

# Acala Cotton Variety Trial, Safford Agricultural Center, 2000

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## *Abstract*

*Eighteen Acala cotton varieties were tested in a replicated small plot trial on the Safford Agricultural Center in Graham county at an elevation of 2950 feet. The highest yielding variety in this study was Hazera 195-208, an interspecific hybrid from Israel, with a yield of 1387 pounds of lint per acre. It was followed closely by two varieties from New Mexico, 1517-99 and B7514. Hazera 195-208 had the highest yield in an interspecific hybrid study and 1517-99 was the highest yielding Acala variety in the Upland cotton regional variety trial in 1999 (1). The next five varieties consisted of two interspecific hybrids from Israel, a variety from Buttonwillow Research and two advanced strains from New Mexico. Yield and other agronomic data as well as fiber quality data are contained in this paper.*

## Introduction

Southeastern Arizona has a history of growing high quality Upland/Acala cotton. Over the years, only the higher elevation growers were able to economically grow the New Mexico Acalas as lower quality varieties produced more yield than the premium would compensate for. Our quest continues to find high quality cotton varieties that will yield, competitively, with the commonly grown varieties.

## Materials and Methods

This trial was designed as a replicated small plot trial with four replications. The plots were planted with a cone-type planter which distributes a given weight of seed uniformly over the length of the plot. This year the seeds were planted dry and watered up. The following crop history provides the information on how the crop was managed:

### Crop History:

Previous crop: Cotton

Soil type: Pima clay loam variant

Planting date: 26 April 2000

Rate: 25 pound per acre

Herbicide: 1.5 pt/ac Treflan pre-plant, 3.2 pts/ac Prometryne at lay-by

Fertilizer: side dressing of 100 lbs/ac of urea on 5/24 and 6/27

Insecticide: 2 applications to control pinkie, aphids and whitefly

Pix/Prep: None

Defoliation: Ginstar

Irrigation: Furrow, watered up + 8 irrigations (ca. 27.3 inches + 1.9 inches of rain)

Harvest dates: 1st pick: 30 November

2nd pick: not taken

**Heat units (86/55EF): to frost (1 Nov) - 3752**

The plots were picked using a modified 2-row cotton picker. The production from each plot was caught in a sack and weighed on an electronic platform scale to determine seed cotton yields. Ten boll samples were collected prior to harvest to determine boll weights. These samples were then ginned to determine percent lint turnout.

**Results and Discussion**

Weather conditions were slightly above normal for cotton stand establishment in 2000 with April temperatures being above normal and May temperatures being the hottest on record. June had a warm average temperature but with a couple of unseasonably cool days, which occurred during rainfall events. The rainfall in June seemed like an early start to the monsoon, but then nothing followed. July was very dry. August produced slightly over average rainfall and then September was dry. Less than normal rainfall was received during the monsoon. The temperatures for July through September were close to normal. October, which is normally dry for harvest, produced record rainfall (4.4") and was abnormally cold. Figures 1, 2 and 3 show the temperature and heat unit measurements throughout the growing season. The number of heat units were the same as in 1999, but came earlier in the year (reference 2).

Table 1 contains yield data, plant height, plant populations and boll weights. Yields varied greatly from 1387 to 703 pounds of lint per acre with an average of 1091 pounds per acre. Direct comparison with previous studies is complicated because this is the first year that the acala varieties were separated from the Regional Upland variety studies, but using 1517-99 as a marker (reference 1), the yields were very comparable between 1999 and 2000. Hazera 195-208 produced the highest yield in the trial, but was followed closely by 1517-99 and B7514 from the New Mexico cotton breeding program. All of these varieties yielded over 1300 pounds of lint per acre. The next four varieties were not statistically separable from the leader. This group consisted of materials from Hazera, Buttonwillow Research and New Mexico. The percent lint turnout values were obtained by ginning the boll samples picked by hand from each plot and ginned in a 10-saw table gin. Percent lint turnout values were then lowered to be more representative of gin turnouts from a grab sample. Percent lint varied from 31.7% to 40.6%, but most of the values were within a point of the average value. New Mexico's B7514 had the highest lint turnout value. Plant heights varied from 44.2 inches for one of the Hazera hybrids to 30.2 inches for one of the Buttonwillow entries. On plant populations, most varieties were within the 40 to 60,000 plants per acre. Notable exceptions were the highest yielding variety with 80,000+ plants per acre and the lowest yielding variety with less than 17,000 plants per acre. Boll weights varied from 3.7 to 7 grams by variety with the average being 5.3 grams. Variability between samples of the same variety was quite high on boll weights. The table below indicates the relation between these measured variables and lint yield.

