

2016

Nutrient Management Initiative (NMI) Results

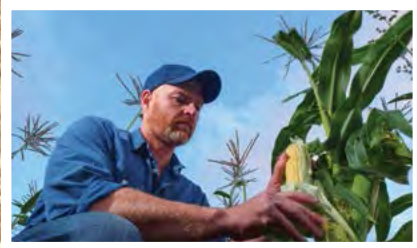
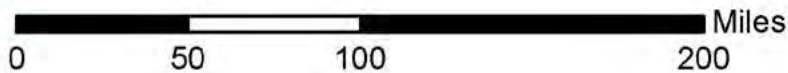
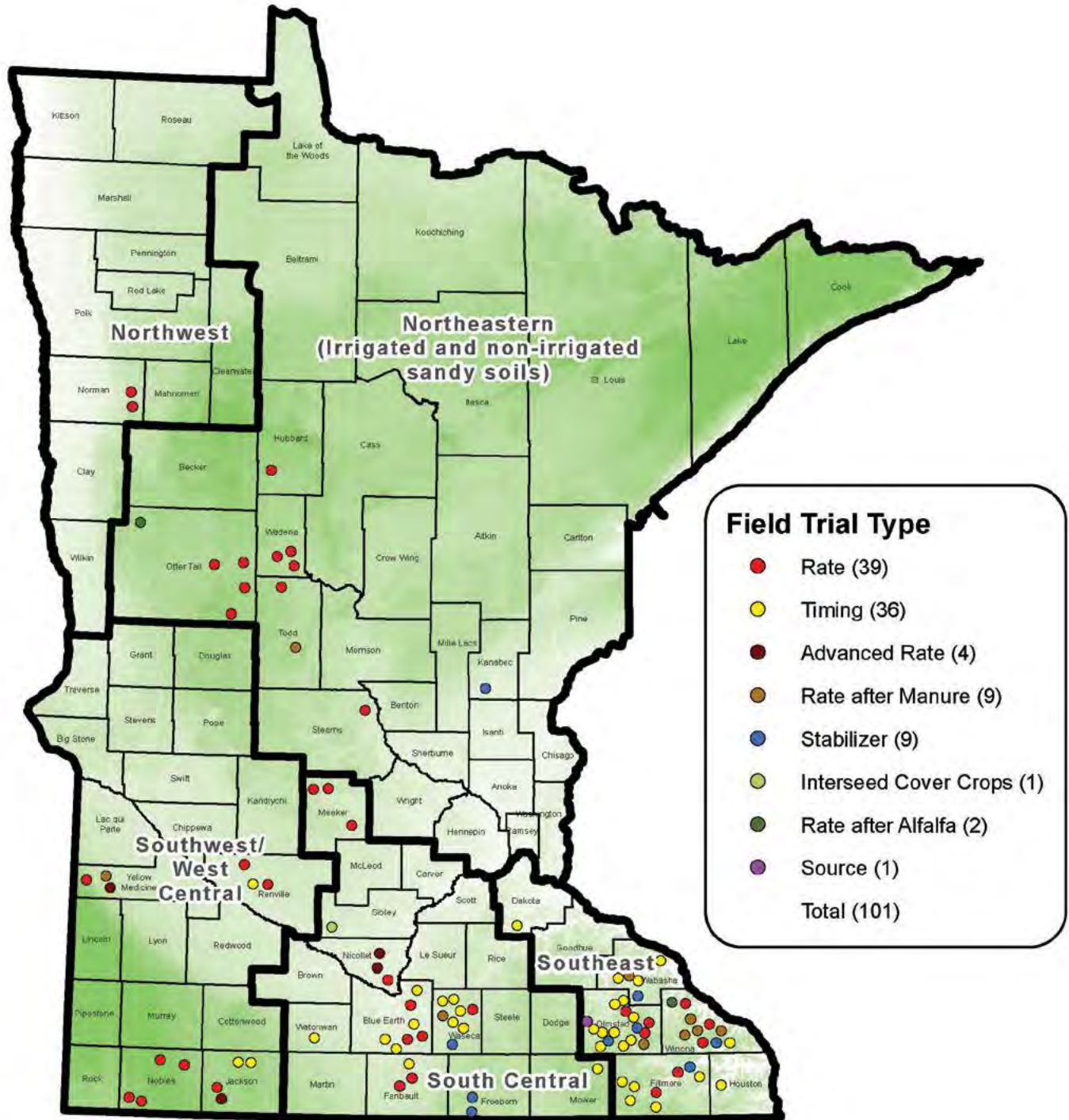


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Nutrient Management Initiative Sites - 2016

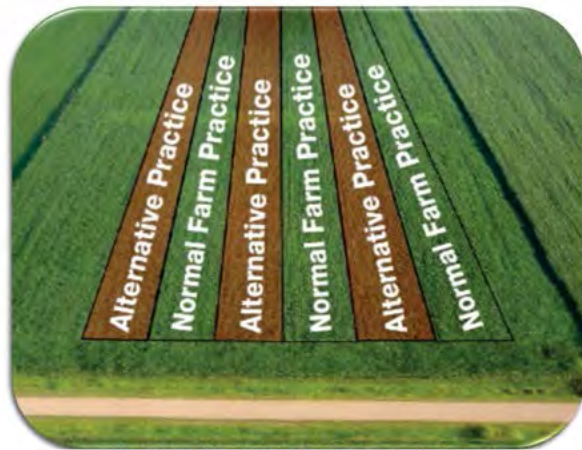


2016 Nutrient Management Initiative (NMI)

The Nutrient Management Initiative is a simple tool to help evaluate the efficiency of nitrogen fertilizer inputs through the use of on-farm side-by-side trials. The NMI was reintroduced in 2015 with direct funding from the Minnesota Department of Agriculture (MDA) and includes field trial options that consider nitrogen rate, timing, stabilizer, and source evaluations. In 2016, 100 farmers worked with 29 crop advisers statewide to establish 101 on-farm trials geared towards improving nitrogen efficiencies on their own farms. Since 2015, there has been a total 269 NMI trials in Minnesota.

NMI Design

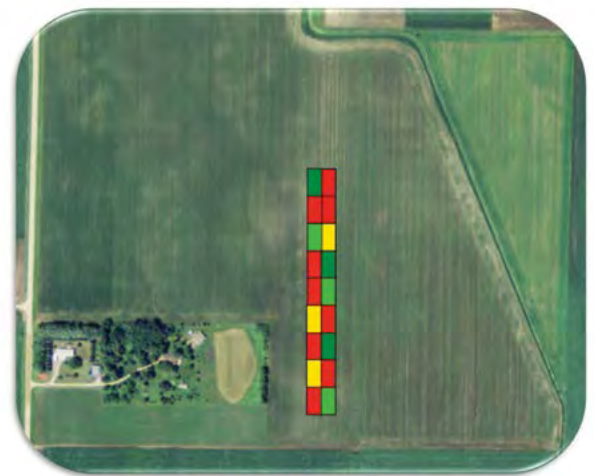
Farmers worked with a crop adviser to set up field trials and verify crop management and harvest information. Advances in technology make NMI trials easier to install pre-determined nitrogen treatments and extract and review harvest information directly from yield maps. Participants received an individual and regional analysis of the results at the end of the season.



Example basic replicated field trial design.

Many crop advisers utilized the NMI in order to promote and evaluate industry advancements, new technology, or application equipment that can help improve efficiency and boost yields. Some crop advisers, MDA, soil and water conservation district, and University of Minnesota (U of M) Extension personnel also held winter farmer meetings to review field trial results. New ideas for field trials from farmers included evaluating inter-seeding cover crops while side dressing nitrogen, as well as a nitrogen rate comparison trial on corn grown for silage in southeast Minnesota.

2016 brought the addition of advanced nitrogen rate trials with guidance from U of M Extension research specialists. Advanced trials will provide a more in-depth design to help validate nitrogen rate recommendations for corn/corn and corn/soybean rotations. Farmers and crop advisers worked directly with staff to set up six replicated nitrogen rates across their fields. Four advanced trials were completed this year; two in the Southwest/West Central region, and two in the South Central. The U of M sent out the nitrogen prescriptions directly to the participants, as well as determined the final results after receiving yield information directly from the monitor after harvest.



Example advanced nitrogen

Average results of 2016 NMI trials

- Not including the four U of M advanced nitrogen rate trials

CORN FOLLOWING CORN									
Nitrogen BMP Region	All trials combined				Rate trials		Timing trials	Stabilizer trials	
	Total N (ac)	Yield (bu/ac)	NUE (lbs of N per bushel)	Price (per pound of N)	Additional N (lbs/ac)	Yield from additional N (bu)	Split App Advantage (bu)	Stabilizer Advantage (bu)	Stabilizer Cost (ac)
Southeast	177.84	218.42	0.81	\$0.38	39.69	3.53	2.89	0.29	\$12.50
South Central	150.56	208.42	0.72	\$0.49	31.00	0.00	30.3*		
Southwest/West Central	177.00	239.00	0.74	na	30.00	0.00			
Northwest									
Northeast	182.83	198.12	0.93	\$0.40	32.50	6.40		0.30	
Averages	172.06	215.99	0.80	\$0.42	33.30	2.48	2.89	0.30	12.50

*Only on one trial. Preplant 32% UAN 1 app vs a split 2 app. Not included in averages.

The average cost for a pound of nitrogen was **\$0.42**. When considering an average of all nitrogen rate trials following corn, an additional **33.30** pounds of nitrogen cost **\$13.99** per acre, but only offered an average yield increase of **2.48** bushels per acre.

CORN FOLLOWING SOYBEANS									
Nitrogen BMP Region	All trials combined				Rate trials		Timing trials	Stabilizer trials	
	Total N (ac)	Yield (bu/ac)	NUE (lbs of N per bushel)	Price (per pound of N)	Additional N (lbs/ac)	Yield from additional N (bu)	Split App Advantage (bu)	Stabilizer Advantage (bu)	Stabilizer Cost (ac)
Southeast	152.04	217.59	0.70	0.41	35.70	3.72	0.32	1.43	
South Central	151.59	213.20	0.71	0.51	36.75	5.00	5.49		
Southwest/West Central	159.53	216.02	0.73	0.42	31.76	3.97	1.62		
Northwest									
Northeast	192.84	184.17	1.05	0.43	40.33	0.66		0.30	na
Averages	164.00	207.75	0.80	0.44	36.14	3.34	2.48	0.87	

The average cost for a pound of nitrogen was **\$0.44**. When considering an average of all nitrogen rate trials following soybeans, an additional **36.14** pounds of nitrogen cost **\$15.90** per acre, but only offered an average yield increase **3.34** bushels per acre.

Only two NMI trials were not harvested correctly last fall in southeast Minnesota and are not included in this report. Of the remaining trials not listed above, one trial in southeast Minnesota was corn grown for corn silage, while the other nine trials had different previous crops consisting of potatoes, barley, wheat, dry beans, and alfalfa. Most of these trials were located in central Minnesota in the Northeast irrigated and non-irrigated sandy soils region.

Statistical Analysis

Statistical analysis was completed on sixty of the ninety-seven (62%) basic NMI field trials which had a minimum of three replications of each nitrogen practice. This is standard practice within the research community. Replications of practices with statistical analysis are crucial to determine if the yield difference is actually a true treatment effect of the different nitrogen practices, and not an effect of other factors from in-field variability. Consistently similar yield results of each specific nitrogen treatment strip help to indicate this as well. While comparisons were made on trials with only one or two replications, results were not confirmed with statistical analysis.

After analysis of those sixty trials, only seven showed a statistically significant difference in yield due to the actual nitrogen treatment. This means that most of the participants did not see any yield difference between their normal and alternative practices. In other words, the lower nitrogen rate, split application, or stabilizer use which was considered an alternative practice, may be adequate to cover the crop nitrogen needs and not affect yields.

Before drawing a conclusion, it is important to note that the 2016 growing season generally was favorable for release of nitrogen from the breakdown of soil organic matter, or mineralization. In-field variability can considerably alter results of each individual field trial strip and needs to be considered before formulating results. The generally above-average nitrogen release may have helped make up for some of the difference between the normal and alternative practices.

Nitrogen Use Efficiency (NUE)

Minnesota corn production is becoming much more efficient by producing a bushel of corn with less nitrogen. In addition to nitrogen management, technology, field history, genetics, equipment, weather, product timing and placement are some of the contributors to the ability of corn to utilize applied nitrogen.

Using on-farm field trials serve as a critical component to evaluating the efficiencies of management practices on any field. NUE values can be represented several ways; however, any NUE value can be a very simple comparison tool and serve as an indicator for tracking and reducing nitrogen losses over time.

Many farmers often question how nitrogen practices on their own farms compare to their neighbors or other farmers in the same area. Similar to 2015, each NMI farmer participant was given a unique field trial identifier with NUE values by taking the total nitrogen rate divided by yield, which determines the amount of nitrogen required to produce one bushel of corn. Nitrogen practices in each trial were given a unique ID for the normal or alternative practices. The NUE values were then sorted by similar crop rotations in the same region and used as a simple method to help showcase farmers that are minimizing their nitrogen inputs and still maintaining great yields.



The last two NMI seasons have shown the benefit and nitrogen producing potential of soil organic matter. For estimates on soil mineralization and plant nitrogen uptake potential, refer to the summary reports from the advanced scientific trials located at the beginning of the Southeast Minnesota section of this report titled **“Effects of Nitrogen Rate and Application Timing on 2016 Corn Yield”**. These advanced trials measured the amount of nitrogen supplied by soil organic matter alone, as well as the nitrogen Fertilizer Recovery Efficiency of the actual applied nitrogen, which generally only averaged around 50-60% in 2016. Results of almost all of the individual NMI field trials reflect similar results with no response to additional nitrogen for another above-average growing season with record yields experienced by many Minnesota farmers.

NUE values are a simple method to help highlight advanced nitrogen management practices and yields from within the same region. NMI participants can review the results of all the other trials and evaluate the factors they feel contributed to the outcomes. The top three NUE practices are listed on the initial summary page of each region. Below is a table highlighting some of the statewide farmers that had field practices which used the least amount of nitrogen to produce a bushel of corn. The asterisk (*) marks a field trial on peat soil, with an organic matter level of 38.7%, which again confirms the soils ability to provide nitrogen during the growing season.

2016 NMI Top Nitrogen Use Efficient (NUE) farmers Total Nitrogen Rate / Yield = pounds of nitrogen per bushel									
NUE (N rate/ yield)	Field Trial ID	Region	County	Previous Crop	Total N Rate (lbs/ac)	Yield (bu/ac)	Variety	Trial type	Page #
.33	*DPSCR*	South Central	Blue Earth	Corn	66	201.3	DKC 46-20	Rate	80
.42	SFNWR2	Northwest	Norman	Dry Beans	88.5	211.4	Dekalb 43-10	Rate	129
.43	JBSES	Southeast	Fillmore	Soybeans	100	232.2	Dekalb 50-84	Stabilizer	70
.48	SFNWR1	Northwest	Norman	Dry Beans	101	210.4	Dekalb 38-03	Rate	128
.50	GKSWR	Southwest	Nobles	Soybeans	120	237.7	Dekalb 54-38	Rate	115
.50	RNSET	Southeast	Olmsted	Corn	103	208.0	na	Timing	35
.52	GLSER	Southeast	Wabasha	Soybeans	136	262.5	DKC54-40VT2P	Rate	49

* peat soil

Environmental Considerations

Today's farmers are very mindful of not only the economic challenges associated with nutrient management decisions, but also of the fate of excessive nutrient losses to the environment. Water quality issues are becoming much more well-known and often the target of news stories and releases. University of Minnesota research has continually shown that applying nitrogen rates at or near the Economic Optimum Nitrogen Rates (EONR) and following nitrogen best management practice (BMP) guidance can ensure maximum profits while minimizing the risk of nitrate losses to surface and ground water sources. Overall results of the 2015-2016 NMI rate trials across Minnesota indicated that rate reductions of a minimum of thirty pounds of nitrogen per acre did not have any negative effect on yield, but rather provided an avenue to reduce inputs to improve economic return.

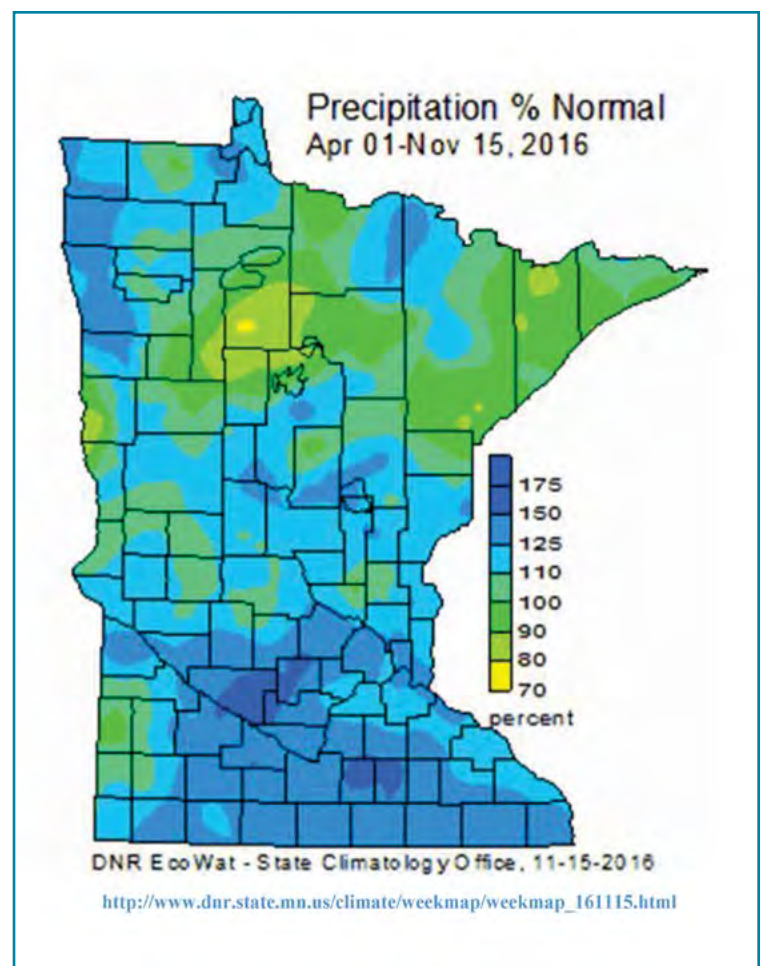
With increased scrutiny of our water resource quality, responsible nutrient management decisions will become even more important in the future. NMI is by no means the silver bullet to solve water quality issues, but participation can certainly help to relay the interest of farmers and ag-industry in working together to protect our water quality. NMI also opens the door to allow participants to share, evaluate, and develop new strategies to enhance nitrogen management practices to protect economic and environmental performance.

2016 year in review

With the exception of a few areas, favorable temperatures and rainfall were maintained throughout the growing season. Many areas received above average and timely rains throughout the season. For most parts of the state, the past two growing seasons have been above average. NMI trial results need to be considered based to these conditions which may not reflect average growing seasons.

Record Yields

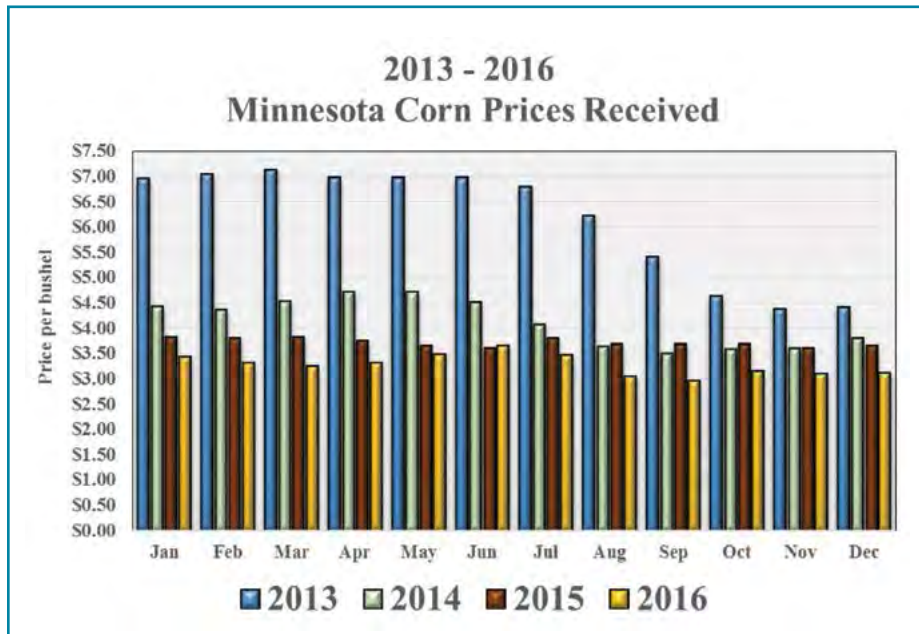
The 2016 crop year was another exceptional year across the state for both corn and soybeans. For the second year in a row, Minnesota farmers set records for corn and soybeans yields. Corn yields averaged 193 bushels per acre, 5 bushels per acre above the previous record set in 2015. Soybean yields averaged 52.5 bushels per acre, 2.5 bushels per acre above the previous record, also set in 2015.



High yields were needed again this year to offset the low prices of both corn and soybeans. Even in the central sand plains of Minnesota, dry land corn acres often averaged over 160 bushels per acre in areas where less than 100 bushels per acre would be normal.

Corn prices did not average over \$4.00 per bushel at any time in 2016, according to the latest data from the USDA National Agricultural Statistics Service (NASS). However, soybean prices rebounded from 2015 topping out over \$10.00 in the summer of 2016, before falling below \$9.00 for most of the fall.

Cropland cash rents in Minnesota remained relatively high in 2016, averaging \$170 per acre, slightly below the all-time high of \$186 in 2014 and \$11 less than in 2015. Cropland values also remained relatively high, averaging \$4,700 per acre, down slightly from the all-time high of \$4,870 in 2014 and \$50 less than in 2015.



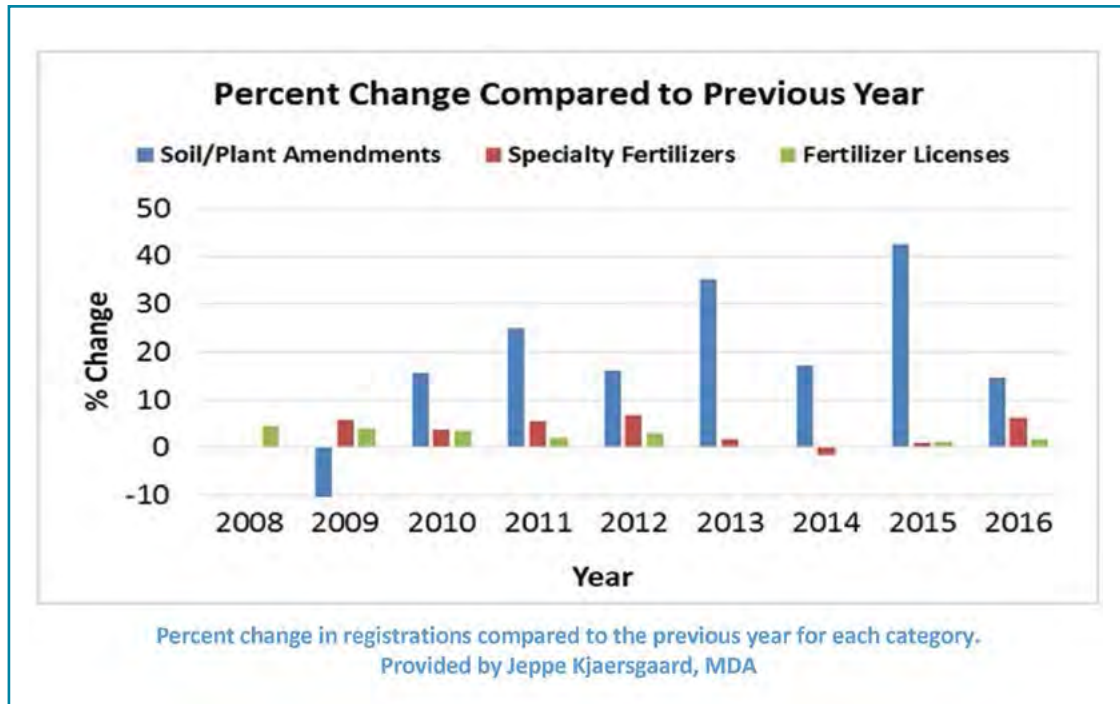
Nitrogen inputs were also down slightly in 2016 ranging from \$0.27 per pound of nitrogen for anhydrous ammonia and \$0.37 per pound for urea in December of 2016, down from \$0.33 per pound of nitrogen for anhydrous ammonia and \$0.38 per pound for urea in December of 2015.

Increase in fertilizer licenses, specialty fertilizers, and soil and plant amendment registrations at MDA

The number of fertilizer licenses, specialty fertilizer and soil & plant amendment consumer products continues to increase, according to the MDA's license and registration database. During 2016, the MDA issued 1939 fertilizer licenses which is 2% more than in 2015. A fertilizer license must be obtained by anyone who sells or distributes fertilizer, custom applies fertilizer or manufactures, blends or otherwise manipulates fertilizer. The number of fertilizer licenses has increased by 21% since 2007.

A combination of 372 companies registered a total of 4384 specialty fertilizers, representing an increase of over 6% compared to 2015. The number of specialty fertilizer registrations has increased by 34% since 2008.

Soil and plant amendment registrations increased to 557 in 2016, which is 15% more than in 2015. Soil & plant amendments are materials intended to improve plants, seed or soil to improve certain desirable characteristics. Soil and plant amendment product registrations have increased by 284% since 2008.



Summary

Organizing and evaluating the results from the NMI is difficult and is by no means a substitute for the reliable, research based results that are delivered by the University of Minnesota. Each site is unique with different farming practices, field variability, and weather patterns that can influence results. The purpose of NMI trials is simply to provide farmers an opportunity to compare different nitrogen practices on their own farms and evaluate other trials from the same region. The NMI can go a long way to help relay the positive efforts farmers are already making on their farms, as well as serve another great tool to help open discussion on ideas that can help benefit water quality in Minnesota.

Thank you to all everyone who participated and assisted with the NMI in 2016. Several new ideas were generated from participants, which should result in an expansion of field trial options in the future. Our goal is to continue to improve and expand the NMI program to become a more valuable tool for Minnesota farmers and crop advisers to not only use, but also to showcase their commitment to advancements that benefit water quality. 2017 NMI enrollment will offer increased enrollment throughout Minnesota and will have a more regional focus that provides additional information to participants on a local level.

