PLANTED AND RATOONED GRAIN SORGHUM RESPONSE TO STARTER FERTILIZER AND FERTILIZER PLACEMENT

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This study was conducted for 2 years on a Dothan fine sandy loam soil at the Alabama Agricultural Experiment Station's Wiregrass Substation. Treatments consisted of tillage (none and disk-turn-disk), starter fertilizer (none and 100 lb./acre 23-26-0), and fertilizer placement (in-row subsoil track and soil surface). Regardless of tillage system, the sorghum (CNS 1334 BR in 1982 and Savannah 5 in 1983) was planted with an in-row subsoiler (12-inch subsoil depth). The in-row subsoil applied fertilizer was dropped into the subsoil track at planting; the surface application, also applied at planting, was applied 3 to 5 inches to one side of the row. The sorghum was planted on 13 March 1982 and 24 April 1983 at a seeding rate of 5 seeds per foot in 24-inch rows. The winter cover crop was rye which was killed with paraquat CL approximately 2 weeks prior to planting. Sidedress N rates were 120 lb./acre N for the planted crop and 100 lb./acre for the ratooned crop. Soil pH was 5.9 and soil P and K were high (85 lb./acre P and 120 Ib./acre K). Herbicides consisted of paraquat preplant, atrazine over the top 4 to 5 weeks after planting, and linuron post directed prior to boot stage for the planted crop. For the ratooned crop, paraquat was applied immediately after first crop harvest and post directed prior to boot stage. The planted crops were harvested 19 July 1982 and 9 August 1983. The ratooned crops were harvested 26 October 1982 and 1 December 1983.

Weights of whole plant samples (Table 1) taken on 20 April 1982 (approximately 6 weeks after planting) suggest that early season plant growth was exceptionally poor even when starter fertilizers were applied. The slow growth implies that early March may be too early to plant grain sorghum. There was no difference in plant weights among tillage systems, but the beside-row and in-row fertilizer increased plant weights by a factor of 4.4X and 11.4X, respectively. Since the beside-row starter was applied on the soil surface, increased growth from this treatment was probably due to N in the starter moving down into the rooting zone. It is doubtful that the surface applied P had any effect on early plant growth. Plant heights on 20 April 1982 (Table 1) were improved only by the in-row starter. Whole plant data were not taken in 1983.

The starter fertilizer application, especially the in-row application, had a tremendous effect on development rate, which could be seen at the early heading stage and at maturity (Table 1). In 1982, approximately 25% of the plants in plots receiving in-row starter had headed before any plants from the no-starter treatment had headed. By mid-June 1983, 99% of the plants receiving in-row starter had headed,

but only 70% of those receiving no starter had headed. There was also a maturity advantage for in-row compared to beside row application, but differences between tillage systems were not found.

Table 1. Early season plant weight and height (20 April) and grain moisture at maturity in 1982, and heading on 27 May 1982 and 15 June 1983 as affected by tillage, starter fertilizer, and fertilizer placement.

Tillage	Fertilizer and placement	Plant weight	Plant height	Grain moisture	Heading	
					1982	1983
		lb./A	inches	%	-----%-------	
Conventional	none	31	23	25	0	70
	beside row	105	23	18	6	87
	in-row	280	26	17	23	99
None	none	14	18	32	0	70
	beside row	97	21	23	6	87
	in-row	243	25	19	23	99

When the first crop was harvested in 1982, grain moisture (Table 1) ranged between 25 and 32% for the no-starter treatment and 17 and 19% for the in-row starter. The planted crop could have been harvested 2 weeks earlier if all plots had received in-row starter fertilizers. Early maturity is exceptionally important in ratoon-cropping systems, and the use of starter fertilizers to hasten maturity of the planted crop may well be the key management practice in ratoon sorghum production.

Actually, the enhanced maturity effect of the starter fertilizer was a bonus because the yield increases obtained with the starter fertilizer exceeded the fertilizer cost. With the planted crop in 1982 (Table 2), there was an 11 and 31 bu./acre yield increase with the starter fertilizer placed in the subsoil track in the conventional- and no-tillage systems, respectively. With the ratooned crop there was a 12 to 14 bu./acre response to the starter fertilizer, but differences between tillage systems were not apparent. The total grain yield response to the starter fertilizer in the conventional- and no-tillage system was 25 and 43 bu./acre, respectively. For the planted crop, both the beside-row and in-row application increased

Table 2. Yield of planted and ratooned sorghum in 1982 as affected by starter fertilizer and tillage

Crop	Till			No-till		
	No Starter	Beside row	In row	No Starter	Beside row	In row
	----------bu./A----------					
Planted	52	62	63	28	53	59
Ratooned	22	22	36	19	15	31
Total	74	84	99	47	68	90

yields, but only the in-row application resulted in yield increases in the ratooned crop.

In 1983, there were no differences between tillage systems, but there was a grain yield response to the starter fertilizer (Table 3). The in-row fertilizer application resulted in higher grain yields than the beside-row application for both the planted and ratooned crop.

Table 3. Yield of planted and ratooned grain sorghum in 1983 as affected by starter fertilizer and fertilizer placement.

	Fertilizer placement			
Crop	None	Beside-row	In-row	FLSD
	----------	bu./acre	---------	0.10
Planted	88	96	*104*	6
Ratooned	43	57	64	7
Total	131	153	168	