

# Preliminary Investigations in Ultra-narrow Row Cotton, Safford Agricultural Center, 1999

*L.J. Clark and E.W. Carpenter*

## **Abstract**

*A preliminary investigation was made in Ultra-narrow row cotton production on the Safford Agricultural Center to see if there was any promise in that technology for cotton producers in the high deserts of Arizona. Increases in plant populations to near 100,000 plants per acre in single lines, double lines and quadruple lines per bed were the goals of the study. In-season plant mapping to evaluate differences in plant growth characteristics were done along with yield measurements to evaluate differences. Yield increases were not seen with increases in plant populations in single row plantings nor in multiple row plantings.*

## **Introduction**

Plant population studies were performed at this location years ago with few yield differences observed with plant populations above 45,000 plants per acre (1). This was corroborated by Norton, et.al. (2) in a study in Pinal County. Studies on narrowing row widths from 36 inches to 30 inches also caused declines in yields when plant populations were held constant (3). The difference brought to the table with ultra-narrow (6 to 10") technology is that plants can be spaced equidistant between rows and within rows. A 6" by 6" planting would contain 175,439 plants per acre and a 10" by 10" planting would contain 62,893 plants per acre.

## **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 for the single rowed plots and with a John Deere-Van Brunt grain drill for the multiple row plots. The plots had been pre-irrigated, but water was flushed through the plots to make sure adequate moisture was available for uniform germination. The following crop history provides the information on how the crop was managed:

### Crop History:

Previous crop: Cotton

Soil type: Pima clay loam variant/Grabe clay loam complex

Planting date: 16 April 1999

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 7/2 and 7/22

Insecticide: 7 applications to control pinkie, aphids and whitefly

Pix/Prep: None

Defoliation: Ginstar

Irrigation: Furrow, planted to moisture + 7 irrigations (ca. 28.7 inches + 3.9 inches of rain)

Harvest dates: 1st pick: 5 November                      2nd pick: not taken

Heat units (HU 86/55°F) from planting to defoliation: 3446

This is part of the 2000 Arizona Cotton Report, The University of Arizona College of Agriculture index at <http://ag.arizona.edu/pubs/crops/az1170>

Treatment number	Seed lines per bed	Projected plant population
1	1	50,000
2	1	100,000
3	2	100,000
4	4	100,000

During the growing season canopy cover and plant heights were measured and the number of nodes were counted to see what physiological differences there were between treatments. The last of these measurements were made just before picking. 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 turnout. 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**

The plant mapping data are shown in figures 1 through 4. The most interesting of the crop parameters measured was the percent canopy cover. It was felt that the multiple row treatment would fill the rows much quicker than the single row plantings, fruit quicker and mature quicker. Figure 1 shows that the percent canopy cover for the 4-lines per plot treatment was not that much ahead of the single line plantings. So, at least under the conditions of this study, an advantage was not seen with the multiple-line, or ultra-narrow row plantings. Plant heights, number of nodes and height to node ratios also ran very close together.

Tables 1 and 2 show numerical data for the first and last dates of plant mapping. No statistical differences are seen between the parameters measured. Table 3 contains yield, plant height, plant populations in single lines and 10 boll weights for the four treatments. Statistical differences were seen in yields with the treatment nearest to ultra-narrow row production producing 200 pounds less yield per acre than the other treatments. The highest yield came from the traditional cotton planting.

As with many first year studies, the apparent results are not necessarily what will be ultimately recommended. The study will be repeated, some of our techniques refined and another assessment of the ultra-narrow row technology will be made.

## **References**

1. Clark, L.J. and E.W. Carpenter. 1988-89. Unpublished research data.
2. Norton, E.R., J.C. Silvertooth and S.W. Stedman. 1995. Plant population evaluation for Upland cotton. Cotton, A College of Agriculture Report, The University of Arizona, Tucson, AZ. Series P-99, pp.25-28.
3. Clark, L.J. and E.W. Carpenter. 1993. Cotton row spacing study on long and short staple cotton, Safford Agricultural Center, 1992. Cotton, A College of Agriculture Report, The University of Arizona, Tucson, AZ. Series P-94, pp. 40-43.