For more information about the Nutrient Management Initiative go to:
www.mda.state.mn.us/nmi

Ryan Lemickson, Minnesota Department of Agriculture

Southeast

2016 Nutrient Management Initiative (NMI)

Dawn Bernau

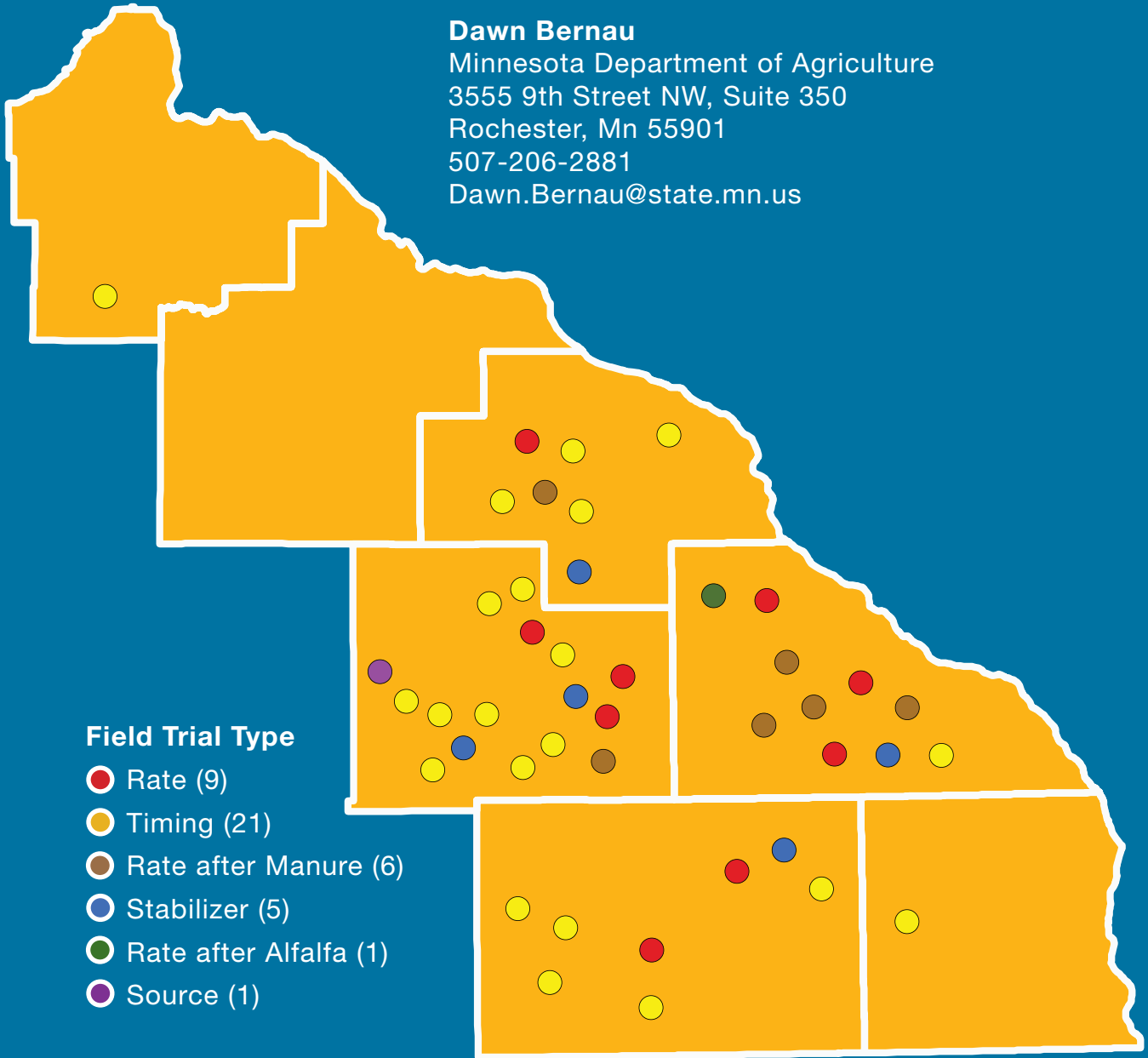
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Effect of N Rate and Timing on 2016 Corn Yield

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Southeast BMP Region SUMMARY

Averages									
Previous Crop	All trial practices combined				Rate trials		Timing trials	Stabilizer trials	
	Total N (ac)	Yield (bu/acre)	NUE (rate/yield)	Price per pound of N	Additional N (lbs)	Yield from additional N (bu)	Split App Advantage (bu)	Stabilizer Advantage (bu)	Stabilizer Cost (ac)
Corn	177.84	218.11	0.84	\$0.38	39.69	3.53	2.89	0.29	\$12.50
Soybeans	152.04	217.59	0.70	\$0.41	35.71	3.72	0.32	1.43	na
Alfalfa	139.00	235.33	0.59	\$0.41	50.00	0.00			
Averages	156.29	223.68	0.71	0.40	41.80	2.42	1.61	0.86	12.50

The average cost for a pound of nitrogen was **\$0.40**. When considering an average of all nitrogen rate trials, an additional 41.80 lbs N/acre cost **\$16.72** per acre, resulting in an average yield difference of only **2.42** bushels/acre in 2016.

CORN AFTER CORN: Top Nitrogen Use Efficiencies (NUE)							
Total N Rate/Yield - lbs of N Per Bushel							
Page	NUE	County	Trial Practice ID	Total N Rate (lbs/ac)	Yield (bu/ac)	Variety	Type of Trial
35	0.5	Olmsted	RNSETalt	103	208	na	Timing
35	0.52	Olmsted	RNSETnorm	103	199.6	na	Timing
23	0.55	Winona	BGSERMalt	108	195	Dekalb 5284	Rate after Manure

CORN AFTER CORN: Top Yields							
bu/acre							
Page	Yield (bu/ac)	County	Trial Practice ID	NUE	Total N Rate (lbs/ac)	Variety	Type of Trial
32	250.3	Olmsted	JLSETnorm	0.74	186	DKC 49-72 SS	Timing
37	248.1	Wabasha	TBSETalt	0.73	180	DKC 53-56 SS	Timing
32	247	Olmsted	JLSETalt	0.75	186	DKC 49-72 SS	Timing

CORN AFTER SOYBEANS: Top Nitrogen Use Efficiencies (NUE)							
Total N Rate/Yield - lbs of N per bushel							
Page	NUE	County	Trial Practice ID	Total N Rate (lbs/ac)	Yield (bu/ac)	Variety	Type of Trial
70	0.43	Fillmore	JBSESnorm	100	232.2	Dekalb 50-84	Stabilizer
70	0.45	Fillmore	JBSESalt	100	223.1	Dekalb 50-84	Stabilizer
49	0.52	Wabasha	GLSERnorm	136	262.5	DKC54-40 VT2P	Rate

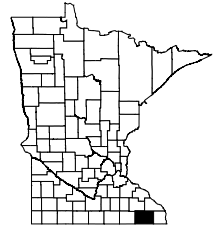
CORN AFTER SOYBEANS: Top Yields							
bu/acre							
Page	Yield (bu/ac)	County	Trial Practice ID	NUE	Total N Rate (lbs/ac)	Variety	Type of Trial
49	262.5	Wabasha	GLSERnorm	0.52	136	DKC54-40 VT2P	Rate
49	259.1	Wabasha	GLSERalt	0.72	186	DKC54-40 VT2P	Rate
56	249.3	Olmsted	DTSETalt	0.6	150	DKC 50-84 VT2P	Timing

Effect of Nitrogen Rate and Application Timing on 2016 Corn Yield

Harmony Site, Fillmore County, Minnesota

Parameter	Plot Details
Test:	Nitrogen rate and timing
Previous Crop:	Corn
Hybrid:	Dyna-Gro D39SS17 RIB
Tillage System:	Conventional tillage
N Applic. / Plant Date:	April 15, 2016 / April 25, 2016
N Source:	Urea-bdcst with DCD/NBPT (Agrotain Plus)
Sidedress Date/Form:	June 2, 2016, Urea-bdcst
Population:	35,000 planted/33,500 actual
Plot Design:	Randomized block (CRBD), 4 reps.

Soil Fertility Measure	Plot Values
Soil Type:	Tama Silt Loam
O.M.%:	4.5% (high)
pH:	5.9 (5.8-7.0 normal)
CEC:	25.4 meq/100 g
Bray P1:	42 ppm (very high)
Potassium:	183 ppm (very high)



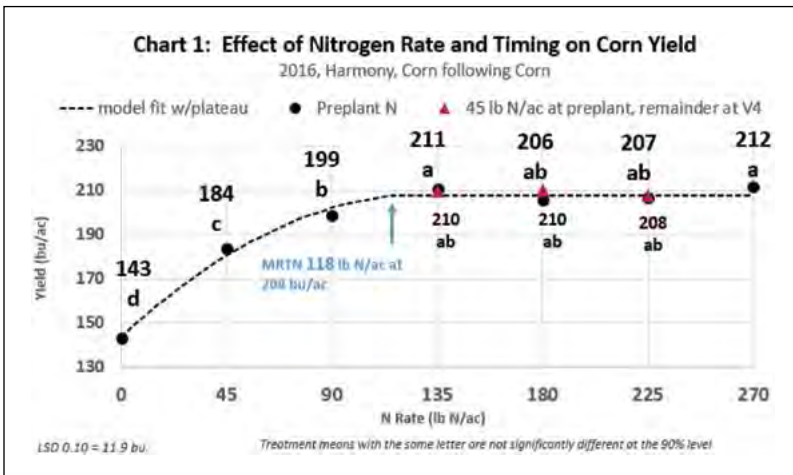
Avg of treatments sampled at 0-6" depth on 4/13/16

Harmony Weather Station Measure	April-June	July-Sept
% of normal precipitation:	-9%	+113%
% of days with more than 1.0" rainfall:	1%	10%

Maximum Return To Nitrogen (MRTN) is the rate that optimizes net profit. Rates near the MRTN can also reduce risk of nitrate-nitrogen leaching to groundwater and surface water.

To determine the MRTN rate, spring 2016 market prices of **0.40/lb N** fertilizer and **\$3.50/bu** corn were entered into an on-line tool called the [Corn Nitrogen Rate Calculator](#). The corn following corn recommendation at these prices is to apply between **142-164 lb N/ac** with a likely best rate of **153 lb N/ac**. The normal N application rate to this field is **211 lb N/ac**.

Chart 1 shows the corn yield and nitrogen rate relationship for this plot. Using this curve, the calculated MRTN was **118 lb N/ac** with a yield of **208 bu/ac**. Due to minimal early season leaching rains, split N applications did not increase yield. Net returns using actual 2016 prices can be seen in the economics table below.

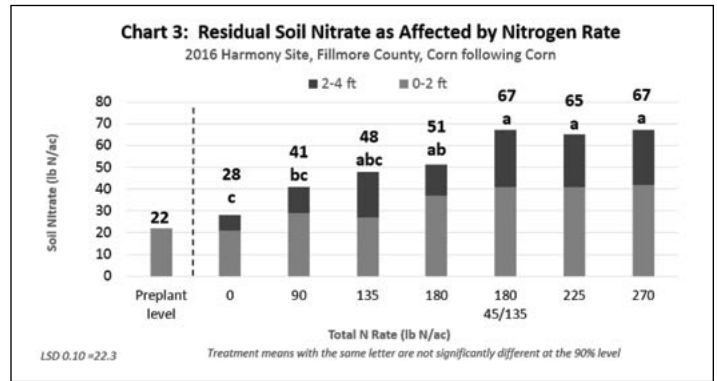
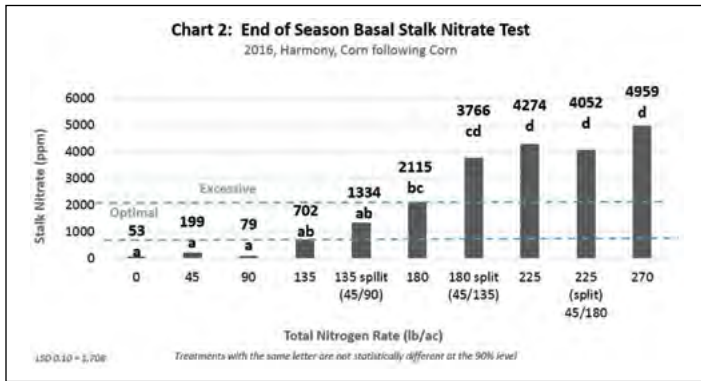


2016 Economics							
Total N Rate (lb N/ac)	Timing	Average Yield (bu/ac) LSD = 8	Average Moisture (%) LSD = 0.4	Drying Cost (\$/ac)	N Cost (\$/ac)	Net Return (\$/ac)	Profit Rank
0	Preplant	143 (d)	22.1 (a)	\$30	\$0	\$397	10
45	Preplant	184 (c)	21.3 (bc)	\$35	\$18	\$499	7
90	Preplant	199 (b)	21.4 (bc)	\$38	\$36	\$522	3
135	Preplant	211 (a)	21.3 (b)	\$40	\$54	\$540	1
135 (45/90)	Preplant + V4	210 (ab)	21.3 (b)	\$40	\$62	\$528	2
180	Preplant	206 (ab)	21.7 (c)	\$41	\$72	\$505	5
180 (45/135)	Preplant + V4	210 (ab)	21.6 (bc)	\$42	\$80	\$509	4
225	Preplant	207 (ab)	21.7 (c)	\$42	\$90	\$489	6
255 (45/180)	Preplant + V4	208 (ab)	21.5 (bc)	\$40	\$98	\$484	9
270	Preplant	212 (a)	21.6 (ac)	\$42	\$108	\$485	8

COLOR KEY = #1 Rank

Assumptions: Corn price \$3.00/bu. (avg. Oct. 2016 price), and .40/lb urea. A \$.03/bu. deduction was used for every moisture point over 15.0%. Extra application costs associated with the in-season split application had an assumed cost of \$8/ac. Treatment means with the same letter in the respective column are not significantly different at the 90% level. Least significant difference (LSD) is the amount needed to be considered statistically different from the treatment mean.

Effect of Nitrogen Rate and Application Timing on 2016 Corn Yield



- The optimal range for the end of season basal stalk nitrate test is 700-2,000 ppm. Stalk nitrate concentrations below 700 ppm may indicate nitrogen deficiencies while levels above 2,000 ppm may indicate excessive nitrogen. Tests indicated that rates above **180 lb N/ac** were considered excessive (chart 2).
- Preplant soil nitrate levels prior to spring N treatment application was **22 lb N/ac** at 0-2' depth.
- Soil nitrate samples collected at the end of the season indicate how much nitrogen was left over (chart 3). Higher residual soil nitrate (RSN) levels could increase nitrate-nitrogen leaching risk to groundwater and surface water. The amount of RSN measured after harvest at 4' depth in the **135 lb N/ac** treatment averaged **48 lb N/ac**. The amount of RSN measured in the **225 lb N/ac** treatment was **65 lb N/ac**. Higher N rates resulted in **17 lb N/ac** more RSN, but were not significantly different. Excessive rains late in the season, 113% above normal, likely leached away any potential differences.

Nitrogen Uptake and Use Efficiency

N Rate lbs N/ac	Average Yield bu/ac LSD = 11.9	Total Corn N Uptake lbs N/ac	N Supplied by Soil %	N Fertilizer Recovery %	Bushels produced per unit of N bu/lb N
0 (check)*	143 (d)	106			
45	184 (c)	135	79%	63%	4.0
90	199 (b)	158	67%	58%	2.2
135	211 (a)	178	60%	53%	1.6
135 (45/90)	210 (ab)	178	60%	53%	1.6
180	206 (ab)	173	62%	37%	1.1
180 (45/135)	210 (ab)	181	59%	42%	1.2
225	207 (ab)	182	58%	34%	0.9
225 (45/180)	208 (ab)	179	59%	32%	0.9
270	212 (a)	192	55%	32%	0.8

Treatment means with the same letter in the respective column are not significantly different at the 90% level. Least significant difference (LSD) is the amount needed to be considered statistically different from the treatment mean.

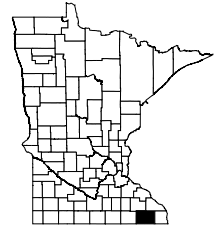
- The total N uptake in the grain and stover for the check rate was 106 lb N/ac. This is an indication of how much N was supplied by the soil. Across all treatments about 62% of the corn N uptake was from the soil.
- The amount of N fertilizer recovered by the 135 lb N/ac treatment was 53%. The amount of N fertilizer recovered by the 225 lb N/ac rate was 34% resulting in 19% percentage point lower nitrogen use efficiency (NUE).
- The 135 lbs N/ac treatment produced 0.7 bu/ac more corn per unit of N applied when compared to the 225 lb N/ac rate.

Effect of Nitrogen Rate and Application Timing on 2016 Corn Yield

Greenleafton Site, Fillmore County, Minnesota

Parameter	Plot Details
Test:	Nitrogen rate and timing
Previous Crop:	Corn
Hybrid:	Dekalb DKC 54-38
Tillage System:	Conventional tillage
N Applic. / Plant Date:	April 15, 2016 / April 22, 2016
N Source:	Urea-bdcst with DCD (Agrotain Ultra)
Sidedress Date/Form:	June 2, 2016, Urea-bdcst
Population:	35,000 planted/33,800 actual
Plot Design:	Randomized block (CRBD), 4 reps.

Soil Fertility Measure	Plot Values
Soil Type:	Tama Silt Loam
O.M. %:	4.5% (high)
pH:	5.9 (5.8-7.0 normal)
CEC:	25.4 meq/100 g
Bray P1:	42 ppm (very high)
Potassium:	183 ppm (very high)



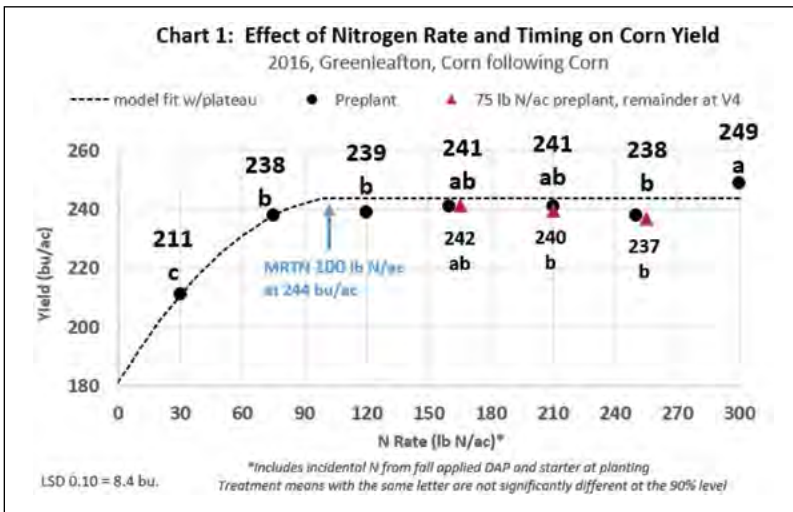
Avg of treatments sampled at 0-6" depth on 4/13/16

Harmony Weather Station Measure	April-June	July-Sept
% of normal precipitation:	-9%	+113%
% of days with more than 1.0" rainfall:	1%	10%

Maximum Return To Nitrogen (MRTN) is the rate that optimizes net profit. Rates near the MRTN can also reduce risk of nitrate-nitrogen leaching to groundwater and surface water.

To determine the MRTN rate, spring 2016 market prices of **0.40/lb N** fertilizer and **\$3.50/bu** corn were entered into an on-line tool called the [Corn Nitrogen Rate Calculator](#). The corn following corn recommendation at these prices is to apply between **142-164 lb N/ac** with a likely best rate of **153 lb N/ac**. The normal N application rate to this field is **203 lb N/ac**.

Chart 1 shows the corn yield and nitrogen rate relationship for this plot. Using this curve, the calculated MRTN was **100 lb N/ac** with a yield of **244 bu/ac**. Due to minimal early season leaching rains, split N applications did not increase yield. Net returns using actual 2016 prices are in the economics table below.

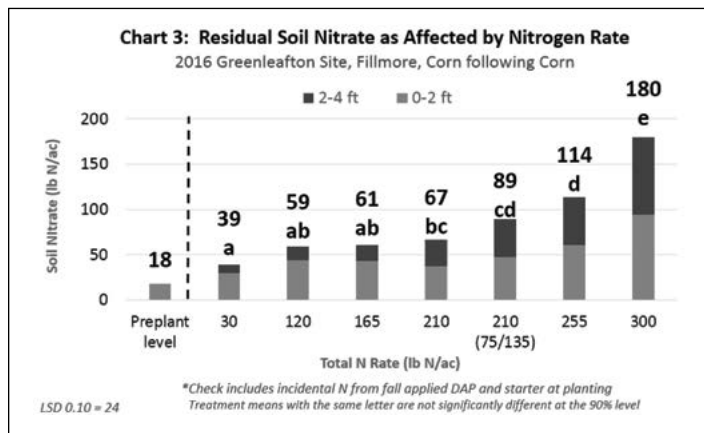
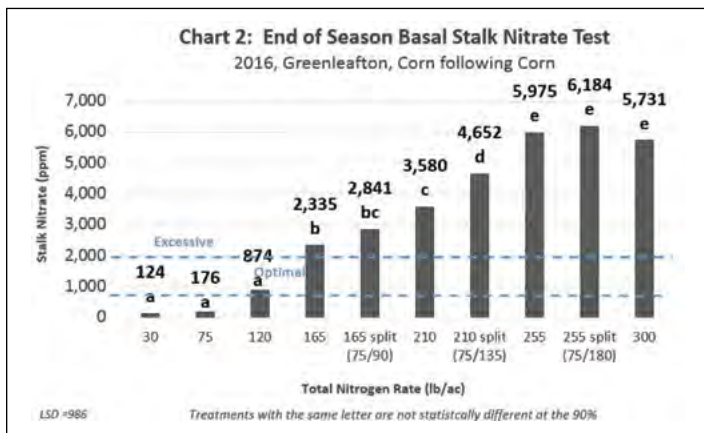


2016 Economics							
Total N Rate (lb N/ac)	Timing	Average Yield (bu/ac) LSD = 8	Average Moisture (%) LSD = 0.4	Drying Cost (\$/ac)	N Cost (\$/ac)	Net Return (\$/ac)	Profit Rank
30 (check)*	Preplant	211 (c)	20.1 (a)	\$32	\$12	\$589	8
75	Preplant	239 (b)	18.9 (b)	\$28	\$30	\$659	1
120	Preplant	239 (b)	19.6 (c)	\$33	\$48	\$636	2
165	Preplant	241 (ab)	19.8 (ac)	\$35	\$66	\$622	3
165 (75/90)	Preplant + V4	242 (ab)	19.6 (c)	\$33	\$74	\$619	4
210	Preplant	243 (ab)	19.7 (c)	\$34	\$84	\$611	5
210 (75/135)	Preplant + V4	240 (b)	19.7(c)	\$34	\$92	\$594	6
255	Preplant	238 (b)	19.6 (c)	\$33	\$102	\$579	9
255 (75/180)	Preplant + V4	237 (b)	19.7 (c)	\$33	\$110	\$568	10
300	Preplant	212 (a)	21.6 (ac)	\$42	\$108	\$485	8

COLOR KEY = #1 Rank

Assumptions: Corn price \$3.00/bu. (avg. Oct. 2016 price), and .40/lb urea. A \$.03/bu. deduction was used for every moisture point over 15.0%. Extra application costs associated with the in-season split application had an assumed cost of \$8/ac. Treatment means with the same letter in the respective column are not significantly different at the 90% level. Least significant difference (LSD) is the amount needed to be considered statistically different from the treatment mean. *The test plot including the check treatment received 30 lb N/ac of incidental N from fall applied liquid MAP and starter at planting.

Effect of Nitrogen Rate on 2016 Stalk Nitrate and Residual Soil Nitrogen Tests



- The optimal range for the end of season basal stalk nitrate test is 700-2,000 ppm. Stalk nitrate concentrations below 700 ppm may indicate nitrogen deficiencies while levels above 2,000 ppm may indicate excessive nitrogen. Tests showed that rates above **120 lb N/ac** were considered excessive (chart 2).
- Preplant soil nitrate levels collected in early April prior to spring N treatment application (some N was applied with fall DAP) measured **18 lb N/ac** at 0-2' depth.
- Soil nitrate samples collected at the end of the season indicate how much nitrogen was left over (chart 3). Higher residual soil nitrate (RSN) levels could increase nitrate-nitrogen leaching risk to groundwater and surface water. The amount of RSN measured after harvest for the 120-165 lb N/ac treatments averaged **60 lb N/ac**. The amount of RSN measured in treatments with more than 210 lb N/ac were significantly different and contained an average of **87 lb N/ac** more RSN. Excessive rains late in the season, 113% above normal, likely leached away any potential significant differences between the other N rate treatments.

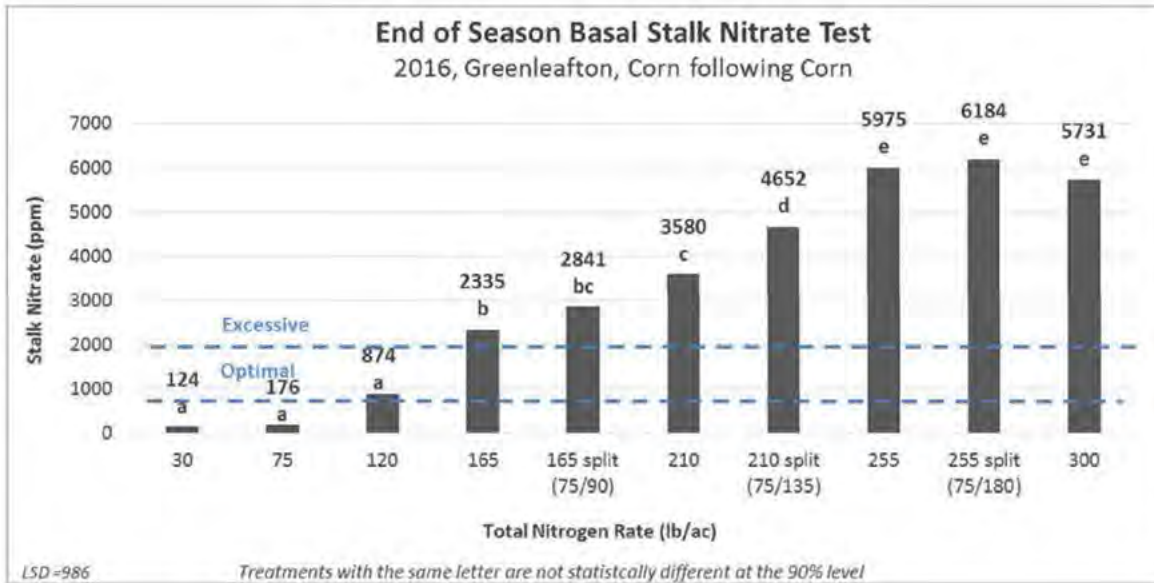
Nitrogen Uptake and Use Efficiency

N Rate lbs N/ac	Average Yield bu/ac LSD = 8	Total Corn N Uptake lbs N/ac	N Supplied by Soil %	N Fertilizer Recovery %	Bushels produced per unit of N bu/lb N
30 (check)*	211 (c)				
75	239 (b)				3.2
120	239 (b)				2.0
165	241 (ab)		Due to the significant amount of incidental N sources in the test plot and the check (50 lb N/ac), these particular NUE indices were not calculated.		1.5
165 (75/90)	242 (ab)				1.5
210	243 (ab)				1.2
210 (75/135)	240 (b)				1.1
255	238 (b)				0.9
255 (75/180))	237 (b)				0.9
300	249 (a)				0.8

February 2017, Kevin Kuehner, Jeff Vetsch

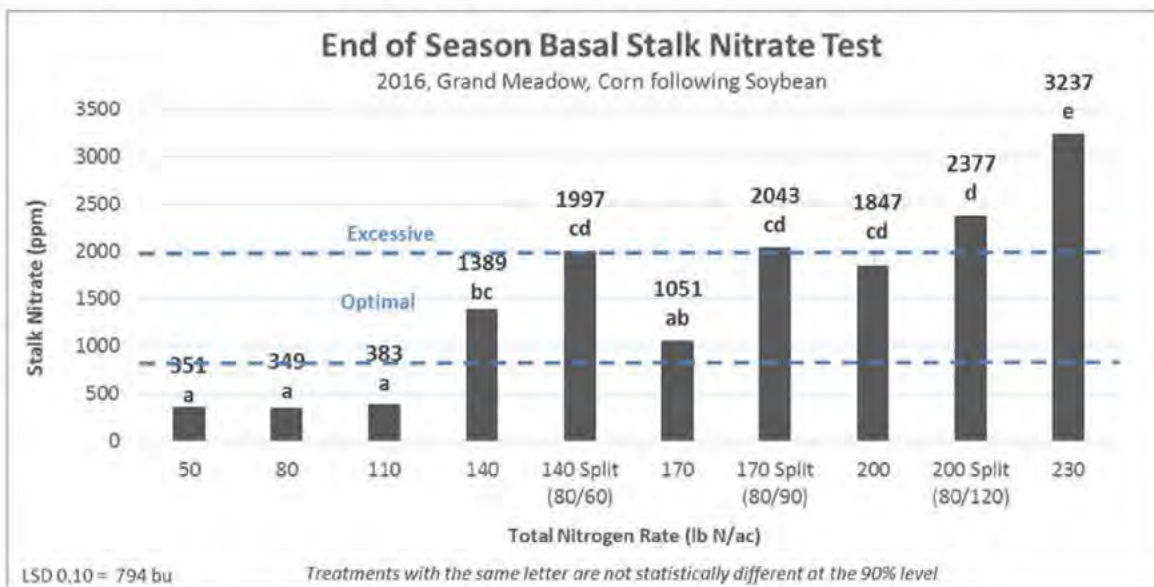
GREENLEAFTON Site

Fillmore County, Corn following Corn, 4.6% organic matter, Tama Silt Loam



GRAND MEADOW Site

Mower County, Corn following Soybean, 4.6% organic matter, Tripoli Silty clay Loam

