CoRoN® AS A FOLIAR NITROGEN SOURCE FOR COTTON

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Abstract

Extensive research conducted over the years has established the fact that cotton bolls require large amounts of nitrogen during peak fruiting periods. The use of foliar applied nitrogen has shown to be of value in supplying this need. However, the use of products such as urea can cause spikes in growth of the plants as well as burning at higher rates. The use of Controlled Released Nitrogen (CRN), which does not show the potential to burn, should be of added value in the development of a high yield cotton plant. Fieldwork during 1998 suggested the use of CoRoN applied by air to the foliage could extend the level of "N" in the petioles for 3 to 4 weeks while urea did not show an effect after the first week. This lead to research studies during 1999 across the cottonbelt to evaluate the effect of CoRoN vs. urea applied to cotton during bloom. Although the season was very dry during the last part, yields from Alabama and Georgia indicated an advantage in using CoRoN vs. urea. Leaf and petiole samples are being analyzed. This work is to continue in the 2000 season.

Introduction

The use of foliar fertilizers on fruiting cotton has been a practice for several years. Zelinski (1984) reported increased lint yields from mid to late season applications of potassium nitrate under high levels of N fertility in California. Guthrie (1986) in North Carolina and Walker et al. (1987) in Georgia reported increased yields from foliar applications of urea to cotton with low petiole N levels. Oosterhuis et al. (1989) reported that foliar applied nitrogen (N) was absorbed into the leaf. Oosterhuis et al. (1990) also reported yield increases from foliar applications of potassium nitrate during flowering and boll fill. Extensive research over the years has established the fact that foliar fertilizers can be used to supplement soil-applied fertilizers in cotton production systems (Oosterhuis, 1993). However, several problems are associated with the use of foliar urea as a nitrogen (N) supplement ranging form volatilization of N to leaf burning caused by urea drying on the leaf. Purdue University in the 1980's demonstrated that up to 70% of urea nitrogen could be lost to the atmosphere depending on field conditions. It has been shown that the unique chemistry of Controlled Release Nitrogen (CRN) can reduce these problems (White, 1995). CRN products remain liquid on the leaf surface much longer than urea, which allows a greater period of time for more nitrogen to be taken into the leaf. CRN's have an osmolality reading (a measure of burn potential) about half that of urea. CoRoN (Helena Chemical Company, Memphis, TN), a Controlled Release Nitrogen fertilizer, contains 70% CRN with the remaining nitrogen as urea giving an analysis of 28-0-0. Other formulations such as a 10-0-10 and 25-0-0 are also available. Field research during 1998 suggested the use of CoRoN applied by air to cotton foliage could extend the level of "N" in the petioles for 3 to 4 weeks while urea did not show an effect after the first week. This lead to research studies being established in 1999 across the cottonbelt to evaluate the effect of CoRoN vs. urea applied to cotton during the bloom stage of growth. The objectives of the studies were: (a.) To evaluate nitrogen levels in the leaves and petioles following an application made at first-bloom and (b.) to evaluate lint yields at harvest.

Discussion

Studies were established in SC, GA, AL (2), LA, TN, TX, and CA. The experimental design was a split plot with sub-plot design as a randomized complete block. The main-plots were soil applied nitrogen applied pre-plant at 20, 40, 60, and 80 pounds "N" per acre. The sub-plots were CoRoN 28-0-0 (70% CRN) at 1 gallon/acre (2.9 lbs. N), CoRoN 28-0-0 (70% CRN) at 1 gallon/acre with a second 1 gallon applied 7 days later, urea at 10 lbs. "N"/A, and an untreated control (no additional nitrogen). Evaluations were made on composited leaf and petiole samples obtained weekly until harvest from each replication. Samples were analyzed for total nitrogen using a LECO FP-2000 nitrogen analyzer. Yield data were taken at harvest and converted to pounds lint per acre.

Summary

Yields across the cottonbelt varied a great deal due to extremely dry weather conditions during the last half of the 1999 growing season. There was a great amount of differences observed in the main plots on residual soil nitrogen levels.

In South Alabama, 40 lbs. N applied pre-plant had the best yield of the main plots. When the foliar treatments were compared, the 20 lbs. N pre-plant plus CoRoN at 1 gallon applied at bloom provided the best lint yield (Table 1.). As additional nitrogen was applied, yields were reduced.

In South Georgia, yields continued to increase with additional nitrogen. With adequate moisture, the cotton was able to respond to the additional nitrogen (Table 2.)

Reprinted from the *Proceedings of the Beltwide Cotton Conference*
Volume 2:1397-1398 (2000)
National Cotton Council, Memphis TN

Yields were variable at the Louisiana site, with little effect from any treatment. Again, the variable responses were due, in part, to extreme dry weather during the growing season. This was also true in North Alabama. Other locations had not reported yields at the time this report was compiled.

Leaf and petiole sample analysis had not been completed at the time of this report. However, preliminary analysis on leaf and petiole "N" levels, indicate differences occurred due to treatment. This work will continue during the 2000 season with a complete report following.

References

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Table 1. Cotton yields from South Alabama

	Untreated	urea	CoRoN @1	CoRoN @1+1
20 lbs. N/A	549	786	843	705
40 lbs. N/A	638	690	676	676
60 lbs. N/A	448	528	567	451
80 lbs. N/A	403	353	520	415

yield as pounds lint per acre.

Table 2. Cotton yields from South Georgia

	Untreated	urea	CoRoN @1	CoRoN @1+1
20 lbs. N/A	1017	1185	1007	1183
40 lbs. N/A	1185	1204	1099	1193
60 lbs. N/A	1243	1306	1225	1256
80 lbs. N/A	1315	1306	1381	1382

yield as pounds lint per acre.