

Other Ag Crops



Cotton

- Fertilizer Program Comparison on Cotton (Arkansas-2003)
- Dryland Cotton Fertilizer Field Comparison (North Carolina – 1999-2000)
- Fertilizer Rate and Placement Effects on Cotton Stand (2007)

Sorghum

- Fertilizer Effect on Protein Content of Grain Sorghum (Kansas)
- Fertilizer Programs in Grain Sorghum (Texas – 2007)

Peanut

- Peanut Demonstration (2008)

Experiment: Fertilizer Program Comparisons in Cotton. Shoffner Farm Research, Inc. Newport, AR. 2003.

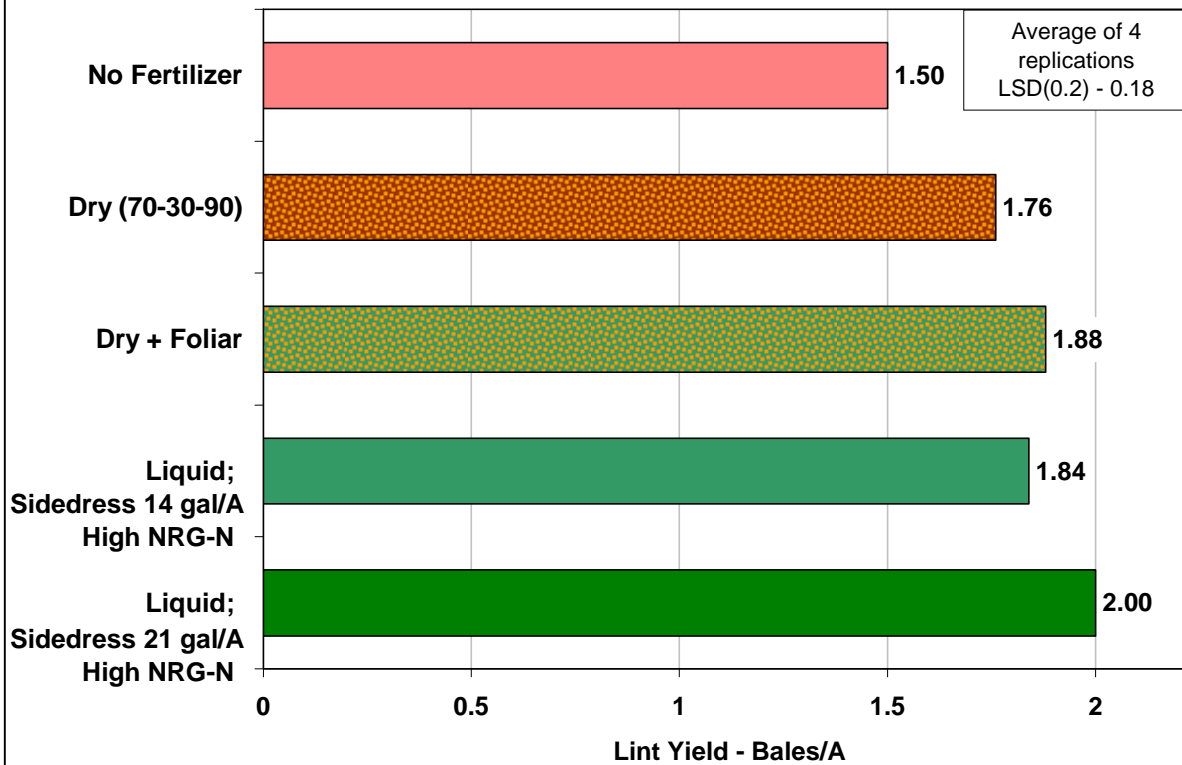
Although there are numerous acres of cotton in the South fertilized with Agro-Culture Liquid Fertilizers, there is little performance data to support recommendations. An experiment was established with Shoffner Farm Research, Inc. to evaluate a standard program using Agro-Culture Liquid Fertilizers against a total dry fertilizer program which is the normal practice for the area. The following treatments were applied:

1. Standard conventional program: 70-30-90 lb/A of N-P₂O₅-K₂O, pre-plant broadcast and incorporated as urea + 0-20-0 and 0-0-60.
2. Agro-Culture Liquid Fertilizers equivalent application to Trt. 1: 2.5 gal/A of Pro-Germinator 9-24-3 + 6.75 gal/A Sure-K + 1 qt/A Micro 500; and side-dress 14 gal/A High NRG-N.
3. Often higher rates of High NRG-N are used, and a comparison treatment using 21 gal/A of High NRG-N (equivalent to 105 lb-N/A) was included which used the same planter fertilizer.
4. Foliar application of potassium and boron are a part of many foliar applications for cotton in the South. Therefore, a foliar application of 2 gal/A Sure-K + 8 oz/A of Boron Flavonol was applied to the standard dry and Liquid treatments.