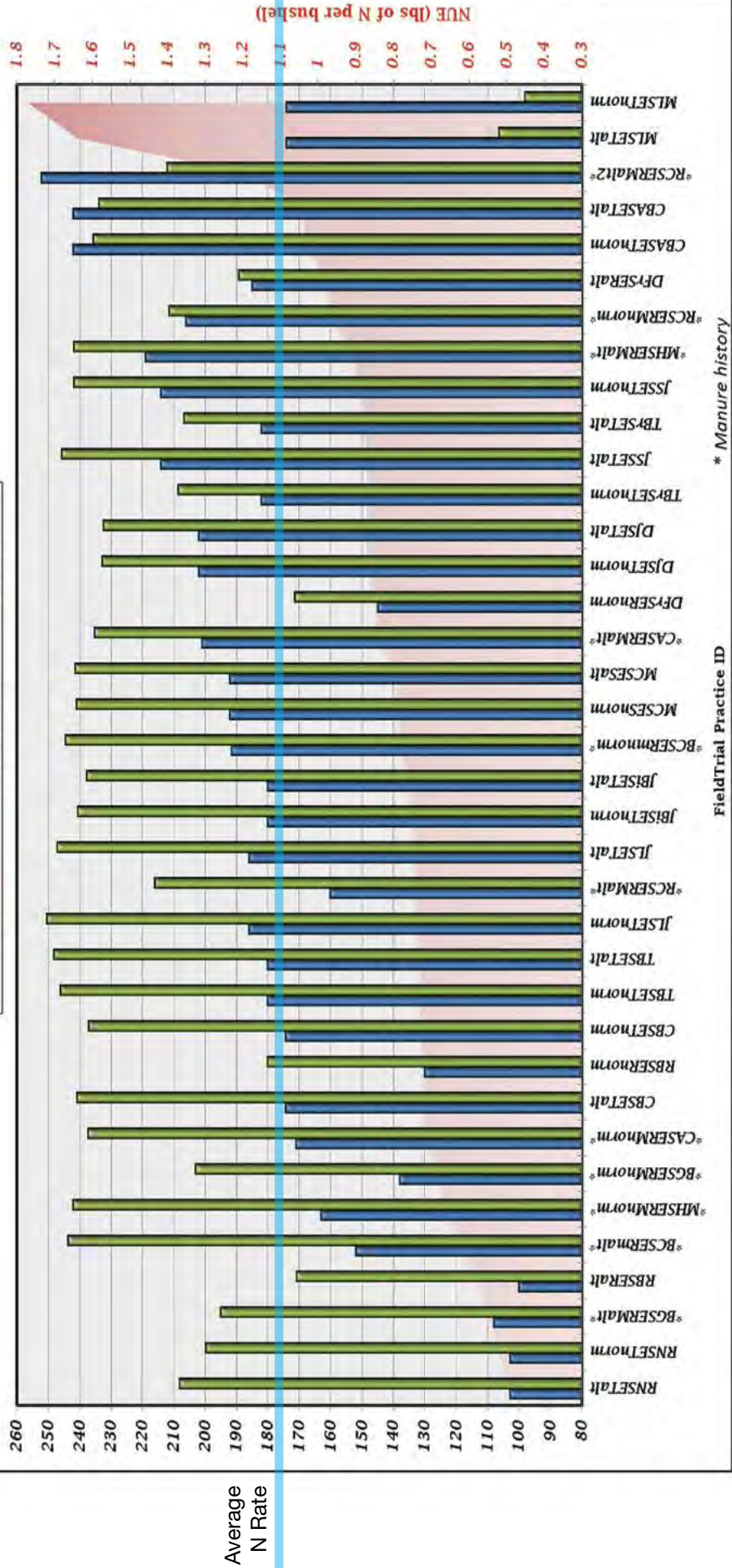


Nitrogen Use Efficiency (NUE)

Southeast Region

All Corn after Corn NMI trials

■ Total_N ■ Yield



* Manure history

FieldTrial Practice ID

Urea: Sidedress additional 40 lbs N/acre

Field Trial ID	DFrSER	Trial	Nitrogen Rate	N source ²	46-0-0
Previous Crop	Corn	County	Winona	Cost/ton	\$379
		Township	Whitewater	46% N cost/lb	\$0.41



2016 NMI

Soil Test Info		Field Info	
Date	11/7/14	Variety	P0193AMX
OM%	2.1	Population	32100
pH	6.8	Row Width	30
Nitrogen		Planting Date	4/16/16
P (bray)	33	Harvest Date	11/5/16
P (olsen)		Soil Texture	silt loam
Potassium	105	Tillage	No-Till
Sulfur		Manure History	No
Zinc		Alfalfa History	No
		Irrigated	No

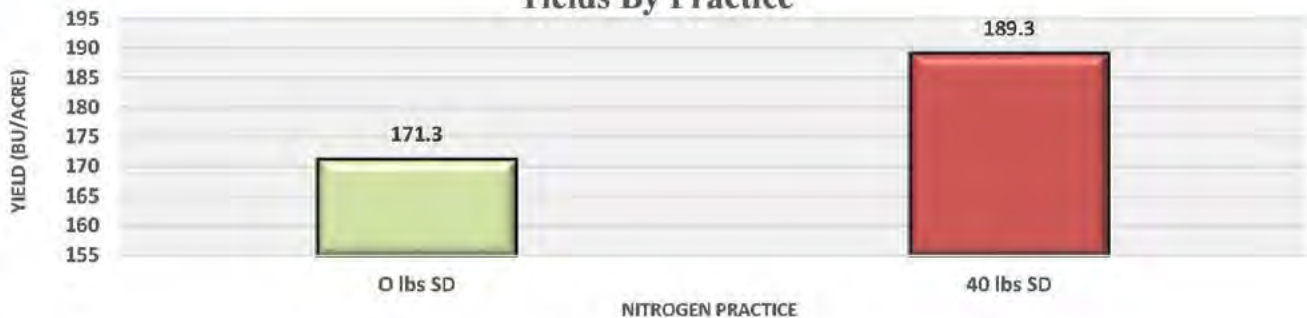
0 lbs N sidedress			Normal Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$379	260	Spring Preplant Broadcast	120				Agrotain
21-0-0-24	\$395	100	Spring Preplant Broadcast	21			24	Agrotain
7-23-5	\$709	55	At Planting Band	4	13	4		
Totals				145	13	4	24	

Stabilizer Cost / ac \$0

40 lbs N sidedress			Alternative Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$379	260	Spring Preplant Broadcast	120				Agrotain
21-0-0-24	\$395	100	Spring Preplant Broadcast	21			24	Agrotain
7-23-5	\$709	55	At Planting Band	4	13	4		
46-0-0	\$370	87	Sidedress Dribble	40				Agrotain
Totals				185	13	4	24	

Stabilizer cost / ac \$0

Yields By Practice



Rate AND Timing difference.

Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
0 lbs N sidedress	145	DFrSERnorm	171.3	0.85	\$49.43	\$0.29	23.9	na
40 lbs N sidedress	185	DFrSERalt	189.3	0.98	\$65.91	\$0.35	24.0	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

28% UAN: Preplant 120 vs 90 lbs N/acre

Field Trial ID	RBSER	Trial	Nitrogen Rate	N source ²	28-0-0
Previous Crop	Com	County	Fillmore	Cost/ton	na
		Township	Pilot Mound	28% N cost/lb	na



2016 NMI

Soil Test Info		Field Info	
Date	4/16/15	Variety	Dekalb 49-72
OM%	3.5	Population	34k
pH	7.1	Row Width	30
Nitrogen		Planting Date	4/25/16
P (bray)	8	Harvest Date	11/2/16
P (olsen)		Soil Texture	
Potassium	102	Tillage	Fall Chisel & Spring FC
Sulfur	10	Manure History	No
Zinc	1.2	Alfalfa History	No
		Irrigated	No

120 lbs N preplant				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
28-0-0		40	Spring Preplant Broadcast	120				
18-46-0		25	At Planting Band	4.5	11.5			
0-0-60		50	At Planting Band			30		
21-0-0-24		25	At Planting Band	5.25			6	
Totals				130	12	30	6	

Stabilizer Cost / ac \$0

90 lbs N preplant				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
28-0-0		30	Spring Preplant Broadcast	90				
18-46-0		25	At Planting Band	4.5	11.5			
0-0-60		50	At Planting Band			30		
21-0-0-24		25	At Planting Band	5.25			6	
Totals				100	12	30	6	

Stabilizer cost / ac \$0



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
120 lbs N preplant	130	RBSERnorm	179.9	0.72	na	na	14.0	56.3
90 lbs N preplant	100	RBSERalt	170.7	0.58	na	na	14.1	56.3

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

82%: Preplant 140 vs 100 lbs N/acre after beef manure

Field Trial ID	BCSERM	Trial	Nitrogen Rate	N source ²	82-0-0
Previous Crop	Corn	County	Wabasha	Cost/ton	\$565
		Township	Plainview	82% N cost/lb	\$0.34



2016 NMI

Soil Test Info

Date	4/8/15
OM%	3.1
pH	6.9
Nitrogen	
P (bray)	72
P (olsen)	
Potassium	244
Sulfur	
Zinc	

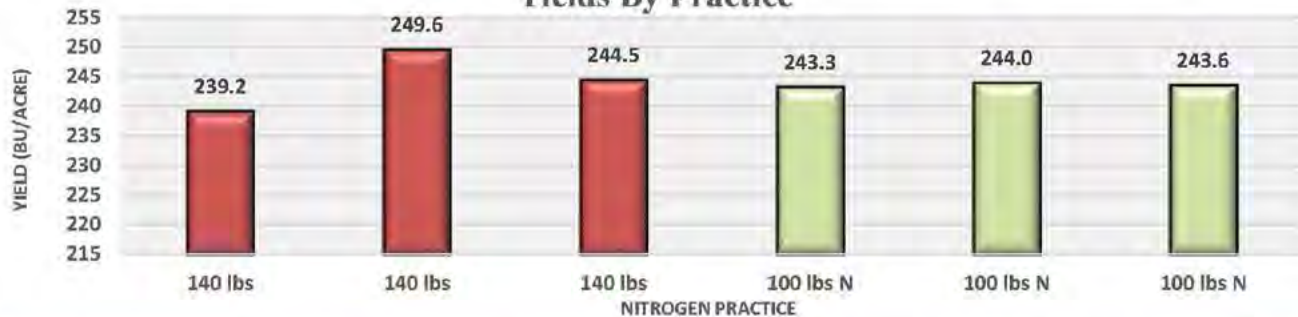
Field Info

Variety	DKC 44-13 SS
Population	34500
Row Width	30
Planting Date	4/23/16
Harvest Date	10/5/16
Soil Texture	silt loam
Tillage	Conventional
Manure History	Yes
Manure Type	Beef (Cows)
Liquid or Solid	Solid
Alfalfa History	No

140 lbs N preplant				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
Manure Credits Year 1		20 ton	Previous Credits	30				
82-0-0	\$565	170	Spring Preplant Band	140				
18-46-0	\$465	60	At Planting Band	11	28			
0-0-60	\$365	140	At Planting Band			84		
21-0-0-24	\$379	50	At Planting Band	10.5			12	
Stabilizer Cost / ac				\$0				
Totals				192	28	84	12	

100 lbs N preplant				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
Manure Credits Year 1		20 ton	Previous Credits	30				
82-0-0	\$565	120	Spring Preplant Band	100				
18-46-0	\$465	60	At Planting Band	11	28			
0-0-60	\$365	140	At Planting Band			84		
21-0-0-24	\$379	50	At Planting Band	10.5			12	
Stabilizer cost / ac				\$0				
Totals				152	28	84	12	

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
140 lbs N preplant	192	BCSERMnorm	244.4	0.78	\$48.23	\$0.20	18.4	57.2
100 lbs N preplant	152	BCSERMalt	243.6	0.62	\$34.45	\$0.14	18.5	56.7

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Sidedress 82-0-0: : 80 vs 50 lbs N/acre after turkey manure

Field Trial ID	BGSERM	Trial	N Rate after Manure	N source ²	82-0-0
Previous Crop	Corn	County	Winona	Cost/ton	\$490
		Township	Utica	82% N cost/lb	\$0.30



2016 NMI

Soil Test Info		Field Info	
Date	7/6/05	Variety	Dekalb 5284
OM%	3.2	Population	
pH	6.6	Row Width	30
Nitrogen		Planting Date	4/19/16
P (bray)	20	Harvest Date	
P (olsen)		Soil Texture	
Potassium	120	Tillage	Conventional
Sulfur		Manure History	Yes
Zinc		Manure Type	Poultry (Hen Turkeys)
		Liquid or Solid	Solid
		Alfalfa History	No

80 lbs N sidedress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
82-0-0	\$490	97	Sidedress Band	80				
Manure Credits Year 2	\$50	60	Previous Credits	38				
32-0-0	\$230	44.4	Spring Preplant Dribble/Spray	14				
12-0-0-26	\$250	44.4	Spring Preplant Dribble/Spray	5.5			11.5	
Stabilizer Cost / ac				\$0				
Totals				138	0	0	12	

50 lbs N sidedress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
82-0-0	\$490	61	Sidedress Band	50				
Manure Credits Year 2	\$50	60	Previous Credits	38				
32-0-0	\$230	44.4	Spring Preplant Dribble/Spray	14				
12-0-0-26	\$250	44.4	Spring Preplant Dribble/Spray	5.5			11.5	
Stabilizer cost / ac				\$0				
Totals				108	0	0	12	



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
80 lbs N sidedress	138	BGSERMnorm	203.0	0.68	\$24.00	\$0.12	na	na
50 lbs N sidedress	108	BGSERMalt	195.0	0.55	\$15.00	\$0.08	na	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Urea: Spring Preplant 138 vs 168 lbs N/acre after beef manure

Field Trial ID	CASERM	Trial	N Rate after Manure	N source ²	46-0-0
Previous Crop	Corn	County	Winona	Cost/ton	\$375
		Township	Utica	46% N cost/lb	\$0.41



2016 NMI

Soil Test Info

Date	10/14/15
OM%	4.1
pH	6.6
Nitrogen	
P (bray)	32.4
P (olsen)	
Potassium	268.1
Sulfur	
Zinc	

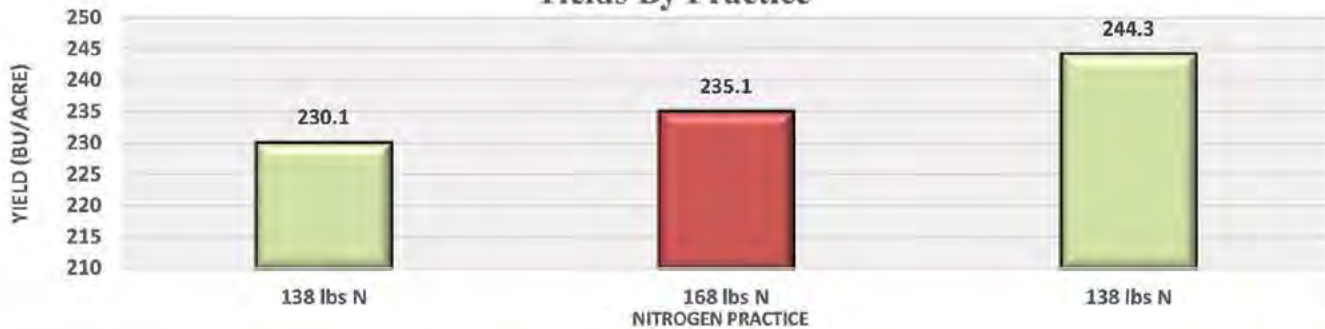
Field Info

Variety	P0339
Population	36000
Row Width	22
Planting Date	4/19/16
Harvest Date	
Soil Texture	loam
Tillage	Conventional
Manure History	Yes
Manure Type	Beef (Finishing)
Type	Solid
Alfalfa History	No

138 lbs N sidedress			Normal Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
10-18-4	\$775	5	At Planting Band	5.3	9.5	2.1		
46-0-0	\$375	300	Spring Preplant Broadcast	138				
21-0-0-24	\$360	50	Spring Preplant Broadcast	10.5			12	
0-0-60	\$372	50	Spring Preplant Broadcast			30		
Manure Credits Year 1			Spring Preplant Broadcast					
Manure Credits Year 2				17				
Stabilizer Cost / ac	\$0		Totals	171	10	32	12	

168 lbs N sidedress			Alternative Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
10-18-4	\$775	5	At Planting Band	5.3	9.5	2.1		
46-0-0	\$375	365	Spring Preplant Broadcast	168				
21-0-0-24	\$360	50	Spring Preplant Broadcast	10.5			12	
0-0-60	\$372	50	Spring Preplant Broadcast			30		
Manure Credits Year 1			Spring Preplant Broadcast					
Manure Credits Year 2				17				
Stabilizer cost / ac	\$0		Totals	201	10	32	12	

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
138 lbs N sidedress	171	CASERMnorm	237.2	0.72	\$56.58	\$0.24	19.3	54.9
168 lbs N sidedress	201	CASERMalt	235.1	0.85	\$68.88	\$0.29	19.4	55.8

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Urea: Sidedress broadcast 57 lbs N/acre after liquid dairy manure

Field Trial ID	MHSERM	Trial	N Rate after Manure	N source ²	46-0-0
Previous Crop	Corn Silage	County	Olmsted	Cost/ton	\$390
		Township	Elmira	46% N cost/lb	\$0.42



2016 NMI

Soil Test Info		Field Info	
Date	11/3/14	Variety	Gold Country 101-99
OM%	3.4	Population	35000
pH	6.6	Row Width	30
Nitrogen		Planting Date	4/22/16
P (bray)	136	Harvest Date	
P (olsen)		Soil Texture	silt loam
Potassium	696	Tillage	Spring Tillage Only
Sulfur		Manure History	Yes
Zinc	5.5	Manure Type	Dairy (Cows)
		Type	Liquid
		Alfalfa History	No

0 lbs N sidedress				Normal Practice					
source	S ton	rate	application	N	P	K	S	stabilizer	
46-0-0	\$390	195	Spring Preplant Broadcast	90				Hydra Hume	
Manure Credits Year 1		3000	Fall Preplant Broadcast	30.5	39	117	20		
0-0-62	\$399	100	Spring Preplant Broadcast			62			
21-0-0-24	\$379	100	Spring Preplant Broadcast	21			24		
10-34-0	\$510	35	At Planting Dribble	3.5	12				
28-0-0	\$289	53	At Planting Dribble	15					
12-0-0-26	\$425	22	At Planting Dribble	2.5		14	6		
Stabilizer Cost / ac		\$10	Totals		163	51	193	50	

57 lbs N sidedress				Alternative Practice					
source	S ton	rate	application	N	P	K	S	stabilizer	
46-0-0	\$390	195	Spring Preplant Broadcast	90				Hydra Hume	
Manure Credits Year 1		3000	Fall Preplant Broadcast	30.5	39	117	20		
0-0-62	\$399	100	Spring Preplant Broadcast			62			
21-0-0-24	\$379	100	Spring Preplant Broadcast	21			24		
10-34-0	\$510	35	At Planting Dribble	3.5	12				
28-0-0	\$289	53	At Planting Dribble	15					
12-0-0-26	\$425	22	At Planting Dribble	2.5		14	6		
46-0-0	\$390	123	Sidedress Broadcast	56.5				ContaiN	
Stabilizer cost / ac		\$13	Totals		219	51	193	50	



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
0 lbs N sidedress	163	MHSERMnorm	241.9	0.67	\$0.00	\$0.00	19.8	na
57 lbs N sidedress	219	MHSERMalt	241.6	0.91	\$23.73	\$0.10	19.9	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Urea: Preplant 104 vs 58 vs 149 lbs N/acre after beef manure

Field Trial ID	RCSERM	Trial	N Rate after Manure	N source ²	46-0-0
Previous Crop	Corn	County	Winona	Cost/ton	\$395
		Township	St. Charles	46% N cost/lb	\$0.43

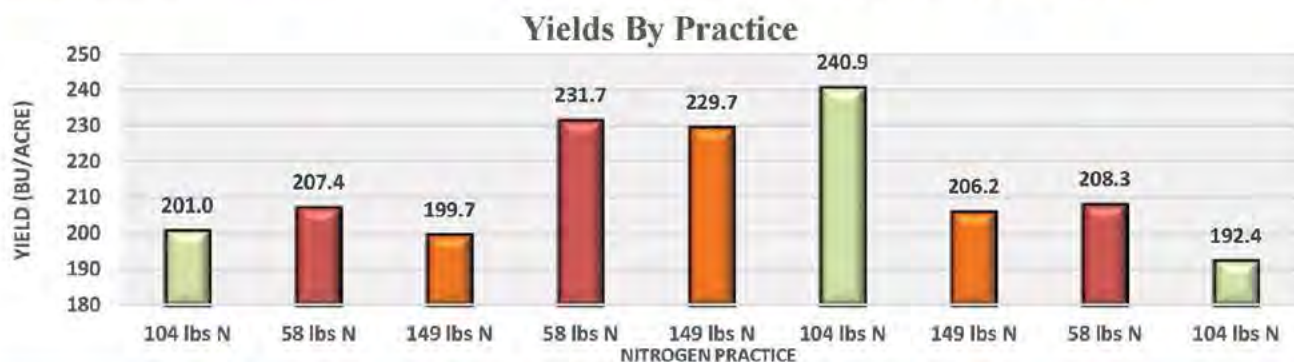


2016 NMI

Soil Test Info		Field Info	
Date	11/6/14	Variety	LG 5499
OM%	2.8	Population	36500
pH	6.8	Row Width	30
Nitrogen		Planting Date	4/23/16
P (bray)	49.5	Harvest Date	
P (olsen)		Soil Texture	sandy loam
Potassium	203.5	Tillage	Conventional
Sulfur		Manure History	Yes
Zinc		Manure Type	Beef (Finishing)
		Liquid or Solid	Solid
		Alfalfa History	No

104 lbs N Preplant				Normal Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer	
46-0-0	\$395	225	Spring Preplant Broadcast	103.5				ESN	
44-0-0	\$550	100	Spring Preplant Broadcast	44					
Manure Credits Year 1		20	Spring Preplant Broadcast	28	64	144			
0-0-60	\$405	50	Spring Preplant Broadcast			30			
21-0-0-24	\$355	50	Spring Preplant Broadcast	10.5			12		
10-12-30-6-1	\$470	200	At Planting Band	20	24	60	12		
Stabilizer Cost / ac				\$0	Totals				206 88 234 24

58 lbs N Preplant				Alternative Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer	
46-0-0	\$395	125	Spring Preplant Broadcast	57.5				ESN	
44-0-0	\$550	100	Spring Preplant Broadcast	44					
Manure Credits Year 1		20	Spring Preplant Broadcast	28	64	144			
0-0-60	\$405	50	Spring Preplant Broadcast			30			
21-0-0-24	\$355	50	Spring Preplant Broadcast	10.5			12		
10-12-30-6-1	\$470	200	At Planting Band	20	24	60	12		
Stabilizer cost / ac				\$0	Totals				160 88 234 24



Also applied a higher rate of urea preplant at 149 lbs N/acre.

Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
104 lbs N Preplant	206	RCSERMnorm	211.4	0.97	\$44.51	\$0.21	55.6	21.5
58 lbs N Preplant	160	RCSERMalt	215.8	0.74	\$24.73	\$0.11	56.3	21.5
149 lbs N Preplant	252	RCSERMalt2	211.9	1.19	\$64.07	\$0.30	56.4	21.0

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Corn Silage. Sidedress 82%: 90 vs 60 lbs N/acre after liquid dairy manure

Field Trial ID	SHSERM	Trial	N Rate after Manure	N source²	82-0-0
Previous Crop	Com	County	Winona	Cost/ton	\$490
		Township	Utica	82% N cost/lb	\$0.30



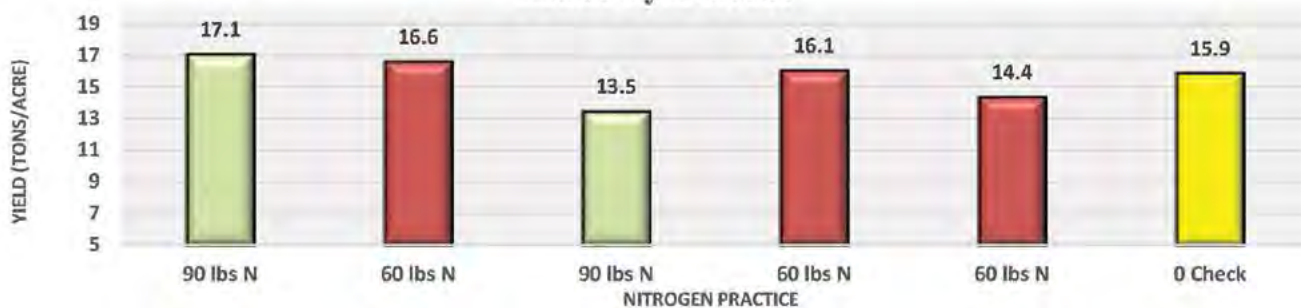
2016 NMI

Soil Test Info		Field Info	
Date	10/1/14	Variety	LG 2549
OM%	3.1	Population	33000
pH	7	Row Width	30
Nitrogen		Planting Date	4/22/16
P (bray)	11	Harvest Date	
P (olsen)		Soil Texture	silt loam
Potassium	112	Tillage	Conventional
Sulfur		Manure History	Yes
Zinc		Manure Type	Dairy (Cows)
		Liquid or Solid	Liquid
		Alfalfa History	No

90 lbs N Sidedress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
Manure Credits Year 1	\$84	14000 g	Previous Credits	56	100	241		
Manure Credits Year 2	\$8		Previous Credits	36				
82-0-0	\$490	110	Sidedress Band	90				
32-0-0	\$230	88.8	Spring Preplant Dribble/Spray	28				
Stabilizer Cost / ac				\$0				
Totals				210	100	241	0	

60 lbs N sidedress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
Manure Credits Year 1	\$84	56	Previous Credits	56	100	241		
Manure Credits Year 2	\$8	36	Previous Credits	36				
82-0-0	\$490	110	Sidedress Band	60				
32-0-0	\$230	88.8	Spring Preplant Dribble/Spray	28				
Stabilizer cost / ac				\$0				
Totals				180	100	241	0	

Yields By Practice



Practice	Total N Rate	ID	Yield (tons)	NUE ¹	N cost per acre ²	N cost per ton ²	Moisture	Test Weight
90 lbs N Sidedress	210	SHSERMnorm	15.3	13.76	\$26.89	\$1.76	na	na
60 lbs N sidedress	180	SHSERMalt	15.7	11.48	\$17.93	\$1.14	na	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per ton. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Urea: Split 152/69 vs Preplant 221 lbs N/acre

Field Trial ID	CBASET	Trial	Nitrogen Timing	N source ²	46-0-0
Previous Crop	Corn	County	Winona	Cost/ton	na
		Township	Hart	46% N cost/lb	na



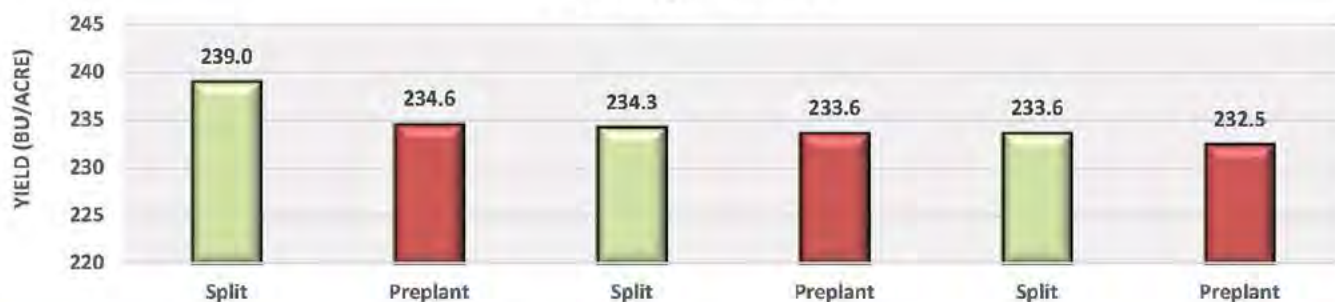
2016 NMI

Soil Test Info	Field Info
Date	Variety
OM%	Population
pH	Row Width
Nitrogen	Planting Date
P (bray)	Harvest Date
P (olsen)	Soil Texture
Potassium	Tillage
Sulfur	Manure History
Zinc	Alfalfa History
	Irrigated

Split 152/69 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0		330	Spring Preplant Broadcast	151.8				Instinct
21-0-0-24		50	Spring Preplant Broadcast	10.5			12	
46-0-0		150	Sidedress Broadcast	69				Agrotain Ultra
21-0-0-24		50	Sidedress Broadcast	10.5			12	
Totals				242	0	0	24	
Stabilizer Cost / ac		\$0						

Preplant 221 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0		480	Spring Preplant Broadcast	220.8				
21-0-0-24		100	Spring Preplant Broadcast	21			24	
Totals				242	0	0	24	
Stabilizer cost / ac		\$0						

Yields By Practice



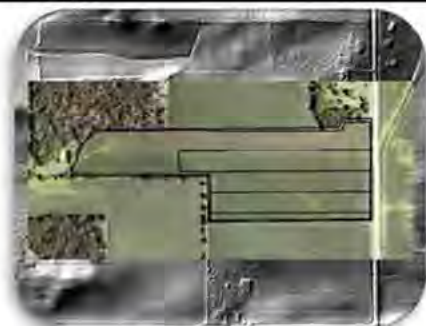
Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Split 152/69 lbs N	242	CBASETnorm	235.6	1.03	na	na	18.5	57.7
Preplant 221 lbs N	242	CBASETalt	233.6	1.04	na	na	19.0	57.3

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Urea: Preplant 124 vs Split 85/40 lbs N/acre

Field Trial ID	CBoSET	Trial	Nitrogen Timing	N source ²	46-0-0
Previous Crop	Corn	County	Olmsted	Cost/ton	\$370
		Township	Salem	46% N cost/lb	\$0.40



2016 NMI

Soil Test Info		Field Info	
Date	5/25/12	Variety	42124
OM%	2.9	Population	34000
pH	6.4	Row Width	30
Nitrogen		Planting Date	DKC 53-56
P (bray)	29	Harvest Date	10/20/16
P (olsen)		Soil Texture	loam
Potassium	204	Tillage	Fall Chisel & Spring FC
Sulfur		Manure History	No
Zinc		Alfalfa History	No
		Irrigated	No

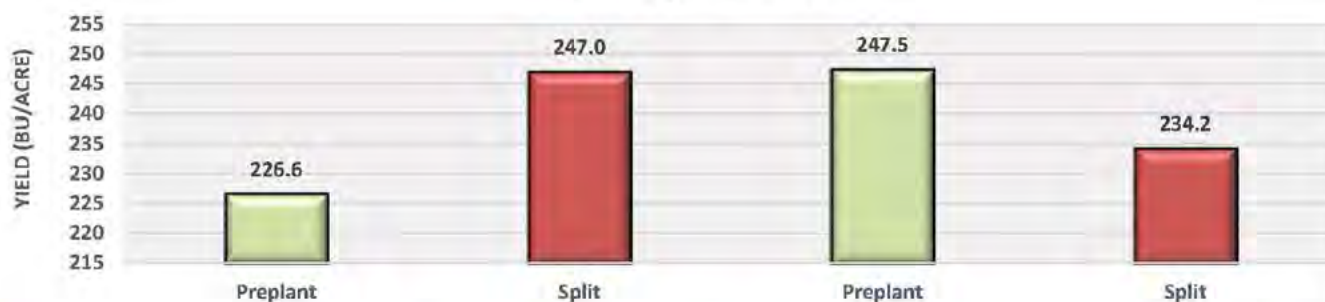
Preplant 124 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$370	270	Preplant Broadcast	124.2				
21-0-0-24	\$379	50	Preplant Broadcast	10			12	
18-46-0	\$465	65	At Planting Band	11	29			
46-0-0	\$370	65	At Planting Band	29				
Totals				174	29	0	12	

Stabilizer Cost / ac \$0

Split 85/40 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$370	184	Preplant Broadcast	84.6				
21-0-0-24	\$379	50	Preplant Broadcast	10			12	
18-46-0	\$465	65	At Planting Band	11	29			
46-0-0	\$370	65	At Planting Band	29				
46-0-0	\$370	86	Sidedress Broadcast	39.6				
Totals				174	29	0	12	

Stabilizer cost / ac \$0

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 124 lbs N	174	CBoSETnorm	237.0	0.73	\$49.68	\$0.21	17.2	56.7
Split 85/40 lbs N	174	CBoSETalt	240.6	0.72	\$49.68	\$0.21	17.9	56.4

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Preplant 82% 135 vs. Split 75 /60 lbs N/acre

Field Trial ID	DJSET	Trial	Nitrogen Timing	N source ²	82-0-0
Previous Crop	Corn	County	Wabasha	Cost/ton	\$565
		Township	Oakwood	82% N cost/lb	\$0.34
				28% N cost/lb	\$0.49



2016 NMI

Soil Test Info	
Date	11/13/13
OM%	2
pH	6
Nitrogen	
P (bray)	19
P (olsen)	
Potassium	115
Sulfur	
Zinc	

Field Info	
Variety	DKC49-72SS
Population	36500
Row Width	30
Planting Date	5/20/16
Harvest Date	10/10/16
Soil Texture	silt loam
Tillage	No-Till
Manure History	No
Alfalfa History	No
Irrigated	No

135 lbs N Preplant			Normal Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
82-0-0	\$565	165	Spring Preplant Band	135				None
7-23-5	\$702	55	At Planting Band	4	13	3		None
21-0-0-24	\$379	100	Spring Preplant Broadcast	21			24	None
18-46-0	\$465	125	Spring Preplant Broadcast	18	46			None
28-0-0	\$275	85	At Planting Dribble	24				None
Totals				202	59	3	24	

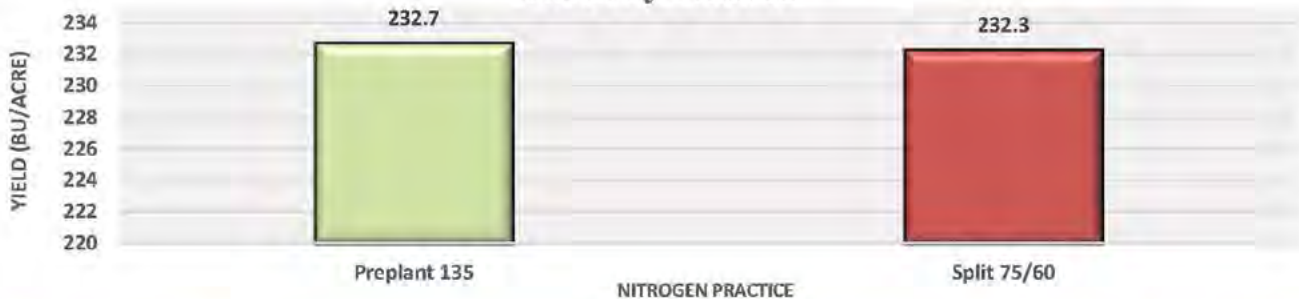
Stabilizer Cost / ac \$0

75 / 60 lbs N Split			Alternative Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
82-0-0	\$565	92	Spring Preplant Band	75				None
7-23-5	\$702	55	At Planting Band	4	13	3		None
21-0-0-24	\$379	100	Spring Preplant Broadcast	21			24	None
18-46-0	\$465	125	Spring Preplant Broadcast	18	46			None
28-0-0	\$275	85	At Planting Dribble	24				None
28-0-0	\$275		Sidedress Dribble	60				None
Totals				202	59	3	24	

Stabilizer cost / ac \$0

Side-dress dribble with Yield360 Y-Drops

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
135 lbs N Preplant	202	DJSETnorm	232.7	0.87	\$45.90	\$0.20	na	na
75 / 60 lbs N Split	202	DJSETalt	232.3	0.87	\$54.96	\$0.24	na	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Urea: Preplant 160 vs Split 110/50 lbs N/acre

Field Trial ID	JBiSET	Trial	Nitrogen Timing	N source ²	46-0-0
Previous Crop	Corn	County	Wabasha	Cost/ton	\$360
		Township	Elgin	46% N cost/lb	\$0.39



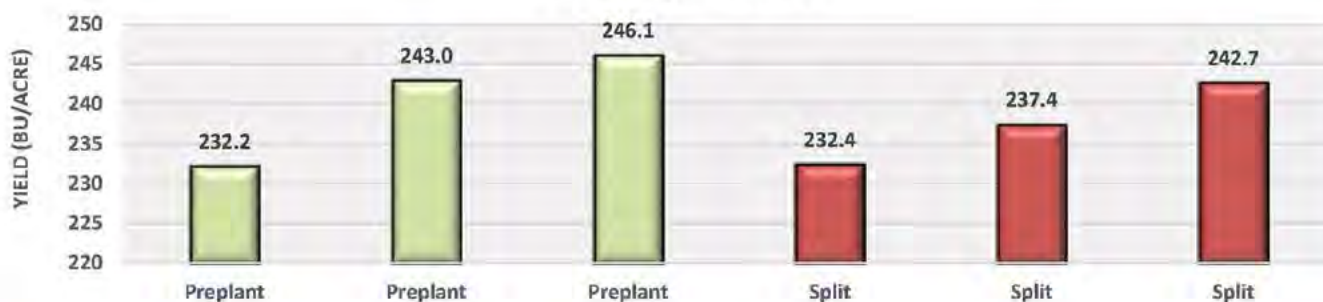
2016 NMI

Soil Test Info		Field Info	
Date	11/13/13	Variety	DKC 53-56 SS
OM%		Population	36100
pH	6.2	Row Width	30
Nitrogen		Planting Date	4/15/15
P (bray)	66	Harvest Date	11/1/16
P (olsen)		Soil Texture	
Potassium	125	Tillage	Conventional
Sulfur		Manure History	No
Zinc		Alfalfa History	No
		Irrigated	No

Preplant 160 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$360	348	Spring Preplant Broadcast	160				Instinct
21-0-0-24	\$379	75	Spring Preplant Broadcast	16			18	Instinct
10-34-0	\$550	40	At Planting Band	4	14			
Totals				180	14	0	18	
Stabilizer Cost / ac		\$0						

Split 110 preplant/50 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$360	348	Spring Preplant Broadcast	110				Agrotain
21-0-0-24	\$379	75	Spring Preplant Broadcast	16			18	
10-34-0	\$550	40	At Planting Band	4	14			
46-0-0	\$360	109	Sidedress Broadcast	50				
Totals				180	14	0	18	
Stabilizer cost / ac		\$0						

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 160 lbs N	180	JBiSETnorm	240.4	0.75	\$62.40	\$0.26	17.2	na
Split 110 preplant/50 lbs N	180	JBiSETalt	237.5	0.76	\$62.40	\$0.26	16.7	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

82-0-0: Preplant 180 vs Split 90/90 UAN lbs N/acre

Field Trial ID	JLSET	Trial	Nitrogen Timing	N source²	82-0-0
Previous Crop	Corn	County	Olmsted	Cost/ton	\$599
		Township	Farmington	82% N cost/lb	\$0.37
				28% N cost/lb	\$0.49



2016 NMI

Soil Test Info		Field Info	
Date	5/21/13	Variety	DKC49-72SS
OM%	3.8	Population	37500
pH	6.4	Row Width	30
Nitrogen		Planting Date	4/19/16
P (bray)	25	Harvest Date	10/14/16
P (olsen)		Soil Texture	silt loam
Potassium	210	Tillage	Conventional
Sulfur		Manure History	No
Zinc		Alfalfa History	No
		Irrigated	No

Preplant 180 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
82-0-0	\$599	220	Spring Preplant Band	180				None
10-34-0	\$550	55	At Planting Band	6	19			
Totals				186	19	0	0	

Stabilizer Cost / ac

\$0

Totals

186

19

0

0

Split 90/90 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
82-0-0	\$599	110	Spring Preplant Band	90				None
10-34-0	\$550	55	At Planting Band	6	19			
28-0-0	\$275	320	Sidedress Dribble	90				
Totals				186	19	0	0	

Stabilizer cost / ac

\$0

Totals

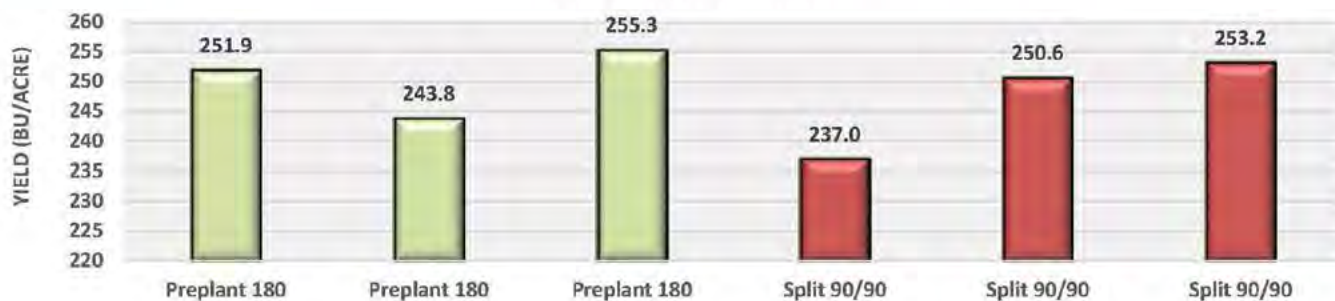
186

19

0

0

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 180 lbs N	186	JLSETnorm	250.3	0.74	\$66.60	\$0.27	17.4	56.7
Split 90/90 lbs N	186	JLSETalt	247.0	0.75	\$77.50	\$0.31	17.5	56.7

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

82%: Preplant 195 vs Split 160/35 Urea lbs N/acre

Field Trial ID	JSSET	Trial	Nitrogen Timing	N source ²	82-0-0
Previous Crop	Corn	County	Fillmore	Cost/ton	\$500
		Township	Fountian	82% N cost/lb	\$0.30
				46% N cost/lb	\$0.59



2016 NMI

Soil Test Info		Field Info	
Date		Variety	Pioneer P9929 AMXT
OM%		Population	34500
pH		Row Width	30
Nitrogen		Planting Date	4/24/16
P (bray)		Harvest Date	
P (olsen)		Soil Texture	
Potassium		Tillage	Conventional
Sulfur		Manure History	No
Zinc		Alfalfa History	No
		Irrigated	No

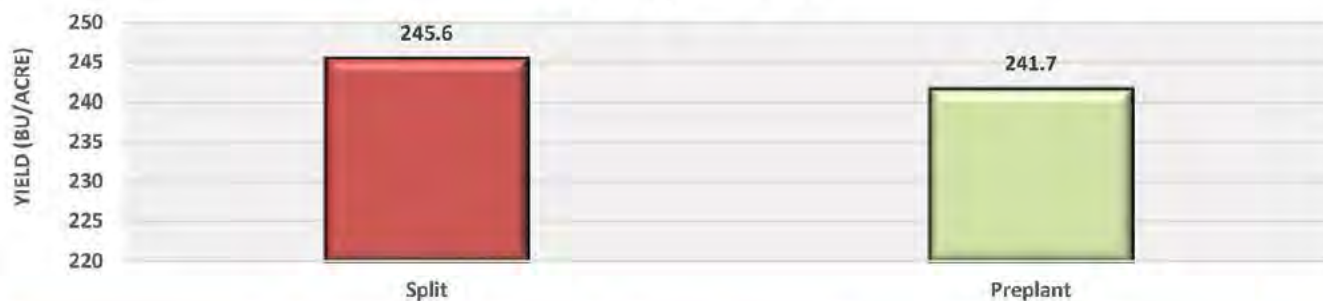
Preplant 195 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
18-46-0	\$540	150	Fall Preplant Broadcast	13.5	69			
0-0-60	\$400	150	Fall Preplant Broadcast			90		
Sulfur	\$760	25	Fall Preplant Broadcast				25	
82-0-0	\$500	238	Spring Preplant Band	195				
10-34-0	\$545	5	At Planting Band	5.9	19.8			
Totals				214	89	90	25	

Stabilizer Cost / ac \$0

Split 160 / 35 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
18-46-0	\$540	150	Fall Preplant Broadcast	13.5	69			
0-0-60	\$400	150	Fall Preplant Broadcast			90		
Sulfur	\$760	25	Fall Preplant Broadcast				25	
82-0-0	\$500	195	Spring Preplant Band	160				
46-0-0	\$545	76	Sidedress Broadcast	34.96				
10-34-0	\$545	5	At Planting Band	5.9	19.8			
Totals				214	89	90	25	

Stabilizer cost / ac \$0

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 195 lbs N	214	JSSETnorm	241.7	0.89	\$58.50	\$0.24	18.0	57.0
Split 160 / 35 lbs N	214	JSSETalt	245.6	0.87	\$68.71	\$0.28	18.0	57.0

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

82-0-0: Preplant 150 vs Split 70/80 Urea lbs N/acre

Field Trial ID	MLSET	Trial	Nitrogen Timing	N source²	82-0-0
Previous Crop	Corn	County	Wabasha	Cost/ton	\$565
		Township	Greenfield	82% N cost/lb	\$0.34
				46% N cost/lb	\$0.40



2016 NMI

Soil Test Info

Date	10/10/12
OM%	
pH	6.4
Nitrogen	
P (bray)	24
P (olsen)	
Potassium	129
Sulfur	
Zinc	

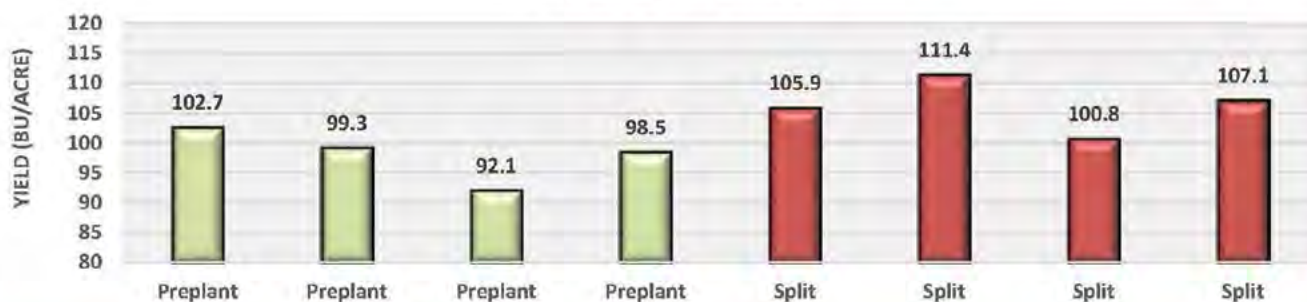
Field Info

Variety	DKC 46-36 SS
Population	29500
Row Width	30
Planting Date	4/23/16
Harvest Date	9/29/16
Soil Texture	sandy loam
Tillage	Conventional
Manure History	No
Alfalfa History	No
Irrigated	No

Preplant 150 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
82-0-0	\$565	180	Spring Preplant Band	150				N-Serve
18-46-0	\$465	75	At Planting Band	13.5	34.5			
0-0-60	\$365	75	At Planting Band			45		
21-0-0-24	\$379	50	At Planting Band	10.5			12	
Stabilizer Cost / ac				\$0				
Totals				174	35	45	12	

Split 70/80 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
82-0-0	\$565	85	Spring Preplant Band	70				
18-46-0	\$465	75	At Planting Band	13.5	34.5			
0-0-60	\$365	75	At Planting Band			45		
21-0-0-24	\$379	50	At Planting Band	10.5			12	
46-0-0	\$370	175	Sidedress Broadcast	80				Agrotain
Stabilizer cost / ac				\$0				
Totals				174	35	45	12	

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 150 lbs N	174	MLSETnorm	98.1	1.77	\$51.00	\$0.52	15.3	55.0
Split 70/80 lbs N	174	MLSETalt	106.3	1.64	\$55.97	\$0.53	15.3	56.6

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

28% UAN: Preplant 97 vs Split 32/65 lbs N/acre

Field Trial ID	RNSET	Trial	Nitrogen Timing	N source ²	28-0-0
Previous Crop	Com	County	Olmsted	Cost/ton	na
		Township	Orion	46% N cost/lb	na
				28% N cost/lb	na



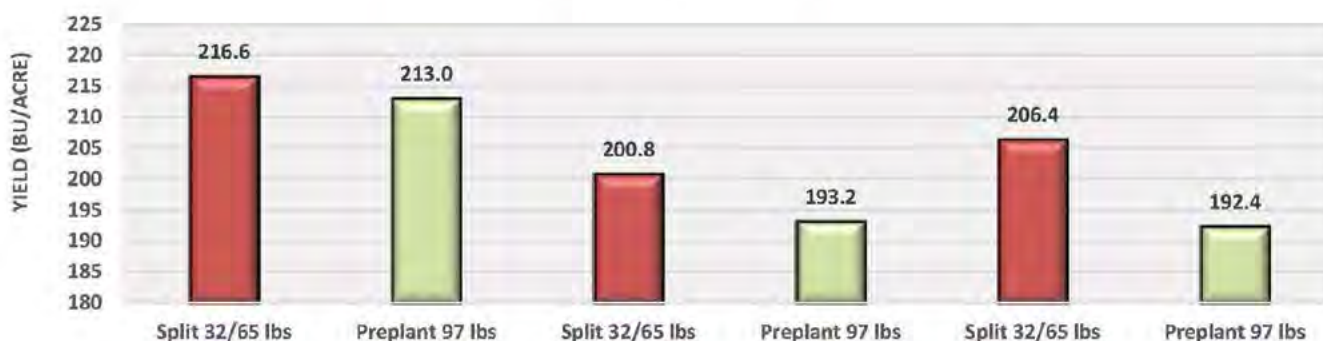
2016 NMI

Soil Test Info		Field Info	
Date	5/15/13	Variety	
OM%	1.8	Population	36000
pH	6.5	Row Width	30
Nitrogen		Planting Date	5/1/16
P (bray)	10	Harvest Date	November 9 2016
P (olsen)		Soil Texture	loam
Potassium	100	Tillage	No-Till
Sulfur		Manure History	No
Zinc		Alfalfa History	No
		Irrigated	No

Preplant 97 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
28-0-0		349	At Planting Band	97				
10-34-0		58	At Planting Band	6	20			
Stabilizer Cost / ac				\$0	Totals			
				103	20	0	0	

Split 32/65 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
28-0-0		116	At Planting Band	32				
46-0-0		141	Sidedress Broadcast	65	20			
10-34-0		58	At Planting Band	6				
Stabilizer cost / ac				\$0	Totals			
				103	20	0	0	

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 97 lbs N	103	RNSETnorm	199.6	0.52	na	na	19.0	na
Split 32/65 lbs N	103	RNSETalt	208.0	0.50	na	na	19.1	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Urea: Spring Preplant 148 vs Split 68/80 lbs N/acre

Field Trial ID	TBrSET	Trial	Nitrogen Timing	N source²	46-0-0
Previous Crop	Corn	County	Dakota	Cost/ton	\$375
		Township	Waterford	Urea N cost/lb	\$0.41



2016 NMI

Soil Test Info

Date	4/15/15
OM%	4.2
pH	u index 6.5
Nitrogen	
P (bray)	15
P (olsen)	
Potassium	101
Sulfur	
Zinc	

Field Info

Variety	DeKalb 4929
Population	32000
Row Width	30
Planting Date	5/2/16
Harvest Date	11/2/16
Soil Texture	loam/silt loam
Tillage	Fall Chisel & Spring FC
Manure History	No
Alfalfa History	No
Irrigated	No

Preplant Urea 148 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$375	321	Spring Preplant Broadcast	148				Instinct
18-46-0	\$500	112	Spring Preplant Broadcast	20	50			
0-0-60	\$347	167	Spring Preplant Broadcast			100		
21-0-0-24	\$394	65	Spring Preplant Broadcast	13.6			15	
Totals				182	50	100	15	

Stabilizer Cost / ac

\$0

Totals

182 50 100 15

Split Urea 68 / 80 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$375	152	Spring Preplant Broadcast	68				Instinct
18-46-0	\$500	112	Spring Preplant Broadcast	20	50			
0-0-60	\$347	167	Spring Preplant Broadcast			100		
21-0-0-24	\$394	65	Spring Preplant Broadcast	13.6			15	
46-0-0	\$375	174	Sidedress Broadcast	80				Instinct
Totals				182	50	100	15	

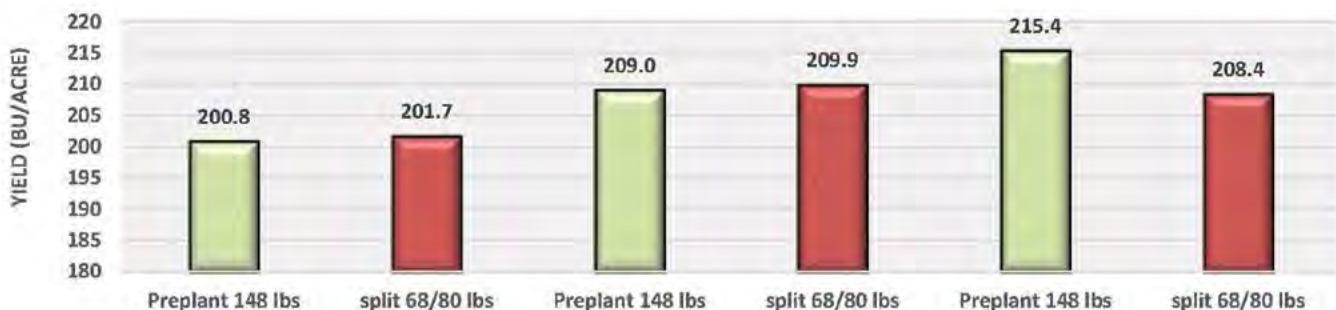
Stabilizer cost / ac

\$0

Totals

182 50 100 15

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant Urea 148 lbs N	182	TBrSETnorm	208.4	0.87	\$60.68	\$0.29	18.1	56.7
Split Urea 68 / 80 lbs N	182	TBrSETalt	206.7	0.88	\$60.68	\$0.29	17.9	57.0

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Spring Preplant 160 vs 110/50 lbs N/acre split

Field Trial ID	TBSET	Trial	Nitrogen Timing	N source ²	46-0-0
Previous Crop	Corn	County	Wabasha	Cost/ton	\$360
		Township	Elgin	46% N cost/lb	\$0.39