Table 2 contains additional agronomical variables. There were significant differences in values for these variables by variety, but most of these comparisons will be left to the reader. The table below shows that 1<sup>st</sup> fruiting branch and Height to Node Ratio (HNR) are the only agronomic variables from this table with a direct statistical correlation to lint yield.

Correlations vs lint yield			
Variable	Probability	Variable	Probability
1st Fruiting Branch	0.02 *	Plants per acre	4.7x10 <sup>-7</sup> ***
Total Nodes	NS	% Lint turnout	0.002 **
Plant Height	0.007 **	Boll Weight	NS
HNR	0.036 *		

HVI values of the lint are included in Table 3. All of the varieties in this test were ginned on a saw gin and sent to the classing office as upland varieties. Because of the exceptional fiber quality of some of the Hazera varieties the classing office ran them as Pima varieties. This resulted in a lack of uniformity in grades. Neither pre- nor post-ginning cleaners were used and the grades tend to be lower than would be seen with a better quality gin, so no further comments will be made about fiber grades. This year was known as a high micronaire year in the state, but none of the varieties in this study were in the high end discount range. The acala varieties tend to produce longer, finer fiber and the weakness is in years with fewer heat units, when micronaire slips into the low range discount area. Only one of the varieties tested this year, Hazera 326, got into this range. Many times with the Acala varieties a low micronaire does not indicate

immature fiber, as is the case with the Delta varieties. None-the-less, until the system changes, breeders need to select cultivars with micronaires in the acceptable range. Length, strength and uniformity as a whole were excellent, with the Hazera varieties showing the best values. These values along with trash, Rd and +b color values will be left with the reader to follow his/her interests.

Many of the cultivar studied in this trial have yield potential and fiber qualities that should bring premium prices. The only thing lacking, that many cotton producers now depend upon, is genetically modified characteristics to aid with insect and weed control.

### **References**

1. Moser, H., G. Hart and L. Clark. 2000. Upland cotton regional variety trial. Cotton, A College of Agriculture Report, The University of Arizona, Tucson, AZ. Series P-121, pp. 98-106.
2. Clark, L.J. and E.W. Carpenter. 2000. Short staple variety trials, Graham County, 1999. Cotton, A College of Agriculture Report, The University of Arizona, Tucson, AZ. Series P-121, pp.107-115.

