

Pima Cotton Regional Variety Trial, Safford Agricultural Center, 1998

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Abstract

Sixteen long staple 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 OA 340 with a yield of 1021 pounds of lint per acre. It was followed by two other Olvey varieties yielding over 900 pounds per acre, including OA 322 and OA 361 (White Pima). In the adjacent regional short staple cotton trial were three interspecific hybrids from Hazera, an Israeli Seed Company. These hybrids grew like short staple cotton, but the fiber was more like the barbadense parent. These hybrids yielded from 1146 to 1091 pounds per acre. Their data is included at the bottom of the tables for comparison with the other long staple variety values. Yield and other agronomic data as well as fiber quality data are contained in this paper.

Introduction

The burden of developing new long staple cotton varieties has changed from the USDA program to the University and commercial seed companies. With this change, newer and better long staple varieties are being developed and tested. Our part in this process is to provide an unbiased testing program where new strains, varieties and hybrids can be evaluated in a high desert environment so cultivars can be selected that will be beneficial to the high desert cotton growers in Arizona, New Mexico and Texas. This is part of an Arizona Regional variety trial as well as a Beltwide Regional variety trial.

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 into moisture where they germinated and produced reasonable stands. 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: 23 April 1998

Rate: 25 pound per acre

Herbicide: 1.5 pt/ac Treflan pre-plant, 3 pts/ac Prometryne at lay-by

Fertilizer: side dressing of 100 lbs/ac of urea on 6/2 and 7/13

Insecticide: 7 applications to control pinkie, aphids and whitefly

Pix/Prep: None

Defoliation: Ginstar

Irrigation: Furrow, planted to moisture + 9 irrigations (ca. 28.7 inches + 3.6 inches of rain)

Harvest dates: 1st pick: 5 November

2nd pick: 25 November

Heat units (86/55 °F): to defoliation - 3292; to harvest - 3580

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. Sub-samples were taken to determine lint quality. Fifty 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 in April and May of 1998 were not ideal for cotton stand establishment. A paragraph on this subject is found in reference 1, which will be found elsewhere in this volume. In spite of a late planting and relatively slow start, some fairly decent yields were observed in the study.

Table 1 contains yield data, plant height and plant populations. Note must be taken that the top part of the table contains the sixteen varieties contained in the study and the bottom three lines of the table contain information on the Hazera hybrids abstracted from the regional short staple study (1) where they were planted. The two trials were side by side so all comparisons should be quite accurate, even though they were in separate statistical units. The Olvey varieties dominated the yields in the trial, with OA 340 yielding over 2 bales. Pima S-6 yielded slightly higher than Pima S-7, which has occurred most years that they have been compared. The New Mexico varieties yielded less than the other varieties. The three Hazera varieties yielded more than any of the varieties in the trial with the highest yielding almost 2.4 bales of lint per acre. Comparing percent lint turnout, OA 325 (High Turn Out, HTO) had its characteristically high turnout, but Hazera 195-26 had an even higher turnout. OA 340 had the advantage in earliness with 89.1% of the crop ready for the first picking. It matured earlier than OA 312 and S-7, which are considered the standards in early maturity. Worthy of note in this column are the varieties that had relatively small first pickings - NM 1331 and DP 9911 were the slowest in opening with NM 1708, Hazera 195-86 NM 1601 and Hazera 195-26 only maturing slightly quicker. This is a fairly important weakness for these varieties in this area. Plant heights varied greatly, but not statistically. OA 340 was one of the shortest and the Hazera varieties were the tallest. Plant populations were all in the acceptable range.

Table 2 contains additional agronomical variables. No significant differences were seen in first fruiting branches and the Hazera varieties fell in the same range, even though it was noted during the growing season that they started fruiting much before the Pima varieties. No differences in node numbers were seen between Pima varieties, but the Hazera entries seemed to have a couple more nodes than the rest. Even with these extra nodes Hazera 195-26 and Hazera 195-86 had higher HNRs than the Pima varieties. S-6 and NM 1601 had the highest HNRs of the Pima varieties and UA 4, OA 328 and OA 361 (White Pima) had the lowest numbers. UA 4 had the heaviest bolls of the Pima varieties but was much smaller than Hazera 83-56 from the short staple regional study. The Hazera value is in line with the upland varieties. The seedling vigor index was determined by making stand counts 2 to 3 weeks after planting, then normalizing the resulting stand counts. A value of 1.00 indicates that the stand count was the average of all of the varieties. As has been seen in the past, OA 312 has the lowest seedling vigor, but an interesting fact is that lint yields were not correlated with seedling vigor within the Pima varieties. Hazera 195-26 has the highest seedling vigor, which could be related to hybrid vigor. The table below shows the probabilities that the listed variables are correlated with lint yield. It is interesting to note that none of the plant mapping parameters measured were significantly correlated with lint yield. Only lint turnout and percent first pick had significant probabilities of being correlated with the lint yield.

