break a bundle of fibers one tex unit in size. A tex is the weight in grams of 1,000 meters of fiber. HVI clamp jaw spacing is 1/8 inch. Fiber strength is under strong genetic control, but may be reduced by nutrient deficiency or stress.

Strength category	HVI Strength (grams per tex)
Very strong	31 and above
Strong	29 – 30
Intermediate	26 – 28
Weak	24 – 25
Very weak	23 and below

Source: USDA (1999)

Transgenic variety: A variety containing genes from dissimilar species or other foreign sources that confer desirable traits such as insect or herbicide resistance.

Trash: Percentage of the sample surface area covered by non-lint materials, as determined by a video scanner. Typical sources of trash include leaf fragments and bark. HVI trash measurement is correlated to a hand classer's leaf grade:

Twinlink: A two-gene trait which expresses two proteins from *Bacillus thuringiensis (Bt)* and provides resistance to certain lepidopteran pests such as tobacco budworm. Abbreviated **T** in variety names.

Uniformity: Length uniformity is the ratio between the mean length and the upper-half mean length of the fibers, expressed as a percentage. Also referred to as the length uniformity index.

Uniformity Group	Length Uniformity Index
Very high	86 and above
High	83- 85
Intermediate	80- 82
Low	77- 79
Very low	76 and below

Source: USDA (1999)

Widestrike: A two-gene trait which expresses the Cry1Ac and Cry1F proteins from *Bacillus thuringiensis (Bt)* and provides resistance to certain lepidopteran pests such as tobacco budworm. Abbreviated **W** in variety names.

Widestrike 3: A three-gene trait which expresses the Cry1Ac, Cry1F, and Vip3A proteins from *Bacillus thuringiensis (Bt)* and provides resistance to certain lepidopteran pests such as tobacco budworm and improved resistance management. Abbreviated **W3** in variety names.

XtendFlex: A trait which provides tolerance (in cotton) to the herbicides dicamba, glyphosate, and glufosinate. Abbreviated **XF** in variety names.

References

- USDA. 1997. Cotton Classification Results -- Understanding the Data. Agricultural Marketing Service, Cotton Div. Rev. 5/97. 12 pp.
- USDA. 1999. The Classification of Cotton. Agricultural Marketing Service, Agric. Handbook 566. Rev. 1/99. Washington, DC. 23 pp.



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