Each treatment was applied to 4-row plots which were 25 ft. long and replicated 4 times. Cotton was planted on May 3, which is later than normal due to excessively wet weather in May. Side-dress treatments were applied on July 3 when the cotton was 12 inches tall in the 4 leaf stage. Foliar application at 1st square was on July 8, and at 1st flower on August 6. On November 25, cotton was harvested from the middle two rows for yield determination. (Lint yield was figured at 32% turnout for all treatments.)

Treatment yields appear in the following chart.

Fertilizer Program Comparisons in Cotton
Shoffner Farm Research, Inc. Newport, AR - 2003



Liquid: 2.5 gal/A 9-24-3 + 6.75 gal/A Sure-K + 1 qt/A Micro 500 applied in-furrow with planter.

Dry: pre-plant broadcast 70-30-90 lb/A of N-P₂O₅-K₂O as urea + 0-20-0 + 0-0-60.

Foliar: 2 gal/A Sure-K + 8 oz/A Boron Flavonol at 1st flower and 1st square.

- All fertilizer treatments resulted in significant yield increases.
- The Agro-Culture Liquid Fertilizers standard application using 14 gal/A of High NRG-N yielded as well as the standard dry program.
- Increasing the rate of High NRG-N did result in a numerical yield increase, although not statistically significant.
- Application of foliar fertilizer resulted in a slight yield increase with the dry fertilizer, but not with the Liquid (data not shown.)
- Late planting due to weather may have minimized effects of some of the fertilizer inputs.

Experiment: Dryland cotton fertilizer field comparison near Dunn, NC

Conventional

Pre-plant broadcast: 400 lb/A 5-15-30

Planter: 7 gal/A 32% UAN

Sidedress: 15 gal/A 32% UAN

(Nutrients applied: 97-60-120)

Yield: 745.59 lb lint/A on 119.6 acres

Agro-Culture Liquid Fertilizers

Planter: 7 gal/A 32% UAN + 4.5 gal/A 9-24-3 + 2 gal/A Sure-K + 2 qt/A Sulfur Flavonol

Sidedress: 16 gal/A 32% UAN + 7 gal/A Sure-K

Folair at 1st flower: 2 gal/A Sure-K

(Nutrients applied: 87-13-8)

Yield: 776.05 lb lint/A on 113 acres

Experiment: Fertilizer Rate and Placement Effects on Cotton Stand

Year (Experiment Number): 2007 (07-100)

Date of Planting/Harvest: 5-30-07

Variety: DPL 445

Plot Size: 6 rows x 185 ft.

Soil Test Levels (ppm)

pH: 7.0 C.E.C.: 6.8
OM: 1.2% P1: 89 ppm
K: 80 ppm (3.0% BS)

The North Central Research Station is proud to state that they are the largest known cotton producers in the state of Michigan. This southern crop has a hard time adapting to the northern climate, however, there were some large bolls produced this year. Cool springs, cold nights and early frost do not all cotton to reach maturity in Michigan. Environmental conditions also play effect on overall growth and appearance of the plants. With all of this, the North Central Research Station was still able to get good stand information as it relates to fertilizer placement. Plot work this year focused on fertilizer rate effects on seed germination. There were two fertilizer rates applied:

1. 3 gal Pro-Germinator + 7 gal Sure-K + 2 qt Micro 500 (high rate)
2. 1.5 gal Pro-Germinator + 3.5 gal Sure-K + 1 qt Micro 500 (low rate)

Each plot (6 rows) represents one treatment, however, within each plot there is a subplot of 3 rows having fertilizer placed in-furrow and 3 rows with fertilizer placed 2 x 2.

Along with having the different fertilizer rate and placement comparison, seeding depth was also evaluated. Many times what may look like fertilizer injury is actually due to planter problems. At each of the fertilizer rates two planting depths were looked at.

1. normal depth of $\frac{3}{4}$ inch.
2. deep planting 1 $\frac{3}{4}$ inches.

