

# Corn: Program Comparison

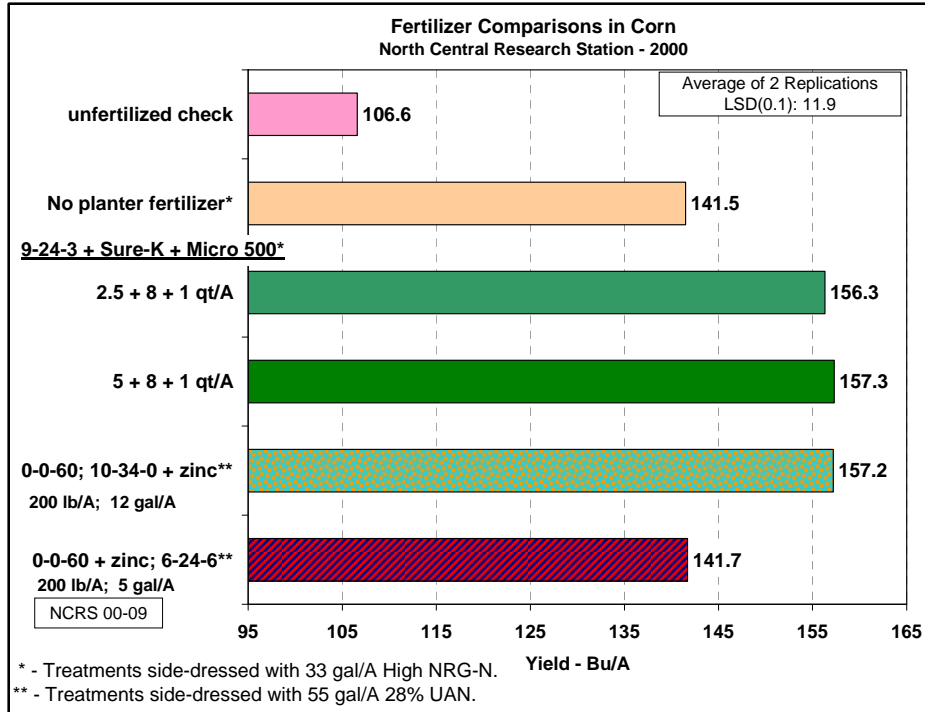


- Fertilizer Comparison in Corn (2000)
- Liquid Planter Fertilizer Comparison (2002)
- Planter Fertilizer Comparison (Iowa-2002)
- Fertilizer Effect for Premium Enhancement in Value-Added Field Corn (IL - 2000)
- Corn Fertilizer Programs (Michigan – 2005)
- Comparison of Planter Fertilizer on Corn (Indiana-2005)
- Planter Fertilizer Comparisons in Corn (2007)
- Evaluation of Soil Amendments for Corn (2007)
- Effect of Lime Application on Fertilizer Utilization in Corn (Texas – 2007)
- Planter Fertilizer Placement in No-Till Corn (2008)
- Planter Fertilizer Comparisons in Irrigated Corn (2008)
- Fertility Programs with Dairy Manure Applications (2009)

**Experiment:** Fertilizer Comparison in Corn  
**Year:** 2000 (00-09)  
**Date of Planting/Harvest:** May 5 / October 17  
**Plot Size:** 4 row x 80 feet

**Soil Test Levels**  
 pH: 7.5 CEC: 16.5  
 OM: 3.6% P1: 25  
 K: 75 ppm (1.2% base sat.)

This experiment compared several different corn fertility applications. Potassium level is low, and planter-applied Sure-K is compared to pre-plant broadcast application of 0-0-60. Additionally, two different rates of Pro-Germinator 9-24-3 were compared. Treatment yields are in the following chart.



- All treatments significantly increased yield over the no planter fertilizer treatment except the 6-24-6 treatment. This is unexpected since the 0-0-60 did not appear to be effective.
- The 2.5 gal/A of 9-2-4-3 was as effective as the 5 gal/A rate in this soil having a phosphorus level of 25 ppm.

**Experiment:** Liquid Planter Fertilizer Comparisons  
**Year:** 2002 (02-28)  
**Date of Planting/Harvest:** May 4 / October 14  
**Plot Size:** 4 row x 100 ft. (5 replications)

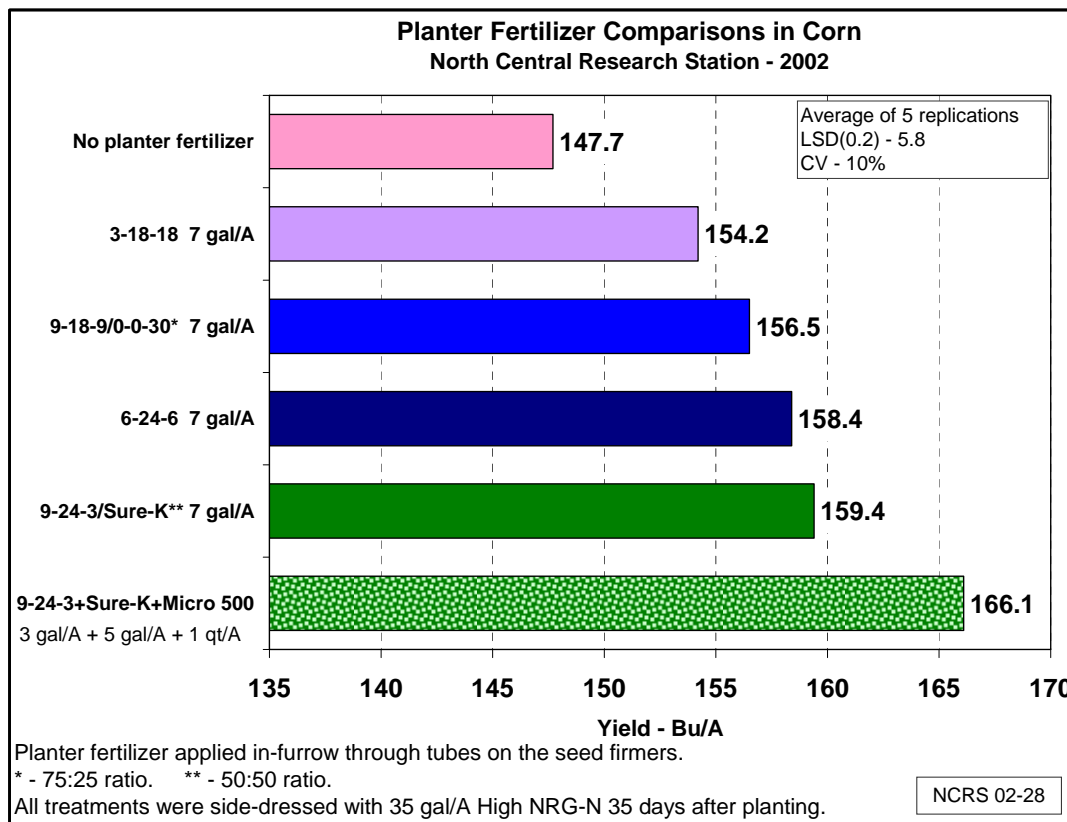
<p><b>Soil Test Levels</b>  pH: 6.1 CEC: 5.7  OM: 2.1% P1: 65 ppm  K: 143 (6.5% base sat.)</p>
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Liquid planter fertilizers are often simply used as “starters”, and are relatively inflexible due to their analysis not meeting all crop needs at the rates applied. However, with Agro-Culture Liquid Fertilizers, crop nutrient needs are met by applying the different nutritional products in combination as a single fertilizer. In this experiment, several different liquid fertilizers from other manufacturers as well as from Agro-Culture Liquid Fertilizers were applied at a set rate of 7 gallons per acre. An additional treatment combination of Agro-Culture Liquid Fertilizers was applied at the rate normally recommended according to soil test.

Objective:

1. Show that applying Agro-Culture Liquid Fertilizers at rates according to soil test is superior to other fertilizers applied at set rates without regard to soil test.

This experiment is adjacent to the “permanent plot” experiment (NCRS 02-05) where the correct planter fertilizer rate as determined over the past 7 years has been 3 gal/A 9-24-3 + 5 gal/A Sure-K + 1 qt/A Micro 500. Treatment yields appear in the chart.



- Application of Agro-Culture Liquid Fertilizers at rates according to soil test is significantly better than any other liquid fertilizer at a set rate. Agro-Culture Liquid Fertilizers offers nutrient application flexibility that most do not.

