

# Cotton Fertility Study, Safford Agricultural Center, 1998

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## **Abstract**

*Three different nitrogen fertilizer regimes were practiced in this study along with an unfertilized check. The same amount of nitrogen fertilizer was sidedressed in the plots in one, two or three applications. No significant differences were seen, but the trends looked like the split applications might have had some advantage.*

## **Introduction**

As a best management practice, nitrogen fertilizer was not applied until after stands were established, but the question was: Would split applications of nitrogen fertilizer be even more beneficial to the efficient use of nitrogen? Gardner and Tucker (1) found that late or split applications of nitrogen tended to increase yields even though plants were smaller and there were less fruiting structures. This study was initiated to find the effects on yield and other measurable plant parameters on this particular variety of cotton.

## **Methods and Materials**

FiberMax 989, an Australian variety, previously known as IF 1003, that had done well in several of our Regional and Advanced Strains trials (2,3,4), was chosen for this investigation. It was planted in 36 inch rows according to the following crop history and fertilized using the regimes listed below:

Soil type: Grabe clay loam

Previous crop: Pima cotton

Planting date: 30 April 1998                      Rate: 25 pounds of seed per acre

Herbicides: 1.5 pts/ac Treflan preplant incorporated, 3 pts/ac Prometryne at layby

Insecticides: 6 times to control aphid, pink bollworm and whitefly

Irrigation: Watered up + 10 furrow irrigations (~ 42 inches of water + 3.6 inches of rain)

Scheduled with AZSCHED setting efficiency at 75% and irrigations scheduled at 45% deficiency levels

Leaching: 2.56 inches (from AZSCHED)

Fertilization:     Treatment 1 ..... Untreated check

                          Treatment 2 ..... 120 lb/ac N applied from urea on 6/4/98

                          Treatment 3 ..... 60 lbs/ac N from urea applied 6/4/98 and 7/8/98

                          Treatment 4 ..... 40 lbs/ac N applied 6/4/98, 6/25/98 and 7/15/98

Defoliation: Ginstar applied on 8 October

Harvest: 11 November

Heat units from plant to harvest: 3716 (86/55°F)

Plots were harvested with a IH cotton picker adapted to harvest small plots. Two rows from each plot were caught in cloth bags and weighed to determine plot weights. Plant measurements and picked 10-boll samples were taken at the time of harvest. Lint turnout was assumed to be 35% for all plots.

## Results and Discussion

The lint yields shown in Table 1 indicate that even though there are numerical differences between treatments there are no statistically significant differences. The first question is why would the unfertilized check yield nearly 3 bales of cotton? Samples taken from the irrigation water shed some light on this question. Approximately 109 pounds of nitrogen were added in the 42 inches of irrigation water. This is adequate nitrogen to produce 1.8 bales of cotton (using 60 pounds of N per bale, per Doerge, et.al. (5)). The remainder of the nitrogen needed to produce the crop was apparently available in the soil. With this high level of nitrogen available in the water and in the soil, it is no wonder that there were not great responses to the applied nitrogen. Never-the-less, the trends that are seen are probably correct. The check plot has the smallest yield, then yields increase to treatment 2 with 120 pounds per acre of nitrogen applied when plant growth is just taking off, then another increase with treatment 3, a split application with nitrogen applied in early June and again in early July (early bloom), and a slight decline with treatment 4. The decline is probably because the last increment of fertilizer was too late to produce bolls that would ripen and could have caused vegetative growth that would have been detrimental to defoliation. Plant height measurements, and the plant mapping characteristics shown in Table 2, however, indicate that the plants were not at all vegetative. The first fruiting branches were relatively high, but the plants were well loaded from there to the top. Boll weights were higher than seen in the regional study (4) and slight differences between treatments were not significant.

Because nitrogen was not limiting in the trial, strong inferences cannot be made. Trends in the data, however, lead one to project that yields can be increased, without increasing nitrogen applied, but by supplying it when the plant most needs it.

## References

1. Gardner, B.R. and T.C. Tucker. 1967. Nitrogen effects on Cotton: I. Vegetative and fruiting characteristics. Soil Sci. Soc. Am. Proc. 31:780-785.
2. Clark, L.J., E.W. Carpenter, G.L. Hart and J.M. Nelson. 1997. Short staple cotton advances strains trial, Safford Agricultural Center, 1996. Cotton, A College of Agriculture Report, The University of Arizona, Tucson, AZ. Series P-108, pp. 134-138.
3. Clark, L.J., E.W. Carpenter, G.L. Hart and J.M. Nelson. 1997. Short staple cotton advances strains trial, Safford Agricultural Center, 1997. Cotton, A College of Agriculture Report, The University of Arizona, Tucson, AZ. Series P-112, pp. 134-138.
4. Clark, L.J., E.W. Carpenter, G.L. Hart and J.M. Nelson. 1997. Short staple regional cotton variety trial, Safford Agricultural Center, 1998. Cotton, A College of Agriculture Report, The University of Arizona, Tucson, AZ. *In this publication.*
5. Doerge, T.A., R.L. Roth and B.R. Gardner. 1991. Nitrogen fertilizer management in Arizona. Publication number 191025, College of Agriculture, The University of Arizona, Tucson, AZ.

**Table 1. Lint yields, plant height and plant population from treatments in the nitrogen regime fertility trial, Safford Agricultural Center, 1998.**

Treatment	Lint Yield	Plant Height	Plant Population
1. Untreated check	1408 a <sup>1</sup>	33.0 a	73961 a
2. 120 lbs/ac N, 1 application	1443 a	32.8 a	77138 a
3. 120 lbs/ac N, 2 split applications	1524 a	33.0 a	74415 a
4. 120 lbs/ac N, 3 split applications	1509 a	33.3 a	71239 a
Average	1470.9	33.0	74188.1
LSD(05)	182.9	2.9	11532.2
CV(%)	7.8	5.5	9.7

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

**Table 2. Plant measurements and boll weights from treatments in the nitrogen regime fertility trial, Safford Agricultural Center, 1998.**

Treatment	Nodes	HNR	1 <sup>st</sup> Fruiting Branch	Boll Weight
1. Untreated check	23.0 a <sup>1</sup>	1.44 a	9.5 a	5.35 a
2. 120 lbs/ac N, 1 application	23.0 a	1.42 a	10.0 a	5.65 a
3. 120 lbs/ac N, 2 split applications	21.8 a	1.53 a	10.3 a	5.63 a
4. 120 lbs/ac N, 3 split applications	23.3 a	1.43 a	10.5 a	5.53 a
Average	22.8	1.46	10.0	5.54
LSD(05)	2.7	0.14	2.3	0.51
CV(%)	7.3	6.2	14.3	5.8

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