**Table 1. Plant mapping data on July 9th for the ultra-narrow row on the Safford Agricultural Center, 1999.**

Treatment	Plant Height	Nodes	HNR	Canopy Cover
1 Line - 50K	28.9 a	20.1 a	1.46 a	22.5 a
1 Lines - 100K	26.7 a	20.8 a	1.28 a	22.4 a
2 Lines - 100K	24.9 a	18.1 a	1.41 a	19.6 a
4 Lines - 100K	27.9 a	19.1 a	1.50 a	23.6 a
AVE	27.1	19.5	1.41	22.0
LSD(05)	4.6	4.4	0.28	6.7
CV(%)	10.7	14.2	12.5	19.1

**Table 2. Plant mapping data at harvest for the ultra-narrow row on the Safford Agricultural Center, 1999.**

Treatment	Nodes	First Fruiting Br	HNR	Bolls/Plant
1 Line - 50K	29.5 a	5.5 a	1.66 a	15.8 a
1 Lines - 100K	28.0 a	6.5 a	1.72 a	16.0 a
2 Lines - 100K	27.3 a	5.3 a	1.67 a	19.0 a
4 Lines - 100K	27.5 a	5.5 a	1.82 a	22.3 a
AVE	28.1	5.69	1.72	18.3
LSD(05)	4.1	1.47	0.27	10.1
CV(%)	9.2	16.1	10.0	34.5

**Table 3. Yield and other agronomic data for the ultra-narrow row on the Safford Agricultural Center, 1999.**

Treatment	Lint Yield	Plant Height	Plant Population	10 Boll Weight
1 Line - 50K	1355 a	49.0 ab	52635 b	49.3 a
1 Lines - 100K	1313 a	47.8 ab	78953 a	47.3 a
2 Lines - 100K	1340 a	45.3 b	50366 b	47.0 a
4 Lines - 100K	1125 b	49.8 a	30401 b	50.3 a
AVE	1283.4	47.9	53088.8	48.4
LSD(05)	186.1	4.1	23436.7	3.9
CV(%)	9.1	5.4	27.6	5.1

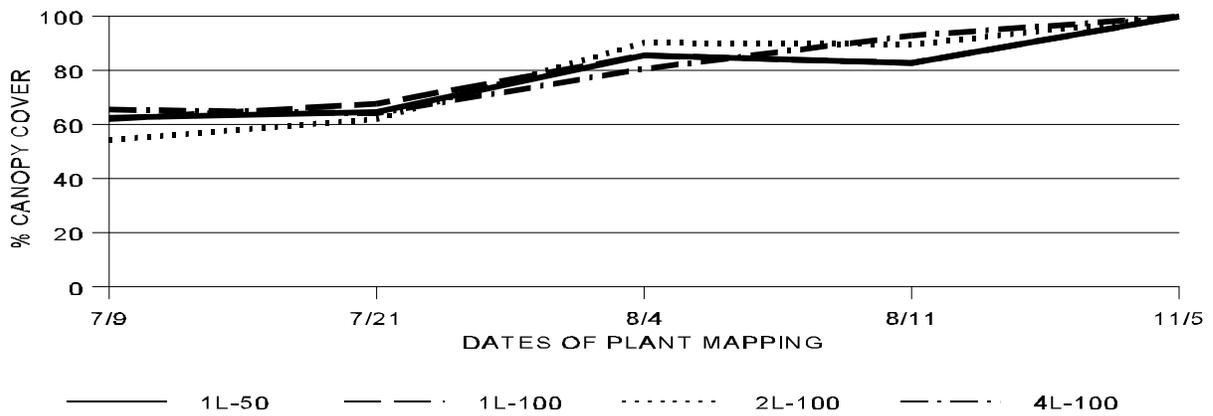


Figure 1. Percent canopy cover measured during the growing season on ultra-narrow row cotton study.