2016 NMI

Soil Test Info		Field Info	
Date	11/13/13	Variety	DKC 53-56 SS
OM%		Population	36100
pH	6.2	Row Width	30
Nitrogen		Planting Date	4/15/15
P (bray)	66	Harvest Date	11/1/16
P (olsen)		Soil Texture	
Potassium	125	Tillage	Conventional
Sulfur		Manure History	No
Zinc		Alfalfa History	No
		Irrigated	No

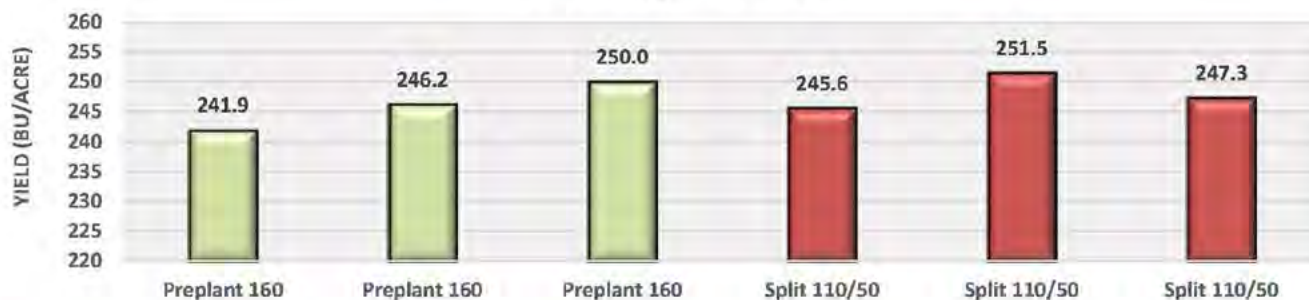
Preplant 160 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$360	348	Spring Preplant Broadcast	160				Instinct
21-0-0-24	\$379	75	Spring Preplant Broadcast	16			18	Instinct
10-34-0	\$550	40	At Planting Band	4	14			
Totals				180	14	0	18	

Stabilizer Cost / ac \$0

Split 110 preplant/50 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$360	239	Spring Preplant Broadcast	110				
21-0-0-24	\$379	75	Spring Preplant Broadcast	16			18	
10-34-0	\$550	40	At Planting Band	4	14			
46-0-0	\$360	109	Sidedress Broadcast	50				Agrotain
Totals				180	14	0	18	

Stabilizer cost / ac \$0

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 160 lbs N	180	TBSETnorm	246.1	0.73	\$62.40	\$0.25	0.0	0.0
Split 110 preplant/50 lbs N	180	TBSETalt	248.1	0.73	\$62.40	\$0.25	0.0	0.0

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

82-0-0: Preplant 140 lbs N/acre with N-Serve

Field Trial ID	MCSES	Trial	Nitrogen Stabilizer	N source ²	82-0-0
Previous Crop	Corn	County	Wabasha	Cost/ton	\$565
		Township	Plainview	82% N cost/lb	\$0.34



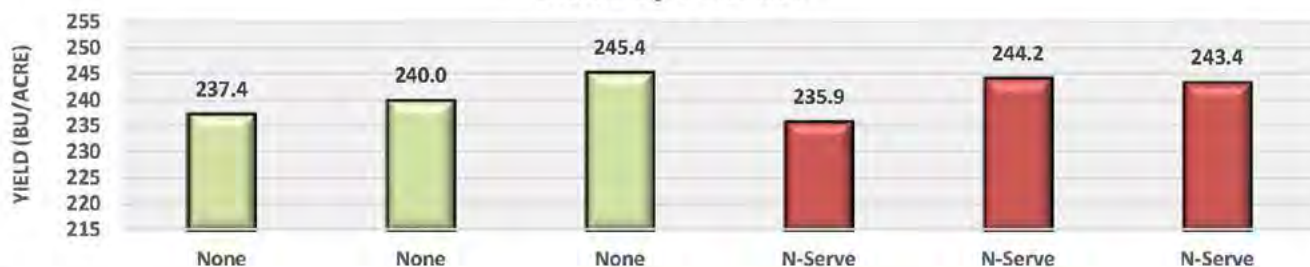
2016 NMI

Soil Test Info		Field Info	
Date	4/8/15	Variety	DKC 44-13 SS
OM%	3.1	Population	34500
pH	6.9	Row Width	30
Nitrogen		Planting Date	4/23/16
P (bray)	72	Harvest Date	10/5/16
P (olsen)		Soil Texture	silt loam
Potassium	244	Tillage	Conventional
Sulfur		Manure History	Yes
Zinc		Alfalfa History	No
		Irrigated	No

No N-Serve with AA preplant				Normal Practice					
source	cost	rate	application	N	P	K	S	stabilizer	
Manure Credits Year 1		20 ton	Previous Credits	30					
82-0-0	\$565	170	Spring Preplant Band	140				None	
18-46-0	\$465	60	At Planting Band	11	28				
0-0-60	\$365	140	At Planting Band			84			
21-0-0-24	\$379	50	At Planting Band	10.5			12		
Stabilizer Cost / ac				\$0	Totals				192 28 84 12

N-Serve with AA preplant				Alternative Practice					
source	cost	rate	application	N	P	K	S	stabilizer	
Manure Credits Year 1		20 ton	Previous Credits	30					
82-0-0	\$565	170	Spring Preplant Band	140				N-Serve	
18-46-0	\$465	60	At Planting Band	11	28				
0-0-60	\$365	140	At Planting Band			84			
21-0-0-24	\$379	50	At Planting Band	10.5			12		
Stabilizer cost / ac				\$12.50	Totals				192 28 84 12

Yields By Practice



Practice	Stabilizer	ID	Yield	NUE ¹	Stabilizer cost per acre ²	% MT	Test Weight
No N-Serve with AA preplant	None	MCSESnorm	240.9	0.79	\$0.00	18.3	56.3
N-Serve with AA preplant	N-Serve	MCSESalt	241.2	0.79	\$12.50	18.2	56.7

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

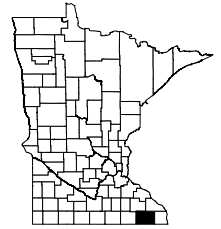
² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Effect of Nitrogen Rate and Application Timing on 2016 Corn Yield

Grand Meadow South Site, Mower County, Minnesota

Parameter	Plot Details
Test:	Nitrogen rate and timing
Previous Crop:	Soybeans
Hybrid:	Pioneer PO157
Tillage System:	Conventional tillage
N Applic. / Plant Date:	April 15, 2016 / April 16, 2016
N Source:	Urea-broadcast-incorporate
Sidedress Date/Form:	June 13, 2016, UAN 28% row
Population:	34,000 planted/33,000 actual
Plot Design:	Randomized (CRD), 4 reps.

Soil Fertility Measure	Plot Values
Soil Type:	Tripoli Silty Clay Loam
O.M.%:	5.8% (high)
pH:	6.8 (5.8-7.0 normal)
CEC:	25.4 meq/100 g
Bray P1:	14 ppm (medium)
Potassium:	129 ppm (high)



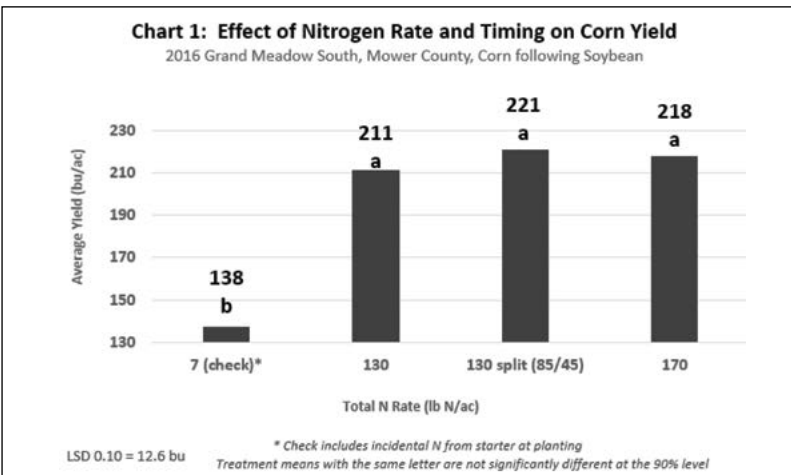
Avg of treatments, grid sampled at 0-6" depth in 2015

Grand Meadow Weather Station Measure	April-June	July-Sept
2% of normal precipitation:	-6%	62%
% of days with more than 1.0" rainfall:	3%	9%

Maximum Return To Nitrogen (MRTN) is the nitrogen rate that optimizes net profit. Rates near the MRTN can also reduce risk of nitrate-nitrogen leaching to groundwater and surface water.

To determine the MRTN rate, spring 2016 market prices of **0.40/lb N** fertilizer and **\$3.50/bu** corn were entered into an on-line tool called the [Corn Nitrogen Rate Calculator](#). The corn following soybean recommendation at these prices is to apply between **102-129 lb N/ac** with a likely best rate of **115 lb N/ac**. Normal N application rates on this farm is **170 lb N/ac** at preplant.

This study evaluated whether 40 lb N/ac less nitrogen at preplant or when split applied is more efficient and profitable. **Results indicated that the 130 lb N/ac split rate had the highest yield, net profit and nitrogen use efficiency. There were no statistically significant yield differences between the lower and higher rate treatments.** This was likely the result of optimal early season precipitation conditions.



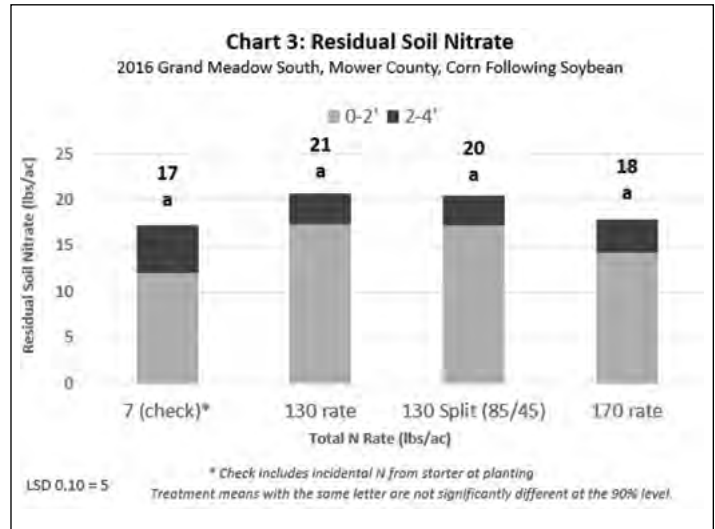
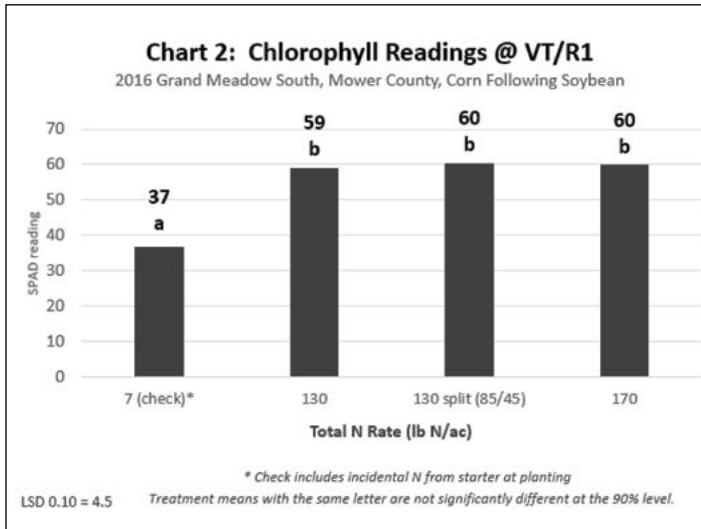
2016 Economics							
Total N Rate (lb N/ac)	Timing	Average Yield (bu/ac) LSD = 12.6	Average Moisture (%) LSD = 0.3	Drying Cost (\$/ac)	N Cost (\$/ac)	Net Return (\$/ac)	Profit Rank
7 (check)*		138 (b)	19.1 (a)	\$17	\$4	\$394	
130	Preplant	211 (a)	19.4 (a)	\$28	\$55	\$551	2
130 (85/45)	Preplant +V5	221 (a)	20.0 (b)	\$33	\$58	\$562	1
170	Preplant	218 (a)	19.8 (b)	\$31	\$71	\$551	3

ASSUMPTIONS: Corn price \$3.00/bu. (avg. Oct. 2016 price), 0.42/lb urea, 0.49/lb for UAN 28% at V4. A \$0.03/bu. deduction was used for every moisture point over 15.0%. Extra application costs associated with the in-season split application had an assumed cost of \$10/ac. Treatment means with the same letter in the respective column are not significantly different at a 90% confidence level. Least significant difference (LSD) is the amount needed for one treatment mean to be considered statistically different from another treatment mean. *The check treatment received 7 lb N/ac of incidental N from 10-34-0 starter at planting.

A collaborative project between the Minnesota Department of Agriculture and CHS of Ostrander/Grand Meadow

December 2016, Kevin Kuehner

Effect of Nitrogen Rate on 2016 Chlorophyll and Residual Soil Nitrogen Tests



- Chlorophyll readings collected at VT/R1 showed there was no significant differences detected between the three nitrate rate treatments. (chart 2).
- Preplant soil nitrate levels (PPNT) collected in early April before any fertilizer was applied to the plot measured **33 lb N/ac** at 0-1 foot depth. Presidedress nitrate tests (PSNT) collected at the same depth at V2 growth stage within the split rate treatments averaged **21 ppm** (84 lb N/ac). Assuming a critical value of 25 ppm nitrate, the N recommendation was 32 additional lb N/ac.
- Soil nitrogen samples collected at the end of the season indicate how much nitrogen was left over (chart 3). Higher residual soil nitrate (RSN) levels could increase nitrate-nitrogen leaching risk to groundwater and surface water. The amount of RSN measured after harvest was very low and ranged from **18-21 lb N/ac**. The RSN concentrations did not relate well to the different N rate and timing treatments. This was unexpected as one may expect higher RSN with higher nitrogen rates. A possible explanation for this can be explained by the above normal rainfall totals in August and September. Excessive rainfall during this time period could have leached most of the residual nitrate from the profile, resulting in undetectable differences between treatments.

Nitrogen Uptake and Use Efficiency

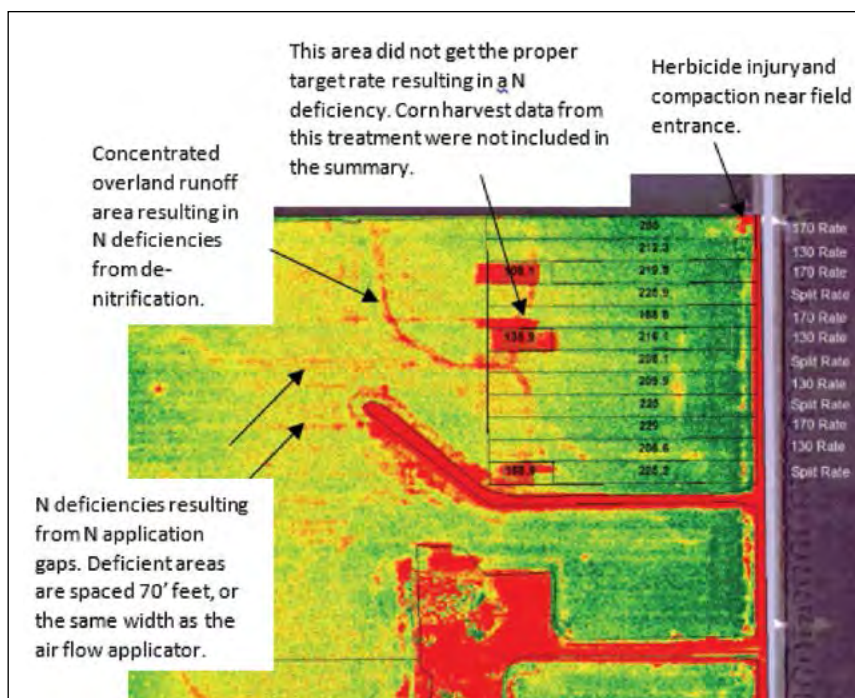
Total N Rate lbs N/ac	Yield bu/ac	Check yield as % of treatment yield bu/lb N	N Supplied by Soil %	Total N uptake in grain and stover bu/lb N	FRE1 %	PFP2 bu/lb N	PFPP23 lb N/bu	AE4 bu/lb N
7 (control)	138 (b)			66*				
130	211 (a)	65%	49%	135	53 (a)	1.6	0.6	1.1
130 split (85/45)	221 (a)	62%	45%	146	62 (a)	1.7	0.6	1.2
170	218 (a)	63%	44%	150	50(a)	1.3	0.8	0.9

1(FRE) Fertilizer Recovery Efficiency= $\frac{\text{Uptake}(\text{rate}) - \text{Uptake}(\text{control})}{\text{N rate}}$. Assumes fertilizer only gets credit for the increase in N uptake. Assumes N content in roots and cob are negligible. 2(PFP) Partial Factor Productivity = $\frac{\text{Yield}(\text{rate})}{\text{N rate}}$, 3(PFP2)= $\frac{\text{Uptake}(\text{rate})}{\text{Yield}(\text{rate})}$ 4 (AE) Agronomic Efficiency= $\frac{\text{Yield}(\text{rate}) - \text{Yield}(\text{control})}{\text{N rate}}$ Column titles in bold were tested for significance. Values with the same letters are not statistically significant at the 90% level. *Excludes incidental N that may be in the control.

- The total corn N uptake in the grain and stover for the zero rate check was **66 lb N/ac**. This is an indication of how much **N was supplied by the soil**. Across all treatments about 50% of the corn N uptake was from the soil.
- The amount of N fertilizer recovered (FRE) ranged from **50-62%** with the highest recovery from the 130 split rate treatment.
- The 130 lbs N/ac preplant and split treatment produced **1.6-1.7 bu/lb of N** applied while the 170 rate produced **1.3 bu/lb of N** applied.

December 2016, Kevin Kuehner

Imagery @R4/R5



High resolution imagery (0.5 meter true color, color infrared and passive NDVI) were collected on August 6th, 2016 using a fixed wing aircraft. This information was used to verify N application locations, general health of the corn crop and identify other potential variables that could have impacted yield results. For instance, the imagery was very helpful in identifying N deficiency in one of the 170 lb N/ac rate treatments due to an applicator issue. This treatment was excluded from the study due to abnormally low yields (29 bushels below the means of the other three replications).

In-Season Nitrogen Prediction Model combined with Soil Nitrogen Testing

N Rate (lbs/ac)	April 13 2016	June 1 2016	July 22 2016	August 8 2016	October 6 2016	October 19 2016
130 Pre-Plant	33 lbs/ac PPNT*	+17 lbs/ac excess (Range of +5 to +30)	+20 lbs/ac excess (Range of +10 to +30)	+20 lbs/ac excess (Range of +10 to +30)	+18 lbs/ac excess (Range of +10 to +30)	21 lbs/ac RSN*
130 Split (85/45)	33 lbs/ac PPNT*	PSNT=21 ppm resulting in N rec of 32 additional lbs N/ac at sidedress. -17lbs/ac deficit (Range of 0 to -35)	+23 lbs/ac excess (Range of +10 to +35) June 13, 2016 45 lbs/ac of N applied.	+23 lbs/ac excess (Range of +10 to +35)	+22 lbs/ac excess (Range of +15 to +30)	20 lbs/ac RSN*
170 Pre-Plant (normal practice)	33 lbs/ac PPNT*	+33 lbs/ac excess (Range of +20 to +50)	+34 lbs/ac excess (Range of +20 to +50)	+37 lbs/ac excess (Range of +25 to +45)	+37 lbs/ac excess (Range of +25 to +45)	18 lbs/ac RSN*

In season N prediction model inputs- 103 day corn, 35,000 population, silty clay loam soil, 210 bu/ac yield goal, reduced tillage/
*Reflects actual soil nitrate test results collected from the field and not results predicted from the model.

Generally, the model appeared to predict the optimal amount of in-season N to apply for the 130 lb N/ac split treatment. **One management approach that may work well for producers in Mower County is to apply MRTN rates at preplant or at planting and use soil nitrate testing combined with other in-season N prediction tools to determine how much, if any, additional in-season N may be needed.**

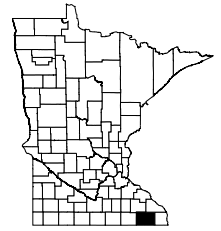
December 2016, Kevin Kuehner

Effect of Nitrogen Rate and Application Timing on 2016 Corn Yield

Grand Meadow North Site, Mower County, Minnesota

Parameter	Plot Details
Test:	Nitrogen rate and timing
Previous Crop:	Soybean
Hybrid:	Dekalb DKC 53-56 RIB
Tillage System:	Conventional tillage
N Applic. / Plant Date:	April 15, 2016 / April 18, 2016
N Source:	Urea-bdcast with NBPT (Agrotain Ultra)
Sidedress Date/Form:	June 2, 2016, Urea-broadcast
Population:	35,300 planted/33,600 actual
Plot Design:	Randomized block (CRBD), 4 reps.

Soil Fertility Measure	Plot Values
Soil Type:	Tripoli Silty Clay Loam
O.M.%:	8.4% (very high)
pH:	6.5 (5.8-7.0 normal)
CEC:	37.6 meq/100 g
Bray P1:	29 ppm (very high)
Potassium:	172 ppm (very high)



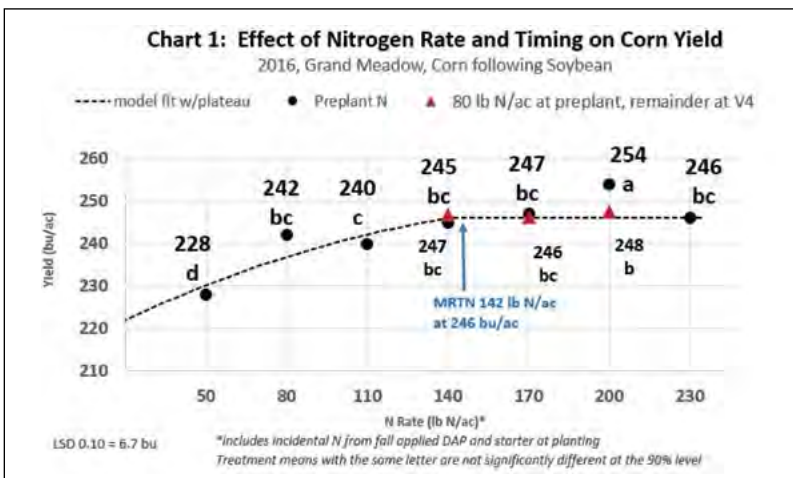
Avg of treatments sampled at 0-6" depth on 4/13/16

Maximum Return To Nitrogen (MRTN) is the rate that optimizes net profit. Rates near the MRTN can also reduce risk of nitrate-nitrogen leaching to groundwater and surface water.

To determine the MRTN rate, spring 2016 market prices of **0.40/lb N** fertilizer and **\$3.50/bu** corn were entered into an on-line tool called the [Corn Nitrogen Rate Calculator](#). The corn following soybean recommendation at these prices is to apply between **102-129 lb N/ac** with a likely best rate of **115 lb N/ac**. The normal N application rate to this field is **170-190 lb N/ac**.

Chart 1 shows the corn yield and nitrogen rate relationship for this plot. Using this curve, the calculated MRTN was **142 lb N/ac** with a yield of **246 bu/ac**. Due to minimal early season leaching rains, split N applications did not increase yield. Net returns using actual 2016 prices can be seen in the economics table below.

Grand Meadow Weather Station Measure	April-June	July-Sept
% of normal precipitation:	-6%	62%
% of days with more than 1.0" rainfall:	3%	9%



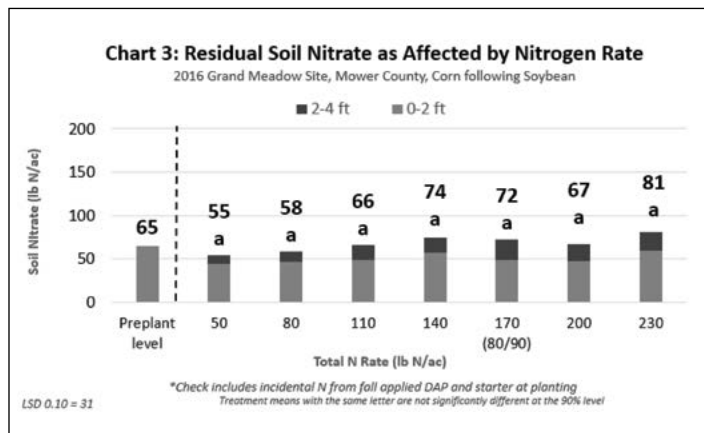
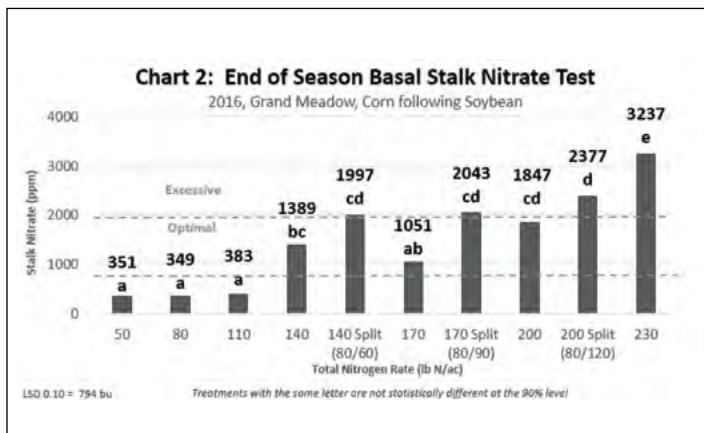
2016 Economics							
Total N Rate (lb N/ac)	Timing	Average Yield (bu/ac) LSD = 6.7	Average Moisture (%) LSD = 0.4	Drying Cost (\$/ac)	N Cost (\$/ac)	Net Return (\$/ac)	Profit Rank
50 (check)*	Preplant	228 (d)	21.0 (de)	\$41	\$20	\$622	7
80	Preplant	242 (bc)	20.1 (a)	\$37	\$32	\$658	1
110	Preplant	237 (c)	20.2 (ab)	\$37	\$44	\$630	6
140	Preplant	245 (bc)	20.5 (bc)	\$40	\$56	\$638	3
140 (80/60)	Preplant + V4	247 (bc)	20.5 (bc)	\$41	\$64	\$636	4
170	Preplant	247(bc)	20.2 (ab)	\$39	\$68	\$634	5
170 (80/90)	Preplant + V4	246 (bc)	21.2 (e)	\$45	\$76	\$617	8
200	Preplant	254 (a)	20.7(cde)	\$44	\$80	\$639	2
200 (80/120)	Preplant + V4	247 (b)	20.6(bcd)	\$41	\$88	\$613	9
230	Preplant	246 (bc)	20.5 (bc)	\$41	\$92	\$607	10

COLOR KEY = #1 Rank

Assumptions: Corn price \$3.00/bu. (avg. Oct. 2016 price), and .40/lb urea. A \$.03/bu. deduction was used for every moisture point over 15.0%. Extra application costs associated with the in-season split application had an assumed cost of \$8/ac. Treatment means with the same letter in the respective column are not significantly different at the 90% level. Least significant difference (LSD) is the amount needed to be considered statistically different from the treatment mean.

