

Short Staple Variety Trials, Graham County, 1999

L. J. Clark and E.W. Carpenter

Abstract

Two replicated on-farm short staple variety trials were planted in 1999. Twenty-two varieties were evaluated on the Claridge farm in Solomon and fifteen varieties on the Colvin farm near Ft. Thomas. Several new varieties were planted in these studies, including 2 transgenic varieties: DP 5690RR, BXN 16; 4 Israeli inter-specific hybrids and six other varieties seen for the first time. DP 35B was the highest yielding variety in the Claridge trial with BXN 47 a close second. Both varieties yielded over 1300 pounds of lint per acre. PM 1440 was the highest yielding variety in the Colvin trial with SG 747 and DP 5690RR following closely behind. These varieties yielded between 700 and 800 pounds of lint per acre. Other agronomic data from the varieties and HVI values from the lint are also included in this report.

Introduction

This cotton variety trial, similar to the previous year's studies, is part of state-wide variety evaluation done in conjunction with Dr. Hal Moser and several seed companies. Even more important, however, this trial is part of the on-going variety trials conducted in the county for the benefit of local cotton growers.

Materials and Methods

The demonstrations were grown with the cooperation of Kenneth Claridge in Solomon, at an elevation close to 3000 feet, and Colvin Farms near Ft. Thomas, at an elevation of 2700 feet, using their equipment and normal cultural practices. The two sites differ in elevation by about 300 feet with the Claridge field being higher and generally warmer and the Colvin site is on a highly saline soil. The varieties were planted in 2-row plots in four replications at the Claridge site and 4-row plots with three replicates on the Colvin site. Agronomic measurements were made on a sub-set of plants prior to harvest. Plots were mechanically picked using the cooperator's machines, with each plot being weighed separately using electronic weigh scales under cotton trailers or a basket scale placed adjacent to the module builder. Sub-samples were taken to determine lint turnout and fiber quality

Crop History - Claridge farm

Previous crop: Cotton

Soil type: Comoro/Grabe loam complex

Planting date: 22 April 1999

Fertilizer: 7 gallons/ac 9-32-0-5 at listing, 20 gallons of UN32 side dressed in May

Insecticide: 1 application in mid-August for multiple insect pests

Irrigation: Furrow, 4 times

Plant growth regulators: PIX applied 2x, 4 oz/ac + 12 oz/ac

Defoliation: Sodium chlorate, second application sodium chlorate + Starfire

Harvest dates: 1st Pick: 10 November 2nd Pick: Not taken

Heat units (86/55) to 1st pick: 3739

Crop History - Colvin farm

Previous crop: Cotton

Soil type: Glendale loam/silty clay loam, saline

Planting date: 3 May 1999 Rate: 25 pounds per acre

Fertilizer: 50 pounds of N water run

Herbicide: Rope wicked with Roundup + 3 hoeings

Insecticide: None

Defoliation: Sodium chlorate

Irrigation: Furrow irrigated 5 times

Harvest dates: 1st Pick: 22 December 2nd Pick: Not taken

Heat units (86/55) planting to killing frost (recorded at Safford Ag Center): 3749

Results and Discussion

The weather plays a significant part in the yield of cotton and also which variety does best in what location. The weather during the 1999 growing season is shown in Figure 1 and seemed to be more variable than normal through the months of April and May. The late April - early May planting dates were selected because the weather was warming and it was felt that there would be sufficient heat units during the germination period to develop a good stand of cotton. It is also noted from Figure 1 that heat units from mid-May to late October varied a bit from the average, but not too far. The outstanding feature was the exceptional warmth in the month of November. This warmth finished maturing most of the cotton in the valley before the frost on the 22nd of November. This extension in time partially made up for the cold start in April and May.

