Drs. C.W. Bednarz, G.H. Harris, and W.D. Shurley

Fluid Starters Bump Cotton Yields

Net economic returns were also higher than untreated check in 23 of 30 comparisons.

Summary: *In 1997 at Plains, Georgia, 10-34-0, and 10-34-0 + 32-0-0 starters significantly increased cotton yields over control. The starter that resulted in the greatest yields at Midville in 1997 was 28-0-0-5S, indicating that starters may be an efficient method of S application. The experiments also indicate that response to the most appropriate cotton starter fertilizer may depend on soil type and weather conditions at planting and stand establishment. Net economic returns were higher than in the untreated checks in 23 of 30 comparisons. The only significant increases that occurred in this study were when the crop was exposed to cool weather for an extended time immediately after planting. Additional research is needed to properly address this question.*

The response of cotton to starter fertilizer has been investigated across much of the eastern half of the U.S. Cotton Belt. Most of these studies investigated the effects of ammonium polyphosphate (APP) starter in relation to planting date, tillage practice, fertilizer placement or application rate.

Due to reduced soil P mineralization, P-containing starters are the reasonable source when planting under cool environmental conditions. Past research, in fact, has reported increased lint yields from banded P when cool weather prevailed for several weeks after planting. Historical weather records from the Coastal Plain Experiment Station, however, indicate that the average soil temperature at 4 inches depth at Tifton, Georgia, for the month of April is 64°F. Application of P-containing starters to counter the effects of depressed soil mineralization at this temperature would be unnecessary. In addition, most soils in South Georgia contain medium to high levels of available P. Thus, APP may not be the ideal starter choice. Finally, other research has reported that lack of nutrient-holding capacity in many southeastern U.S soils could result in loss of some preplant applied N to leaching. Starter fertilizer may, therefore, be an environmentally and economically attractive method of preplant N fertilization.

Objectives in this study were to determine 1) if cotton grown on Coastal Plain soils in South Georgia would respond to different starter fertilizer sources, and 2) if the use of starter fertilizers would result in an economic gain.

Yield

In these trials, starters resulted in greater yields in two of the six tests. At Midville in 1997, 28-0-0-5S resulted in a greater yield than the untreated and the 9-0-0-11Ca starter (Figure 1). APP resulted in a greater yield than the untreated check, UAN, and calcium nitrate at Plains in 1997.

It is interesting to note that the increases in lint yield from starter applications occurred when the crop experienced a period of cool weather *immediately* after planting. Prevailing weather conditions were cool for several weeks following planting at Midville and Plains in 1997.

The study revealed no statistical differences in fiber length or fiber strength between fertilizer treatments and the untreated check (data not shown).

Dollar return

Quality factors available from the study that influence price were fiber

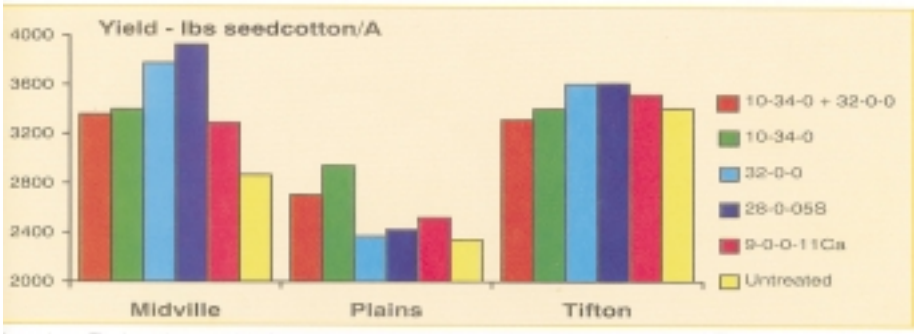

Figure 1. Final seed cotton yield from starter fertilizer tests at Midville, Plains, and Tifton, Georgia, 1997.

Table 1. Cotton price premiums and discounts from starter tests conducted at Midville, Plains, and Tifton, GA, 1997 and 1998.

1998	Midville 1997	Midville 1998	Plains 1997	Plains 1998	Tifton 1997	Tifton 1998
	cents/lb					
10-34-0 + 32-0-0	.05	.325	-2.3	.375	.025	.325
10-34-0	0	.325	0	.425	-1.625	.375
32-0-0	.025	.325	-2.3	.425	.025	.375
28-0-0-5S	0	.325	-2.3	.425	.025	.375
9-0-0-11Ca	0	.075	0	.425	.025	.375
Untreated	0	-3.65	0	.425	.025	.425

Base price was 69.8 cents/lb for 1997 and 65.3 cents/lb for 1998 and was the average of the December contract price on June 1 and the spotmarket price on March 1. Quality premiums and discounts were applied to these base prices to calculate net return.

Table 2. Net return above treatment costs from starter tests conducted at Midville, Plains, and Tifton, GA, in 1997 and 1998.

Treatment	Midville 1997	Midville 1998	Midville Avg	Plains 1997	Plains 1998	Plains Avg.	Tifton 1997	Tifton 1998	Tifton Avg.
	$/A								
10-34-0 + 32-0-0	762	514	638	587	633	610	759	691	725
10-34-0	776	511	643	668	674	671	763	669	716
32-0-0	864	483	674	525	684	605	833	688	761
28-0-0-5S	896	532	714	535	682	608	833	727	780
9-0-0-11Ca	752	528	640	575	690	632	810	725	768
Untreated	672	442	557	549	678	613	798	675	737

Net return is cotton income (price times yield) minus ginning, warehousing, and treatment costs. Treatment costs include fertilizer, labor, equipment, fuel, handling, fixed, and interest costs.