February 2017, Kevin Kuehner, Jeff Vetsch

A collaborative project between the University of Minnesota, Minnesota Department of Agriculture and CPS of Grand Meadow
Effect of Nitrogen Rate on 2016 Stalk Nitrate and Residual Soil Nitrogen Tests



- The optimal range for the end of season basal stalk nitrate test is 700-2,000 ppm. Stalk nitrate concentrations below 700 ppm may indicate nitrogen deficiencies while levels above 2,000 ppm may indicate excessive nitrogen. Tests were highly variable, but generally showed that rates between **140-170 lb N/ac** were optimal, while rates above **200 lb N/ac** were significantly different and considered excessive (chart 2).
- Preplant soil nitrate levels collected in early April prior to spring N treatment application (some N was applied with fall DAP) measured **65 lb N/ac**.
- Soil nitrate samples collected at the end of the season indicate how much nitrogen was left over (chart 3). Higher residual soil nitrate (RSN) levels could increase nitrate-nitrogen leaching risk to groundwater and surface water. The amount of RSN measured after harvest at 4' depth were similar across all treatments and averaged **68 lb N/ac**. Excessive rains late in the season, 62% above normal, likely leached away any potential differences.

Nitrogen Uptake and Use Efficiency

N Rate lbs N/ac	Average Yield bu/ac LSD = 8	Total Corn N Uptake lbs N/ac	N Supplied by Soil %	N Fertilizer Recovery %	Bushels produced per unit of N bu/lb N
50 (check)*	228 (d)				
80	242 (bc)				4.4 (f)
110	237 (c)				2.3 (e)
140	245 (bc)				1.6 (d)
140 (80/60)	247 (bc)		Due to the significant amount of incidental N sources in the test plot and the check (50 lb N/ac), these particular NUE indices were not calculated.		1.5 (d)
170	247(bc)				1.1 (c)
170 (80/90)	246 (bc)				1.1 (c)
200	254 (a)				0.9 (b)
200 (80/120)	247 (b)				0.9 (b)
230	246 (bc)				0.8 (a)

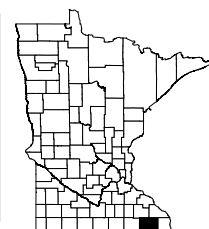
February 2017, Kevin Kuehner, Jeff Vetsch

Effect of Nitrification Inhibitor on 2016 Corn Yield

Fountain Site, Fillmore County, Minnesota

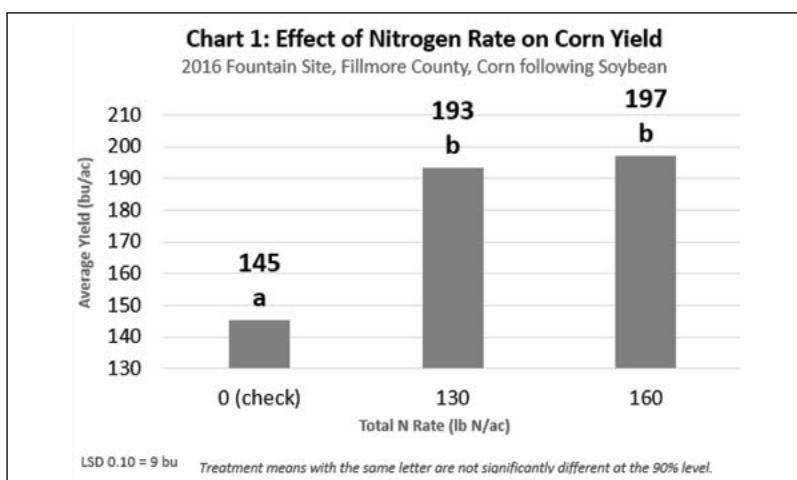
Parameter	Plot Details
Test:	Nitrogen rate
Previous Crop:	Soybeans
Hybrid:	Titan Pro 40-03 (conventional)
Tillage System:	No Till
N Applic. Date:	June 2, 2016
Plant Date:	April 25, 2016
N source:	Anhydrous ammonia at V4
Population:	36,000 planted/33,000 actual
Plot Design:	Randomized (CRD) 3 reps.

Soil Fertility Measure	Plot Values
Soil Type:	Fayette Silt Loam
O.M.%:	3.1 % (medium)
pH:	7.0 (5.8-7.0 normal)
Bray P1:	38 ppm (very high)
Potassium:	186 ppm (very high)



Sampled at 0-6" depth on 10/25/15

Grand Meadow Weather Station Measure	April-June	July-Sept
Avg. % of normal precipitation:	+2%	+97%
% of days with more than 1.0" rainfall:	3%	10%



Maximum Return To Nitrogen (MRTN) is the nitrogen rate that optimizes net profit. Rates near the MRTN can also reduce risk of nitrate-nitrogen leaching to groundwater and surface water.

To determine the MRTN rate, spring 2016 market prices of **0.40/lb N** fertilizer and **\$3.50/bu** corn were entered into an on-line tool called the Corn Nitrogen Rate Calculator. The recommendation at these prices is to apply between **102-129 lb N/ac** with a likely best rate of **115 lb N/ac**. Normal N application rates on this farm are **130 lb N/ac** at preplant.

This study evaluated whether an additional **30 lb N/ac** of in-season N had a yield advantage over the producers normal rate.

2016 results showed there was no significant difference between the higher and lower N rate.

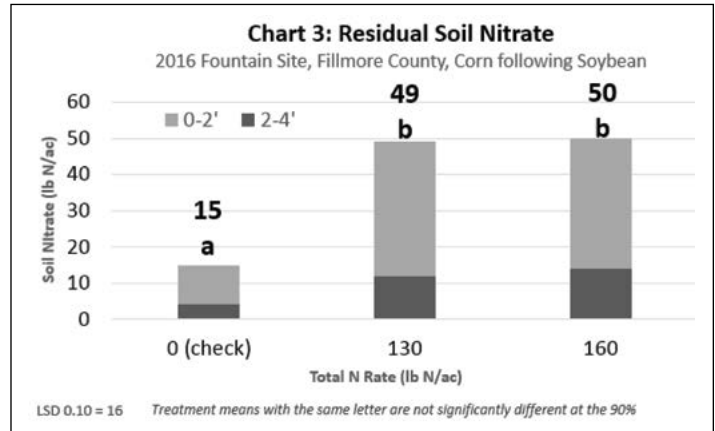
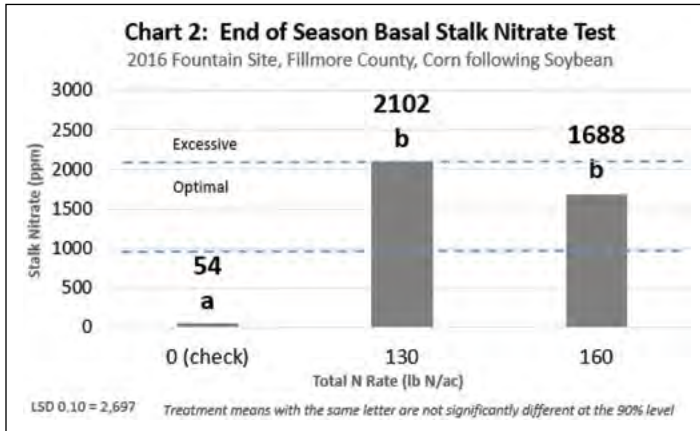
2016 Economics						
Total N Rate (lb N/ac)	Timing	Average Yield (bu/ac) LSD = 9	Average Moisture (%) LSD = 0.5	Drying Cost (\$/ac)	N Cost (\$/ac)	Net Return (\$/ac)
0 (check)*		145 (a)	20.7 (a)	\$1	\$25	\$410
130	@V4	193 (b)	20.8 (a)	\$2	\$34	\$503
160	@V4	197 (b)	20.9 (a)	\$1	\$35	\$503

ASSUMPTIONS: Corn price assumes \$3.00/bu. (avg. Oct. 2016 price) and 0.33/lb anhydrous ammonia (avg. April price). A \$0.03/bu. deduction was used for every moisture point over 15.0%. Treatment means with the same letter in the respective column are not significantly different at a 90% confidence level. Least significant difference (LSD) is the amount needed for one treatment mean to be considered statistically different from another treatment mean.

NMI is a collaborative project between farmers of southeast Minnesota, Minnesota Department of Agriculture and University of Minnesota Extension

December 2016

Effect of Nitrogen Inhibitor on 2016 Stalk Nitrate and Residual Soil Nitrogen Tests



- The optimal range for the end of season basal stalk nitrate test is 700-2,000 ppm. Stalk nitrate concentrations below 700 ppm may indicate nitrogen deficiencies while levels above 2,000 ppm may indicate excessive nitrogen. Tests showed that both treatments were near the optimal category and there was no significant difference between the treatments (chart 2).
- Preplant soil nitrate levels collected in early April prior to spring N treatment application measured **41 lb N/ac** at 0-2 foot depth. Pre sidedress soil nitrate test (PSNT) levels at V4 crop growth, before anhydrous N was applied, averaged **39 lb N/ac** (9.8 ppm) at 0-1 foot depth across both treatments.
- Soil nitrogen samples collected at the end of season indicate how much nitrogen was left over (chart 3). Higher residual soil nitrate (RSN) levels could increase nitrate-nitrogen leaching risk to groundwater and surface water. The amount of RSN at a depth of four feet measured after harvest ranged from **49-50 lb N/ac** in the treatments and **15 lb N/ac** in the check. Most of the RSN was detected in the upper two feet. There was no significant difference between treatments. Any potential differences between the different N rates was likely removed by the excessive rains late in the season (97% above normal).

Nitrogen Uptake and Use Efficiency

N Rate lbs N/ac	Average Yield bu/ac LSD = 9	Total Corn N Uptake lbs N/ac	N Supplied by Soil %	N Fertilizer Recovery %	Bushels produced per unit of N bu/lb N
0 (check)*	146 (a)	69			
130	193 (b)	111	62%	32%	1.5
160	197 (b)	117	59%	59%	1.5

Least significant difference (LSD) is the amount needed to be considered statistically different from the treatment mean. Treatment means with the same letter in the respective column are not significantly different at the 90% level.

- The total corn N uptake in the grain and stover for the zero rate check was **69 lbs N/ac**. This is an indication of how much **N was supplied by the soil**. Across both treatments 59-61% of the corn N uptake was from the soil.
- The amount of N fertilizer recovered by both treatments was similar and ranged from **30-32%**.
- Both treatments **produced 1.5 bu. per lb of N applied**.

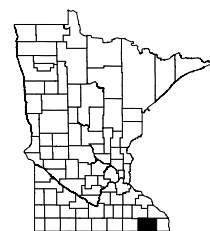
NMI is a collaborative project between farmers of southeast Minnesota, Minnesota Department of Agriculture and University of Minnesota Extension
December 2016

Effect of Nitrification Inhibitor on 2016 Corn Yield

Elgin Site, Olmstead County, Minnesota

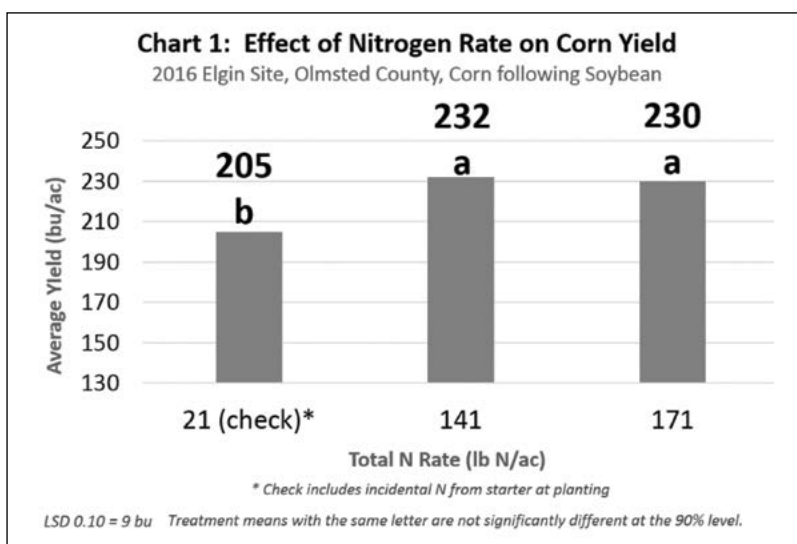
Parameter	Plot Details
Test:	Nitrogen rate
Previous Crop:	Soybeans
Hybrid:	Dekalb 5358
Tillage System:	Conventional
N Applic. Date:	April 14, 2016
Plant Date:	April 16, 2016
N source:	Anhydrous ammonia
Population:	34,000 planted/32,917 actual
Plot Design:	Randomized (CRD), three reps.

Soil Fertility Measure	Plot Values
Soil Type:	Port Byron Silt Loam
O.M.%:	3.5 % (high)
pH:	6.7 (5.8-7.0 normal)
Bray P1:	28 ppm (very high)
Potassium:	163 ppm (very high)



Avg. of treatments, grid sampled 0-6" depth

Grand Meadow Weather Station Measure	April-June	July-Sept
Avg. % of normal precipitation:	-8%	+40%
% of days with more than 1.0" rainfall:	1%	7%



Maximum Return To Nitrogen (MRTN) is the nitrogen rate that optimizes net profit. Rates near the MRTN can also reduce risk of nitrate-nitrogen leaching to groundwater and surface water.

To determine the MRTN rate, spring 2016 market prices of **0.40/lb N** fertilizer and **\$3.50/bu** corn were entered into an on-line tool called the Corn Nitrogen Rate Calculator. The recommendation at these prices is to apply between **102-129 lb N/ac** with a likely best rate of **115 lb N/ac**. Normal N application rates on this farm is **170 lb N/ac** at preplant.

This study evaluated if there were any yield differences with **30 lb N/ac** less nitrogen when compared to the normal rate at this farm.

2016 results indicated there was no significant difference in yield between the lower and higher N rate.

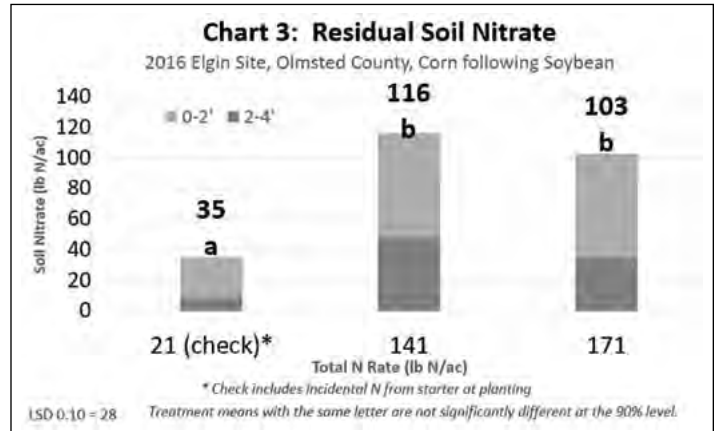
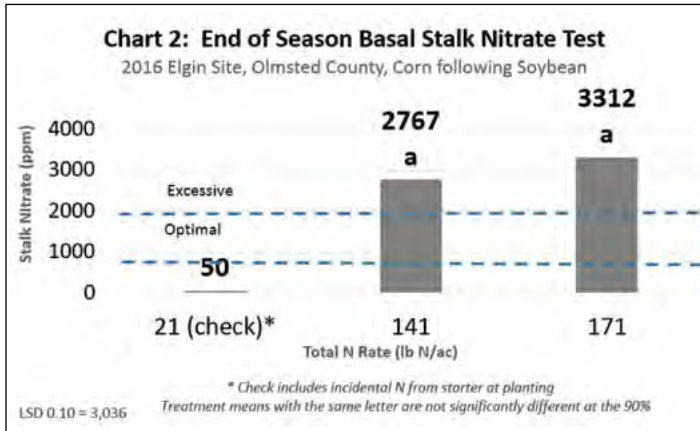
2016 Economics							
Total N Rate (lb N/ac)	Timing	Average Yield (bu/ac) LSD = 9	Average Moisture (%) LSD = 1.3	Drying Cost (\$/ac)	N Cost (\$/ac)	Net Return (\$/ac)	Profit Rank
21 (check)*		204 (a)	19.2 (a)	\$26	\$7	\$579	
141	Preplant	231 (b)	19.8 (a)	\$33	\$47	\$613	1
171	Preplant	229 (b)	19.5 (a)	\$31	\$56	\$600	2

ASSUMPTIONS: Corn price \$3.00/bu. (avg. Oct. 2016 price) and 0.33/lb anhydrous ammonia (avg. April price). A \$0.03/bu. deduction was used for every moisture point over 15.0%. Treatment means with the same letter in the respective column are not significantly different at a 90% confidence level. Least significant difference (LSD) is the amount needed for one treatment mean to be considered statistically different from another treatment mean.*The check treatment received 21 lb N/ac of incidental N from 28-0-0 and 10-34-0 starter at planting.

NMI is a collaborative project between farmers of southeast Minnesota, Minnesota Department of Agriculture and University of Minnesota Extension

December 2016

Effect of Nitrogen Inhibitor on 2016 Stalk Nitrate and Residual Soil Nitrogen Tests



- The optimal range for the end of season basal stalk nitrate test is 700-2,000 ppm. Stalk nitrate concentrations below 700 ppm may indicate nitrogen deficiencies while levels above 2,000 ppm may indicate excessive nitrogen. Tests showed that both the 141 and 171 lb N/ac rates were in the excessive test category. There were no significant differences detected between the 141 and 171 lb N/ac treatments (chart 2).
- Preplant soil nitrate (PPNT) levels collected in early April prior to spring N treatment application measured **42 lb N/ac** at 0-2 foot depth. Pre-sidedress nitrate test (PSNT) samples collected at V4 to a depth of 0-1 foot averaged **109 and 141 lb N/ac** (27.3 and 35.3 ppm) respectively for the 141 and 171 lb N/ac treatments.
- Soil nitrogen samples collected at the end of the season indicate how much nitrogen was left over (chart 3). Higher residual soil nitrate (RSN) levels could increase nitrate-nitrogen leaching risk to groundwater and surface water. **The amount of RSN measured after harvest down to four feet, was very high and ranged from 103-116 lb N/ac** in the treatments. For comparison, typical RSN levels after harvest when using MRTN rates is about 75 lb N/ac or less in a corn/soybean rotation at a depth of five feet under normal rainfall conditions.
- There were no statistically significant RSN differences detected between the 141 and 171 lb N/ac treatments. Any potential differences between N treatment rates could have been removed due to excessive rains late in the season (+40%).

2016 Nitrogen Uptake and Use Efficiency

N Rate lbs N/ac	Average Yield bu/ac LSD = 9	Total Corn N Uptake lbs N/ac	N Supplied by Soil %	N Fertilizer Recovery %	Bushels produced per unit of N bu/lb N
21 (check)*	204 (a)	71**			
141	231 (b)	135	68%	45%	1.6
171	229 (b)	134	69%	37%	1.3

Least significant difference (LSD) is the amount needed to be considered statistically different from the treatment mean. Treatment means with the same letter in the respective column are not significantly different at the 90% level. *The check treatment received 21 lb N/ac of incidental N from 28-0-0 and 10-34-0 starter at planting. **Excludes incidental commercial N that may be in the control. Note that incidental N rates above 10 lb N/ac in the control may increase uncertainty in how much N is provided by the soil.

- The total corn N uptake in the grain and stover for the zero rate check was **71 lb N/ac**. This is an indication of how much **N was supplied by the soil**. Across all treatments an estimated **68%** of the corn N uptake was supplied from the soil.
- The amount of N fertilizer recovered by the 141 lb N/ac treatment was **45%**. The amount of N fertilizer recovered by the higher 171 lb N/ac rate averaged **37% or 8 percentage point lower nitrogen use efficiency**.
- The 141 lb N/ac treatment **produced 0.3 bu/ac more corn** per unit of N when compared to the higher N rate.

82%: Preplant 150 vs 110 lbs N/acre

Field Trial ID	CUSER	Trial	Nitrogen Rate	N source ²	82-0-0
Previous Crop	Soybeans	County	Olmsted	Cost/ton	\$580
		Township	Viola	82% N cost/lb	\$0.35



2016 NMI

Soil Test Info

Date	10/20/12
OM%	3.2
pH	6.7
Nitrogen	
P (bray)	29
P (olsen)	
Potassium	142
Sulfur	
Zinc	

Field Info

Variety	DKC 46-37 VT2P
Population	34000
Row Width	30
Planting Date	4/24/16
Harvest Date	11/15/16
Soil Texture	silt loam
Tillage	Conventional
Manure History	No
Alfalfa History	No
Irrigated	No

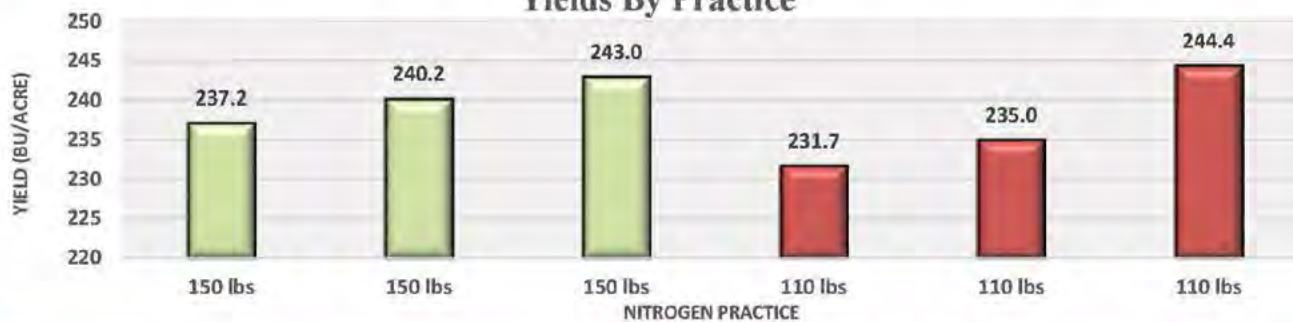
150 lbs N preplant			Normal Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
82-0-0	\$580	150	Spring Preplant Band	150				
18-46-0	\$480	50	At Planting Band	9	23			
0-0-60	\$380	100	At Planting Band			60		
21-0-0-24	\$379	50	At Planting Band	10.5			12	
Totals				170	23	60	12	

Stabilizer Cost / ac \$0

110 lbs N preplant			Alternative Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
82-0-0	\$580	110	Spring Preplant Band	110				
18-46-0	\$480	50	At Planting Band	9	23			
0-0-60	\$380	100	At Planting Band			60		
21-0-0-24	\$379	50	At Planting Band	10.5			12	
Totals				130	23	60	12	

Stabilizer cost / ac \$0

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
150 lbs N preplant	170	CUSERnorm	240.1	0.71	\$53.05	\$0.22	14.0	56.7
110 lbs N preplant	130	CUSERalt	237.1	0.55	\$38.90	\$0.16	13.9	56.8

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

28% UAN: Sidedress 0 vs 50 lbs N/acre

Field Trial ID	GLSER	Trial	Nitrogen Rate	N source ²	28-0-0
Previous Crop	Soybeans	County	Wabasha	Cost/ton	\$279
		Township	Elgin	28% N cost/lb	\$0.50



2016 NMI

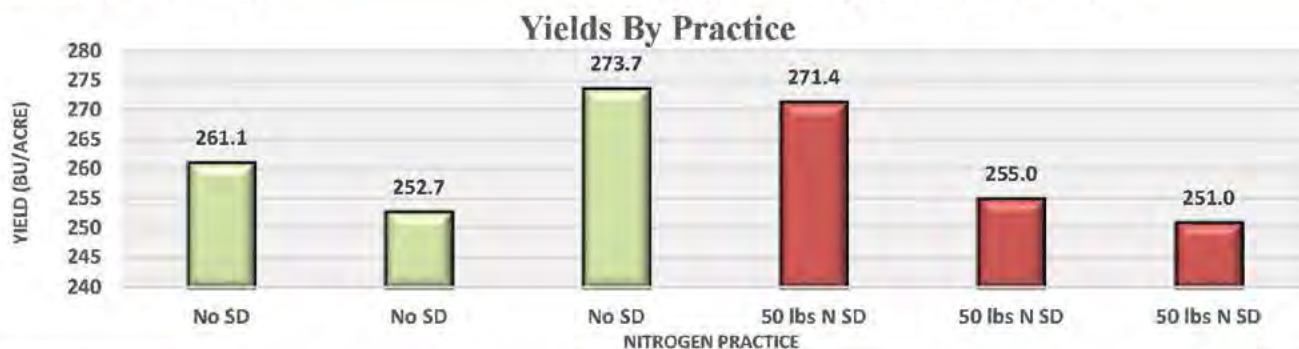
Soil Test Info		Field Info	
Date	5/21/13	Variety	DKC54-40VT2P
OM%	3.3	Population	37500
pH	6.6	Row Width	30
Nitrogen		Planting Date	4/16/16
P (bray)	85	Harvest Date	10/22/16
P (olsen)		Soil Texture	silt loam
Potassium	180	Tillage	Conventional
Sulfur		Manure History	No
Zinc		Alfalfa History	No
		Irrigated	No

0 lbs N sidedress			Normal Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
82-0-0	\$565	140	Other	130				None
10-34-0	\$550	55	At Planting Band	6	19			None
Totals				136	19	0	0	

Stabilizer Cost / ac \$0

50 lbs N sidedress			Alternative Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
82-0-0	\$565	140	Other	130				None
10-34-0	\$550	55	At Planting Band	6	19			None
28-0-0	\$279	178	Sidedress Dribble	50				
Totals				186	19	0	0	

Stabilizer cost / ac \$0



Rate AND Timing differences.

Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
0 lbs N sidedress	136	GLSERnorm	262.5	0.52	\$0.00	\$0.00	18.5	57.3
50 lbs N sidedress	186	GLSERalt	259.1	0.72	\$24.91	\$0.10	18.6	57.7

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Preplant Urea: 133 vs 103 lbs N/acre

Field Trial ID	JMSER	Trial	Nitrogen Rate	N source ²	46-0-0
Previous Crop	Soybeans	County	Olmsted	Cost/ton	\$375
		Township	Dover	46% N cost/lb	\$0.41



2016 NMI

Soil Test Info		Field Info	
Date		Variety	DK 44-13
OM%	3.7	Population	36400
pH	6.3	Row Width	20
Nitrogen		Planting Date	4/13/16
P (bray)	45	Harvest Date	10/15/16
P (olsen)		Soil Texture	silt loam
Potassium	241	Tillage	Spring Tillage Only
Sulfur		Manure History	No
Zinc	2.5	Alfalfa History	No
		Irrigated	No

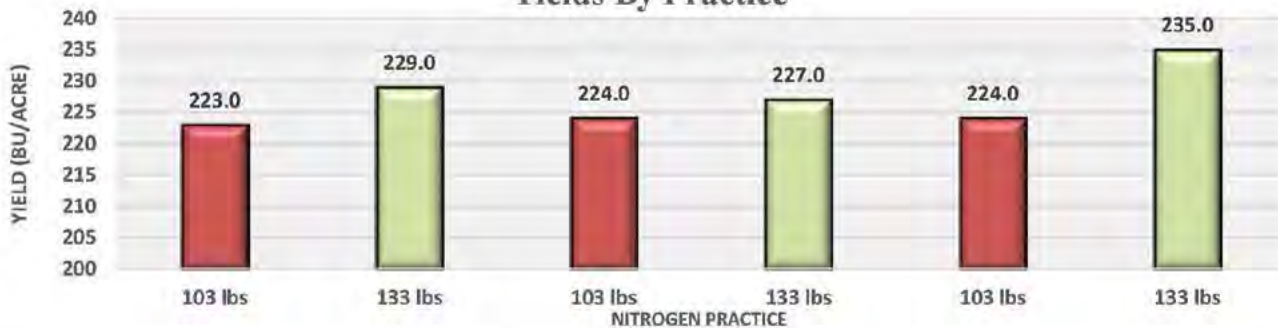
133 lbs N preplant				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$375	290	Spring Preplant Broadcast	133.4	0	0		
21-0-0-24	\$372	100	Spring Preplant Broadcast	21	0	0	24	
Hydra-Hume	\$2,300	10	Spring Preplant Broadcast					
10-34-0	\$577	70	At Planting Band	7	24	0		
Totals				161	24	0	24	

Stabilizer Cost / ac \$0

103 lbs N preplant				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$375	225	Spring Preplant Broadcast	103.4	0	0		
21-0-0-24	\$372	100	Spring Preplant Broadcast	21	0	0	24	
Hydra-Hume	\$2,300	10	Spring Preplant Broadcast					
10-34-0	\$577	70	At Planting Band	7	24	0		
Totals				131	24	0	24	

Stabilizer cost / ac \$0

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
133 lbs N preplant	161	JMSERnorm	230.3	0.70	\$54.69	\$0.24	18.0	na
103 lbs N preplant	131	JMSERalt	223.6	0.59	\$42.39	\$0.19	18.0	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Urea: Preplant 154 vs 119 vs 189 lbs N/acre

Field Trial ID	RKSER	Trial	Nitrogen Rate	N source ²	46-0-0
Previous Crop	Soybeans	County	Winona	Cost/ton	\$380
		Township	Utica	46% N cost/lb	\$0.41



2016 NMI

Soil Test Info

Date	10/4/13
OM%	2.4
pH	6.7
Nitrogen	
P (bray)	28
P (olsen)	
Potassium	167
Sulfur	
Zinc	

Field Info

Variety	LG 5470
Population	33800
Row Width	30
Planting Date	4/17/16
Harvest Date	
Soil Texture	loam
Tillage	Conventional
Manure History	No
Alfalfa History	No
Irrigated	No

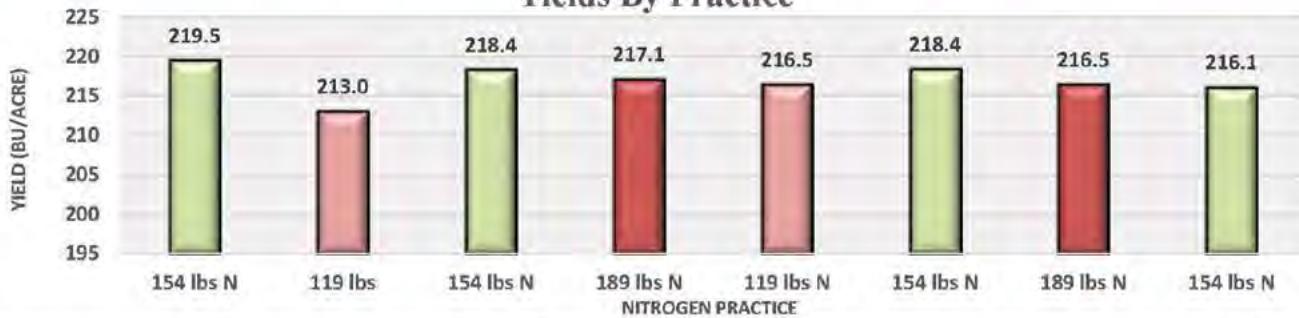
154 lbs N preplant			Normal Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
10-34-0	\$585	5	At Planting Band	6	20			
46-0-0	\$380	335	Spring Preplant Broadcast	154				
21-0-0-24	\$355	50	Spring Preplant Broadcast	10.5			12	
18-46-0	\$495	30	Spring Preplant Broadcast	5.4	13.8			
0-0-60	\$380	100	Spring Preplant Broadcast			60		
Totals				176	34	60	12	

Stabilizer Cost / ac \$0

119 lbs N preplant			Alternative Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
10-34-0	\$585	5	At Planting Band	6	20			
46-0-0	\$380	411	Spring Preplant Broadcast	118.7				
21-0-0-24	\$355	50	Spring Preplant Broadcast	10.5			12	
18-46-0	\$495	30	Spring Preplant Broadcast	5.4	13.8			
0-0-60	\$380	100	Spring Preplant Broadcast			60		
Totals				141	34	60	12	

Stabilizer cost / ac \$0

Yields By Practice



Also applied a high rate of 189 lbs N/acre.

Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
154 lbs N preplant	176	RKSERnorm	218.1	0.81	\$63.61	\$0.29	17.7	55.6
119 lbs N preplant	141	RKSERalt	214.8	0.65	\$49.03	\$0.23	17.6	55.7
189 lbs N preplant	211	RKSERalt2	216.8	0.97	\$78.07	\$0.36	17.7	55.5

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

82-0-0: Sidedress 130 vs 160 lbs N/acre

Field Trial ID	SESER	Trial	Nitrogen Rate	N source ²	82-0-0
Previous Crop	Soybeans	County	Fillmore	Cost/ton	\$500
		Township	Fountain	82% N cost/lb	\$0.30



2016 NMI

Soil Test Info

Date	10/21/15
OM%	3.1
pH	6.98
Nitrogen	
P (bray)	38
P (olsen)	
Potassium	186
Sulfur	
Zinc	

Field Info

Variety	
Population	36000
Row Width	30
Planting Date	
Harvest Date	
Soil Texture	
Tillage	No-Till
Manure History	Yes
Alfalfa History	No
Irrigated	No

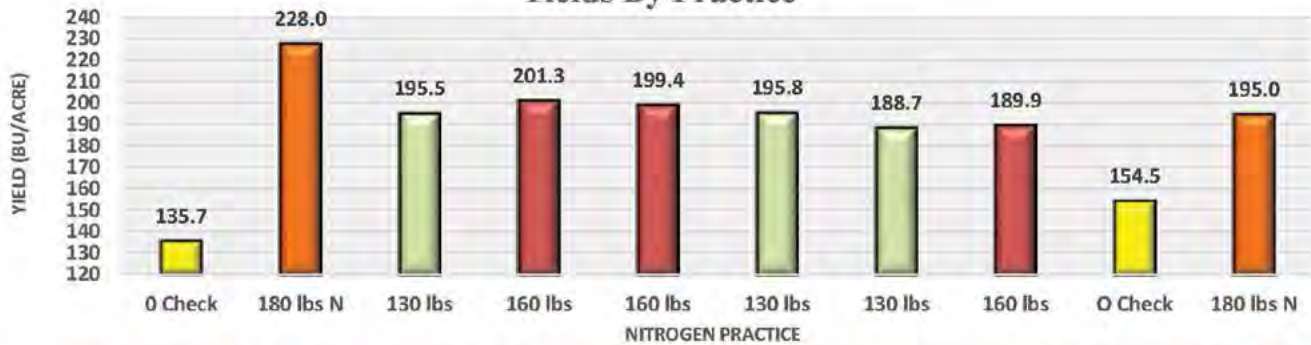
130 lbs N sidedress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
82-0-0	\$500	158	Sidedress Band	130	0	0		

Stabilizer Cost / ac	\$0	Totals	130	0	0	0
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160 lbs N sidedress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
82-0-0	\$500	195	Sidedress Band	160	0	0		

Stabilizer cost / ac	\$0	Totals	160	0	0	0
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Yields By Practice



SE MN N BMP high end plot, has 2 180 lbs N/acre non limiting strips behind the O check strips.

Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
130 lbs N sidedress	130	SESERNorm	193.3	0.67	\$39.63	\$0.21	20.8	53.0
160 lbs N sidedress	160	SESERalt	196.9	0.81	\$48.78	\$0.25	20.7	52.7
180 lbs N sidedress	180		211.5	0.85	\$54.88	\$0.26	20.5	53.0

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Preplant Urea: 133 vs 104 lbs N/acre

Field Trial ID	SVSER	Trial	Nitrogen Rate	N source ²	46-0-0
Previous Crop	Soybeans	County	Olmsted	Cost/ton	\$375
		Township	Dover	46% N cost/lb	\$0.41

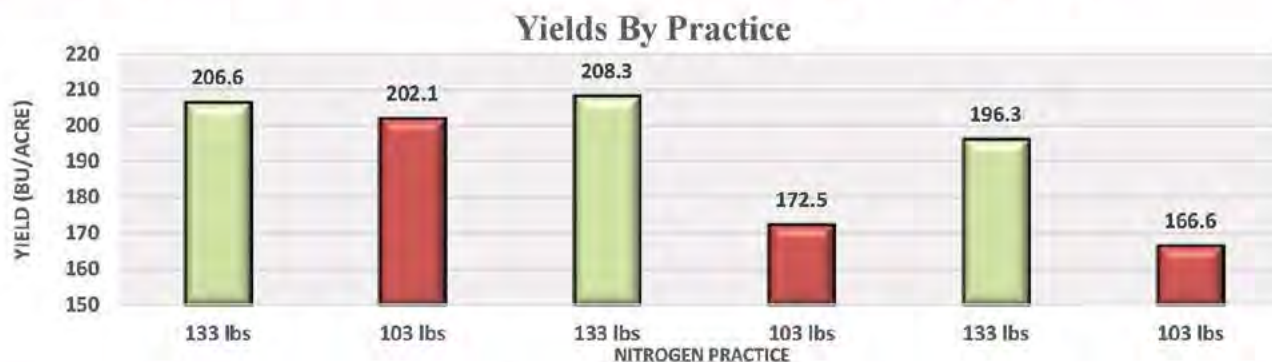


2016 NMI

Soil Test Info		Field Info	
Date		Variety	DK 46-37
OM%	1.7	Population	35500
pH	6.9	Row Width	20
Nitrogen		Planting Date	4/13/16
P (bray)	11	Harvest Date	11/3/16
P (olsen)		Soil Texture	silty clay loam
Potassium	101	Tillage	Spring Tillage Only
Sulfur		Manure History	No
Zinc	0.62	Alfalfa History	No
		Irrigated	No

133 lbs N preplant				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$375	290	Spring Preplant Broadcast	133.4	0	0		
21-0-0-24	\$372	100	Spring Preplant Broadcast	21	0	0	24	
Hydra-Hume	\$2,300	10	Spring Preplant Broadcast					
10-34-0	\$577	70	At Planting Band	7	24	0		
Stabilizer Cost / ac				\$0				
Totals				161	24	0	24	

104 lbs N preplant				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$375	225	Spring Preplant Broadcast	103.5	0	0		
21-0-0-24	\$372	100	Spring Preplant Broadcast	21	0	0	24	
Hydra-Hume	\$2,300	10	Spring Preplant Broadcast					
10-34-0	\$577	70	At Planting Band	7	24	0		
Stabilizer cost / ac				\$0				
Totals				132	24	0	24	



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
133 lbs N preplant	161	SVSERnorm	203.7	0.79	\$54.69	\$0.27	19.2	na
104 lbs N preplant	132	SVSERalt	180.4	0.73	\$42.44	\$0.24	19.4	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

28% UAN: Preplant 122 vs Split 78/46 Urea lbs N/acre

Field Trial ID	CGSET	Trial	Nitrogen Timing	N source ²	28-0-0
Previous Crop	Soybeans	County	Fillmore	Cost/ton	na
		Township	Sumner	28% N cost/lb	na
				46% N cost/lb	na



2016 NMI

Soil Test Info

Date	4/24/12
OM%	3
pH	6.3
Nitrogen	
P (bray)	20
P (olsen)	
Potassium	100
Sulfur	
Zinc	

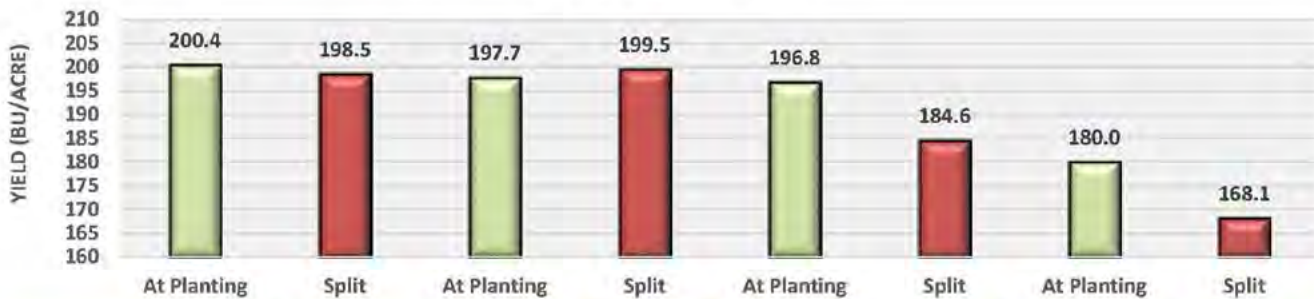
Field Info

Variety	DKC 49-72
Population	35500
Row Width	30
Planting Date	April 24 2016
Harvest Date	October 3 2016
Soil Texture	loam
Tillage	No-Till
Manure History	No
Alfalfa History	No
Irrigated	No

At Planting 122 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
28-0-0		437	At Planting Band	122				
12-0-0-26		33	At Planting Band	4			8.5	
Totals				126	0	0	9	
Stabilizer Cost / ac		\$0						

Split 78/46 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
28-0-0		279	At Planting Band	78				
12-0-0-26		19.8	At Planting Band	2.3			5	
46-0-0		100	Sidedress Broadcast	46				
Totals				126	0	0	5	
Stabilizer cost / ac		\$0						

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
At Planting 122 lbs N	126	CGSETnorm	193.7	0.65	na	na	19.0	na
Split 78/46 lbs N	126	CGSETalt	187.7	0.67	na	na	19.2	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Urea: Preplant 138 vs Split 69/69 lbs N/acre

Field Trial ID	COSET	Trial	Nitrogen Timing	N source²	46-0-0
Previous Crop	Soybeans	County	Houston	Cost/ton	\$385
		Township	Yucatan	46% N cost/lb	\$0.42



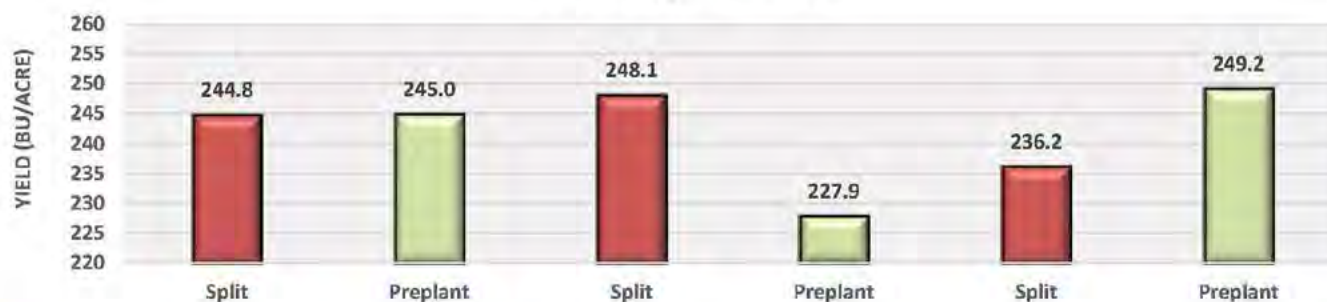
2016 NMI

Soil Test Info		Field Info	
Date		Variety	DKC 53-58
OM%		Population	34000
pH		Row Width	30
Nitrogen		Planting Date	4/22/16
P (bray)		Harvest Date	11/4/16
P (olsen)		Soil Texture	
Potassium		Tillage	Conventional
Sulfur		Manure History	No
Zinc		Alfalfa History	No
		Irrigated	No

Preplant 138 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$385	300	Spring Preplant Broadcast	138				Instinct
21-0-0-24	\$365	100	Spring Preplant Broadcast	21				Instinct
0-0-60	\$390	100	Spring Preplant Broadcast			60		
7-23-5	\$727	44	Sidedress Dribble	3	10	2.2		
Totals				162	10	62	0	
Stabilizer Cost / ac		\$0						

Split 69/69 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$385	150	Spring Preplant Broadcast	69				Instinct
21-0-0-24	\$365	100	Spring Preplant Broadcast	21				Instinct
0-0-60	\$390	50	Spring Preplant Broadcast			30		
7-23-5	\$727	44	Sidedress Dribble	3	10	2.2		
46-0-0	\$385	150	Sidedress Broadcast	69				Agrotain Ultra
0-0-60	\$390	50	Sidedress Broadcast			30		
Totals				162	10	62	0	
Stabilizer cost / ac		\$0						

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 138 lbs N	162	COSETnorm	240.7	0.67	\$57.96	\$0.24	16.5	52.3
Split 69/69 lbs N	162	COSETalt	243.1	0.67	\$57.96	\$0.24	16.7	51.8

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Urea: Preplant 104 vs. Split 53/51 lbs N/acre

Field Trial ID	DTSET	Trial	Nitrogen Timing	N source²	46-0-0
Previous Crop	Soybeans	County	Olmsted	Cost/ton	\$370
		Township	Viola	46% N cost/lb	\$0.40



2016 NMI

Soil Test Info		Field Info	
Date	11/29/13	Variety	DKC 50-84 VT2P
OM%	3.5	Population	34000
pH	7.3	Row Width	30
Nitrogen		Planting Date	5/4/16
P (bray)	17	Harvest Date	10/21/16
P (olsen)		Soil Texture	silt loam
Potassium	126	Tillage	Conventional
Sulfur		Manure History	No
Zinc		Alfalfa History	No
		Irrigated	No

Preplant 104 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$370	225	Spring Preplant Broadcast	103.5				
18-46-0	\$475	150	Spring Preplant Broadcast	27	69			
21-0-0-24	\$379	50	Spring Preplant Broadcast	10.5			12	
0-0-60	\$335	75	Spring Preplant Broadcast			45		
18-46-0	\$475	50	At Planting Band	9	23			
0-0-60	\$335	50	At Planting Band			30		
Totals				150	92	75	12	

Stabilizer Cost / ac

\$0

Totals

150

92

75

12

Split 53/51 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$370	115	Spring Preplant Broadcast	53				
18-46-0	\$475	150	Spring Preplant Broadcast	27	69			
21-0-0-24	\$379	50	Spring Preplant Broadcast	10.5			12	
0-0-60	\$335	75	Spring Preplant Broadcast			45		
18-46-0	\$475	50	At Planting Band	9	23			
0-0-60	\$335	50	At Planting Band			30		
46-0-0	\$370	110	Sidedress Broadcast	50.5				Agrotain
Totals				150	92	75	12	

Stabilizer cost / ac

\$0

Totals

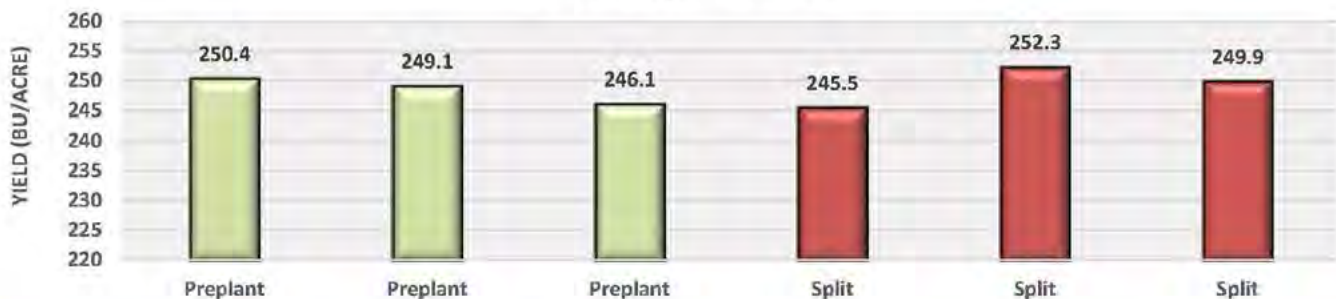
150

92

75

12

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 104 lbs N	150	DTSETnorm	248.5	0.60	\$41.40	\$0.17	17.1	57.3
Split 53/51 lbs N	150	DTSETalt	249.3	0.60	\$41.40	\$0.17	17.0	57.9

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

28% UAN: Preplant 139 vs Split 92/47 lbs N/acre

Field Trial ID	ETSET	Trial	Nitrogen Timing	N source ²	28-0-0
Previous Crop	Soybeans	County	Olmsted	Cost/ton	na
		Township	Rock Dell	46% N cost/lb	na
				28% N cost/lb	na



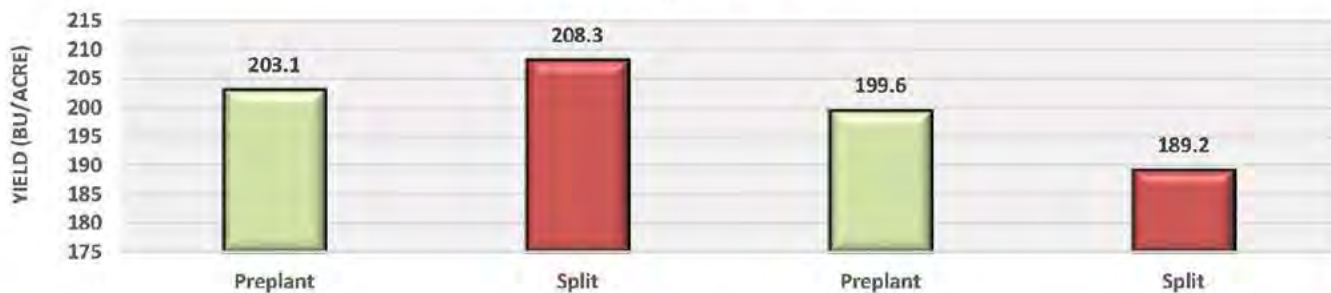
2016 NMI

Soil Test Info		Field Info	
Date	5/25/16	Variety	
OM%	2.3	Population	34000
pH	6.3	Row Width	30
Nitrogen		Planting Date	5/5/16
P (bray)	11	Harvest Date	11/5/16
P (olsen)		Soil Texture	loam
Potassium	108	Tillage	Conventional
Sulfur		Manure History	No
Zinc		Alfalfa History	No
		Irrigated	No

Preplant 139 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
28-0-0		496	Spring Preplant Dribble/Spray	139				
10-34-0		69.6	At Planting Band	7	23.6			
Totals				146	24	0	0	
Stabilizer Cost / ac		\$0						

Split 92/47 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
28-0-0		328	Spring Preplant Dribble/Spray	92				
46-0-0		104	Sidedress Broadcast	47	23.6			
10-34-0		69.6	At Planting Band	7				
Totals				146	24	0	0	
Stabilizer cost / ac		\$0						

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 139 lbs N	146	ETSETnorm	201.4	0.73	na	na	0.0	0.0
Split 92/47 lbs N	146	ETSETalt	198.8	0.73	na	na	0.0	0.0

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

82-0-0: Preplant 130 vs Split 90/40 Urea lbs N/acre

Field Trial ID	KUSET	Trial	Nitrogen Timing	N source²	82-0-0
Previous Crop	Soybeans	County	Olmsted	Cost/ton	\$580
		Township	Dover	82% N cost/lb	\$0.35
				46% N cost/lb	\$0.40



2016 NMI

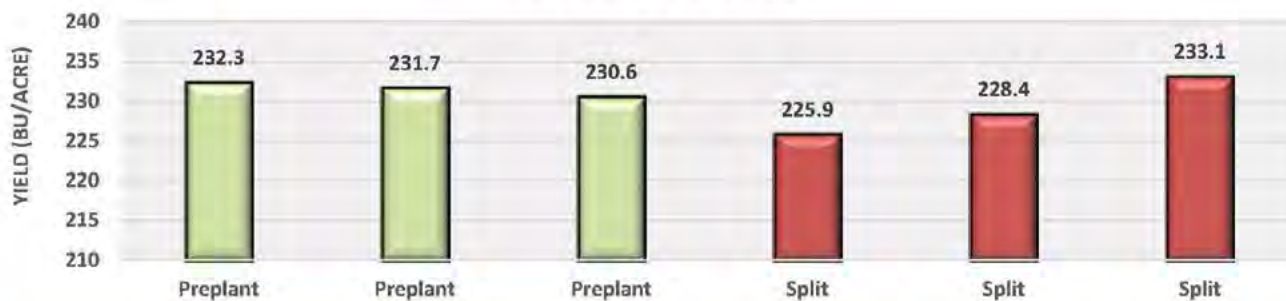
Soil Test Info	
Date	11/15/15
OM%	3.1
pH	6.4
Nitrogen	
P (bray)	10
P (olsen)	
Potassium	145
Sulfur	
Zinc	

Field Info	
Variety	DKC 46-37 VT2P
Population	34000
Row Width	30
Planting Date	4/27/16
Harvest Date	10/25/16
Soil Texture	silty clay loam
Tillage	No-Till
Manure History	No
Alfalfa History	No
Irrigated	No

Preplant 130 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
82-0-0	\$580	160	Spring Preplant Band	130				
18-46-0	\$480	50	At Planting Band	9	23			
0-0-60	\$380	100	At Planting Band			60		
21-0-0-24	\$379	50	At Planting Band	10.5			12	
Totals				150	23	60	12	
Stabilizer Cost / ac		\$0						

Split 90/40 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
82-0-0	\$580	160	Spring Preplant Band	90				
18-46-0	\$480	50	At Planting Band	9	23			
0-0-60	\$380	100	At Planting Band			60		
21-0-0-24	\$379	50	At Planting Band	10.5			12	
46-0-0	\$370	85	Sidedress Broadcast	40				Agrotain
Totals				150	23	60	12	
Stabilizer cost / ac		\$0						

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 130 lbs N	150	KUSETnorm	231.5	0.65	\$45.50	\$0.20	15.3	na
Split 90/40 lbs N	150	KUSETalt	229.1	0.65	\$47.59	\$0.21	15.6	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

82-0-0: Preplant 140 vs Split 84/56 Urea lbs N/acre

Field Trial ID	KKSET	Trial	Nitrogen Timing	N source ²	82-0-0
Previous Crop	Soybeans	County	Mower	Cost/ton	na
		Township	Racine	82% N cost/lb	na
				46% N cost/lb	na



2016 NMI

Soil Test Info		Field Info	
Date	5/25/12	Variety	
OM%	3	Population	34000
pH	6.5	Row Width	30
Nitrogen		Planting Date	April 25 2016
P (bray)	12	Harvest Date	October 25 2016
P (olsen)		Soil Texture	loam
Potassium	120	Tillage	Conventional
Sulfur		Manure History	No
Zinc		Alfalfa History	No
		Irrigated	No

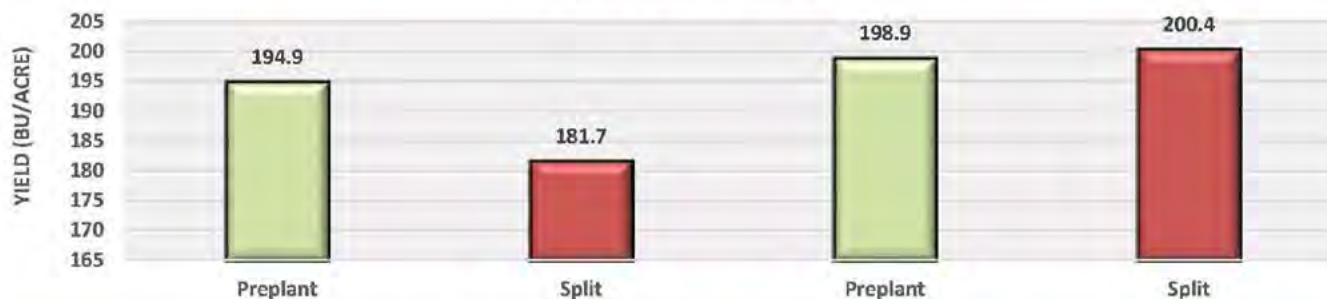
Preplant 140 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
10-34-0		69	Spring Preplant Band	6.9	23			
82-0-0		170	Spring Preplant Band	140				
Totals				147	23	0	0	

Stabilizer Cost / ac \$0

Split 84/56 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
10-34-0		69	Spring Preplant Band	6.9	23			
82-0-0		102	Spring Preplant Band	84				
46-0-0		122	Sidedress Broadcast	56.1				
Totals				147	23	0	0	