Tables 1 and 2 show the yield and other agronomic data from the Claridge trial. The highest yielding varieties performed very well, even better than in the Carpenter trial in 1998 (1). The change in locations between 1998 and 1999 makes yield comparison difficult, but the best varieties yielded higher and the poorer varieties yielded lower than in 1998 with the average yields very similar. Two transgenic Bt varieties were in the top three in yield even though it was not felt that insects were a significant threat to yield. DP 35B, developed from DP 90, was the highest yielding variety with 1370 pounds of lint per acre, notwithstanding the fact that its percent lint turnout was lower than average in the trial. BXN 47 was the number two variety in yield, the same placing as last year. Table 1 shows considerable differences in yield, percent lint, plant height and plant population between varieties. Of these variables, percent lint turnout and plant population were positively correlated with lint yield. Table 2 shows many statistically significant differences between varieties in first fruiting branches, nodes, height to node ratios (HNR) and 10 boll weights. None of these variables, however, were positively correlated to yield.

Table 3 provides HVI data for all the varieties tested in the study. The three interspecific hybrids from Hazera were in a class by themselves with exceptionally long and strong fiber. New Mexico's 1517-91 was next in rank for long fiber, but sharing the ranking for strength with two of the Olvey varieties, three of the Delta Pine varieties and AgriPro's 6101. Many differences were seen in micronaire values. The Hazera varieties produced low micronaire values. It was felt that this was due to the fineness of the fibers rather than immature fibers, but this would have to be dealt with at marketing time. Only SureGrow 747 had a micronaire value in the discount area for high micronaire. This was also seen in the 1999 Upland cotton variety trials in Maricopa, Pinal and Pima counties (2).

Table 4 contains the yield, plant height and plant population data for the Colvin trial. Paymaster 1440 had the highest yield in this trial with a yield of 783 pounds of lint per acre. SureGrow 747 and Delta Pine 5690 RR also produced more than 700 pounds of lint per acre. The average yield from this year's study was slightly lower than in 1998 (1) and the ranking of common varieties changed a bit from last year to this year. The NM acala that placed fourth in last year's study could not be included in this year's trial, for lack of seed, but 1517-91, three interspecific hybrids from Hazera Seed Company in Israel and Olvey's acala, OA 207, were added as high fiber quality entries in this year's trial. Hazera 195 and 175 are fuzzy seed types, whereas the 83 entry is a naked

seeded variety. Statistically significant differences in yield were seen between varieties and the varieties with the best lint quality appear in the bottom half of the yield spectrum. Differences were seen in the percent lint turnouts, the most notable being the lower lint turnouts of two of the Hazera varieties. In plant heights, DP 5690RR was the tallest variety and PM 1560BG was the shortest. The interesting thing being that they were right next to each other in the yield rankings. OA 207 had the highest plant population at 49,000 plants per acre and HCR 9257 had the lowest plant population at 24,000, however plant population was not statistically correlated to lint yields.

Table 5 contains more agronomic variables from the upland variety trial grown on the Colvin site. Statistical differences are seen in each of the variables and are related to the genetic differences between varieties. Hazera 83-208, the Pima-type seed, had the most vegetative nodes before fruiting and SureGrow 501 had the least. Differences in node numbers and height to node ratios (HNR) will be left for the reader to compare. The interspecific hybrids from Hazera had boll weights significantly lighter than the other varieties in the study.

HVI data from the Colvin Farm site are shown in table 6. The average length of fiber was shorter and the HNR greater in 1999 than in 1998. This would leave one with the conclusion that management was not a factor in the short fiber. This leaves the climate to blame for the short fiber. The Hazera varieties had the best fiber qualities, as was seen in the Claridge study. A comparison of specific fiber characteristics by variety will be left to the reader.

References

1. Clark, L.J., E.W. Carpenter and R.H. Walser. 1999. Short staple variety trials, Graham county, 1998. Cotton, A College of Agriculture Report, The University of Arizona, Tucson, AZ. Series P-116, pp. 133-141.
3. Silvertooth, J.C., E.R. Norton and P.W. Brown. 1996. Cotton growth and development patterns. Cotton, A College of Agriculture Report, The University of Arizona, Tucson, AZ. Series P-103, pp. 75-97.