## Experiment: Planter Fertilizer Comparison in Corn. ACRES Research. Cedar Falls, IA

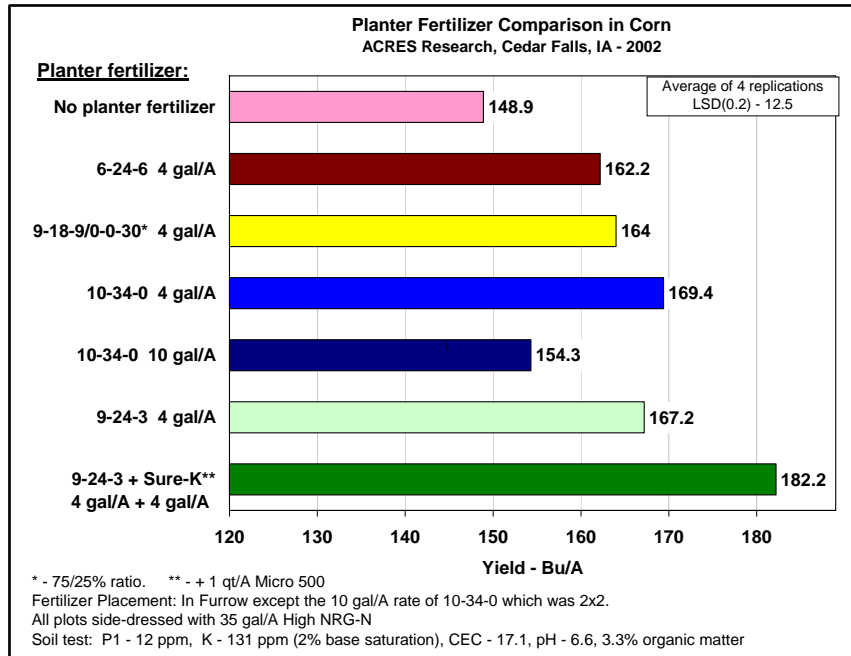
An experiment was established with ACRES Research in Iowa to evaluate performance of several different liquid planter-applied fertilizers. The objectives of this experiment are similar to one conducted at the North Central Research Station reported above (NCRS experiment 02-28).

### Objective:

Compare performance of different planter-applied liquid fertilizers at set rates vs. a complete Agro-Culture Liquid Fertilizers program rate with regard to soil test.

Often liquid “starters” are used at a set rate, as the 4 gal/A rate here. We wanted to see if application at a higher rate with regard to soil test needs would result in better yield to justify the application. ACRES Research is in the heart of the fertile Iowa corn growing area. It is on black silty clay loam soil with good yield potential. The corn hybrid used was Pioneer 33P67 with a finished population of 29,000 plants per acre.

Yield results from the planter fertilizer treatments are in the following chart.



- All planter fertilizer treatments resulted in significantly higher corn yield than the no planter fertilizer treatment, except the 10 gal/A rate of 10-34-0. The reason for the lower than expected yield with this treatment is not known.
- The highest yielding treatment was the one where Sure-K and Micro 500 were added to 9-24-3, as would be recommended after consulting soil test. This yield was significantly higher than any other fertilizer treatment, showing the advantage of the complete program.
- This result is consistent with that in the similar experiment conducted at the North Central Research Station.
- (Note: to avoid any unintentional bias in this experiment, the fertilizers are coded so that the researchers did not know the identity of the products with which they were working.)

**Experiment:** Fertilizer Effects for Premium Enhancement in Value-Added Field Corn.  
 Arise Research #& Discovery, Martinsville, IL. (2000)

This experiment was conducted to determine if high-quality fertilizer from Agro-Culture Liquid Fertilizers would also enhance certain value added characteristics of specialty corn. Experiments were conducted on three different specialty corn hybrids: High Oil corn (UAP 5456), White corn for Milling (Cargill 424W), and High Amylose corn for Starch (National Starch A7759). Each corn type was treated with three different fertilizer programs based on soil test:

**1. Agro-Culture Liquid Fertilizers:**

4 gal/A 9-24-3 + 6 gal/A Sure-K + 1 qt/A Micro 500 (planter: 1x1 placement from seed);  
 30 gal/A High NRG-N at side-dress (48 days after planting)

**2. Conventional Fertilizers:**

150 lb/A 0-0-60 (pre-plant broadcast and incorporated); 10 gal/A 10-34-0 (planter 1x1);  
 50 gal/A 28% UAN at side-dress

**3. Unfertilized Check.**

There were four replications of treatments. Growing conditions were very favorable with adequate precipitation during the growing season. After harvest, corn samples from each replication were sent to labs for analysis of the specialty trait of the particular hybrid. Additionally, premium levels paid to growers based on specialty trait levels were determined.

<u>High Oil Corn:</u>				
	<u>Yield</u> <u>(Bu/A)</u>	<u>% oil</u>	<u>Premium</u> <u>(\$/Bu)</u>	<u>Premium</u> <u>(\$/A)</u>
1. Agro-Culture Liquid Fertilizers	147.4	7.47	0.195	28.74
2. Conventional Fertilizers	136.7	7.10	0.16	21.87
3. Unfertilized Check	85.3	6.03	0	0
	LSD(0.1) 10.1	0.07		

<u>Milling Quality of White Corn:</u>				
	<u>Yield</u> <u>(Bu/A)</u>	<u>Milling</u> <u>Quality*</u>	<u>Premium</u> <u>(\$/Bu)</u>	<u>Premium</u> <u>(\$/A)</u>
1. Agro-Culture Liquid Fertilizers	132.1	64.8	0.22	29.06
2. Conventional Fertilizers	123.8	63.0	0.11	13.62
3. Unfertilized Check	69.3	61.8	0	0
	LSD(0.1) 9.1	0.9		

(\* - Milling Quality rating ranges from 62 to 68, and is a measurement of milling quality and is based on three evaluations: (1) colorimeter readings which measure the “whiteness” of grain, (2) an “endosperm scratch test” to determine how hard the endosperm is for milling, and (3) a “gluten” test for processing. Scores above 68 and below 62 are not suitable for quality milling.)

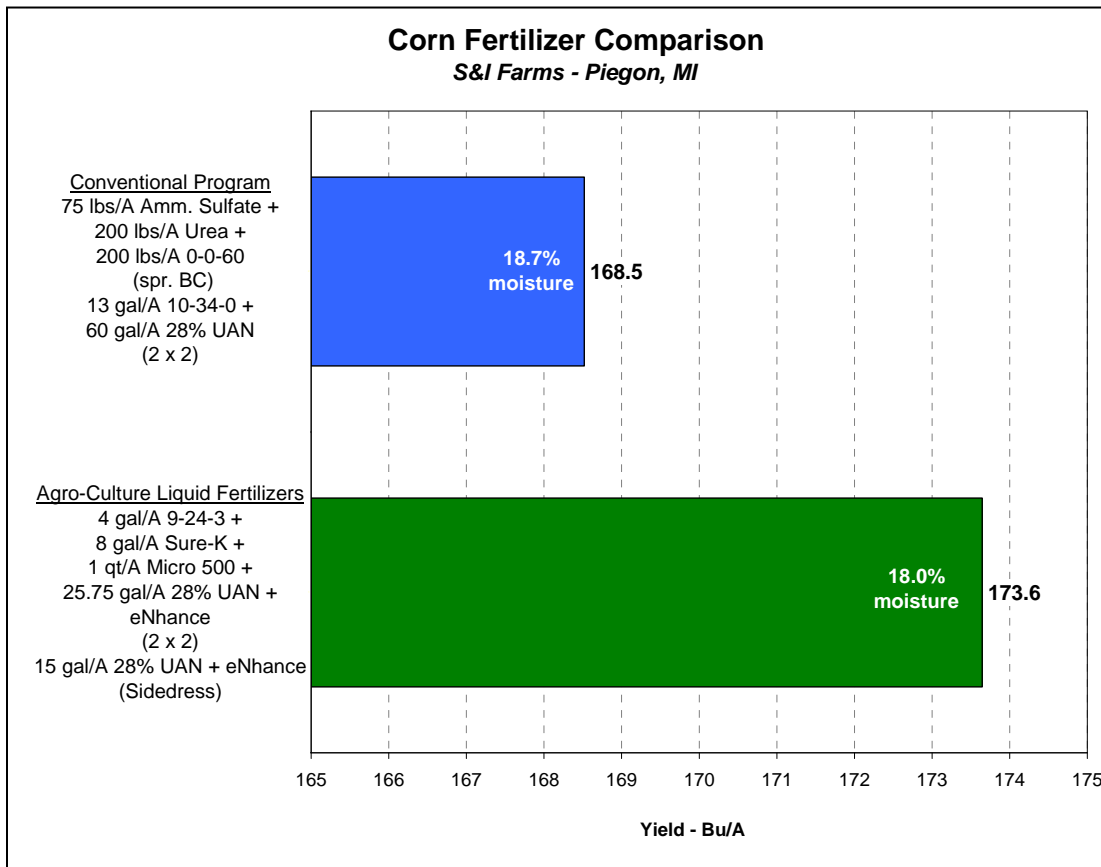
High Amylose (Starch) Corn:

	Yield (Bu/A)	% Starch
1. Agro-Culture Liquid Fertilizers	122.3	56.0
2. Conventional Fertilizers	117.8	55.0
3. Unfertilized Check	57.3	48.0
	LSD(0.1)	9.1      2.4

(Premium assessments were not available.)