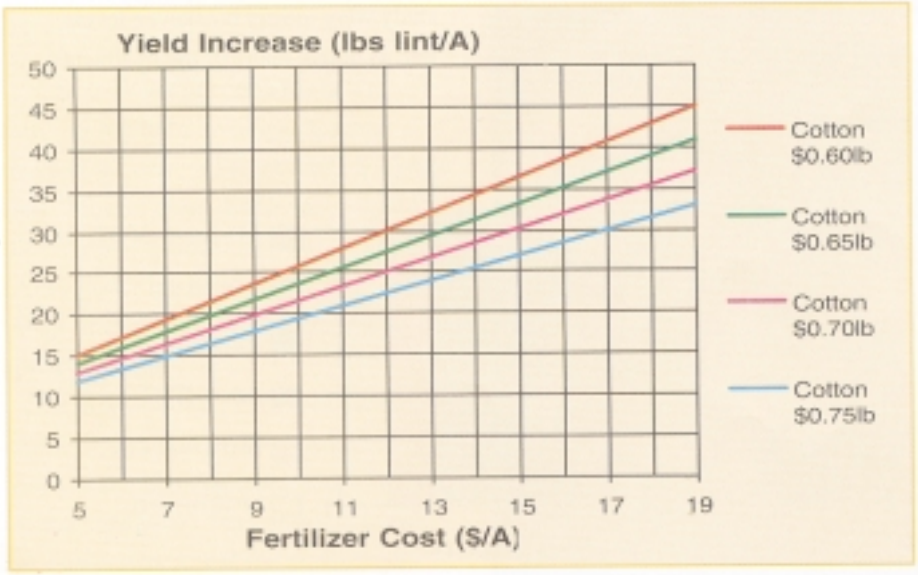

Figure 2. Break-even yield increase for starter fertilizer.

length, strength, and micronaire. Fiber uniformity data were also collected but do not influence the price received for cotton by the farmer. The base value for fiber length is 1.06 inches. The base value for fiber strength is 23 to 28 g/tex. The base value for fiber micronaire is 3.5 to 4.9 with a premium range of 3.7 to 4.2. Across all locations and years, fiber length ranged from 1.04 to 1.15 inches. Fiber strength ranged from 25 to 31 g/tex and fiber micronaire ranged from 3.3 to 4.2.

Premiums and discounts were assigned to the mean staple length, fiber strength and micronaire of each treatment. Table 1 shows the sum of all premiums and discounts applied to each treatment. The price discount from Midville in 1998 was due to high micronaire, while discounts from Plains in 1997 were due to low micronaire. The price discount from Tifton in 1997 was due to short fiber length. These differences were statistically insignificant. The only significant difference in lint quality throughout the study was for micronaire at Plains in 1998. However, all micronaire means at Plains in 1998 were within the acceptable range and received no price premium or discount.

At Midville in 1997 and 1998, net return above treatment costs was higher for the starter fertilizer treatments than the untreated check (Table 2). Starter fertilizers resulted in higher net returns ranging from 81 to 157 $/A. Results at Plains and Tifton, however, were mixed. Over two years, two of the five treatments at Plains and three of the five treatments at Tifton resulted in higher mean net returns than the untreated check. Over two years, 28-0-0-5S resulted in highest mean net returns at Midville and Tifton, while 10-34-0 resulted in highest mean net return at Plains.

Figure 2 illustrates the breakeven yield

increase needed to cover all added costs of using starter based on the cost of the fertilizer and the price of cotton. This illustration assumes no price premiums or discounts for fiber quality. Breakeven yield increase includes fertilizer, labor, fuel, equipment, warehousing, picking, hauling, and interest costs. Depending on the cost/price relationship, the breakeven yield increase ranges from 11 to 44 lbs/A. Mean yield differences observed in this study were mostly breakeven levels, but, as noted, many of the treatments were not statistically different from the untreated check.

Plant analysis

Uptake. At Tifton in 1997 and 1998, side-banded UAN (32-0-0 and 28-0-0-5S) increased whole-plant N concentration at approximately five weeks after planting relative to the untreated check and side-banded APP. In all studies, however, whole-plant N concentration was never below the sufficiency range.

Side-banded calcium nitrate (9-0-0-11Ca) increased whole-plant Ca concentration over the APP starter at five weeks after planting at Tifton in 1998. At Plains in 1998, calcium nitrate (9-0-0-11Ca) and 28-0-0-5S resulted in increased whole-plant Ca concentration at four weeks after planting relative to the APP starter. Whole-plant Ca was never deficient in any study or starter treatment.

Plant height. Increased plant height was observed in only two of the six studies, once on the Tifton loamy sand and once on the Greenville sandy loam. In both instances, the increase could be attributed to side-banded APP.

Dr. Bednarz is assistant professor of crop physiology at the Coastal Plain Experiment Station, U of Georgia; Dr. Harris is associate professor and extension soil fertility specialist and Dr. Shurley is professor and agricultural economist at the Rural Development Center, U of Georgia.