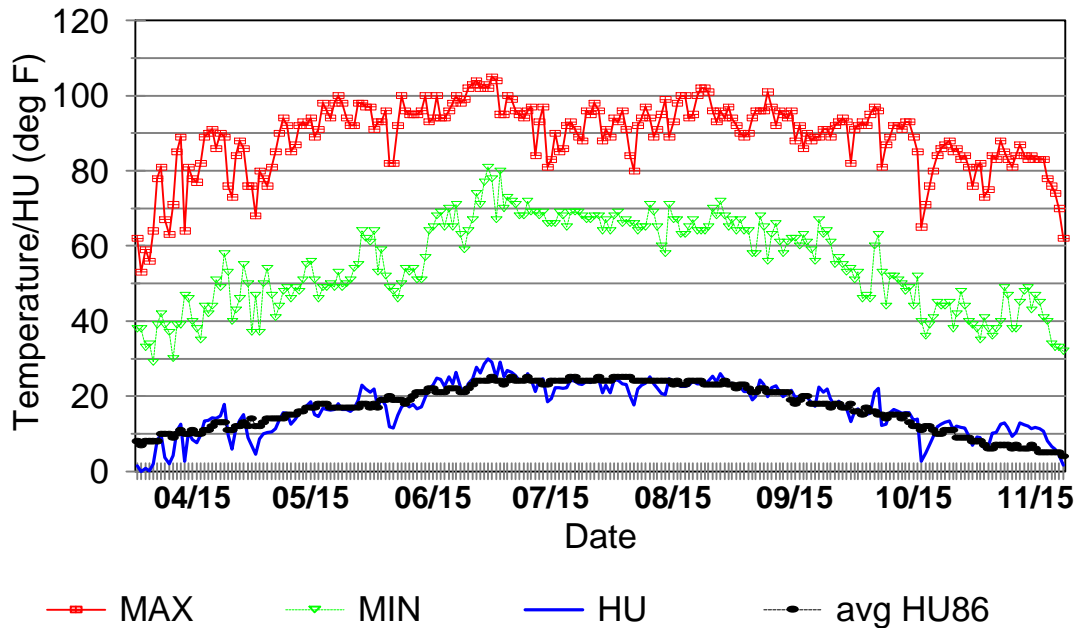


Figure 1. Temperatures and Heat Units during the 1999 growing season at the Safford Agricultural Center.

Table 1. Yields and other agronomic data from the upland variety trial grown on the Claridge Farm, 1999.

Variety	Lint Yield	% Lint	Plants Height	Plants Per Acre
DP 35B	1370 a	34.3 h	50.0 ab	58470 bc
BXN 47	1340 a	37.6 abc	34.5 ef	45142 d-g
PM 1560BG	1286 ab	36.4 c-f	33.0 f	58040 bc
SG 747	1285 ab	37.7 ab	37.3 def	44712 d-h
PM 1440	1254 abc	36.5 c-f	33.0 f	50731 b-e
SG 501	1224 a-d	37.8 ab	36.0 def	44712 d-h
AP 6101	1195 a-e	37.1 a-e	39.5 c-f	56750 bc
SG 125	1189 a-e	36.8 b-f	39.5 c-f	47722 c-f
HAZ 195-208	1179 a-e	34.4 h	46.3 bc	45142 d-g
FM 989	1136 b-f	37.2 a-d	36.8 def	53311 ghi
HCR 9257	1133 b-f	35.9 efg	37.5 def	34824 ghi
OA 63	1116 b-f	38.3 a	53.8 a	58900 b
OA 77	1084 c-g	36.3 c-g	46.3 bc	52021 bcd
DP 90	1078 c-g	37.2 a-d	51.5 ab	72228 a
DP 5690RR	1054 d-f	36.8 b-e	42.0 cd	56320 bc
DP 675	1023 efg	35.5 fgh	50.3 ab	44712 d-h
HAZ 151-208	1017 e-h	32.7 i	40.8 cde	39983 e-f
BXN 16	1003 e-h	36.1 d-g	32.8 f	33534 i
1517-91	954 f-i	35.1 gh	39.0 def	35684 ghi
OA 7	919 ghi	37.3 a-d	50.3 ab	55031 bcd
OA 207	824 hi	37.0 b-e	36.8 def	38264 f-i
HAZ 175-208	771 i	31.3 j	46.3 bc	33965 hi
Average	1111	36.2	41.5	48191
LSD(05)	195	1.2	6.9	11172
CV(%)	8.5	1.7	8	11.15