Various combinations of the planter rates and planting depths were made to develop the plots. Stand counts and photo evaluations were done on June 22nd, 23 days after planting. The pictures below show the differences seen in population due to the fertilizer and planting depth treatments. Target stand was around 40,000 seeds/A.

Each picture below shows the fertilizer rate and depth of planting listed below the picture. The left rows had fertilizer placed in-furrow and the right had fertilizer placed 2 x 2. Complete stand count is listed in the upper corners of each.



Cotton plants pictured above have a number of different growth stages including different flower colors.



Figure 1. deep - low fertilizer rate



Figure 2. deep – high fertilizer rate



Figure 3. normal – low fertilizer rate



Figure 4. normal - high fertilizer rate

The above figures show pictures taken 23 days after planting. In each figure the left row has the fertilizer placed in-furrow and the right 2 x 2. Population based on stand counts for each row is in the corresponding box in each corner.

Conclusions:

- Placing fertilizer, even low rates, in-furrow on cotton may increase the risks of stand reduction.
- Planting depth is just as important as fertilizer placement.
- Planting depth dramatically reduced plant population.
- The combination of deep planting and in-furrow fertilizers caused the most damage.
- Cotton stands were not reduced with 2 x 2 placement of the higher fertilizer rate if planted at the correct depth.

Fertilizer effects on protein content of grain sorghum. The use of *Agro-Culture Liquid Fertilizers* has shown quality benefits on milo. Jerry Cordell, ACLF sales representative in Southern Kansas, has conducted side-by-side field tests, where grain samples were submitted to a lab for protein analysis. Planter fertilizers were compared in 1999 and 2000 (which was drought stressed.) Yields were measured by weigh wagon under supervision of the Pioneer sales representative.

	1999		2000	
	<u>Bu/A</u>	<u>Crude protein (dry)</u>	<u>Bu/A</u>	<u>Crude protein (dry)</u>
9-24-3	159.4	11.49%	83.2	11.18%
10-34-0	149.8	10.64%	77.3	10.70%

- In both the good year of 1999, and the stress year of 2000, higher yield and protein levels were obtained with 9-24-3 through the planter.

Pilot Point, Texas Test Plots 2007

The following experiments were conducted in Pilot Point, Texas which is approximately 50 miles north of Dallas. They were run by Sales Account Manager Andrew Strittmatter on the family farm. The ground had been fallow for five years, and had been in peanut production for many years prior to that. As such, the ground is very sandy, and had become very acidic. It was decided to implement several fertilizer tests and impose interaction with application or no application of dolomitic lime.

An application of 2 ton/A of dolomitic limestone (22% Calcium, 11% Magnesium) was broadcast and incorporated on January 30, 2007 on half of the plot area. A beginning soil test level and one from late December of 2007 appear in Table 1.

Sample date	lime:	pH	CEC	P1	K	Mg	Ca	%K	%Mg	%Ca	%H
Oct. 2006		4.8	7.8	53 VH	71 L	108 M	717 L	2.0	10.1	40.3	47.0
Dec. 2007	2 T/A	5.9	7.1	32 VH	78 L	169 VH	847 M	2.8	19.8	59.6	16.8
"	none	5.0	6.1	40 VH	80 M	77 M	540 L	3.4	10.5	44.3	41.0

Lime application - January 30, 2007.

Replicated fertilizer comparisons were made in the limed and unlimed areas in corn, milo and cotton. All plots were planted with a John Deere 7300 vacuum planter.

Experiment: Fertilizer Programs in Grain Sorghum

Location: Pilot Point, TX (2007)

Date of Planting/Harvest: April 5 / August 28

Hybrid: NC+ 6B50 (67,500 seeds/A)