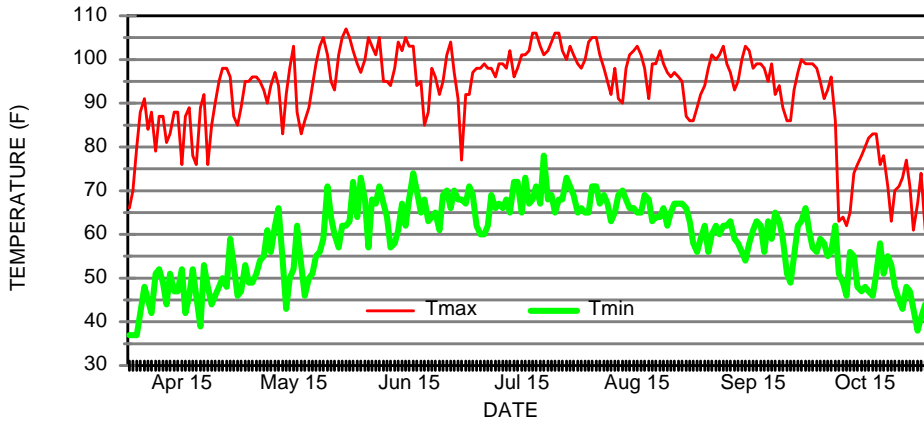
Variety	Lint Yield	% Lint	Plant Height	Plants per Acre	Boll Weight
HAZ 195-208	1386.7 a	36.8 c-f	41.0 ab	80465 a	5.1 ab
1517-99	1340.9 ab	38.4 a-d	38.3 ab	69878 abc	5.7 ab
NM B7514	1330.1 abc	40.6 a	37.8 ab	76835 abc	5.1 ab
HAZ 516	1195.6 abc	34.1 fg	41.2 ab	69575 a-d	5.0 ab
HAZ 14-08	1182.1 abc	35.9 def	37.5 a	51122 efg	3.7 b
BR 9605	1174.0 abc	40.4 ab	30.2 c	61408 c-f	5.5 ab
NM W 4100	1167.6 abc	37.6 b-e	36.7 b	77743 abc	5.9 ab
NM W 1158	1149.7 bc	36.6 c-f	36.7 b	78650 ab	7.0 a
1517-95	1144.3 b	38.2 a-d	39.3 ab	63525 b-e	4.9 ab
DP 6207	1115.8 bc	39.2 abc	35.0 bc	65038 a-e	7.0 a
HAZ 175-208	1057.1 cd	35.6 def	38.3 ab	63525 b-e	4.3 b
1517-91	1053.4 cd	35.5 def	36.7 b	50518 efg	5.9 ab
HAZ 726	1041.5 cd	35.2 ef	39.3 ab	45980 fg	5.4 ab
HAZ 34-08	1012.7 cd	37.8 ef	39.8 ab	50518 efg	4.5 b
BR L002	974.6 cde	35.9 def	35.0 bc	45375 fg	4.9 ab
HAZ 326	838.1 def	35.6 def	44.2 a	41745 g	4.9 ab
HAZ 11-66	770.1 ef	31.7 g	36.8 b	53240 d-g	5.0 ab
BR L001	702.9 f	38.2 a-d	36.5 b	16940 h	5.5 ab
Average	1091	36.7	38.3	59004	5.3
LSD(05)	197.3	2.57	5.77	14552	1.95
CV(%)	10.9	4.23	9.08	14.9	25.9

**Table 2. Plant mapping and gin trash for Acala variety study, Safford Agricultural Center, 2000.**

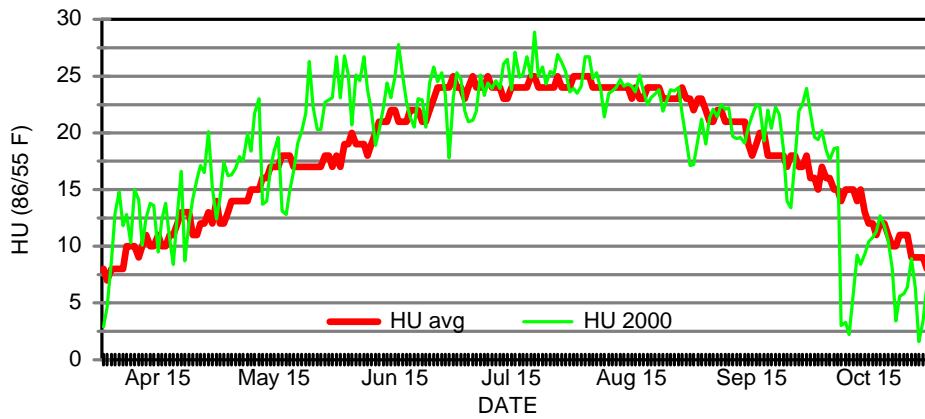
Variety	1st Fruiting Branch	Total Nodes	HNR	% Trash
HAZ 195-208	8.0 a	29.5 abc	1.39	0.0 a
1517-99	7.8 ab	28.8 abc	1.33 ab	3.4 a
NM B7514	7.3 ab	27.8 abc	1.38 ab	1.2 a
HAZ 516	7.5 ab	28.8 abc	1.44 a	2.0 a
HAZ 14-08	7.3 ab	29.7 abc	1.26 ab	0.8 a
BR 9605	8.0 a	27.8 abc	1.32 ab	0.2 a
NM W 4100	7.3 ab	29.0 abc	1.39 ab	3.2 a
NM W 1158	8.2 a	30.0 ab	1.33 ab	2.2 a
1517-95	7.8 ab	28.8 abc	1.36 ab	1.7 a
DP 6207	6.5 ab	24.5 c	1.43 a	1.9 a
HAZ 175-208	6.8 ab	27.8 abc	1.39 a	2.9 a
1517-91	6.5 ab	29.5 abc	1.24 ab	3.1 a
HAZ 726	6.7 ab	30.7 ab	1.29 ab	2.9 a
HAZ 34-08	8.2 a	28.3 abc	1.41 a	1.6 a
BR L002	7.5 ab	29.7 abc	1.23 ab	3.9 a
HAZ 326	7.2 ab	32.2 a	1.37 ab	1.2 a
HAZ 11-66	6.8 ab	28.0 abc	1.32 ab	3.6 a
BR L001	6.2 b	25.7 bc	1.18 b	4.0 a
Average	7.3	28.7	1.34	2.4
LSD(05)	1.5	4.39	0.18	3.7
CV(%)	12.5	9.22	8.05	93.3

