

# Short Staple Variety Trials, Graham County, 1998

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## **Abstract**

*Two replicated on-farm short staple variety trials were planted in 1998. Fifteen varieties were evaluated on both the Carpenter farm in Thatcher and the Colvin farm near Ft. Thomas. Several new varieties were planted in both studies, including 4 transgenic varieties: DP 90B, BXN 47, DP 90RR and Paymaster 1560BG, 2 varieties from Australia: FiberMax 989 and FiberMax 832, and seven other varieties seen for the first time. Two of the new varieties produced the highest yields; AgriPro 6101 and Phytogen 952 on the Carpenter and Colvin farms, respectively. 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. Jeff Silvertooth and seven 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 Darin Carpenter in Thatcher, at an elevation of 2900 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 200 feet with the Carpenter 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 Carpenter site and 4-row plots with two replicates on the Colvin site. Agronomic measurements were made on a sub-set of plants prior to harvest. Plots were mechanically picked using the cooperators' 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 - Carpenter farm

Previous crop: Cotton

Soil type: Grabe clay loam

Planting date: 28 April 1998

Rate: 26 pounds per acre

Fertilizer: 25 gallons of 20-10-0 side dressed late May

Herbicide: Staple applied post-directed

Insecticide: 1 application for lygus

Irrigation: Furrow, 8 times

Defoliation: Sodium chlorate

Harvest dates: 1st Pick: 30 October

2nd Pick: Not taken

Heat units (86/55) to 1st pick: 3707

## Crop History - Colvin farm

Previous crop: Cotton

Soil type: Glendale loam/silty clay loam, saline

Planting date: 29 April 1998                      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: 4 December              2nd Pick: Not taken

Heat units (86/55) to 1st pick (recorded at Safford Ag Center): 3707

## **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 1998 growing season is described in reference 1 and seemed to be more variable than normal through the months of April and May. The late April 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.

Tables 1 and 2 show the yield and other agronomic data from the Carpenter trial. Yields were higher than last year (2) and that was related to the soil quality on the Thatcher farm compared with the Central farm. The highest yielding variety was AgriPro 6101, a variety that had not previously been tested in the valley. Stoneville's BXN 47 and 373 were very close in yield to AP 6101 and SG 501 and FM 989 were only slightly lower in yield. Little pink bollworm pressure was seen in the field so the two bollgard entries, PM 1560BG and DP 90B were not given any advantage. AP 6101 had one of the lowest percent lint turnouts in the trial but still produced the most lint per acre. Plant heights and plant populations were higher than in 1997 and there was a negative correlation between yield and plant population in 1998.

The first four columns of Table 2 give a glimpse of the plant at harvest time. More nodes would be useful to a plant, if they are fruiting nodes and if there is sufficient plant height that the Height to Node Ratio (HNR) is not suppressed. Similarly, a tall plant is good if the first fruiting branch is low and the HNR doesn't get out of the optimal range (3). HNR's in the Carpenter trial fall within the optimal range. It is desirable to have the first fruiting branch relatively low and this is more notably the case with the more determinant varieties, but in this study the highest yielding and the lowest yielding varieties had bolls set on early branches. It is also desirable to have large numbers of fruiting branches, but in this study the varieties with the largest number of fruiting branches did not have a yield advantage. Large boll weights would make it easier to produce a big yield, but in this study the highest yielding variety had the smallest bolls. There were no statistically significant correlations between any of factors listed in the table with lint yield.

Table 3 displays the HVI values for the varieties grown in the Carpenter trial. Too much information is given to discuss in detail. Our comments will be limited to a few remarks about micronaire, length and strength. FM 832, the okra-leaved variety had a micronaire value in the premium range of 37-42, all of the rest had values in the zero premium/discount range of 43-49. Four varieties had exceptional length: FM 832, AP 6101, FM 989 and SG 248. Three varieties had fiber strength over 32 grams/tex and the average for the test was over 30 grams/tex. Overall FM 832 had the best fiber at this site. It would, however, require a premium of 94/lb (with a 604 base) to overcome the yield deficit for FM 832 to produce the same value as AP 6101.

Table 4 contains the yield, plant height and plant population data for the Colvin trial. PhytoGen 952, another newcomer to the valley, produced the highest yield with the Australian variety, FM 832 and Germains 120 within the same statistically significant range. NM B8073, a promising advanced strain from the New Mexico State breeding program, performed quite well in this trial. Lint turnouts varied between varieties but were very close to the same values seen in the Carpenter trial with AP 6101 at the low end and the SureGrow varieties at the high end. The average plant height was about the same between the Colvin and Carpenter trials but the varieties reacted very differently at the two sites, perhaps due to the salinity at the Colvin site and perhaps because of the high plant population on the Carpenter site. None of the plant heights nor plant populations were in an area of concern.