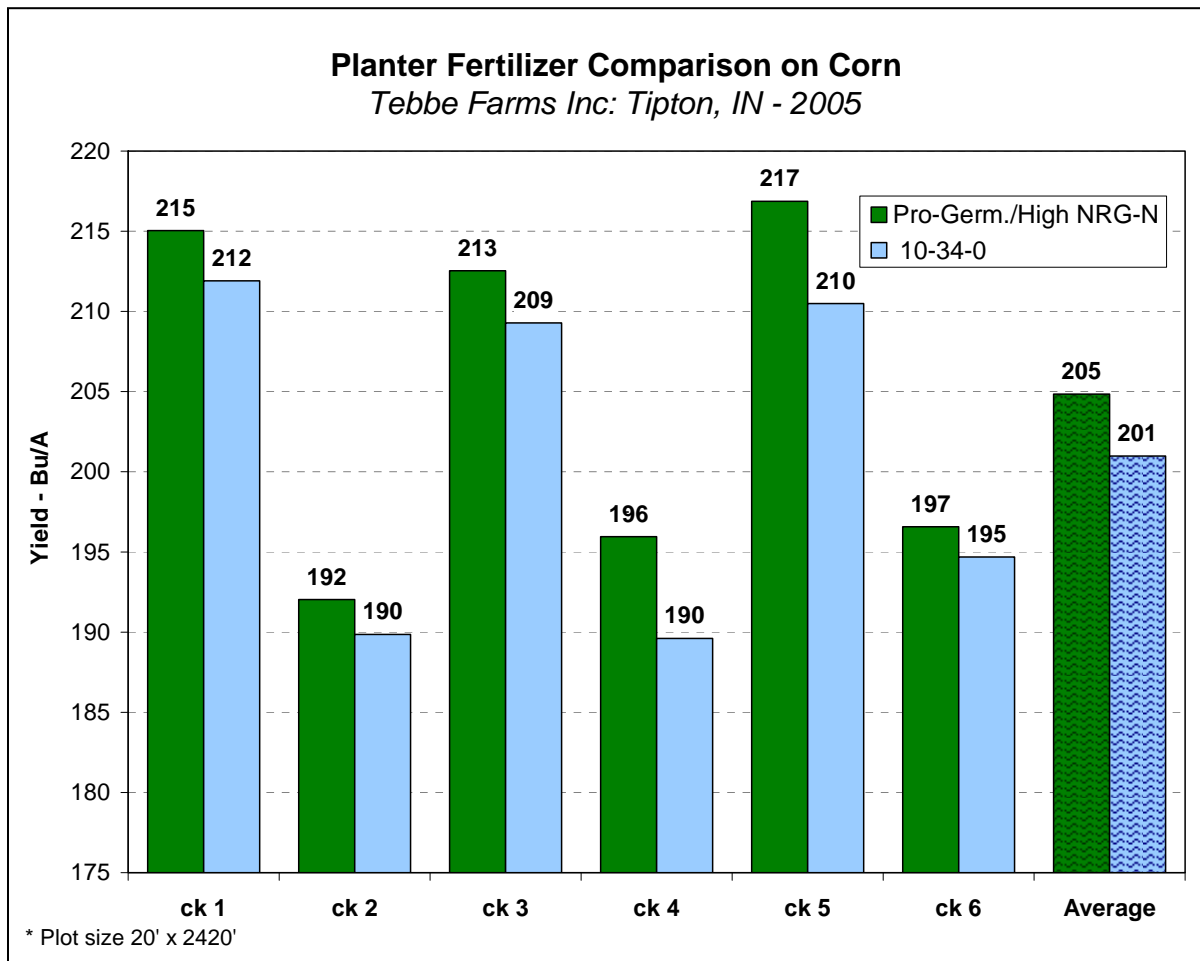
- Application of Agro-Culture Liquid Fertilizers resulted in both higher yield *and* higher specialty trait enhancements compared to the conventional fertilizer treatment.
- Premiums based on enhancement levels times the yield per acre resulted in from \$7 to \$15 per acre of *increased return* with Agro-Culture Liquid Fertilizers compared to the conventional treatment. This is in addition to the value of the increased yield.
- These results with Agro-Culture Liquid Fertilizers were obtained with only 107 lb/A of N-P2O5-K20, compared to 289 lb/A from the conventional fertilizer treatment.

**Experiment: Corn Fertilizer Programs – S&I Farms (Michigan)**  
**Year: 2005**



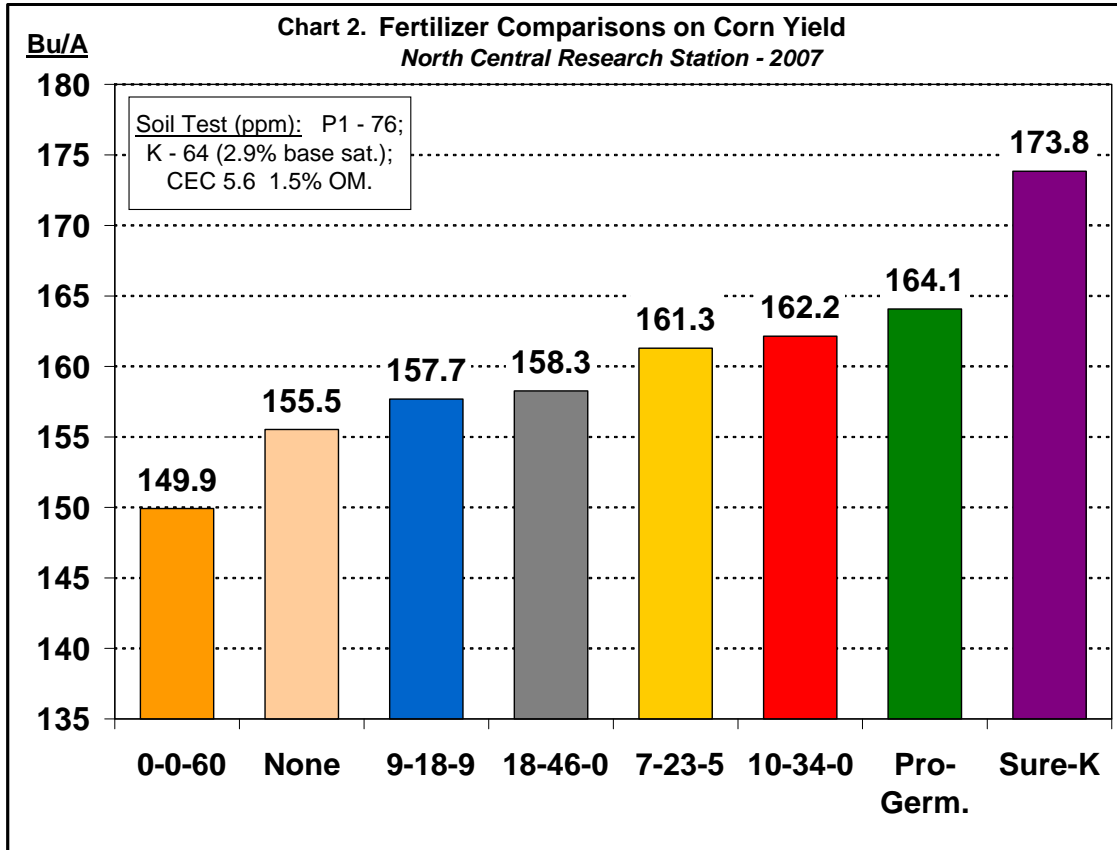
- Two complete fertilizer programs for corn were compared in a grower trial in Pigeon, Michigan.
  - **Agro-Culture Liquid Fertilizers:** 4 gal/A Pro-Germinator + 8 gal/A Sure-K + 1 qt/A Micro 500 + 25.75 gal/A 28% UAN + eNhance (2 x 2 band at planting); 15 gal/A 28% UAN + eNhance (sidedress)
  - **Conventional:** 75 lbs/A Ammonium Sulfate + 200 lbs/A Urea + 200 lbs/A Sure-K (spring broadcast); 13 gal/A 10-34-0 + 60 gal/A 28% UAN (2 x 2 band at planting)
- The original conventional program had included a sidedress application, which was switched to all being applied at planting.
- The Agro-Culture Liquid Fertilizers program yielded over 5 bu/A higher than the conventional program.
- The Agro-Culture Liquid Fertilizers was also 0.7% dryer than the conventional program; this will save growers additional money in drying costs.