Table 2. Other agronomic variables measured or calculated from the upland variety trial grown on the Claridge Farm, 1999.

Variety	1st Fruiting Branch	Nodes	HNR	10 Boll Wt.
DP 35B	8.00 ab	24.0 abc	2.09 b	54.5 cde
BXN 47	7.25 a-d	24.0 abc	1.44 e	54.5 cde
PM 1560BG	6.75 bcd	19.8 ef	1.68 b-e	54.0 cde
SG 747	6.50 cde	19.3 f	1.95 bcd	53.5 def
PM 1440	7.00 bcd	22.5 a-f	1.47 de	60.5 b
SG 501	7.00 bcd	21.5 c-f	1.67 b-e	52.5 ef
AP 6101	6.50 cde	22.3 b-f	1.78 b-e	53.0 ef
SG 125	6.75 bcd	21.0 c-f	1.89 b-e	52.0 ef
HAZ 195-208	7.00 bcd	23.8 abc	1.95 bcd	44.5 h
FM 989	6.75 bcd	20.8 c-f	1.77 b-e	59.5 bc
HCR 9257	6.75 bcd	22.3 b-f	1.69 b-e	55.0 b-e
OA 63	8.50 a	25.8 a	2.09 b	53.5 def
OA 77	7.25 a-d	23.3 a-d	2.00 bc	56.0 b-e
DP 90	8.00 ab	25.5 ab	2.02 bc	51.0 efg
DP 5690RR	7.25 a-d	22.3 b-f	1.89 b-e	54.5 cde
DP 675	7.50 abc	20.0 def	2.61 a	59.0 bcd
HAZ 151-208	6.00 de	23.3 a-d	1.78 b-e	48.0 fgh
BXN 16	6.25 cde	21.5 c-f	1.53 cde	55.0 b-e
1517-91	6.50 cde	23.0 a-e	1.70 b-e	59.0 bcd
OA 7	7.00 bcd	25.3 a-d	2.17 ab	52.0 ef
OA 207	7.50 abc	21.3 c-f	1.73 b-e	67.0 a
HAZ 175-208	5.25 e	23.0 a-e	2.02 bc	45.5 gh
Average	6.97	22.4	1.86	54.30
LSD(05)	1.43	3.5	0.5	5.7
CV(%)	9.9	7.5	12.9	5.1

Table 3. HVI Data from the upland variety trial grown on the Claridge Farm, 1999.