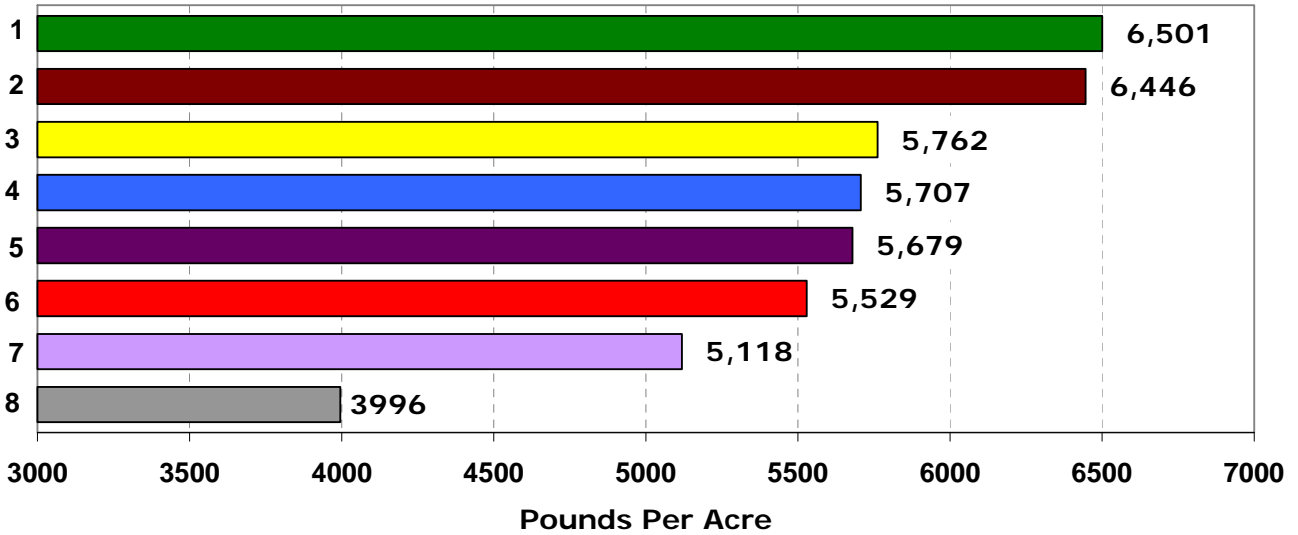
Plot Size (replications): 4 row x 110 feet (2 reps per lime level)

Grain sorghum is a commonly planted crop in North Texas, and fertilizer comparisons were evaluated at the Pilot Point plots. One concern with grain sorghum is the potential for seedling injury from in-furrow fertilizer applications. This can limit the amount of fertilizer applied which could lead to nutrient shortages. A different type of fertilizer application was evaluated in this experiment. This is referred to as 0x0 placement, where the fertilizer is dribbled over the through tubes behind the closing wheels. Similar to the more common term "2x2", the "0x0" means 0 inches deep and 0 inches to the side, or right over the row.

Based on the soil test levels listed above, a nutrient application of 140-30-60 for pounds per acre of N-P₂O₅-K₂O was the recommendation used. Equivalent rates of Agro-Culture Liquid Fertilizers were compared to conventional fertilizers. Out of concern for seedling injury, a regular rate and a half rate of Pro-Germinator + Sure-K was compared. Additionally, the regular rate of Pro-Germinator + Sure-K was applied both in-furrow and in 0x0 placement. The conventional treatment used 0-0-60, which was applied pre-plant broadcast and incorporated; and 10-34-0 applied 0x0.

As before, two lime rates were applied over the plot area: no lime and 2 tons/A of dolomite. Unlike the corn experiment, there was no effect of the lime on treatment yields. As such, the data was combined for presentation. Yield data appears in the following chart.

Fertilizer Comparisons - Grain Sorghum Pilot Point, TX - 2007



1. ■ PG + SK + M500; 2 + 2 + 1qt In Furrow; 32% eNhance (100%) 40 gal
2. ■ PG + SK + M500; 2 + 2 + 1qt In Furrow; 32% eNhance (80%) 32 gal
3. ■ PG + SK + M500; 2 + 2 + 1qt In Furrow; High NRG-N 28 gal
4. ■ PG + SK + M500; 4 + 4 + 1qt In Furrow; High NRG-N 28 gal
5. ■ 0-0-60, 100 lb preplant; 10-34-0, 8 gal 0x0; 32% UAN 40 gal
6. ■ PG + SK + M500; 4 + 4 + 1qt 0 x 0; High NRG-N 28 gal
7. ■ no planter fertilizer; High NRG-N 28 gal
8. ■ Check

Variety: NC+ 6B50
Population: 67,000
Average of 4 reps

- All fertilizer treatments produced yields substantially higher than the untreated check.
- Yield data indicated that there was no advantage to using the 0x0 placement method over the In-Furrow placement for the 8.25 gal/A rate of Agro-Culture Liquid Fertilizers, as there was no significant difference between treatment 6 (0x0) and treatment 4 (In-Furrow). However, the 0x0 could possibly be used for nitrogen applications, which will be evaluated in the future.
- Additionally, there was no yield difference between the low rate (trt. 3) and the high rate (trt. 4) of Agro-Culture Liquid Fertilizers. The efficiency of this lower rate was very high. But there was a yield response to using the planter-applied fertilizers as treatment 7, which used no planter-applied fertilizer was lower than all of the nutrient application programs.
- Fertilizer efficiency was again much higher for the Agro-Culture Liquid Fertilizer direct comparison to the conventional treatment (trt 4 vs 5), as seen in the following table.