**Table 3. HVI data for Acala variety study, Safford Agricultural Center, 2000.**

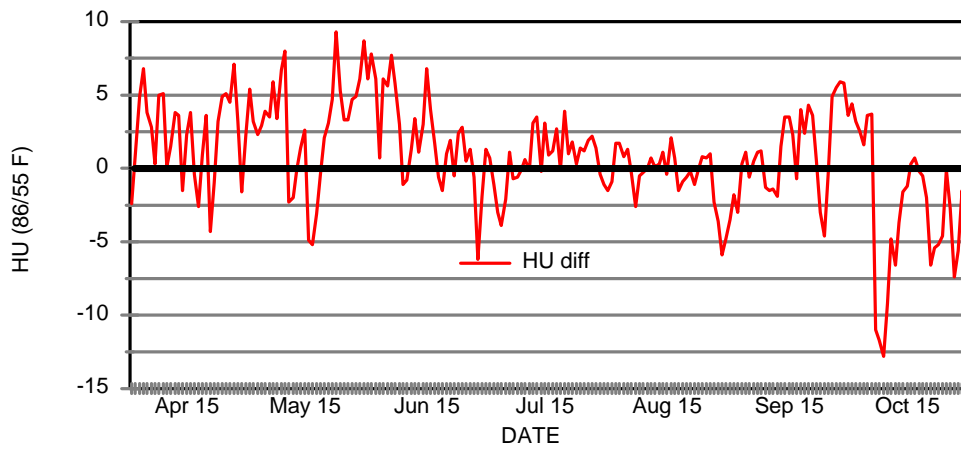
Variety	Grade	Mike	Length	Strength	Uniformity	Trash	RD	+b
HAZ 195-208	4	4.1	1.30	36.8	83	--	69	92
1517-99	41	4.4	1.22	35.5	85	1.3	73	83
NM B7514	41	4.8	1.19	35.2	83	1.2	72	86
HAZ 516	52	3.5	1.37	37.1	85	1.3	69	84
HAZ 14-08	32	4.4	1.35	38.8	85	1.0	72	102
BR 9605	31	4.7	1.17	34.3	84	0.9	75	88
NM W 4100	41	4.5	1.12	31.9	84	1.8	73	83
NM W 1158	41	4.5	1.23	34.6	85	1.6	73	85
1517-95	32	4.4	1.15	34.1	83	0.9	73	94
DP 6207	41	4.8	1.16	33.6	83	0.6	75	85
HAZ 175-208	42	4.3	1.25	36.2	85	1.5	69	91
1517-91	41	4.6	1.21	34.5	83	1.5	74	85
HAZ 726	4	3.8	1.36	34.0	85	--	68	94
HAZ 34-08	3	3.7	1.32	38.4	85	--	72	100
BR L002	41	4.6	1.22	35.8	84	1.1	73	81
HAZ 326	5	3.3	1.37	37.1	84	--	69	94
HAZ 11-66	32	4.0	1.26	36.3	84	1.5	73	94
BR L001	41	4.7	1.08	33.4	82	0.9	76	80
Average	--	4.3	1.24	35.4	84	1.2	72.1	88.9



**Figure 1. Maximum and minimum temperatures during the cotton growing season, 2000.**



**Figure 2. Heat units (86/55EF) during the 2000 cotton growing season and average data.**



**Figure 3. Heat unit differences from normal during the 2000 cotton growing season.**