Variety	Length	Strength	Uniformity	Micronaire	RD	+b
DP 35B	1.13 cde	30.4 bcd	81.5 abc	39.5 c-f	78.0 abc	76.0 cde
BXN 47	1.10 gh	26.0 gh	81.0 a-d	43.5 bcd	77.0 cd	80.5 c
PM 1560BG	1.13 cde	27.4 efg	81.0 a-d	43.0 cd	79.0 abc	69.5 fgh
SG 747	1.11 e-h	25.0 h	81.5 abc	50.5 a	78.5 abc	79.0 cd
PM 1440	1.11 fgh	26.5 fgh	81.0 a-d	48.5 ab	79.5 ab	67.0 gh
SG 501	1.15 c	27.8 efg	81.5 abc	43.5 bcd	77.0 cd	76.5 cde
AP 6101	1.13 cde	29.4 b-e	81.0 a-d	44.5 bc	80.0 a	69.0 fgh
SG 125	1.14 cd	25.9 gh	81.0 a-d	43.5 bcd	79.5 ab	77.0 cde
HAZ 195-208	1.25 a	35.8 a	80.5 bcd	34.5 fg	74.0 ef	94.5 a
FM 989	1.12 d-g	28.3 def	80.0 cd	41.0 cd	78.5 abc	76.0 cde
HCR 9257	1.11 fgh	27.4 efg	80.5 bcd	39.5 c-f	77.5 bcd	75.0 c-f
OA 63	1.10 hi	28.6 c-f	79.5 d	44.0 bcd	78.5 abc	72.5 efg
OA 77	1.12 e-h	27.5 efg	80.0 cd	42.5 cd	78.0 abc	74.0 def
DP 90	1.10 gh	29.3 b-e	80.5 bcd	41.5 cd	79.0 abc	76.5 cde
DP 5690RR	1.10 hi	28.5 c-f	80.5 bcd	41.0 cd	78.0 abc	76.5 cde
DP 675	1.13 c-f	29.4 b-e	81.0 a-d	39.0 def	79.0 abc	76.0 cde
HAZ 151-208	1.25 a	36.5 a	80.5 bcd	33.5 g	72.5 f	91.0 ab
BXN 16	1.08 i	25.6 gh	79.5 d	43.5 b-d	78.5 abc	66.0 h
1517-91	1.19 b	30.9 b	82.0 ab	40.5 cd	75.5 de	78.5 cde
OA 7	1.10 gh	28.9 b-e	80.5 bcd	40.0 cde	78.5 abc	77.0 cde
OA 207	1.15 c	30.7 bc	82.0 ab	42.0 cd	77.0 cd	75.0 c-f
HAZ 175-208	1.26 a	34.6 a	82.5 a	35.0 efg	72.0 f	87.0 b
Average	1.14	29.1	80.9	41.5	77.5	76.8
LSD(05)	0.21	2.3	1.8	5.1	2.0	6.2
CV(%)	0.88	3.8	1.1	5.9	1.3	3.9

Table 4. Yields and other agronomic data from the upland variety trial grown on the Colvin Farm, 1999.

Variety	Lint Yield	% Lint	Plants Height	Plants per Acre
PM 1440	783.0 a	37.3 a	26.5 c-f	36754 a-d
SG 747	744.0 ab	37.6 a	29.3 bcd	34031 bcd
DP 5690RR	724.2 ab	36.3 ab	37.3 a	31763 cd
PM 1560BG	687.7 ab	37.1 a	23.8 f	35846 bcd
SG 501	679.4 ab	37.9 a	26.5 c-f	31309 cd
FM 989	678.1 ab	37.6 a	27.8 b-f	40383 abc
DP 675	662.2 ab	36.8 ab	30.0 bcd	32216 cd
HAZ 195-208	661.3 ab	35.1 b	28.5 b-e	46283 ab
OA 207	652.6 ab	36.4 ab	25.8 def	49005 a
HAZ 83-208	635.8 abc	33.1 c	29.3 bcd	39022 abc
AP 7115	624.0 bc	37.3 a	30.5 bc	31309 cd
1517-91	609.4 bc	35.1 b	30.0 bcd	30855 cd
ST BXN 16	608.5 bc	36.2 ab	24.5 ef	33124 cd
HCR 9257	480.2 cd	37.8 a	31.5 b	24049 d
HAZ 175-208	441.0 d	30.9 d	28.5 b-e	32670 cd
Average	644.7	36.1	28.6	35241
LSD(05)	158.2	1.9	4.5	13020
CV(%)	11.4	2.4	7.4	17.2

Table 5. Other agronomic variables measured or calculated from the upland variety trial grown on the Colvin Farm, 1999.

