

# Plant Population Effects on Pima S-6 Lint Yield

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## ***Abstract***

*A replicated field study was conducted at the Maricopa Agricultural Center in 1991 to investigate the effect of plant population density on Pima S-6 lint yield. Treatments ranged from a low of 10,465 plants per acre to a high of 65,000 plants per acre. There were no significant yield differences observed with populations between 17,000 plants per acre and 65,000 plants per acre. Significant yield decreases occurred when populations were reduced below 17,000 plants per acre.*

## **Introduction**

A plant population field study was initiated in 1991 to investigate effects on Pima S-6 lint yield when plant population ranged from 10,000 to 65,000 plants per acre. Numerous plant population studies of this nature have been conducted over the past several decades. In general, most of these studies have illustrated that extremely wide ranges of plant populations can be tolerated in both Upland and Pima before yields decrease. Ranges of plant populations producing optimum yields in American pima cotton have been reported from as low as 8,000 to as high as 150,000 plants per acre. In general, it is recognized that lint production is maximized when plant populations are in the 20,000 to 50,000 plant per acre range for both Pima and Upland cotton.

Pima cotton lint production in central Arizona has been somewhat inconsistent. Plant population counts in commercial fields many times result in densities in excess of 50,000 plants per acre. The reason this study was initiated was to determine whether high populations of Pima cotton could be a factor on yield inconsistency as well as confirm or modify well documented recommendations for optimum production.

## **Materials and Methods**

Pima S-6 cotton was planted on April 4, 1991 at the Maricopa Agricultural Center. Thirty six rows, six hundred feet long were initially planted at a high seeding rate of twenty five pounds per acre. Population counts taken upon emergence resulted in an initial plant population of 65,000 plants per acre. The field was then divided into twenty four, six row plots, each one hundred twenty five feet long. Plots were arranged into a randomized complete block design consisting of six population treatments with four replicates.

Plots were hand thinned to a plant every 3, 6, 9, 12, and 15 inches in their respective treatments. These densities resulted in the treatments consisting of 65,000, 52,300, 26,162, 17,441, 13,081, and 10,465 plants per acre respectively. Plant growth and development measurements were made by treatment. These measurements consisted of fruit retention, plant height, number of mainstem nodes, flowers per 25 feet of row length, and height:node ratio.

All management practices for the season remainder were standard with approximately 48 inches of applied irrigation water and 180 pounds of nitrogen per acre applications. The center two rows of each six row plot were machine harvested on November 6, 1991. Lint turnouts from a commercial gin were used for calculating final lint yields.

## Results and Discussion

There were no statistically significant yield differences between treatments 1 through 4, those with plant population ranges from 17,000 to 65,000 plants per acre. (Table 1). Although not significant, yield trends within these population densities, indicated a yield decrease at the high density of 65,000 plants per acre population and the lower density of 17,000 plants per acre. Lint yields were optimized when plant populations ranged from approximately 25,000 to 50,000 plants per acre.

Significant yield decreases were observed in treatments 5 and 6 when populations were decreased to under 15,000 plants per acre. No measurable differences were observed in growth and development measurements described earlier.

## Conclusions

The results of this study serve simply to reinforce existing plant population recommendations. Highest lint yields in Pima S-6 were found between population densities of 25,000 and 50,000 plants per acre. These results are in complete agreement with literature cited below and should still be considered optimum for maximum lint production.

## References

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**Table 1. The Effects of Plant Population on Pima S-6 Lint Yield**

Treatment	Lint Yield (lbs/acre)	Bales/Acre	Population (Plants/Acre)
1	1221 ab	2.5	65,000
2	1282 a	2.7	52,300
3	1267 a	2.6	26,162
4	1198 abc	2.5	17,441
5	1030 c	2.1	13,081
6	1088 bc	2.3	10,465