

Applied Research Report

Evaluation of Reducing Nitrogen Fertilizer Application by Residual Soil Nitrogen Found to Depths of 24 Inches in Cotton

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Summary

A field research trial was conducted to evaluate the effect of using soil sampling to twenty-four inches to reduce nitrogen fertilizer application. Nitrogen fertilizer was applied to treatments of 68, 34, and 0 lbs N per acre in a replicated field trial. Lint yield of the treatments was not statistically significant between the three nitrogen fertilizer levels. Though not statistically significant, the middle N range provided a numerical advantage of \$22.08 and \$25.98 in increased profits over the 0 and 68 lbs N treatment, respectively.

Objective

Research conducted over the past decade has demonstrated nitrogen fertilizer applications can be reduced by the amount of residual nitrogen found in soil tests at depths up to 24 inches. This research was conducted to evaluate this concept on large scale plots in a grower field.

Materials and Methods

A field was sampled for soil nutrients in early January using a hydraulic soil probe to 24 inches. Soil testing was conducted at the Texas A&M Soil, Water, and Forage Testing Laboratory in College Station Texas. Results of the soil testing found 32 lbs N at 0-6 inches and 72 lbs N (11.95 ppm) from 6-24 inches for a total of 104 lbs residual N per acre (Table 1).

Table 1. Soil test results from soil sampling. (Calhoun County, TX 2017)

pH	Conductivity	NO ₃ -N (lbs/A)			P (lbs/A)	K (lbs/A)	Ca (lbs/A)	Mg (lbs/A)	S (lbs/A)	Na (lbs/A)
		0-6"	6-24"	Total						
6.3	576	32	72	104	25	259	5811	738	13	70

The cotton variety PhytoGen 499 WR was planted on March 24, 2017.

Pre-plant nitrogen fertilizer treatments were applied by field sprayer at the treatment rates of 0, 34, and 68 lbs/A on February 6, 2017. The fertility treatments were determined as follows:

- Treatment 1: Grower rate of fertilizer if no nitrogen was found (68 lbs N/A)
- Treatment 2: Grower rate of fertilizer less 50% nitrogen found to a 24-inch depth (34 lbs N/A)
- Treatment 3: Grower rate of fertilizer less 100% nitrogen found to a 24-inch depth (0 lbs N/A)

Plot size was 32 rows (38-inch width) wide and 3200 feet in length. Treatments were replicated three times in the field in a randomized complete block design. 12 rows of each plot were harvested on August 21, 2017. Yield was measured with the picker's yield monitor.

Results and Discussion

Yield was the only data point measured across all three replications. The yield of the N treatments was not statistically different (Table 2).

Grower profit from these treatments was determined by assuming nitrogen fertilizer cost of \$0.27 per lb N and cotton lint value of \$0.70/lb. Though not statistically significant, the middle N rate provided a numerical advantage of \$22.08 and \$25.98 in increased profits over the 0 and 68 lbs N, respectively.

Table 2. Cotton yield, nitrogen cost and net revenue of three different treatments of nitrogen based on soil available nitrogen in the top 24 inches of soil. (Calhoun County, TX 2017).

Treatment	Yield (lbs. lint/A)	Nitrogen Cost	Net Revenue (\$/acre)
1 68 lbs N	976 NS	\$18.36	\$665.07
2 34 lbs N	1000 NS	\$9.18	\$691.05
3 0 lbs N	956 NS	\$0.00	\$668.97
LSD P=.10	105.46		73.824
Standard Deviation	60.59		42.412
CV	6.2		6.28
Treatment F	0.408		0.327
Treatment Prob(F)	0.6896		0.7384

Means followed by same letter or symbol do not significantly differ (P=.10, LSD)

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