Variety	1st Fruiting Branch	Nodes	HNR	10 Boll Wt.
PM 1440	7.5 bc	20.3 a-d	1.31 ab	51.5 b
SG 747	7.8 bc	19.8 b-e	1.52 ab	58.0 ab
DP 5690RR	7.5 bc	23.5 a	1.59 a	58.0 ab
PM 1560BG	7.0 bc	18.0 de	1.32 ab	52.0 b
SG 501	6.5 c	19.8 b-e	1.35 ab	56.0 ab
FM 989	9.3 ab	23.5 a	1.19 b	60.5 a
DP 675	6.3 c	19.8 b-e	1.54 a	56.0 ab
HAZ 195-208	8.8 abc	19.0 cde	1.50 ab	41.0 c
OA 207	8.5 abc	16.3 e	1.59 a	59.0 a
HAZ 83-208	10.8 a	21.5 a-d	1.36 ab	44.5 c
AP 7115	8.3 abc	21.5 a-d	1.42 ab	57.0 ab
1517-91	8.0 bc	22.5 abc	1.34 ab	54.0 ab
ST BXN 16	7.0 bc	19.0 cde	1.29 ab	51.5 b
HCR 9257	7.0 bc	22.6 ab	1.39 ab	55.0 ab
HAZ 175-208	7.3 bc	18.8 de	1.52 ab	38.5 c
Average	7.8	20.4	1.41	52.80
LSD(05)	2.6	3.5	0.33	6.8
CV(%)	15.5	8	10.9	6

Table 6. HVI Data from the upland variety trial grown on the Colvin Farm, 1999.

Variety	Length	Strength	Uniformity	Micronaire	RD	+b
PM 1440	103.0 f	27.7 de	79.5 d	47.5 ab	76.0 ab	79.0 bcd
SG 747	106.5 def	26.4 e	81.0 bcd	49.5 a	75.5 ab	80.5 b
DP 5690RR	107.5 def	31.8 bc	80.0 cd	40.5 cde	74.5 bc	76.0 b-e
PM 1560BG	102.5 f	27.3 de	80.5 bcd	47.5 ab	75.0 abc	80.0 bc
SG 501	108.0 def	30.4 cd	81.5 bc	47.5 ab	75.0 abc	77.5 b-e
FM 989	110.5 de	31.9 bc	80.0 cd	41.5 cde	76.5 ab	74.0 d-e
DP 675	104.5 ef	29.5 cde	80.5 bcd	43.0 b-e	76.0 ab	78.0 bcd
HAZ 195-208	122.0 ab	36.6 a	81.5 bc	34.5 f	71.0 de	92.0 a
OA 207	104.5 ef	28.7 cde	80.5 bcd	45.5 abc	75.5 ab	74.5 cde
HAZ 83-208	128.0 a	31.7 bc	85.0 a	40.0 de	68.5 e	94.5 a
AP 7115	102.5 f	26.9 de	79.5 d	45.0 a-d	77.5 a	75.0 b-e
1517-91	112.5 cd	31.7 bc	82.0 b	43.5 b-e	72.5 cd	78.5 bcd
ST BXN 16	103.5 f	28.9 cde	81.5 bc	42.0 cde	77.5 a	72.0 e
HCR 9257	105.0 ef	28.4 cde	80.0 d	44.5 a-d	77.5 a	77.0 b- e
HAZ 175-208	117.0 bc	34.9 ab	82.0 b	38.5 ef	71.0 de	91.5 a
Average	109.20	30.2	81.0	43.4	74.6	80.0
LSD(05)	6.10	3.6	1.6	5.3	2.7	5.9
CV(%)	2.60	5.5	0.9	5.7	1.7	3.4