**Experiment:** Comparison of Planter Fertilizer on Corn – Tebbe Farms, Inc (Indiana)  
**Year:** 2005



- Six planter fertilizer trials were done by a grower in Tipton, Indiana.
- Agro-Culture Liquid Fertilizers program was 3 gal/A Pro- Germinator and 5.85 gal/A High NRG-N.
- Conventional program was 8.3 gal/A 10-34-0.
- The average of all six trials showed a 4 bu/A advantage to the Agro-Culture Liquid Fertilizers program.

In another experiment, several different planter-applied liquids and pre-plant broadcast dry fertilizers were compared for demonstration purposes in non-replicated strip plots at the NCRS. The soil in this experiment is also high in phosphorus, but unlike the first field, is low in potassium. Liquid in-furrow rate for all was 6 gal/A. The dry fertilizers were both broadcast applied at 150 lb/A. All plots were sidedressed with High NRG-N 22 days after planting. This experiment was planted in late-May, and did not respond as much to the phosphorus fertilizer like the first test, although **Pro-Germinator** gave the highest yield for the phosphorus fertilizers. But notice that the **Sure-K** resulted in the highest yield by far as it was able to supply needed potassium in this low-K soil. So by applying the right combination of the right nutrition, your plants will be off to a great start.



**Experiment:** Planter Fertilizer Comparisons in Corn  
**Year (Experiment Number):** 2007 (07-506 & 07-101)  
**Hybrid:** NK 45A6 LL & DK 5446 RR  
**Plot Size (replications):** 6 row x 130 ft (4) & 6 row x 180 ft (1)

From the December 2007 issue of *LIQUID Does It Better!*

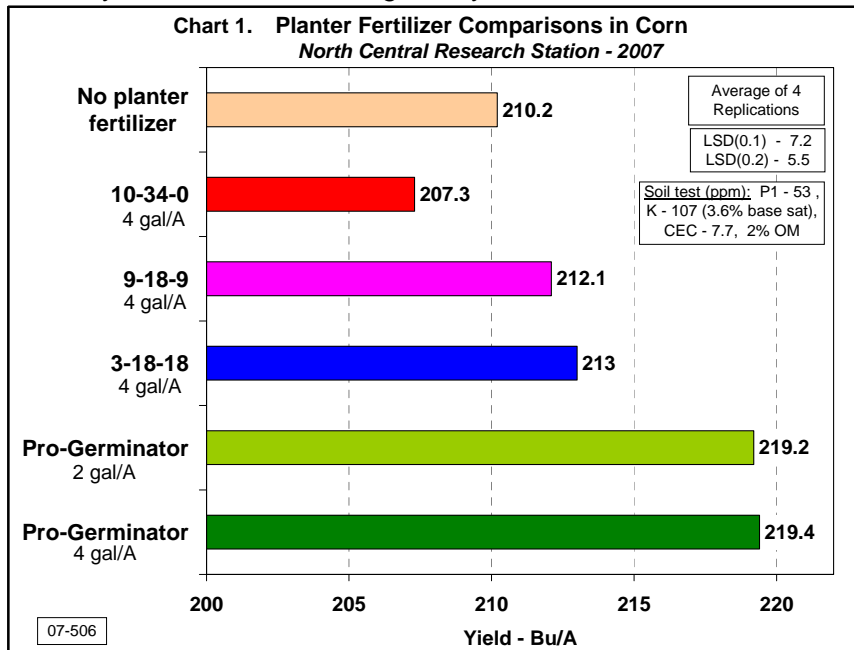
### Use the Right Products at the Right Time

Dr. Jerry Wilhm, Senior Research Manager

If you have ever been to an Agro-Culture Liquid Fertilizers meeting, talked to an Area Manager, Sales Account Manager, Director or anyone from the St. Johns home office, before any recommendations are made, you should have been asked: "What does the soil test say?" This is truer today than ever with the ever increasing production input costs. We can no longer just apply the same fertilizer that we always have. That is the beauty of using Agro-Culture Liquid Fertilizers because you can apply what the soil test indicates is needed.



At the *North Central Research Station (NCRS)* in 2007, several experiments were conducted to determine what is the best nutrient product for several different situations. In the first experiment, several different liquid phosphorus fertilizers were planter applied in the seed furrow. This was a strip tillage (*Nutri-Till<sub>R</sub>*) experiment under irrigation where all plots received the same rate of nitrogen as 60 gal/A of 28% + eNhanse with the *Nutri-Till<sub>R</sub>* operation. The previous crop was winter wheat. The NCRS is notoriously high in soil phosphorus, yet we have always maintained that with early planted corn, planter-applied phosphorus fertilizer is warranted. This is proven out in the yield chart where highest yield is obtained with **Pro-Germinator**. In fact, the **Pro-Germinator** treatments were the only ones to significantly out-yield the non-fertilized check.



the only ones to significantly out-yield the non-fertilized check. It appears that the lower rate of 2 gal/A was as effective as the higher 4 gal/A rate. This makes sense in a high phosphorus soil where some is needed just to safely provide phosphorus for early growth. (Additionally, in data not shown, addition of 4 gal/A of Sure-K did not significantly further increase yield in this higher-K soil. However, history indicates that this yield level is about as high as can be obtained on this relatively coarse soil on this

part of the NCRS.)

How do the yield results compare in terms of fertilizer efficiency? For each treatment, the yield increase above the check divided by the pounds of nutrients applied per acre was calculated. The results appear in Table 1 for the first experiment described above.

Rate per acre applied	Yield increase over check (Bu/A)	lb-nutrients applied/A	Bu/A increase per lb-N applied
4 gal 10-34-0	-2.9	20	- 0.15
4 gal 9-18-9	1.9	16	0.12
4 gal 3-18-18	2.8	18.4	0.15
4 gal Pro-Germinator	9.0	16	0.58
2 gal Pro-Germinator	9.2	8	1.125

- Pro-Germinator, especially at the lower rate of 2 gal/A, had the highest production efficiency.
- At equal volume rates of application (4 gal/A), the Pro-Germinator had nearly four times the efficiency of the other fertilizers that had a yield increase.

In the second experiment where there was a large yield response to Sure-K, the efficiency calculations are quite revealing, as shown in Table 2.

Rate per acre applied	Yield increase over check (Bu/A)	lb-nutrients applied/A	Bu/A increase per lb-N applied
150 lb 0-0-60	- 5.6	90	-0.06
6 gal 9-18-9	2.2	24	0.09
150 lb 18-46-0	2.8	96	0.03
6 gal 7-23-5	5.8	24	0.24
6 gal 10-34-0	6.7	30	0.22
6 gal Pro-Germinator	8.6	16	0.54
6 gal Sure-K	18.3	5.1	3.59

- Sure-K had the highest efficiency by far of the fertilizers applied.
- Pro-Germinator had more than double the efficiency of the other liquid phosphate fertilizers.

**Experiment:** Evaluation of Soil Amendments for Corn

**Year (Experiment Number):** 2007 (07-510)

**Date of Planting/Harvest:** May 8 / October 15

**Hybrid:** DK 5446 RR

**Plot Size (replications):** 6 row x 130 ft (2)

**Soil Test Levels (ppm)**

See Text

Objective: Evaluate the effects of several different soil amendments on corn yield and soil nutrient levels.

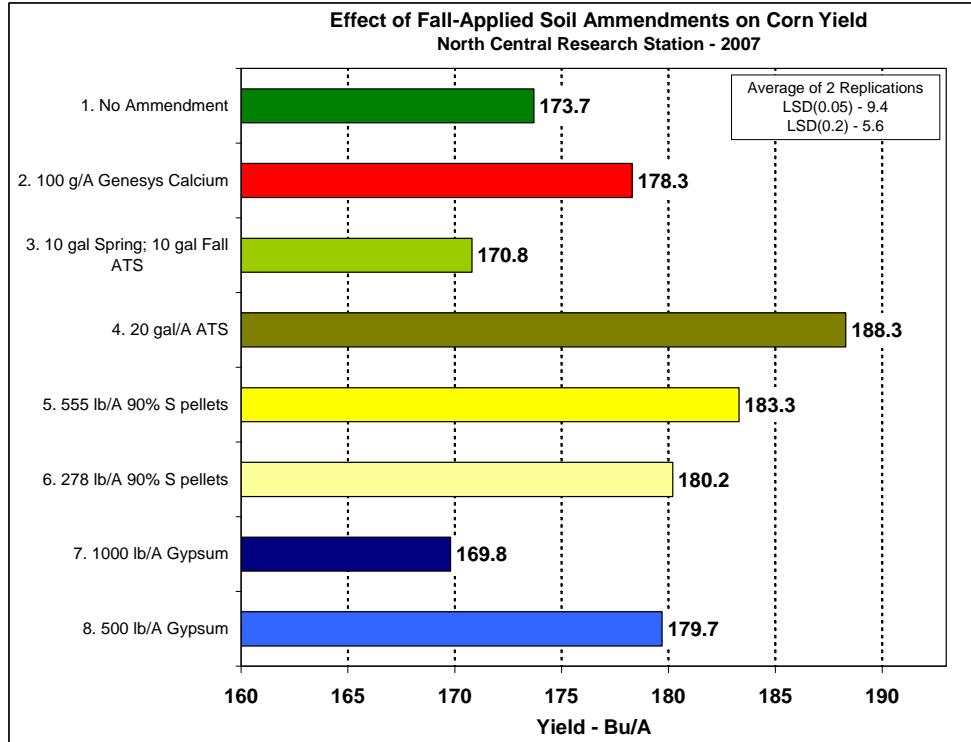
Fertilizer application typically is done in order to provide key nutrients to the growing crop. These are in the form of nitrogen, phosphorus, potassium and micronutrients. Soil adjustments usually are in the form of lime for pH elevation. Other soil amendments such as gypsum, elemental sulfur, ammonium thiosulfate, and various calcium materials are applied to influence soil nutrient balance. In this experiment, several soil amendments were applied to evaluate for influence on corn yield and soil adjustments. Treatment rates and application information are in the following table.

