

Cotton Fertility Study, Safford Agricultural Center, 1999

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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 statistically significant differences were seen between lint yields in this study nor in the previous study, but the yield trends were very similar. Applying the fertilizer nitrogen in two equal portions at the onset of rapid vegetative growth and just before peak bloom appeared to produce the best lint yield.

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? This study is a follow-up of the 1998 study (1) to verify the effects reported in that study.

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: Upland cotton

Planting date: 16 April 1999 Rate: 25 pounds of seed per acre Variety: FM 989

Herbicides: 2 pts/ac Treflan preplant incorporated, 3.2 pts/ac Prometryne at layby

Insecticides: 8 times to control aphid, pink bollworm and whitefly

Irrigation: Watered up + 7 furrow irrigations (~ 35 inches of water + 3.9 inches of rain)

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

Leaching: 2.68 inches (from AZSCHED)

Fertilization: Treatment 1 Untreated check

 Treatment 2 120 lb/ac N applied from urea on 6/11/98

 Treatment 3 60 lbs/ac N from urea applied 6/11/98 and 7/12/98

 Treatment 4 . 40 lbs/ac N applied 6/11/98, 7/12/98 and 7/27/98

Defoliation: Ginstar applied on 7 October

Harvest: 5 November

Heat units from plant to defoliation: 3630 (86/55°F)

Plots were harvested with a Case-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 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 question as to why the unfertilized check could yield 2 bales of cotton was answered in last year's report. The 35 inches of irrigation water carried approximately 90 pounds of nitrogen. This is adequate nitrogen to produce 1.5 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. The results of this year's study were very similar to the data in 1998. A slight increase in yield, above the check plot, was seen with the nitrogen fertilizer added in one lump sum in early June, a greater increase when the fertilizer was applied in two portions and a decrease when the applications were in three portions, the third portion being applied in late July. This would imply that fertilizer is not well utilized when it is all applied at the beginning of the growing season, and some may even be leached out of the root zone. The best management practice is to apply the nitrogen fertilizer as a split application at the initiation of rapid growth and again before the plant reaches peak bloom. Nitrogen fertilizer applied after peak bloom in the case of this experiment didn't cause runaway growth, as verified by plant height, number of nodes and height to node ratios (HNR), but also didn't result in increased yield.

References

1. Clark, L.J. and E.W. Carpenter. 1999. Cotton fertility study, Safford Agricultural Center, 1998. Cotton, A College of Agriculture Report, The University of Arizona, Tucson, AZ. Series P-116, pp. 237-239.
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.
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Table 1. Yields and other agronomic data from the fertility study on Safford Agricultural Center, 1999.

Treatment	Lint Yield	Plant Height	Plant Population	10 Boll Weight
Unfertilized Check	1040 a ¹	28.6 a	45602 a	56.3 a
One application	1073 a	27.6 a	51954 a	53.0 a
Two applications	1285 a	26.0 a	51047 a	53.0 a
Three applications	1212 a	27.3 a	52408 a	53.0 a
Average	1152.5	27.4	50252.8	53.8
LSD(05)	346.1	4.5	13008.5	4.4
CV(%)	18.8	10.3	16.2	5.1

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

Table 2. Other agronomic variables measured or calculated from the fertility study on Safford Agricultural Center, 1999.

Treatment	First Fruiting Branch	Fruiting Nodes	Total Nodes	Height to Node Ratio
Unfertilized Check	8.1 a ¹	8.6 a	22.6 a	1.27 a
One application	7.4 a	8.9 a	22.0 a	1.26 a
Two applications	7.6 a	10.1 a	22.1 a	1.17 a
Three applications	7.8 a	8.8 a	22.8 a	1.21 a
Average	7.7	9.1	22.4	1.23
LSD(05)	4.0	2.5	3.6	0.22
CV(%)	8.2	17.2	10.2	11.0

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