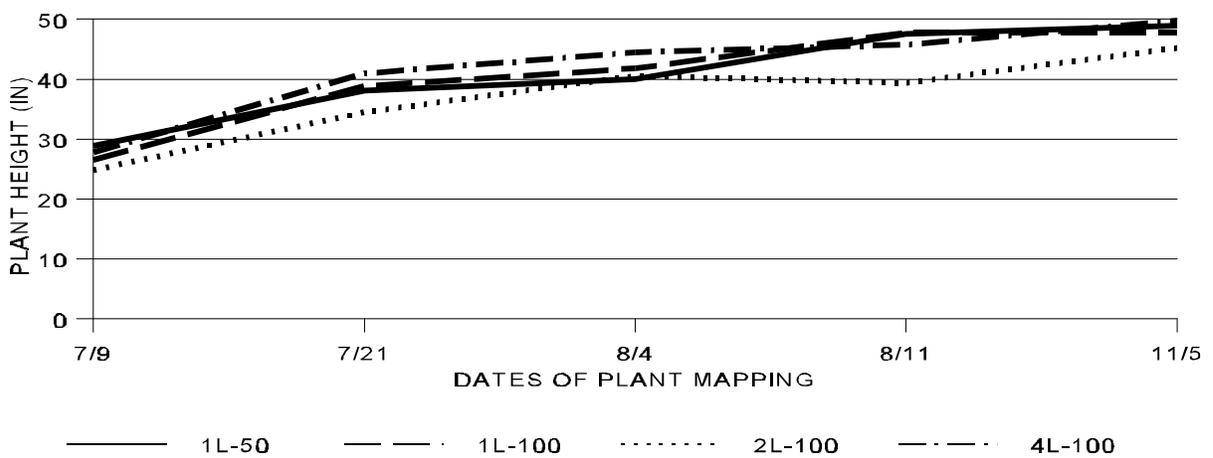


Figure 2. Plant height measured during the growing season on ultra-narrow row cotton study.

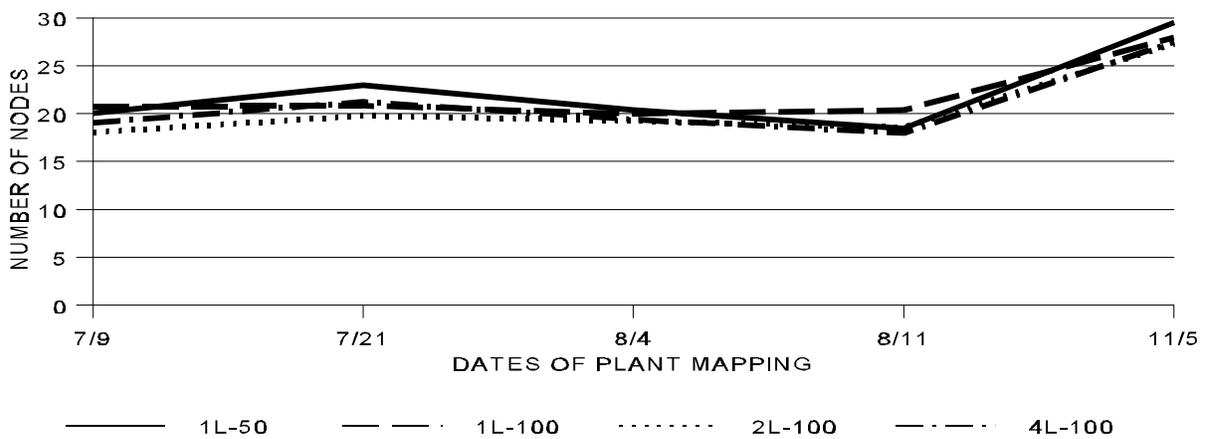


Figure 3. Number of nodes measured during the growing season on ultra-narrow row cotton study.

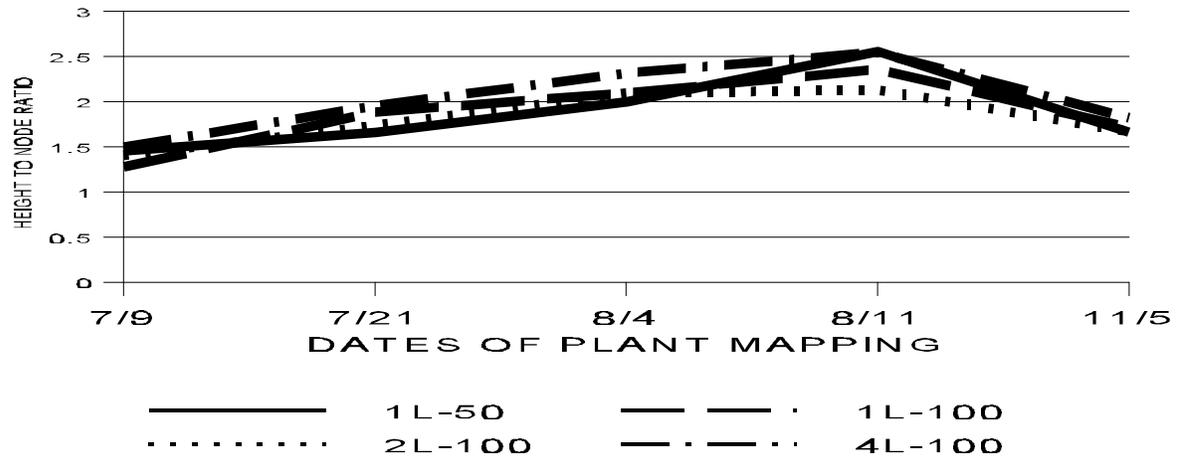


Figure 4. Height to node ratio measured during the growing season on ultra-narrow row cotton study.