	Ammendment material	Rate/A	Timing*
1.	None		
2.	Genesys Calcium (25% calcium)	100 g	Late fall
3.	Ammonium thiosulfate (12-0-0-26)	10 gal/10 gal	Spring/Fall
4.	Ammonium thiosulfate (12-0-0-26)	20 gal	Fall
5.	90% Sulfur pellets	555 lb	Fall
6.	90% Sulfur pellets	278 lb	Fall
7.	Gypsum (22.5% Ca, 16.8% S)	1000 lb	Fall
8.	Gypsum (22.5% Ca, 16.8% S)	500 lb	Fall

\* - Late fall: 12/15/2006; Spring: 6/9/2006; Fall: 11/9/2006.

Previous soil samples found a soil sulfur level of 10 ppm, which is considered low. Thus, it was hypothesized that there is a likelihood of a positive yield response to added sulfur. That is why these sulfur materials were included. Following corn harvest this year, plots were individually sampled for comparative evaluation of the amendment effects on soil nutrient levels.

The dry materials were uniformly broadcast over the plot area using a hand-held spinner applicator. The liquid ammonium thiosulfate was broadcast applied with a self propelled sprayer. These were all applied after soybean harvest followed by chisel plowing. The Genesys calcium was dissolved in water and broadcast applied over the plowed ground with a backpack-mounted pressurized sprayer at a spray volume of 21 gal/A. The ground was prepared for planting the next spring with a field cultivator. All plots received a planter fertilizer application of 3 gal/A Pro-Germinator + 7 gal/A Sure-K + 1.5 qt/A Micro 500 + 1 pt/A Boron. Thirty days after planting, all plots were sidedressed with 38 gal/A of High NRG-N. There were no visual treatment effects through the growing season. Yield results appear in the following chart.



- The 20 gal/A application of ammonium thiosulfate (ATS) and the higher rate of sulfur pellets both resulted in significant yield increases. However the ATS application also provided 26.5 lb/A of additional nitrogen, which wasn't provided in the "No Ammendment" treatment.
- Neither gypsum treatment had a significant effect on corn yield.
- The Genesys calcium treatment resulted in a numeric yield increase.

How did these treatments affect soil nutrient levels? Eight inch soil sample cores were collected from each plot after corn harvest. This was approximately one year after application of the soil amendments. A table with the results on key soil nutrients averaged over replications follows.

*Effect of Soil Amendments on Soil Nutrient Levels One Year After Application. North Central Research Station 2007.*

Amendment	Rate/A	applied S (lb/A)	pH	S (ppm)	Ca (ppm)	NO <sub>3</sub> (lb/A)	P1 (ppm)
1. None	--	0	7.1	11.5	1196	10.5	21
2. Genesys Calcium	100 g	0	7.1	11	1083	9.5	23
3. Ammonium thiosulfate	10 gal/10 gal	57.4	7.1	10.5	1141	9.5	24.5
4. Ammonium thiosulfate	20 gal	57.4	7.0	12.5	1139	14.5	28
5. 90% Sulfur pellets	555 lb	500	6.5	35.5	1093	9.5	27.5
6. 90% Sulfur pellets	278 lb	250	6.8	26.5	1248	8.5	29.5
7. Gypsum	1000 lb	168	7.0	17.5	1305	12	27.5
8. Gypsum	500 lb	84	7.2	13.5	1377	10.5	30.5

- Sulfur applications are often used to lower pH, and that was in evidence here as the sulfur pellet applications did just that.
- The sulfur pellets also had the greatest impact on soil sulfur levels. Gypsum had a moderate effect on soil sulfur level.
- The calcium in the gypsum appeared to increase the soil calcium.
- The single application of ammonium thiosulfate did leave an elevated soil nitrate level, suggesting that this may have contributed to the higher yield observed.
- There appears to be an effect of some of the amendments on increased soil phosphorus levels, although the mode of action is not clear at this time.

- While the application rate of some amendments was high, these are rates sometimes recommended by some soil test labs. We wanted to see the effects on corn yield and soil test levels, and so these rates were selected. We plan to plant soybeans on this site in 2008 and will monitor the residual effects on that crop.

## 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:** Effect of Lime Application on Fertilizer Utilization in Corn

**Location:** Pilot Point, Texas (2007)

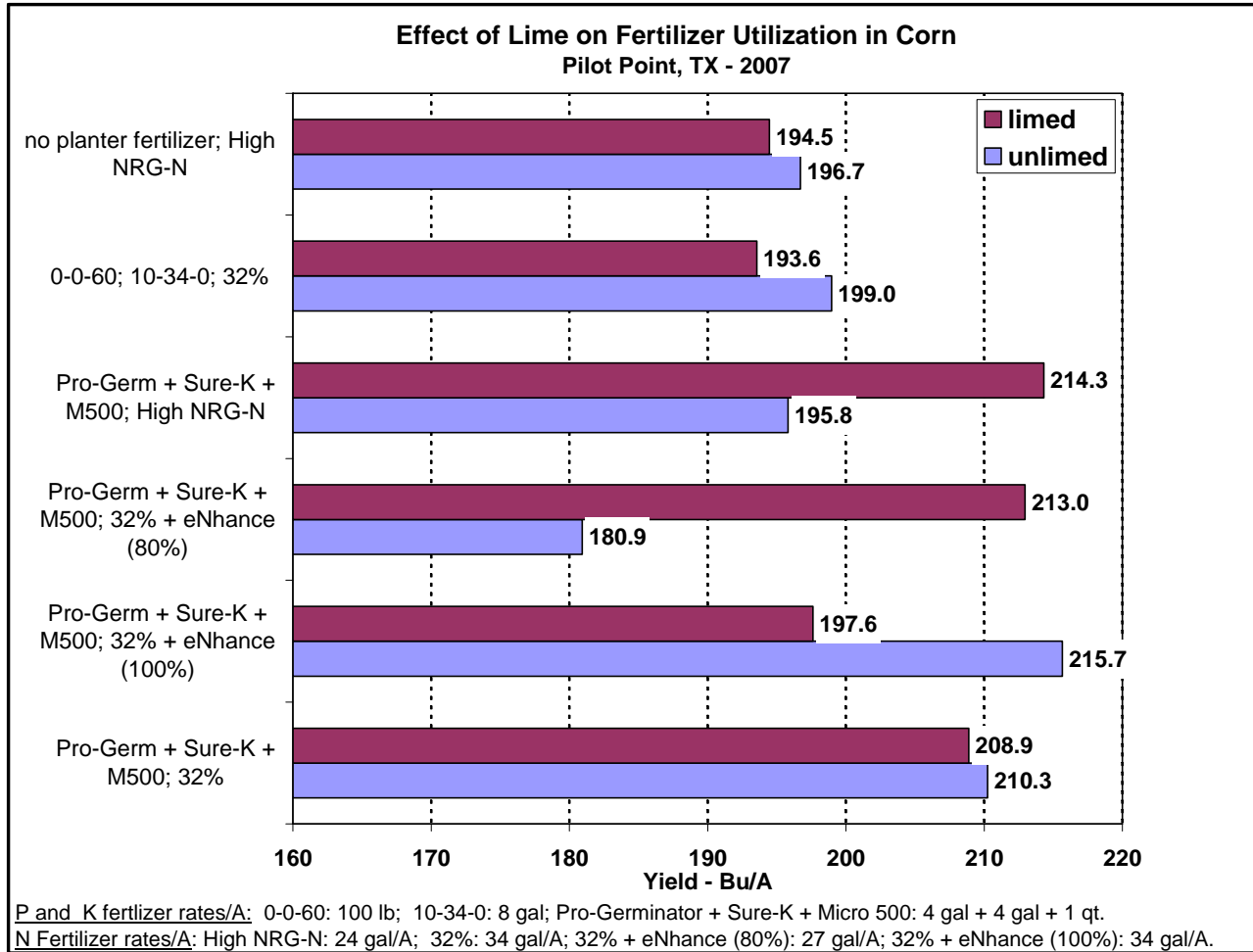
**Date of Planting/Harvest:** March 9 / September 1

**Hybrid:** NC+ 5434 triple stacked (26,000 seeds/A)

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

Corn fertilizer programs involving conventional programs and Agro-Culture Liquid Fertilizers were compared on the limed and unlimed ground. Planter fertilizers were applied in-furrow through drop tubes. In the conventional treatment, the 0-0-60 was applied pre-plant broadcast. A conventional application of 128 – 32 – 60 was used. Several different nitrogen programs were compared. The conventional application was 34 gal/A of 32% UAN. The nitrogen additive eNhanse was added to 32% and applied at both an 80% application rate of 27 gal/A and at a 100% application rate of 34 gal/A. High NRG-N was applied at 24 gal/A, which is 60% of the conventional rate. Nitrogen applications were made on March 18 as a surface band through drop tubes in the middle between the rows.

