Improving Nitrogen Fertilizer Management In Subsurface Drip-Irrigated Cotton (Field 6A-F)

Kevin Bronson, Rajkumari Yabaji, and J.D Booker

Objectives: To assess lint yields with N fertilizer urea ammonium nitrate (UAN) (32-0-0) injected into a subsurface drip irrigated cotton system between: first square and early bloom, and first square and peak bloom. Secondly we compared lint yields with two N fertilizer sources: 32-0-0 and 32-0-0 plus ammonium thiosulfate (28-0-0-5)

Methodology: Blocks were divided into two, 72 row plots that were randomly assigned to either 28-0-05 injected up to early bloom, 32-0-0 injected up to early bloom, and 32-0-0 injected up to mid bloom. Each plot has its own irrigation and fertilizer injection station. Nitrogen fertilizer rate was based on an N requirement for a 2 .5 bale/ac yield, which is 150 lb N/ac. The amount of NO_3-N extracted in initial, spring 2004 2-acre grid soil samples from 0-24 inches was subtracted from 150 lb N/ac to give a seasonal N fertilizer requirement of 52 to 62 N/ac (Table 1). Nitrogen fertilizer was injected into the SDI system daily, between 15 June and terminated at either 15 July (early bloom) or 30 July (mid bloom). Plant samples were taken on 15 July for biomass and leaf and stem N analysis. Soil samples were also taken at this time from 0-9 inches above the drip tape and analyzed for NH_4 and NO_3. Total irrigation applied in the wetter than average growing season of 2004 was 13 inches.

Results: Early squaring biomass and lint yields were very high (Table 2). The 3 - 3.8 bale/ac yields we observed greatly exceeded our 2.5 bale/ac yield goal. This was due to the above average rainfall and cool temperatures in the 2004 growing season and the lack of damaging insect pressure. The N supply was greater than our target by 25 lb N/ac. At the 7 % probability level, 32-0-0 injected up to 30 July had greater lint yields than 32-0-0 injected up to 15 July. The 28-0-0-5 treatment did not produce lint yields different from 32-0-0 with the same 15 July termination of fertigation. On 15 there was less NO_3 with 28-0-0-5 than the 32-0-0 treatments (Table 2). This suggests some inhibition of nitrification, however, the soil NH_4 was similar among the N treatments.

Table 1. Spring soil NO_3 contents, N fertilizer amounts injected, and N supplied in irrigation water, Halfway, TX, 2004

N source	N timing	Spring NO_3-N	N fertilizer injected	Well water-N	N-pHuric-N injected	Total N supply
		----------	----------	lb N/ac	----------	----------
28-0-0-5	Early	69	52	9	45	175
32-0-0	Early	64	56	9	45	174
32-0-0	Late	58	62	9	45	174

Table 2. Early squaring biomass, N accumulation, soil NH_4 and NO_3, and lint yields as affected by fluid N fertilizer source and timing, Halfway, TX, 2004.

N source	N timing	Biomass	N accum.	Soil NH_4-N	Soil NO_3-N	Lint yield
		lb/ac	----------	lb N/ac	----------	lb/ac
28-0-0-5	Early	2479	73	10.2	12.0	1525
32-0-0	Early	1918	64	12.0	28.5	1632
32-0-0	Late	2127	66	10.2	24.9	1909