Correlations vs lint yield			
Variable	Probability	Variable	Probability
1st Fruiting Branch	NS	Seedling vigor	NS
Nodes	NS	Plants per acre	NS
Plant Height	NS	% Lint turnout	0.03*
HNR	NS	% 1 ST pick	3.43x10 ⁻⁷ ***

HVI values of the lint are included in Table 3. As a group the New Mexico varieties with strong Sea Island parentage, had the longest fiber, but as individuals UA 5 and Hazera 195-86 had the longest fiber. In Uniformity, the varieties with the longest fiber excelled again. OA 361, White Pima, had outstanding fiber strength and the Israeli lines and OA 338

were definitely on the weak end of the line. OA 361 excelled in Elongation and the varieties with the weakest fiber also had the lowest elongation values. The micronaire values of most varieties were in the acceptable range, Hazera 195-86 and Hazera 83-56 were in the discount range. Color values are documented in the RD and +b columns and it is interesting to compare the values of White Pima (OA 361) with the other varieties. It appears that three of the varieties could be classified as having white lint. Grades are the averages of grades taken on each of two samples. For example, the grade of 2.5' listed for OA 340 means that one of the samples had a grade of 2 and the other had a grade of 3.

References

1. Clark, L.J., E.W. Carpenter, G.L. Hart and J.M. Nelson. 1999. Regional short staple variety trial, Safford Agricultural Center, 1998. Cotton, A College of Agriculture Report, The University of Arizona, Tucson, AZ. *In this publication.*
2. Brown, P., B. Russell and J. Silvertooth.. 1999. 1998 Weather conditions. Cotton, A College of Agriculture Report, The University of Arizona, Tucson, AZ. *In this publication.*
2. Clark, L.J., E.W. Carpenter, G.L. Hart and J.M. Nelson. 1998. Pima cotton regional variety trial, Safford Agricultural Center, 1997. Cotton, A College of Agriculture Report, The University of Arizona, Tucson, AZ. Series P-112, pp. 204-208.

Table 1. Yields and other agronomic data from the Pima cotton variety trial grown on the Safford Agricultural Center, 1998.

Variety	Lint Yield	% Lint	% 1 st Pick	Plants Height	Plants/Acre
OA 340	1021 a	34.92 bc	89.1 a	27.8 a	40233 a
OA 322	951 ab	34.85 bc	88.8 a	28.7 a	37510 a
OA 361 ²	925 abc	33.47 efg	85.8 abc	29.7 a	38418 a
OA 338	887 bcd	35.11 b	86.6 abc	30.3 a	32368 a
OA 312 ³	871 bcd	33.25 fg	85.7 abc	28.8 a	40535 a
OA 339	858 bcd	33.63 d-g	86.8 abc	30.3 a	38115 a
OA 325 ⁴	834 bcd	36.43 a	84.2 cd	31.0 a	40233 a
OA 328	826 cde	34.42 b-e	85.7 abc	27.2 a	33880 a
UA 5	821 cde	32.85 g	84.4 bcd	30.7 a	38115 a
S-6	819 cde	34.45 b-e	86.6 abc	32.2 a	38418 a
S-7	786 def	33.78 d-g	88.6 ab	32.5 a	35393 a
UA 4	784 def	34.01 c-f	85.4 abc	27.7 a	38115 a
DP 9911	710 ef	34.56 bcd	78.4 e	31.0 a	32973 a
NM 1708	688 f	33.61 d-g	80.5 de	30.2 a	38115 a
NM 1601	674 f	34.16 b-f	83.0 cd	32.2 a	43560 a
NM 1331	667 f	32.86 g	77.5 e	32.5 a	42048 a
Average	820.2	34.1	84.8	30.2	38001.5
LSD(05)	119.5	1.0	4.2	5.4	11199.8
CV(%)	8.7	1.8	3.0	10.7	17.7
Hazera 195-26	1146	37.7	83.1	41.8	42653
Hazera 195-86	1116	35.8	82.3	44.0	53423
Hazera 83-56	1091	36.0	86.3	38.0	44921

1. Values followed by the same letter within columns are not significantly different at the 5% level of probability.
2. White Pima
3. Conquistador
4. High Turnout (HTO)

Table 2. Other agronomic variables measured or calculated from the Pima cotton variety study on the Safford Agricultural Center, 1997.