Yield data appear in the following chart.



- Soil pH appeared to have the greatest effect on the performance of the reduced rate nitrogen applications. High NRG-N at 60% of conventional application rate following planter fertilizer had much higher yield in the limed ground. This was also true for the 32% + eNhance application at the 80% rate. This suggests that in order to achieve higher efficiency of reduced rate applications, the pH should be adjusted. The pH level in the limed ground was still lower than ideal, but it did have an effect on yield. (It is not clear why this effect was not observed with High NRG-N in the absence of planter fertilizer. Nor is it clear why the 32% + eNhance at the 100% application rate produced lower yield in the limed ground.)
- The 32% at the 34 gal/A rate did not differ in yield between the limed and unlimed ground. But in order to achieve efficiency of reduced rates, pH should be adjusted first.
- At equal full rates of 32% UAN, the Agro-Culture Liquid Fertilizers treatment of Pro-Germinator + Sure-K + Micro 500 produced higher corn yield than did the conventional treatment of 0-0-60 and 10-34-0.

**Experiment:** Planter Fertilizer Placement in No-Till Corn  
**Year (Experiment Number):** 2008 (08-203)  
**Date of Planting/Harvest:** May 6 / October 24  
**Variety:** DeKalb 4660  
**Plot Size (replications):** 15 ft x 200 ft (4 replications)

<b>Soil Test Levels (ppm)</b> pH: 7.0 C.E.C.: 6.1 OM: 1.7% P1: 37 ppm K: 102 ppm (4.3% BS)
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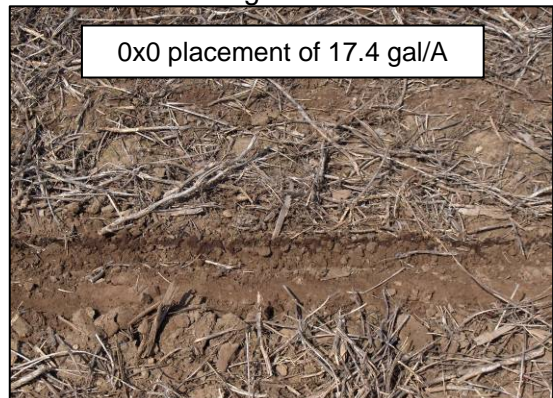
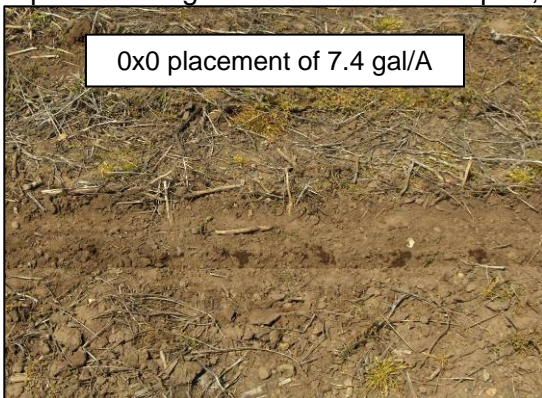
**Objective:** Compare planter placement of fertilizer for determination of best method.

Previous placement studies at the NCRS have shown an advantage for in-furrow applications as long as the total application rate did not exceed 10 gal/A of combination of Pro-Germinator and Sure-K. In 2007, an experiment showed that a 13 gal/A combination applied in 2x2 placement produced a higher yield than an in-furrow placement. Although there was no stand reduction, there likely was some stress resulting in lower yield. However, with lower a lower rate of fertilizer combination, such as 7 gal/A, the in-furrow application had a higher yield. It is thought that this is due to better early access to nutrition at a rate that does not result in stress. Another placement method was evaluated, and that was the “0x0” placement, where the fertilizer was dribbled directly over the row behind the closing wheels (see picture below, and note that the other seed boxes are for 15 inch row spaced soybeans). This application method resulted in yields very close to the optimum yields for the other placements and rates.

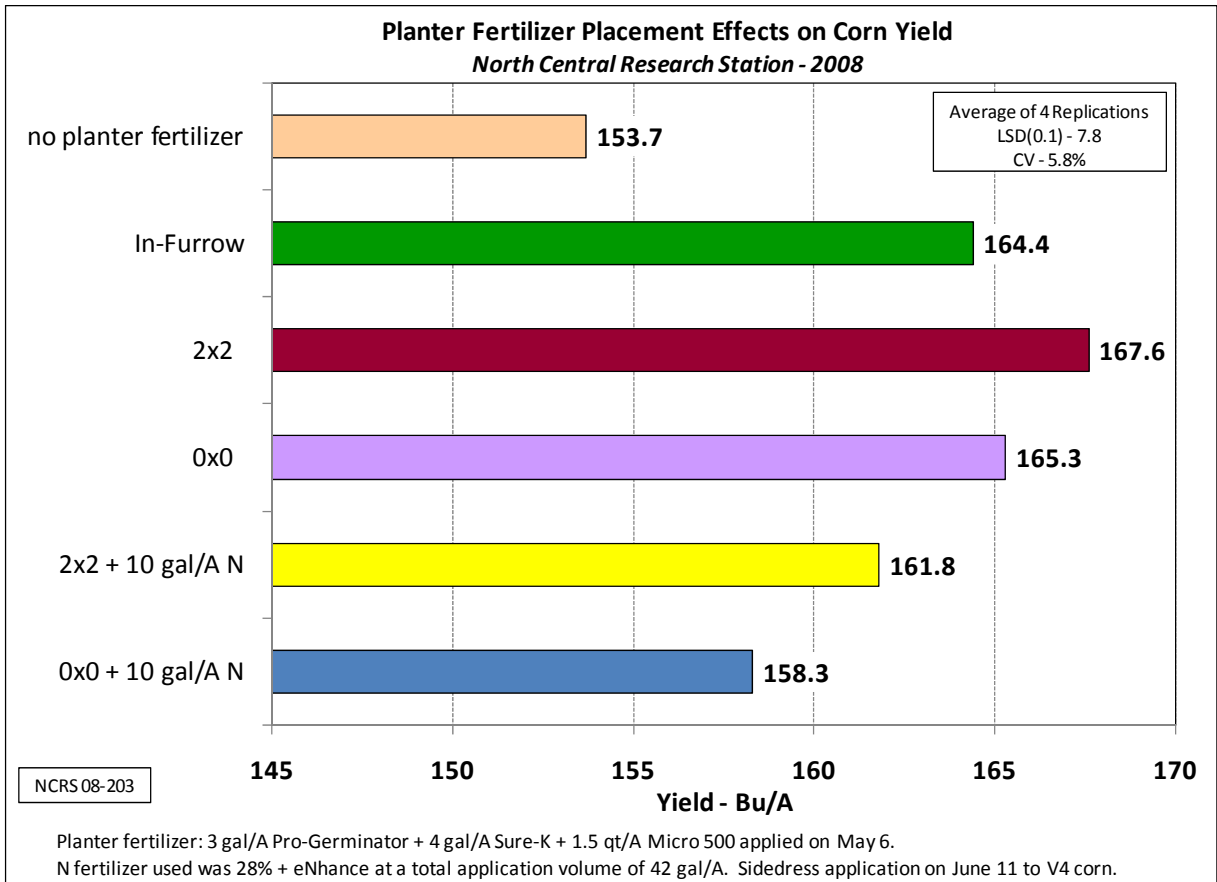


This year an experiment was conducted in dryland no-till corn with one base planter fertilizer rate of 3 gal/A Pro-Germinator + 4 gal/A Sure-K + 1.5 qt/A Micro 500 (7.4 gal/A) applied either in-furrow (Rebounder with Y-Not Split-It seed covers from Schaffert Manufacturing), in 2x2 or 0x0 placement. Both the 2x2 and 0x0 placement offer the opportunity to apply some nitrogen since it is placed away from the seed. The nitrogen source used in this experiment was 28% + eNhanse at 42 gal/A (126 actual pounds of N per acre.) This was applied either all at sidedress or 10 gal/A in 2x2 or 0x0 at planting and 32

gal/A at sidedress. The sidedress application was on June 11 when the corn was in the V4 stage of growth and 8 to 10 inches tall. Planter fertilizer flow is regulated by a Capstan N-Ject-LF system. This ensures uniform flow, and evenly spaces low-rate application. As seen below, the droplets at 7.4 gal/A are about 1.25” apart, but in a solid stream at 17.4 gal/A.



