COTTON RESPONSE TO FOLIAR NUTRIENT APPLICATION

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ABSTRACT: A 3-year (2000-2002) study was completed in 2002, evaluating the influence foliar slow release N (CoRoN, 25-0-0, N-P-K), N + K [CoRoN, 10-0-10, (N-P-K) formulated with 0.5% boron (B)] liquid solutions, and conventional foliar applications of potassium nitrate (KNO_3) and feed grade urea (46% N) applied either at pinhead square (PHS) or sequential applications starting at PHS or first bloom have on seedcotton yield. The environmental parameters during the growing seasons for 2000, 2001, and 2002 were highly variable with 11.90, 25.63, and 34.16 inches of rainfall, respectively. Foliar fertilizer treatments had no visual effect on cotton growth and maturity. The study mean seedcotton yield was 2404, 2400, and 2876 lb/ac for 2000, 2001, and 2002, respectively. CoRoN (10-0-10) at 1 gpa applied at first bloom produced higher yield than the check 2 of 3 years and was equal to CoRoN (10-0-10) at 1 gpa applied at first bloom and repeated 13 days later 2 of 3 years. Foliar applications of CoRoN (10-0-10) at 1 gpa, KNO_3 at 1 lb N/ac and 3.3 lb K_2O or urea at 1 lb N/ac applied at first bloom and repeated 13 days after first bloom produced similar and higher yield than the check (water) and Solubor in 2001, and the check in 2002. CoRoN (25-0-0) applied at PHS showed higher yield than the check only 1 of 3 years. The 3-year results indicated foliar applications of CoRoN (10-0-10), KNO_3, and urea applied at first bloom and repeated 9 to 13 days after first bloom has potential to increase yield 7 to 10%.

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KEYWORDS: Foliar, nutrient applications, cotton

MATERIALS AND METHODS: A 3-year (2000-2002) study was conducted on a Leeper silty clay loam soil evaluating the effect foliar applications of slow release nitrogen [CoRoN (25-0-0)], slow release nitrogen + potassium + boron [CoRoN (10-0-10) formulated with 0.5% boron (B)] as liquid solutions, and conventional sources of foliar N applications [potassium nitrate (KNO_3) and feed grade urea (46% N)] have on seedcotton yield. These were applied either at PHS or sequential applications starting at PHS or first bloom (Table 1). The study was conducted as a randomized complete block design with 4 replications on a Leeper silty clay loam soil. Plot size was 4 rows (38 inch) x 500 ft.

Soil test indicated high P and high K level. Each year in the fall, potash (K_2O) at 250 lb/ac was applied broadcast to the soil surface. Nitrogen as liquid UAN (32% N) at 80 lb N/ac was applied sidedress 6 inches from the row and 2 inches deep on 6/13/00, 6/19/01, and 6/17/02. All foliar nutrient treatments were applied at 4 mph with TXVS-4 nozzles (20-inch spacing) with a 5 gpa carrier volume. Boom height was 20 inches above tallest cotton. The PHS applications were

made 7/06/00, 6/28/01, and 6/24/02. The first bloom applications were made 7/18/00, 7/24/01, and 7/17/02. The repeat applications were made 9 days after first bloom application in 2000 and 2001 and 13 days after first bloom application in 2002. The 2002 application had to be delayed from 9 to 13 days after bloom due to wet soil conditions.

Land preparation was done in the fall after crop harvest. The cotton stubble was flail mowed and the land was prepared with a one-pass paratill-bed-roller system in late October or November. A burndown herbicide was applied in early March and repeated in late April. The area was do-alled (row conditioner) prior to planting cotton. NuCOTN 33B cultivar was planted in 38-inch rows at 4 seed/ft of row on 5/30/00, 5/23/01, and 5/16/02. Ridomil 11G (mefenoxam) and Temik 15G (aldicarb) at 0.88 and 0.52 lb ai/ac were applied in-furrow at planting. Appropriate preemergence and post-directed herbicides were applied for good weed control during the growing season.

The major cotton insect pests during growing seasons were tarnished plant bug (*Lygus lineolaris*), budworm (*Heliothis virescens*), and bollworm (*Helicoverpa zea*). In 2000, banded winged white flies (*Trialeurodes abutiloneus*) and cotton aphids (*Aphis gossypii*) also were major pests. Appropriate cotton insecticides were applied when insects were at threshold or above threshold level based on twice weekly scouting reports. All insecticide applications were made with TXVS-4 nozzles, 5 gpa carrier volume, 48 psi, and a 4 mph rate of travel.

Pix (mepiquat chloride) was applied during the growing season when necessary to control cotton rank growth. Cotton was defoliated when the cracked boll on the first position branch was 4 nodes from the upper most harvestable boll. Cotton was defoliated with a boll opener (ethephon) and appropriate defoliants on 9/28/00, 9/21/01, and 9/12/02. The center 2 rows of cotton were harvested with a 2-row spindle picker 10/12/00, 10/08/01, and 9/26/02. Plot seedcotton weights were recorded. Grab samples from each plot of seedcotton were collected and ginned with small gin to determine percent gin turnout and lint yield. All lint samples were subjected to HVI analysis. Lint loan values for 2001 and 2002 were calculated based on the National Commodity Credit Corporation loan rate for 2001. Gin turnout, lint yield, loan values, and HVI data were not available at the time of this report. All data were analyzed with analysis of variance procedure and treatment means were separated with Fisher Protected LSD at the 5% significance level.