Fertilizer Efficiency Comparison: Nutrient effect on yield increase.				
		Lb/A yield increase over check	Lb nutrient applied/A	Lb/A Yield increase per lb nutrient applied
Agro-Culture	Trt. 4	1711	99.3	17.2
Conventional	Trt. 5	1683	240	7.0

Soil Test Levels (ppm)

pH: 7.2 C.E.C.: 4.3
OM: 1.2% P1: 56 ppm
K: 54 ppm (3.2% BS)

Experiment: Peanut Demonstration
Year (Experiment Number): 2008 (08-104)
Plot Size: 10 ft. x 40 ft.

Objective: This field demonstration was established to show early growth response on peanuts, a crop not usually grown in our northern climate.

Peanuts are a crop grown in the Southern US. However, for demonstration purposes a small peanut plot was planted at the North Central Research Station. Because of the difference in climates, the peanuts were planted on June 5 when the soil temperature reached 65 degrees. The large seeded peanuts would not fit through the row crop planter. Therefore, the plots were planted with a small 1 row garden planter (see picture 1). Each row was then walked on to pack the soil over the seed bed (see picture 2). Prior to seeding, liquid fertilizer was applied an inches to the side of the seed zone and rows were marked with the six-row Monosem planter. Dry fertilizers were broadcasted and incorporated prior to planting and broadcast liquid fertilizers were applied with a Self-propelled plot sprayer after planting. Foliar applications were applied on July 25 with a pressurized backpack sprayer.

Treatments tested are listed below:

1. Dry
2. Dry + ACLF Foliar
3. No Fertilizer
4. ACLF broadcast (1.2X rate)
5. ACLF (2 x 2)
6. ACLF 2 x 2 + ACLF Foliar
7. ACLF + LiberateCa (2 x 2)
8. ACLF + LiberateCa (2 x 2) + ACLF Foliar

Dry: 87 lbs 18-46-0 + 200 lbs 0-0-60

ACLF: 3 gal Pro-Germinator + 9 gal Sure-K + 2 qt Micro 500

LiberateCa: 2 qt

ACLF Foliar: 2 qt High NRG-NR + 1 gal Sure-K + 1 pt Boron + 1 gal LiberateCa

Picture 1. It took two people to run the single row planter, one to push and add down pressure for depth and one to help pull and guide through the plots.



Picture 2. Lots of feet were used to press down each row to slightly compact the soil over the seed bed.



Although the peanuts did not reach maturity before a killing frost the week of October 13th, plants did produce some peanuts. Pictures, counts and weights for estimated yield were taken. Keep in mind, that another month or more was necessary for growth. Therefore this is just a general comparison for these plots in these growing conditions.

On October 2nd, one averaged sized plant was selected from each plot; most of the soil was removed for pictures. Peanuts were then removed from the plants and washed to remove the soil. The peanuts were then dried with a towel and counts and weights were recorded. Pictures are shown below and labeled with the above listed treatment numbers. A summary of numbers and weight are listed on *Table 1* below.



Table 1. Fertilizer Effects on Peanut Counts and Weights

Fertilizer Treatments	# of Peanuts	Total wt - grams
1 Dry	34	98.2
2 Dry + ACLF Foliar	37	92.5
3 Untreated Check	23	61.1
4 ACLF Broadcast	48	115.8
5 ACLF 2 x 2	33	80.6
6 ACLF 2 x 2 + ACLF Foliar	53	121.9
7 ACLF + LiberateCa 2 x 2	55	148.2
8 ACLF + LiberateCa 2 x 2 + ACLF Foliar	57	164.8

Results:

- Visual Growth, peanut count and size we greatly increased with all fertilizer treatments compared to the Check.
- The dry fertilizer program was one of the lowest treatments; however the foliar application did improve growth, but lowered weight.
- LiberateCa 2 x 2 increased growth.
- Highest growth and peanut count was seen with the ACLF program with LiberateCa plus a foliar application.