Yield results appear in the following chart.



- All treatments except the 0x0 plus N at planting yielded significantly higher than the no planter fertilizer treatment. It is not clear why this occurred, as there was nearly 1.21 inches of rainfall within three days of planting, of which was 0.64 inches within 24 hours of planting.
- Although not significantly so, the application of 10 gal/A of nitrogen at planting resulted in lower yields than waiting until sidedress. This is consistent with earlier work indicating that Pro-Germinator and Sure-K provide enough early nitrogen until a timely sidedress, although recognizing the fact that early applications can ease gallons used at sidedress. But lower gallons at planting can be an advantage in itself.
- There was no difference in yield due to placement of the Pro-Germinator and Sure-K, although this rate would not be expected to cause injury when applied in-furrow. Additionally, the 0x0 placed fertilizer was able to work its way into the root system since the yield with this placement was significantly higher than the no-fertilizer treatment.

**Experiment:** Planter Fertilizer Comparisons in Irrigated Corn

**Year (Experiment Number):** 2008 (08-508)

**Date of Planting/Harvest:** May 1 / October 16

**Variety:** DeKalb 5044

**Plot Size (replications):** 15 ft x 130 ft (4 replications)

**Soil Test Levels (ppm)**

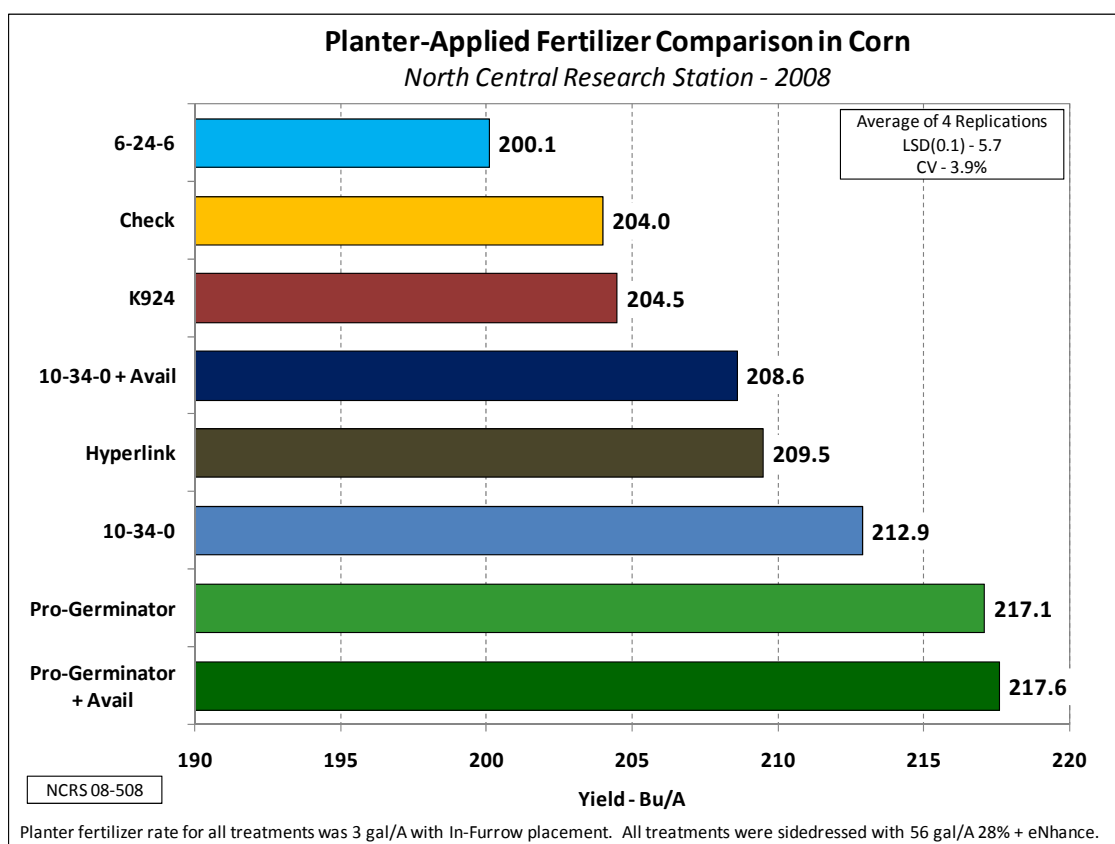
pH: 7.2 C.E.C.: 8.2

OM: 2.1% Bicarb P: 26 ppm

K: 100 ppm (3.1% BS)

**Objective:** Compare effects of different liquid planter-applied fertilizers on yield of corn.

The debate over effectiveness of row placed planter-applied liquid fertilizers continues and probably always will. Since the start of the North Central Research Station in 1994, planter-applied Pro-Germinator has resulted in increased corn yield, even in soil testing high in phosphorus. In this experiment, five different liquid fertilizers were compared. These were: Pro-Germinator 9-24-3 (Agro-Culture Liquid Fertilizers), 6-24-6 (Nutra-Flo), K924 (9-24-3 from Kugler Company), 10-34-0 (CPS), and Hyperlink (8-24-4 from Helena). Additionally, the fertilizer additive Avail phosphorus fertilizer enhancer (OS - On Seed formulation from Specialty Fertilizer Products) was evaluated in combination with Pro-Germinator and 10-34-0. All fertilizers were placed in the seed furrow using Rebounders with Y-Not Split-It seed covers from Schaffert Manufacturing. Application rate for all was 3 gal/A. Now these products will vary in recommended application rates compared to each other, but from a research standpoint, equal volumes were applied. There were no other fertilizers applied in combination. Yield results appear in the following chart.



- Highest yield was obtained with Pro-Germinator. Only Pro-Germinator and 10-34-0 produced corn yields significantly higher than the no-planter fertilizer check treatment.
- Avail did not have a significant yield effect with either Pro-Germinator or 10-34-0.
- Stand counts were taken and there was no significant difference in crop stand, which averaged 33,924 plants per acre.



**Experiment: Fertility Programs with Dairy Manure Applications (09-507)**

<b>Planted:</b> 5/8/09	<b>Hybrid:</b> DKC52-59	<b>Population:</b> 46,000
<b>Plot Size:</b> 15' x 135'	<b>Replications:</b> 2	<b>Harvested:</b> 10/29/09
<b>Sidedress:</b> 6/4/09		

<b>Soil Test Values (ppm):</b>														
Manure	pH	CEC	% OM	P1	K	S	% K	% Mg	% Ca	% H	% Na	Zn	Mn	B
FS	7.2	8.4	2.2	66	223	13	6.8	18.3	73.0	0	1.9	1.4	5	0.8
F	7.1	9	1.9	66	210	18	6	17.6	72.7	0	3.7	1.2	6	1.0
No	6.9	8.4	1.4	26	59	11	1.8	18.2	78.3	0	1.7	0.9	5	0.7