RESULTS AND DISCUSSION: Rainfall during the growing season was highly variable across years and months (Table 2). The 2000 growing season (May through September) had the lowest rainfall of 11.90 inches compared to 25.63 and 34.16 inches for 2001 and 2002, respectively. The study mean seedcotton yields were 2404, 2400, and 2876 lb/ac for 2000, 2001, and 2002. respectively (Table 1). During the growing season, no observable differences in treatments were noted. The CoRoN (10-0-10) 1 gpa applied at first bloom and repeated 9 to 13 days after first bloom, produced higher yield than the check all 3 years. CoRoN (25-0-0) at 0.5 gpa applied at PHS followed by repeat applications of CoRoN (10-0-10) at 1 gpa applied at first bloom and repeated 9 to 13 days after first bloom or CoRoN (10-0-10) at 1 gpa only applied at first bloom produced higher yield than the check 2 of 3 years. Potassium nitrate (KNO_3) at 1 lb N + 3.3 lb K_2O/ac and feed grade urea at 1 lb N/ac applied in 2001 and 2002 at first bloom and repeated 9 to 13 days after first bloom produced yield equal to CoRoN (10-0-10) at 1 gpa applied

at first bloom, or applied at first bloom and repeated 9 to 13 days after bloom; and CoRoN (25-0-0) at 0.5 gpa applied at PHS plus CoRoN (10-0-10) at 1 gpa and repeated 9 to 13 days after first bloom. Solubor (boron) at 0.15 lb B/ac applied at first bloom and repeated 9 to 13 days later produced yield equal to the check and feed grade urea in 2001 and 2002 and was lower than all other treatments in 2001. CoRoN (25-0-0) at 0.5 gpa applied at PHS only produced higher yield than the check 1 of 3 years.

Two-year (2001 and 2002) average results indicated CoRoN (10-0-0) applied at first bloom and KNO_3 applied at first bloom and repeated 9 to 13 days later produced the highest yield and was 10% more than the check and 7% more than Solubor. These treatments were similar in yield to CoRoN (25-0-0) at 0.5 gpa applied at PHS followed by CoRoN (10-0-10) at 1 gpa applied at first bloom and repeated 9 to 13 days after first bloom; CoRoN (10-0-10) at 1 gpa applied at first bloom and repeated 9 to 13 days after first bloom; and feed grade urea at 1 lb N/ac applied at first bloom and repeated 9 to 13 days after first bloom. The results indicated that foliar applications of CoRoN (10-0-10), KNO_3, or urea applied at first bloom and repeated 9 to 13 days later has the potential to increase cotton yield by 7 to 10%.

COOPERATORS: None

PUBLICATIONS: None

Table 1. Effects of foliar nutrient applications and timing on seedcotton yield on a Leeper silty clay loam soil in 2000-2002Verona, MS.

Foliar Treatment	Rate/ac	Application growth stage	------- Seedcotton -------- 2000	2001	2002	2-yr (01-02) Mean
			----------Lb/ac----------			
1. CoRoN (25-0-0)	0.5 gpa	PHS[1]	2424	2450	2760	2605
2. CoRoN (25-0-0)	0.5 gpa	PHS	2349	2508	2901	2705
CoRoN (10-0-10)[3]	1 gpa	1st Bloom				
CoRoN (10-0-10)	1 gpa	9/13 DAB[2]				
3. CoRoN (10-0-10)[3]	1 gpa	1st Bloom	2376	2532	2911	2722
4. CoRoN (10-0-10)[3]	1 gpa	1st Bloom	2616	2434	2928	2681
CoRoN (10-0-10)[3]	1 gpa	9/13 DAB				
5. KNO_3 (13.5-0-45)[4]	1 lb N/ac	1st bloom	-----	2522	2968	2745
KNO_3 (13.5-0-45)[4]	1 lb N/ac	9/13 DAB				
6. FG.Urea (46% N)[5]	1 lb N/ac	1st bloom	-----	2360	2914	2637
FG.Urea (46% N)[5]	1 lb N/ac	9/13 DAB				
7. Solubor	0.15 lb B/ac	1st bloom	-----	2219	2859	2539
	0.15 lb B/ac	9/13 DAB				
8. Check (water)	5 gpa	PHS	2257	2177	2770	2474
		1st bloom				
		9/13 DAB				
Grand mean			2404	2400	2876	
LSD			205	176	123	
%CV			5	5	3	

[1] PHS means pinhead square.
[2] DAB means days after first bloom.
[3] Contains 0.5% boron.
[4] KNO_3 is potassium nitrate which was applied at 1 lb N/ac and 3.3 lb K_2O/ac.
[5] FG. Urea is feed grade urea (46% N).

Table 2. Rainfall for the cotton growing seasons of 2000-2002, Verona, MS.

Month/Date		Year 2000	2001	2002
		inches		
May	1-10	0.03	0.00	9.44
	11-20	0.00	0.10	0.93
	21-31	0.98	4.49	1.70
June	1-10	0.82	4.61	0.00
	11-20	1.62	0.00	0.86
	21-30	2.12	1.08	1.49
July	1-10	0.00	1.19	2.56
	11-20	0.41	0.63	4.00
	21-31	2.77	0.28	1.17
August	1-10	0.11	2.50	0.02
	11-20	0.22	4.96	0.53
	21-31	0.00	1.31	1.55
Sept.	1-10	1.74	3.55	0.00
	11-20	0.98	0.93	0.35
	21-31	0.10	0.00	9.56
	Total	11.90	25.63	34.16