# EFFECTS OF CoRoN™ SLOW-RELEASE FOLIAR NITROGEN FERTILIZATION ON COTTON GROWTH AND YIELD

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## BACKGROUND INFORMATION

Interest in foliar fertilizers has arisen due to the multiples advantages of foliar application methods such as rapid and efficient response to the plant needs, less product needed, and independence of soil conditions (Oosterhuis, 1995). However, the effects of foliar fertilizer applications have not been consistent and it has been proposed that slow-release fertilizers may improve this situation. Foliar-applied, controlled-release nitrogen has been reported to have positive effects on boll weight and boll number (Morse and Oosterhuis, 1996).

## RESEARCH PROBLEM

CoRoN™ is a combination of polymethylene urea coupled with fast-release, low-biuret urea, designed to provide a unique method of foliar fertilizer application due to its slow nutrient-release properties. Furthermore, CoRoN is apparently not subject to volatilization or crystallization (Helena Chemical Company). Previous studies with CoRoN have shown some yield advantages (White *et al*., 1995) and positive effects on boll weight and boll number (Morse and Oosterhuis, 1996) and very low phytotoxicity (Oosterhuis, unpublished). However, recent studies have shown some inconsistency with regard to yield response. The purpose of the present study was to further evaluate the effect of foliar-applied CoRoN on the yield of field-grown cotton.

## MATERIALS AND METHODS

The field study was carried out at the Delta Branch Station in Clarkedale in 1999 on a well-drained Dundee silt loam under dryland conditions. The cultivar 'Suregrow 125' was planted on 11 May in plots consisting of four rows spaced 35 inches apart and 50 ft in length. The statistical design was a randomized complete block with six replications. The two N sources were CoRoN (25 % N) (Helena Chemical Company, Memphis, TN) and liquid urea (23 % N). The K source was Tracite (15 % K) (also from Helena Chemical Company). The first two products were applied at two different rates, and Tracite was applied alone and in combination with CoRoN at two different rates

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(Table 1). All foliar applications were made with a $CO_2$ backpack sprayer calibrated to deliver 10 gal solution/acre. All treatments were applied on 29 July and again on 12 August (approximately 2 and 4 weeks after first flower). Phytotoxicity was determined by percentage foliar burn (0=none and 10=complete leaf damage) before first white flower. The center two rows of each plot were machine-harvested at approximately 70% open boll.

## RESULTS AND DISCUSSION

There was no significant difference (P=0.05) in boll weight or lint yield between treatments (Table 2). Previous studies have shown no foliar burn with CoRoN up to 20 lb N/acre. CoRoN at 2 gal/acre increased yielded numerically, but not significantly, over the untreated control (+ 80 lb/acre) and over urea (+ 47 lb/acre). At 1 gal/acre, CoRoN was 52 lb/acre higher than the control, but 20 lb/acre less than urea alone. Tracite showed some yield promise and exhibited the highest yield (+ 103 lb/acre compared to the control) at 1 gal/acre (Table 2). The season was exceptionally hot and dry, which may have masked treatment affects.

When yields were averaged over the 6 years that CoRoN has been tested in Arkansas, CoRoN increased yields over the untreated control by 45 lb/acre and by about 25 lb/acre over the foliar urea treatment (Table 3). Significant yield responses were obtained in 2 of 6 years.

## PRACTICAL APPLICATION

Because the unusually hot and stressful 1999 season probably masked any treatment affects, the study will be repeated. Previous studies in Arkansas have shown some promise from CoRoN but also some inconsistency from year to year. This may have been associated with environmental conditions and lack of attention paid to plant nitrogen status. Future field evaluations of CoRoN should probably involve sites that are in need of foliar feeding, e.g., in relation to color, petiole analysis, or high boll loads, so as to give the product a chance to show its potential.

## LITERATURE CITED

Morse S.G., and D.M. Oosterhuis. 1996. Early and mid-season advantages of Folocron, a slow release nitrogen fertilizer. Pro. Beltwide Cotton Conf., National Cotton Council, Memphis, TN. pp. 1348-1351.

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White, D.R., S.G. Morse, D.M. Oosterhuis, and E.M. Holman. 1995. The effects of foliar-applied controlled release nitrogen on uptake and yield of cotton in Arkansas. Proc. Beltwide Cotton Conf., National Cotton Council, Memphis, TN. pp. 1355-1356.

**Table 1. Rates of urea and CoRoN and application timing in 1999 at Clarkedale, Arkansas.**

| Treatment | Rate | Timing |
|---|---|---|
| Untreated Control | | |
| Urea 23-0-0[z] | 1 gal/acre (2.3 lb N/acre) | 2 and 4 wk after 1st flower |
| CoRoN 25-0-0 | 1 gal/acre (2.5 lb N/acre) | 2 and 4 wk after 1st flower |
| Urea 23-0-0 | 2 gal/acre (4.6 lb N/acre) | 2 and 4 wk after 1st flower |
| CoRoN 25-0-0 | 2 gal/acre (5.0 lb N/acre) | 2 and 4 wk after 1st flower |
| Tracite 0-0-15 | 1 gal/acre (1.5 lb K/acre) | 2 and 4 wk after 1st flower |
| Tracite + CoRoN | 1 gal/acre (1.5 lb K/acre + 2.5 lb N/acre) | 2 and 4 wk after 1st flower |
| Tracite + CoRoN | 2 gal/acre (3.0 lb K/acre + 5.0 lb N/acre) | 2 and 4 wk after 1st flower |

[z] N-P-K.

**Table 2. Effect of foliar-applied urea and CoRoN on boll weight and yield under dryland conditions in 1999 at Clarkedale, Arkansas.**

| Treatment | Avg. Boll Weight | Lint Yield |
|---|---|---|
| | g | lb/acre |
| Untreated Control | 4.23 | 673 |
| Urea @ 1 gal/acre | 4.45 | 745 |
| CoRoN @ 1 gal/acre | 4.30 | 725 |
| Urea @ 2 gal/acre | 4.16 | 706 |
| CoRoN @ 2 gal/acre | 4.40 | 753 |
| Tracite @ 1 gal/acre | 4.63 | 776 |
| Tracite + CoRoN @ 1 gal/acre | 4.45 | 715 |
| Tracite + CoRoN @ 2 gal/acre | 4.12 | 666 |
| LSD(0.05) | 0.54 (NS)[z] | 113 (NS) |

[z] NS=non-significant (P=0.05).

**Table 3. Effect of foliar-applied CoRoN and urea on lint yield during 6 years (1993-1999) of field research in Arkansas.**

| | Lint yield | | | | | |
|---|---|---|---|---|---|---|
| Treatment | 1993[z] | 1994[z] | 1995[z] | 1996[z] | 1998[y] | 1999[z] |
| | ---------- lb/acre ---------- | | | | | |
| Control | 863 | 1003 | 1416 | 1321 | 690 | 673 |
| CoRoN™ | 987 | 1106 | 1382 | 1272 | 732 | 753 |
| Urea | 953 | 1055 | 1403 | ------[x] | 719 | 706 |
| LSD(0.05) | 46 | 81 | NS[w] | NS | NS | NS |

[z] Two foliar applications during flowering and boll development.
[y] Two foliar applications during late boll development.
[x] Treatment not included.
[w] NS = non-significant (P=0.05).