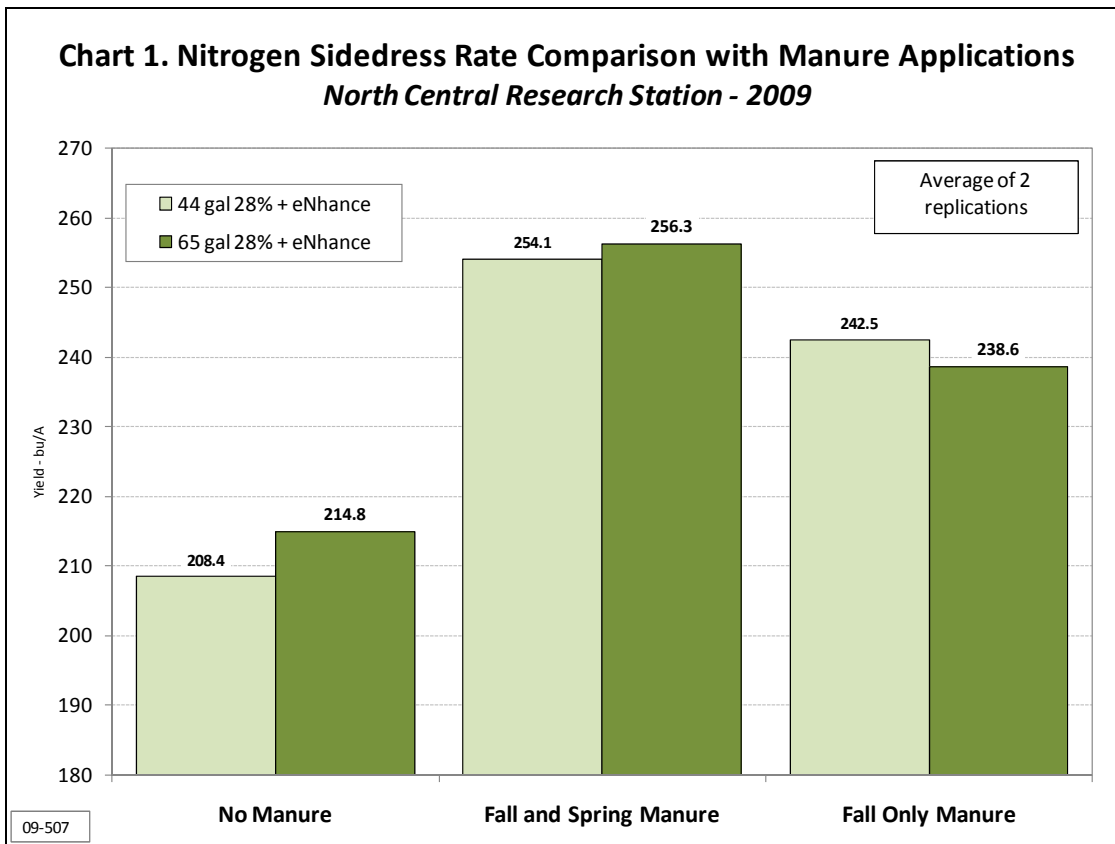
FS: Fall and spring manure; F: Fall manure, No: No manure

**Objectives:** 2009 marks the 12<sup>th</sup> year of the continuous corn with manure applications experiment at the North Central Research Station. Soil tests, continue to be monitored and fertilizer programs applied according to the results. Fresh dairy manure is used as the manure source and applied at 20 T/A per application. This year two comparisons were made, first shown on Chart 1 was an evaluation of sidedress nitrogen rate. This is a comparison of the standard program of 220 lbs N/A and an increased rate of 300 lbs N/A to shoot for maximum yield. The second part of the experiment, shown on Table 2 below, looks at the addition of 1 gal of eNhance to the planter fertilizer program. Standard fertilizer programs, based on soil tests above, for each manure application are shown on Table 1 below.

**Table 1. Planter Fertilizer Programs Based on Soil Tests**

	<b>Pro-Germ.</b>	<b>Sure-K</b>	<b>Micro 500</b>	<b>28% + eNhance</b>
No Manure	3 gal	12.25 gal	2 qt	15 gal
Spring and Fall Manure	3 gal	3.75 gal	2 qt	15 gal
Fall Manure	3 gal	4.5 gal	2 qt	15 gal

\*See Product Descriptions in the introduction for more information on ACLF products used.



LSD (0.1):14.8, CV: 10.1%

**Table 2. Comparison of Plater Applied eNhance**  
*North Central Research Station - 2009*

Manure Program	Standard Program	+ 1 gal eNhance
No Manure	208.4	203.1
Spring and Fall Manure	254.1	255.3
Fall Manure	242.5	240.1

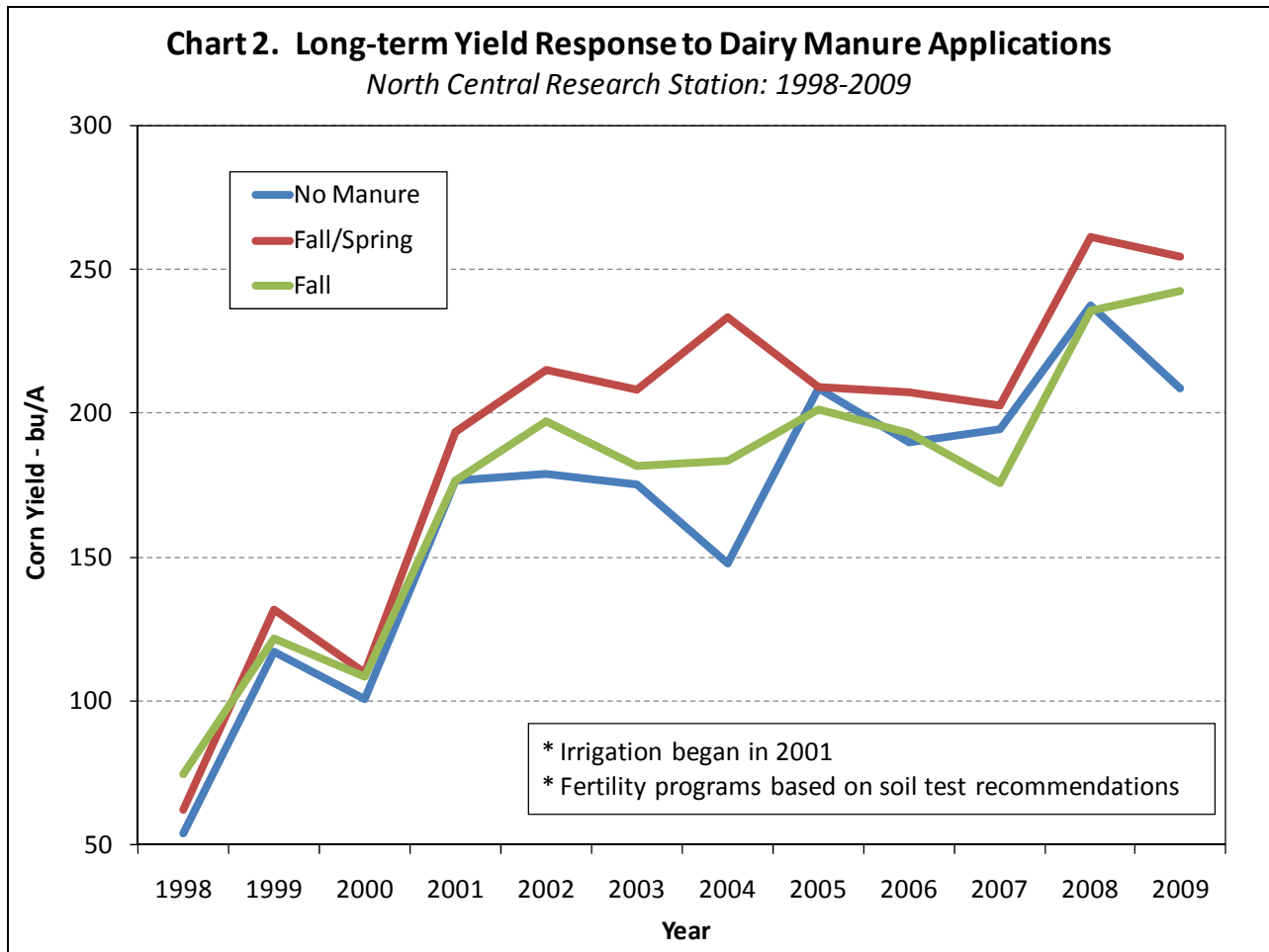
LSD (0.1):14.8, CV: 10.1%

**Conclusions:**

- Within each manure application there was no statistical difference between the treatments.
- The addition of extra nitrogen to shoot for maximum yield did not provide additional yield response in this cool growing season, where temperature was the limiting factor on plant growth.
- There was a significant difference between manure applications, proving that fertility cannot make up all the benefits that manure applications provide.

\*See *Product Descriptions* in the introduction for more information on ACLF products used.

**Objectives:** Chart 2 below shows yield response for the past 12 years of continuous corn for each of the three manure applications. In 1998 extremely dry conditions without irrigation resulted in below normal yields. In 2001 irrigation began on the farm, increasing our yield goal from 150 bu/A to over 200 bu/A. Each year fertilizer applications were made based on recent soil test levels, therefore varied throughout the years.



**Conclusions:**

- At the start of this experiment, corn yields stayed very close between manure applications.
- From 1998 through 2004, the same planter fertilizer program was used on all manure application zones. At this time, the soil levels by zone were taken and nutrient level changes were noticed, specifically for phosphorus and potassium. Subsequently, fertilizer rates were adjusted to reflect this. These levels are reported on the soil tests listed above.
- Over time the manure applications increased soil nutrient levels and overall productivity, the no manure section with a full fertility program could not reach the same yields as the manure treated sections.
- Soil test levels will continue to be monitored to determine if there is a point when the manure applications have a negative effect on corn yield.

\*See *Product Descriptions* in the introduction for more information on ACLF products used.