Table 5 contains other agronomical data collected at the Colvin site. Node numbers varied a bit from variety to variety, but nothing outstanding. HNR values were different with PM 1560BG and AP 7115 being at the bottom edge of the acceptable range with about half of the remaining varieties below the mid-way point. This may have been caused by the salinity of the soil or the coolness of the experimental site. There was much variability in first fruiting branches and total number of fruiting nodes. In some cases they were similar to what was seen at the Carpenter site, in other cases they differed greatly. There was no correlation between these parameters and the lint yields. Boll weights were quite similar between the two sites with FM 832 and Stoneville 373 having the largest bolls and SG 248 having the smallest bolls. This table has an additional parameter. Since the crop was harvested so late there was some stringing-out of the locks from the bolls. Values were given from 0 (no stringing-out) to 6 (maximum stringing-out). The values raise some concern about the weather-fastness of three of the varieties, SG 501, GC 120 and NM B8073.

Table 6 displays the HVI data for fiber characteristics at the Colvin site. Seven of the varieties fell in the premium micronaire values between 37 and 42. Two varieties, GC 9033 and PSC 569 were in the discount range and the remainder were in the zero discount/premium range. Three varieties exhibited longer fiber than the rest, these were FM 832, SG 248 and the NM advanced strain, B8073. Two of these had exceptionally strong fiber, approaching 30 grams/tex along with two other varieties. All-in-all it is encouraging to see new varieties being developed with fiber characteristics comparable to the New Mexico 1517 lines and with good yield potential.

## References

1. Clark, L.J., E.W. Carpenter, G.L. Hart and J.M. Nelson. 1999. Short staple regional cotton variety trial, Safford Agricultural Center, 1998. *In this publication.*
2. Clark, L.J. and E.W. Carpenter. 1998. Short staple variety trials, Graham county, 1997. Cotton, A College of Agriculture Report, The University of Arizona, Tucson, AZ. Series P-112, pp. 113-118.
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.

**Table 1. Yield and other agronomic data from the short staple variety trial, Carpenter Farm, Graham county, AZ, 1998.**

Variety	LINT YLD	% LINT	PLANT HT	PL/AC
AP 6101	1268 a <sup>1</sup>	35.8 fg	30.5 a-d	74035 cde
STV BXN 47	1263 a	36.8 cde	33.0 ab	66574 e
STV 373	1250 a	37.3 bcd	31.0 a-d	64852 e
SG 501	1218 a	38.8 a	27.7 bcd	92974 bc
FM 989	1218 a	37.6 bc	29.7 a-d	114783 a
SG 248	1197 a	38.1 ab	30.7 a-d	88957 bcd
PSC 952	1193 a	37.1 b-e	30.8 a-d	89817 bcd
DP 90RR	1160 a	35.4 g	31.0 a-d	91826 bc
GC 9033	1122 a	36.5 def	27.0 cd	92974 bc
AP 7115	1121 a	37.1 b-e	32.0 abc	96417 ab
PM 1560BG	1121 a	37.5 bcd	25.8 d	87809 bcd
FM 832	1109 a	36.1 efg	30.0 a-d	92974 bc
DP 90B	1088 a	35.8 fg	34.7 a	94696 b
GC 120	1087 a	37.4 bcd	28.0 bcd	102444 ab
PSC 569	1044 a	36.8 cde	32.5 abc	70878 de
Average	1163.9	36.9	30.3	88133.9
LSD(05)	209.0	0.9	4.8	17491.0
CV(%)	10.7	1.5	9.4	11.9

1. Values followed by the same letter within a column are not significantly different at the 5% level of probability.

**Table 2. Continuation of Table 1. Additional agronomic data from the short staple trial grown on the Carpenter Farm, Graham County, 1998.**