Variety	1st Fruiting Branch	Nodes	HNR	Boll Weight (gms)	Seedling Vigor Index
OA 340	5.5 a	19.2 a	1.45 ab	2.84 b-e	1.00 a
OA 322	6.0 a	19.8 a	1.45 ab	2.84 b-e	1.12 a
OA 361 ²	6.7 a	21.2 a	1.40 b	2.71 d-e	0.98 a
OA 338	5.5 a	20.2 a	1.51 ab	2.76 c-e	1.17 a
OA 312 ³	5.7 a	19.8 a	1.46 ab	2.92 b-d	0.81 a
OA 339	6.0 a	19.3 a	1.58 ab	2.90 b-d	1.00 a
OA 325 ⁴	5.8 a	20.0 a	1.55 ab	3.05 ab	1.08 a
OA 328	6.5 a	19.5 a	1.39 b	2.90 b-d	1.09 a
UA 5	5.8 a	19.7 a	1.55 ab	2.77 c-e	1.12 a
S-6	5.7 a	19.3 a	1.67 a	2.99 a-c	0.93 a
S-7	5.5 a	20.7 a	1.57 ab	2.80 ce	0.94 a
UA 4	5.8 a	20.0 a	1.39 b	3.23 a	0.98 a
DP 9911	5.8 a	19.3 a	1.61 ab	2.65 e	1.02 a
NM 1708	6.2 a	19.3 a	1.59 ab	2.77 c-e	0.96 a
NM 1601	6.0 a	19.3 a	1.66 a	2.91 b-d	0.89 a
NM 1331	6.7 a	20.5 a	1.59 ab	2.84 b-e	0.89 a
Average	6.0	19.8	1.53	2.89	1.00
LSD(05)	1.5	2.4	0.23	0.24	0.38
CV(%)	15.6	7.2	9.2	5.0	23.0
Hazera 195-26	6.5	23.3	1.82	--	1.34
Hazera 195-86	6.8	22.5	1.98	--	1.09
Hazera 83-56	6.0	22.8	1.68	4.27	0.99

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

2. White Pima

3. Conquistador

4. High Turnout (HTO)

Table 3. HVI Data from the Pima cotton variety trial grown on the Safford Agricultural Center, 1997.

Variety	Length	Uniformity	Strength	Elongation	Micronaire	RD	+b	Grade
OA 340	1.32	88.6	44.4	11.0	4.4	67.9	11.7	2.5
OA 322	1.35	89.7	41.2	11.0	3.8	71.9	10.9	1.0
OA 361 ¹	1.32	88.8	50.4	12.0	4.4	73.5	9.4	1.0
OA 338	1.33	88.0	38.5	10.0	3.9	76.6	9.1	1.0
OA 312 ²	1.34	88.9	45.3	11.0	4.2	67.7	12.1	2.5
OA 339	1.34	88.7	43.1	10.0	4.2	66.6	12.0	3.0
OA 325 ³	1.31	88.5	44.1	11.5	4.4	67.8	12.0	2.5
OA 328	1.34	89.0	41.8	11.0	4.4	68.7	11.5	2.0
UA 5	1.38	90.7	47.8	11.0	4.0	67.0	11.3	3.0
S-6	1.30	88.0	42.9	11.0	4.4	66.2	12.5	2.5
S-7	1.31	89.1	44.4	11.0	4.3	67.6	12.0	2.5
UA 4	1.33	89.8	44.1	11.0	4.5	68.5	11.5	2.0
DP 9911	1.34	89.4	42.8	11.5	4.4	66.9	12.4	2.5
NM 1708	1.37	90.1	44.7	10.5	4.0	68.2	11.3	2.0
NM 1601	1.37	90.1	45.1	11.0	4.1	65.4	12.4	2.5
NM 1331	1.36	88.9	41.9	10.5	3.9	67.9	11.7	2.5
Average	1.34	89.1	43.9	10.9	4.2	68.7	11.5	2.2
Hazera 195-26	1.35	88.3	35.3	10.0	3.7	70.4	10.0	2.5
Hazera 195-86	1.42	90.7	33.5	10.5	3.0	68.4	10.5	3.0
Hazera 83-56	1.37	87.4	31.6	10.0	3.4	72.5	9.0	1.5

1. White Pima
2. Conquistador
3. High Turnout (HTO)