Variety	Nodes	HNR	1 <sup>st</sup> Fruiting Branch	Tot. Fruiting Branches	Boll Weight (gm)
AP 6101	23.2 ab	1.34 bc	7.0 cd	13.3 abc	4.70 g
STV BXN 47	23.3 ab	1.42 abc	8.5 a-d	12.0 b-e	5.13 efg
STV 373	21.3 ab	1.50 abc	8.0 bcd	12.0 b-e	6.10 a
SG 501	22.2 ab	1.26 bc	8.3 a-d	12.2 b-e	5.20 efg
FM 989	20.5 b	1.46 abc	10.5 a	9.5 de	5.87 abc
SG 248	21.0 b	1.46 abc	9.3 abc	9.0 e	4.97 fg
PSC 952	22.3 ab	1.39 abc	9.0 a-d	12.0 b-e	5.40 c-f
DP 90RR	20.0 b	1.55 ab	8.2 a-d	10.5 cde	5.37 c-f
GC 9033	23.7 ab	1.15 c	7.0 cd	15.0 ab	4.90 fg
AP 7115	25.5 a	1.25 bc	7.0 cd	16.0 a	5.25 def
PM 1560BG	20.0 b	1.30 bc	6.7 d	11.7 b-e	5.77 a-d
FM 832	21.7 ab	1.39 abc	9.7 ab	10.3 cde	6.00 ab
DP 90B	19.8 b	1.75 a	8.8 a-d	9.8 de	5.57 b-e
GC 120	23.5 ab	1.20 bc	8.0 bcd	13.5 abc	5.50 b-e
PSC 569	21.0 b	1.55 ab	6.7 d	12.8 a-d	5.53 b-e
Average	21.9	1.40	8.2	12.0	5.42
LSD(05)	3.6	0.3	2.0	3.0	0.47
CV(%)	9.9	13.6	14.9	14.8	5.2

1. Values followed by the same letter within a column are not significantly different at the 5% level of probability.

**Table 3. HVI data from the short staple variety trial grown on the Carpenter Farm, Graham County, 1997.**

VAR	C GRADE	LF GRADE	MIC	LEN (in/100)	STR	UNIF	TRASH	RD	+B
AP 6101	31	5.0	46.0	118.5	31.5	81.5	4.5	77.5	76.5
STV BXN47	31/41	6.0	46.0	112.0	28.2	82.0	10.0	75.5	80.5
STV 373	41/51	6.5	46.0	114.0	26.8	82.0	12.5	73.0	80.0
SG 501	41/42	6.0	47.0	112.0	31.9	83.0	11.0	72.0	80.5
FM 989	41	6.0	45.0	118.0	31.3	82.5	13.0	74.5	77.5
SG 248	41	6.0	46.0	117.5	31.3	82.0	9.5	75.0	75.0
PSC 952	41	6.0	49.0	113.5	28.0	82.0	10.0	73.5	78.5
DP 90RR	31/41	4.5	45.5	111.0	31.2	81.0	6.0	77.5	75.5
GC 9033	31/41	5.5	47.0	113.5	32.2	82.5	6.0	7.5	83.0
AP 7115	31	4.5	43.5	112.0	29.0	82.0	5.0	77.5	75.0
PM 1560BG	31/41	5.5	46.0	111.5	28.7	82.5	9.5	75.5	76.0
FM 832	31/41	6.5	40.0	120.5	32.0	82.5	10.5	74.0	75.0
DP 90B	31	6.0	46.0	113.0	33.0	81.5	7.5	74.5	82.5
GC 120	31/41	5.5	44.0	112.5	28.0	83.0	8.5	76.0	77.0
PSC 569	31	1.0	47.5	109.5	30.9	80.5	4.5	77.5	84.5
AVG	--	5.4	45.6	113.9	30.3	82.0	8.5	70.7	78.5

**Table 4. Yields and other agronomic data from the short staple variety study, Colvin Farms, Graham County, AZ, 1998.**

VARIETY	LINT YLD	% LINT	PLANT HT	PLANTS/AC
PSC 952	874 a <sup>1</sup>	36.9 a-d	31.8 abc	50295 bc
FM 832	788 ab	35.9 cd	33.0 abc	56314 ab
GC 120	773 abc	38.1 abc	29.5 bcd	54164 ab
NM B8073	750 bc	37.7 abc	27.8 cde	49006 bcd
AP 7115	734 bc	37.9 abc	22.5 ef	53734 ab
SG 248	731 bcd	38.8 a	33.3 abc	36539 cde
STV 373	685 b-e	37.9 abc	25.5 def	52446 ab
GC 9033	664 cde	36.1 bcd	36.8 a	58033 ab
SG 501	664 cde	38.3 abc	29.3 bcd	45137 b-e
FM 989	664 cde	38.6 ab	29.3 bcd	64481 a
PM 1560BG	663 cde	38.8 a	20.0 f	57173 ab
AP 6101	610 de	34.4 d	33.5 abc	31811 e
PSC 569	605 e	36.1 bcd	34.8 ab	49865 bc
DP 90B	587 e	37.5 abc	25.3 def	46856 bcd
STV BXN 47	568 e	36.4 a-d	28.8 bcd	35680 de
Average	690.6	37.3	29.4	49436
LSD(05)	108.3	2.3	5.5	12495
CV(%)	7.3	2.9	8.8	11.8

1. Values followed by the same letter within a column are not significantly different at the 5% level of probability.

**Table 5. Additional agronomic data from the short staple trial grown on the Colvin Farm, Graham County, 1998.**

Variety	Nodes	HNR	1st Frt Branch	Total Fruiting Nodes	Boll weight	String-out Values
PSC 952	21.5 ab <sup>1</sup>	1.48 a	8.3 bc	10.0 a	4.85 cd	3.5 abc
FM 832	22.5 ab	1.47 a	10.3 ab	8.5 a	6.25 a	1.0 f
GC 120	22.3 ab	1.33 ab	8.8 abc	9.8 a	5.15 cd	3.8 ab
NM B8073	21.3 ab	1.31 ab	6.3 c	11.5 a	5.35 bcd	3.8 ab
AP 7115	21.0 ab	1.07 b	9.0 abc	9.0 a	5.50 bc	2.5 b-e
SG 248	22.0 ab	1.52 a	9.5 ab	10.0 a	4.75 d	2.0 def
STV 373	21.0 ab	1.22 ab	9.5 ab	9.3 a	6.00 ab	2.8 a-d
GC 9033	24.3 a	1.52 a	11.3 a	10.3 a	5.00 cd	1.5 def
SG 501	19.8 b	1.47 a	8.0 bc	9.3 a	5.40 bcd	4.0 a
FM 989	23.0 ab	1.27 ab	9.5 ab	11.5 a	5.95 ab	1.5 def
PM 1560BG	19.8 b	1.02 b	7.5 bc	9.5 a	5.50 bc	2.5 b-e
AP 6101	22.3 ab	1.51 a	8.5 abc	9.8 a	5.10 cd	2.3 c-f
PSC 569	23.5 ab	1.48 a	10.3 ab	9.0 a	5.40 bcd	1.5 def
DP 90B	21.0 ab	1.23 ab	8.5 bc	9.0 a	5.30 bcd	1.3 ef
STV BXN 47	21.8 ab	1.32 ab	8.0 bc	10.8 a	5.10 cd	1.8 def
Average	21.8	1.35	8.9	9.8	5.37	2.37
LSD(05)	3.8	0.28	2.6	5.0	0.62	1.2
CV(%)	8.2	9.7	13.7	23.9	5.4	23.7

1. Values followed by the same letter within a column are not significantly different at the 5% level of probability.

**Table 6. HVI data from the short staple variety trial grown on the Colvin Farm, Graham County, 1998.**

Var	C Grade	LF Grade	Mic	Len (in/100)	Str g/tex	Unif	Trsh	RD	+B
PSC 952	41/51	8.0	39.0	109.5	25.6	80.0	12.5	73.0	70.5
FM 832	41	8.0	36.5	116.5	29.8	82.0	9.5	74.5	70.5
GC 120	31/41	7.5	41.0	109.5	26.4	82.5	7.0	76.5	72.0
NM B8073	51	8.0	41.5	115.5	29.2	81.5	9.0	73.5	69.0
AP 7115	32/41	8.0	43.5	110.0	26.3	81.0	8.5	75.5	71.0
SG 248	41/42	8.0	42.0	116.0	27.4	81.5	7.0	75.5	64.5
STV 373	31/41	7.0	39.5	111.5	25.5	80.5	8.0	76.5	71.0
GC 9033	31/41	7.5	34.0	110.5	27.1	80.0	9.5	76.0	68.5
SG 501	42/52	8.0	44.0	111.0	29.9	82.0	9.0	72.5	78.5
FM 989	41	8.0	37.5	112.5	29.6	80.5	10.0	74.5	71.5
PM1560BG	41/42	7.5	43.5	111.5	27.3	82.5	12.5	75.0	69.0
AP 6101	41.5	7.0	43.0	114.5	27.5	82.0	6.0	77.0	68.5
PSC 569	31/32	6.0	33.5	109.0	27.3	80.0	6.5	78.0	79.0
DP 90B	41	9.0	37.0	113.0	27.6	80.0	8.0	77.0	69.0
STVBXN47	41/51	6.0	39.5	110.5	25.6	81.5	12.0	73.0	79.5
Avg	--	7.6	39.7	112.1	27.5	81.2	9.0	75.2	71.5