Stabilizer cost / ac \$0

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 140 lbs N	147	KKSETnorm	196.9	0.75	na	na	14.6	na
Split 84/56 lbs N	147	KKSETalt	191.1	0.77	na	na	15.0	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Urea: Preplant 120 vs Split 69/51 lbs N/acre

Field Trial ID	RRSET	Trial	Nitrogen Timing	N source ²	46-0-0
Previous Crop	Soybeans	County	Fillmore	Cost/ton	\$376
		Township	Rushford Village	46% N cost/lb	\$0.41



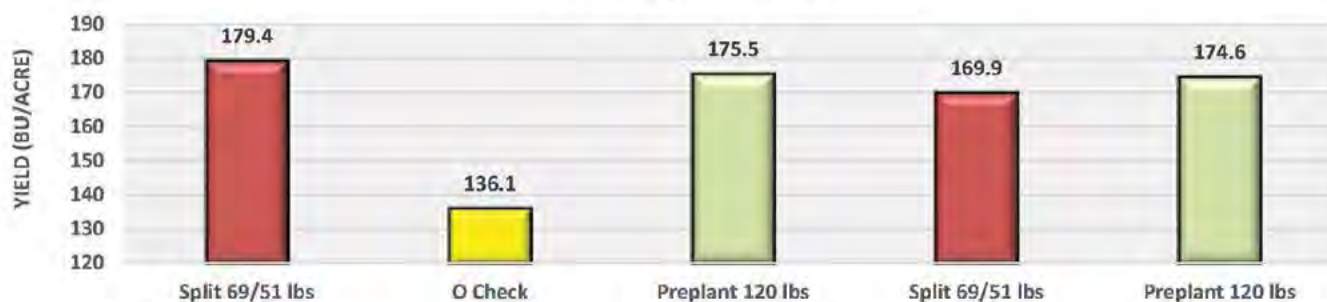
2016 NMI

Soil Test Info		Field Info	
Date		Variety	
OM%		Population	30000
pH		Row Width	36
Nitrogen		Planting Date	April 27th
P (bray)		Harvest Date	
P (olsen)		Soil Texture	
Potassium		Tillage	Conventional
Sulfur		Manure History	No
Zinc		Alfalfa History	No
		Irrigated	No

Preplant 120 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$376	260	Spring Preplant Broadcast	119.6				None
21-0-0-24	\$365	100	Spring Preplant Broadcast	21			24	
18-46-0	\$463	100	Spring Preplant Broadcast	18	46			
0-0-60	\$343	100	Spring Preplant Broadcast			60		
10-9-10	\$407	150	Spring Preplant Band	15	13.5	15		
Totals				174	60	75	24	
Stabilizer Cost / ac		\$0						

Split 69/51 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$376	150	Spring Preplant Broadcast	69				
21-0-0-24	\$365	100	Spring Preplant Broadcast	21			24	
18-46-0	\$463	100	Spring Preplant Broadcast	18	46			
0-0-60	\$343	100	Spring Preplant Broadcast			60		
10-9-10	\$407	150	Spring Preplant Band	15	13.5	15		
46-0-0	\$376	110	Sidedress Broadcast	50.6				Agrotain Ultra
Totals				174	60	75	24	
Stabilizer cost / ac		\$0						

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 120 lbs N	174	RRSETnorm	175.0	0.99	\$49.04	\$0.28	14.8	56.0
Split 69/51 lbs N	174	RRSETalt	174.7	0.99	\$49.04	\$0.28	15.0	56.0

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

82-0-0: Preplant 140 vs Split 84/56 lbs N/acre

Field Trial ID	RVSET	Trial	Nitrogen Timing	N source²	82-0-0
Previous Crop	Soybeans	County	Fillmore	Cost/ton	na
		Township	Summer	82% N cost/lb	na



2016 NMI

Soil Test Info		Field Info	
Date	4/24/12	Variety	
OM%	3	Population	33000
pH	6.5	Row Width	30
Nitrogen		Planting Date	4/25/16
P (bray)	20	Harvest Date	10/30/16
P (olsen)		Soil Texture	loam
Potassium	100	Tillage	Conventional
Sulfur		Manure History	No
Zinc		Alfalfa History	No
		Irrigated	No

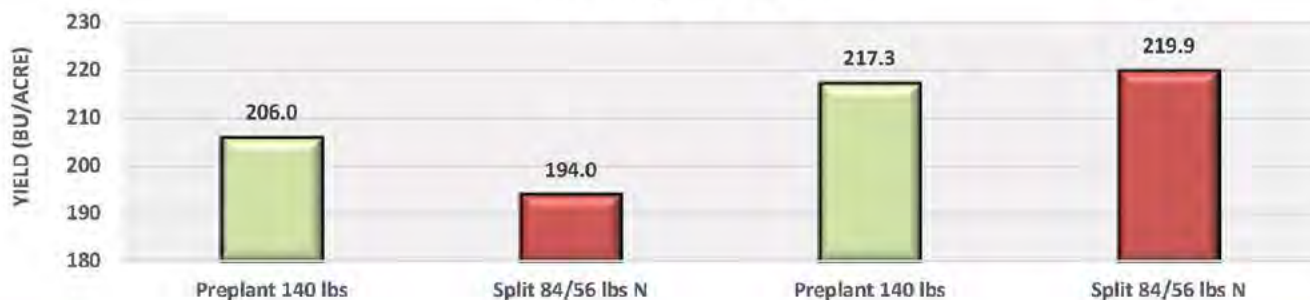
Preplant 140 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
82-0-0		170	Spring Preplant Band	140				
Totals				140	0	0	0	

Stabilizer Cost / ac \$0

Split 84/56 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
82-0-0		102	Spring Preplant Band	84				
46-0-0		121	Sidedress Broadcast	56				
Totals				140	0	0	0	

Stabilizer cost / ac \$0

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 140 lbs N	140	RVSETnorm	211.6	0.66	na	na	25.5	54.5
Split 84/56 lbs N	140	RVSETalt	207.0	0.68	na	na	25.3	55.3

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Urea: Preplant 111 vs Split 51/60 lbs N/acre

Field Trial ID	TKSET	Trial	Nitrogen Timing	N source ²	46-0-0
Previous Crop	Soybeans	County	Olmsted	Cost/ton	na
		Township	Rock Dell	46% N cost/lb	na



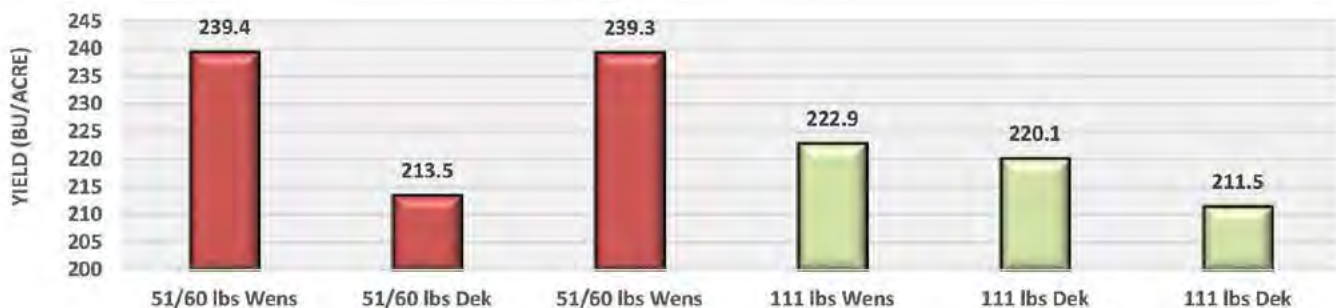
2016 NMI

Soil Test Info		Field Info	
Date	5/9/16	Variety	
OM%	3.4	Population	34000
pH	6	Row Width	30
Nitrogen		Planting Date	4/25/16
P (bray)	20	Harvest Date	
P (olsen)		Soil Texture	loam
Potassium	150	Tillage	Conventional
Sulfur		Manure History	No
Zinc		Alfalfa History	No
		Irrigated	No

Preplant 111 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
21-0-0-24		75	Spring Preplant Broadcast	15			18	
46-0-0		242	Spring Preplant Broadcast	111				
18-46-0		135	Spring Preplant Broadcast	24	62			
0-0-60		72	Spring Preplant Broadcast			43		
10-34-0		58	At Planting Band	6	20			
Stabilizer Cost / ac				\$0				
Totals				156	82	43	18	

Split 51/60 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
21-0-0-24		75	Spring Preplant Broadcast	15			18	
46-0-0		110	Spring Preplant Broadcast	51				
18-46-0		135	Spring Preplant Broadcast	24	62			
0-0-60		72	Spring Preplant Broadcast			43		
46-0-0		130	Sidedress Broadcast	60				
10-34-0		58	At Planting Band	6	20			
Stabilizer cost / ac				\$0				
Totals				156	82	43	0	

Yields By Practice



2 different varieties, Wensman and Dekalb. Yield averages using Wensman only.

Practice	Total N Rate	ID	Yield (Wensman Only)	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 111 lbs N	156	TKSETnorm	222.9	0.70	na	na	na	na
Split 51/60 lbs N	156	TKSETalt	239.4	0.65	na	na	na	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Urea: Preplant 149 vs Split 79/70 lbs N/acre

Field Trial ID	TFSET	Trial	Nitrogen Timing	N source²	46-0-0
Previous Crop	Soybeans	County	Olmsted	Cost/ton	na
		Township	High Forest	46% N cost/lb	na



2016 NMI

Soil Test Info

Date	10/21/13
OM%	3
pH	6.8
Nitrogen	
P (bray)	20
P (olsen)	
Potassium	130
Sulfur	
Zinc	

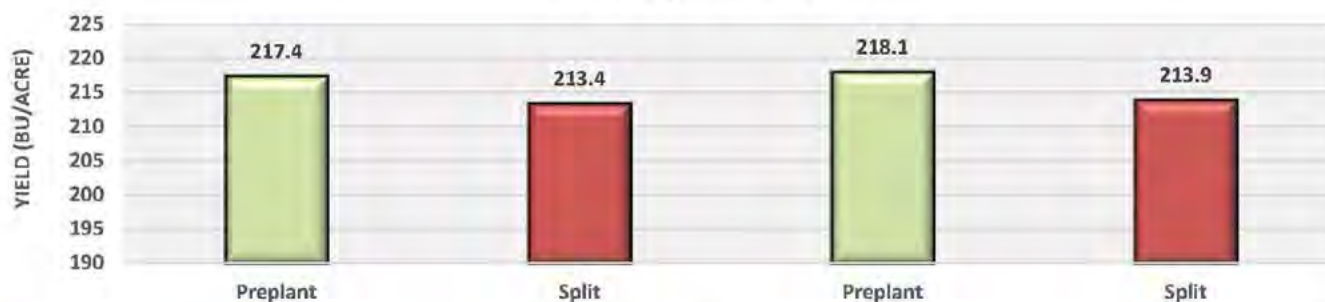
Field Info

Variety	
Population	36000
Row Width	30
Planting Date	5/1/16
Harvest Date	October 21 2016
Soil Texture	Loam
Tillage	Conventional
Manure History	No
Alfalfa History	No
Irrigated	No

Preplant 149 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
21-0-0-24		100	Spring Preplant Broadcast	21				
46-0-0		324	Spring Preplant Broadcast	149				
10-34-0		58	At Planting Band	6	20			
Stabilizer Cost / ac				\$0				
Totals				176	20	0	0	

Split 79/70 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
21-0-0-24		100	Spring Preplant Broadcast	21				
46-0-0		171	Spring Preplant Broadcast	79				
46-0-0		152	Sidedress Broadcast	70	20			
10-34-0		58	At Planting Band	6	20			
Stabilizer cost / ac				\$0				
Totals				176	40	0	0	

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 149 lbs N	176	TFSETnorm	217.7	0.81	na	na	16.6	na
Split 79/70 lbs N	176	TFSETalt	213.6	0.82	na	na	16.6	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

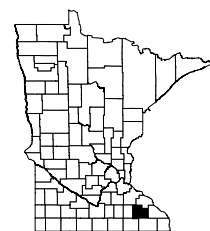
² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Effect of Nitrification Inhibitor on 2016 Corn Yield

Dover Site, Olmstead County, Minnesota

Parameter	Plot Details
Test:	Nitrogen rate
Previous Crop:	Soybeans
Hybrid:	Dekalb DJC52-85
Tillage System:	Strip Till
N Applic. Date:	April 26, 2016 with planter (4 x 2)
Plant Date:	April 26, 2016
N source:	UAN 28% at planting
Population:	34,000 planted/30,000 actual
Plot Design:	Side by side, avg. of 3 reps.

Soil Fertility Measure	Plot Values
Soil Type:	Mt. Carroll Silt Loam
O.M.%:	2.0 % (low)
pH:	6.7 (5.8-7.0 normal)
Bray P1:	16 ppm (high)
Potassium:	140 ppm (high)



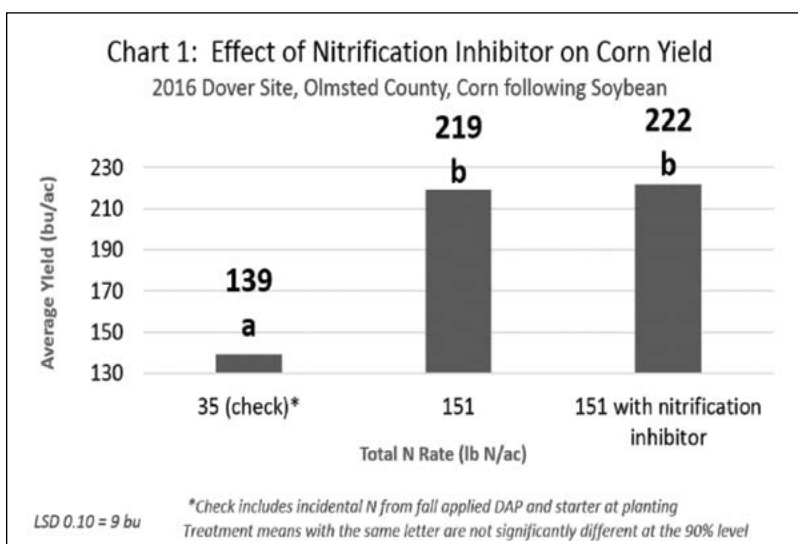
Sampled at 0-6" depth on 5/31/13

Grand Meadow Weather Station Measure	April-June	July-Sept
Avg. % of normal precipitation:	-8%	+40%
% of days with more than 1.0" rainfall:	1%	7%

The nitrification inhibitor used at this plot was Instinct®. The active ingredient for this product is nitrapyrin. Instinct is a nitrification inhibitor for UAN and Urea and delays the conversion of ammonium-nitrogen to nitrate-nitrogen. Instinct is a trademark of Dow AgroSciences.

2016 results showed there was no significant yield difference between the tested treatments (chart 1).

Factors that may have contributed to no differences detected include: N application method and timing, ideal early season growing conditions and soil mineralization, below normal early season precipitation totals and minimal leaching rains.



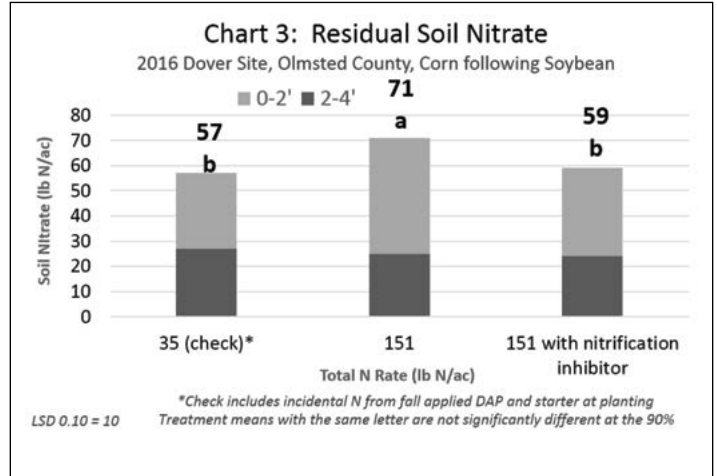
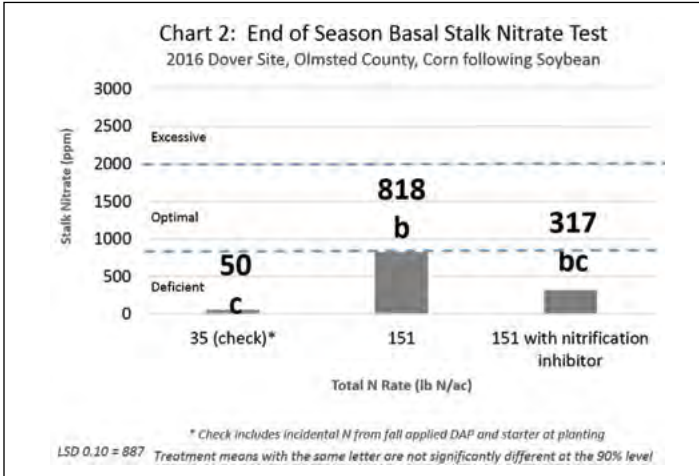
2016 Economics							
Total N Rate (lb N/ac)	Timing	Average Yield (bu/ac) LSD = 9	Average Moisture (%) LSD = 0.5	Drying Cost (\$/ac)	N Cost (\$/ac)	Net Return (\$/ac)	Profit Rank
35 (check)*		139 (a)	20.7 (a)	\$1	\$25	\$410	
151	@planting	193 (b)	20.8 (a)	\$2	\$34	\$503	1
151 w/N inhibitor	@planting	197 (b)	20.9 (a)	\$1	\$35	\$503	2

ASSUMPTIONS: Corn price assumes \$3.00/bu. (avg. Oct. 2016 price) and 0.33/lb anhydrous ammonia (avg. April price). A \$0.03/bu. deduction was used for every moisture point over 15.0%. Treatment means with the same letter in the respective column are not significantly different at a 90% confidence level. Least significant difference (LSD) is the amount needed for one treatment mean to be considered statistically different from another treatment mean.

NMI is a collaborative project between farmers of southeast Minnesota, Minnesota Department of Agriculture and University of Minnesota Extension

December 2016

Effect of Nitrogen Inhibitor on 2016 Stalk Nitrate and Residual Soil Nitrogen Tests



- The optimal range for the end of season basal stalk nitrate test is 700-2,000 ppm. Stalk nitrate concentrations below 700 ppm may indicate nitrogen deficiencies while levels above 2,000 ppm may indicate excessive nitrogen. Tests showed that both treatments were near the **optimal to deficient** category and there was no significant differences observed between the treatments (chart 2).
- Preplant soil nitrate levels collected in early April prior to spring N treatment application (some N was applied with fall DAP) measured **41 lb N/ac** at 0-2 foot depth. Soil nitrate levels at V4 crop growth stage (PSNT) at 0-1 foot depth averaged **142 lb N/ac** (35.5 ppm) without the inhibitor and **93 lb N/ac** (23.3 ppm) with the inhibitor.
- Soil nitrate samples collected at the end of the season indicate how much nitrogen was left over (chart 3). Higher residual soil nitrate (RSN) levels could increase nitrate-nitrogen leaching risk to groundwater and surface water. The amount of RSN at a depth of four feet measured after harvest ranged from **59-71 lb N/ac** in the treatments and **57 lb N/ac** in the check. There was **11 lb N/ac** less RSN when using the N inhibitor. Most of the RSN was found from 0-2 feet.

Nitrogen Uptake and Use Efficiency

N Rate lbs N/ac	Average Yield bu/ac LSD = 9	Total Corn N Uptake lbs N/ac	N Supplied by Soil %	N Fertilizer Recovery %	Bushels produced per unit of N bu/lb N
35 (check)*	139 (a)	44**			
151	219 (b)	147	30%	68%	1.5
151 w/N inhibitor	222 (b)	136	32%	61%	1.2

Least significant difference (LSD) is the amount needed to be considered statistically different from the treatment mean. Treatment means with the same letter in the respective column are not significantly different at the 90% level.

*Check includes incidental N from fall applied DAP and starter at planting.

**Excludes incidental commercial N that may be in the control. Note that incidental N rates above 10 lb N/ac in the control may increase uncertainty in how much N is provided by the soil.

- The total corn N uptake in the grain and stover for the zero rate check was **44 lb N/ac**. This is an estimate of how much **N was supplied by the soil**. Across both treatments **30-32%** of the corn N uptake was from the soil.
- The amount of N fertilizer recovered by both treatments ranged from **61-68%**.
- Both treatments produced between **1.2 to 1.5 bu.** per lb of N applied.

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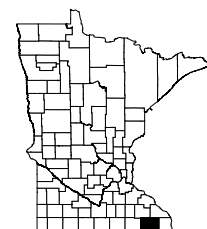
December 2016

Effect of Urease Inhibitor on 2016 Corn Yield

Arendahl Site, Fillmore County, Minnesota

Parameter	Plot Details
Test:	Urease inhibitor (NBPT)
Previous Crop:	Soybeans
Hybrid:	Dekalb 50-85
Tillage System:	Conventional
N Applic. Date:	April 26, 2016 and Nov. 8, 2016
Plant Date:	May 3, 2016
N source:	UAN 28%, bdcst/pre-emg., no inc.
Population:	34,000 planted/33,125 actual
Plot Design:	Side by side, avg. of 3 reps.

Soil Fertility Measure	Plot Values
Soil Type:	Tama Silt Loam
O.M.%:	4.2 % (high)
pH:	6.5 (5.8-7.0 normal)
Bray P1:	6 ppm (low)
Potassium:	104 ppm (medium)



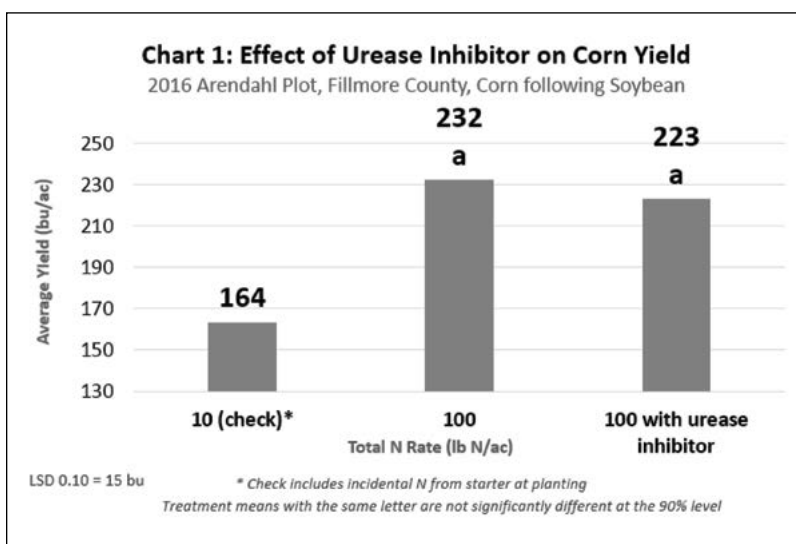
Sampled at 0-6" depth on April 16, 2015

Grand Meadow Weather Station Measure	April-June	July-Sept
Avg. % of normal precipitation:	+2%	+97%
% of days with more than 1.0" rainfall:	3%	10%

The urease inhibitor used on this plot was Factor®. The active ingredient in this product is NBPT. Factor is a urease inhibitor for UAN and urea and reduces the risk of ammonia volatilization losses of urea by the urease enzyme found naturally in the soil. Factor is manufactured for Rosen's Inc. and is a registered trademark of Midtech R&D, Inc.

2016 results showed there was no significant yield difference between the treatments.

UAN 28% was broadcast applied on May 3, 2016 (pre-emerge) with no incorporation. At least 0.5" of rain was received within **seven days** after N application. Ideal early season temperatures and rainfall may have reduced ammonia volatilization risk at this plot.



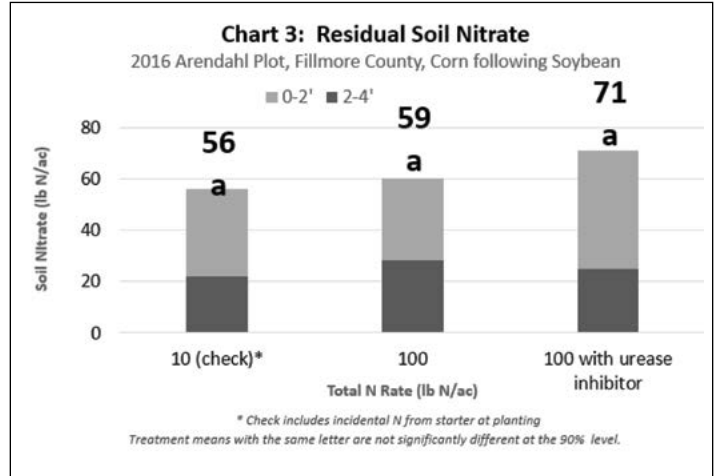
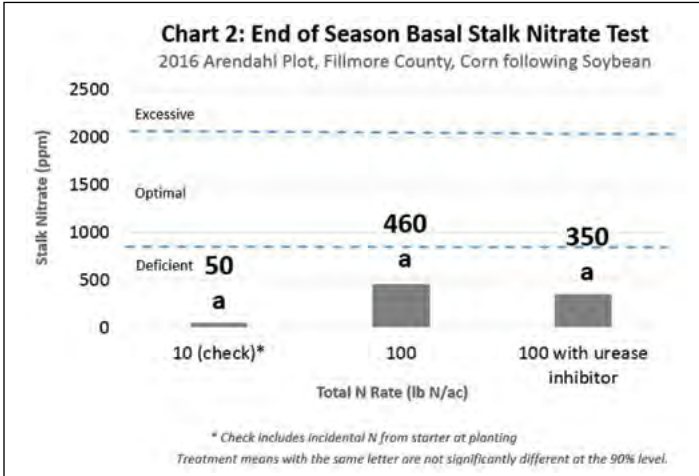
2016 Economics							
Total N Rate (lb N/ac)	Timing	Average Yield (bu/ac) LSD = 15	Average Moisture (%) LSD = 0.5	Drying Cost (\$/ac)	N Cost (\$/ac)	Net Return (\$/ac)	Profit Rank
10 (check)*		164	14.9	\$0	\$5	\$488	
100	Pre-emerge	232 (a)	14.5 (a)	\$0	\$46	\$650	1
100 w/ inhibitor	Pre-emerge	223 (a)	14.3 (a)	\$0	\$57	\$612	2

ASSUMPTIONS: Corn price assumes \$3.00/bu. (avg. Oct. 2016 price), \$0.46/lb UAN (avg. March price) and \$11.00/ac for stabilizer. A \$0.03/bu. deduction was used for every moisture point over 15.0%. Treatment means with the same letter in the respective column are not significantly different at a 90% confidence level. Least significant difference (LSD) is the amount needed for one treatment mean to be considered statistically different from another treatment mean. *Check includes incidental N from starter at planting.

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December 2016

Effect of Nitrogen Inhibitor on 2016 Stalk Nitrate and Residual Soil Nitrogen Tests



- The optimal range for the end of season basal stalk nitrate test is 700-2,000 ppm. Stalk nitrate concentrations below 700 ppm may indicate nitrogen deficiencies while levels above 2,000 ppm may indicate excessive nitrogen. Tests showed that both treatments were in the **deficient category** and there was no significant difference between the treatments (chart 2).
- Preplant soil nitrate levels collected in early April prior to spring N treatment application measured **46 lb N/ac** at 0-2 foot depth. Soil nitrate levels at V4 crop growth stage (PSNT) measured **105 lb N/ac** (26.3 ppm) at 0-1 foot depth without inhibitor and **95 lb N/ac** (23.8 ppm) with inhibitor.
- Soil nitrogen samples collected at the end of the season indicate how much nitrogen was left over (chart 3). Higher residual soil nitrate (RSN) levels could increase nitrate-nitrogen leaching risk to groundwater and surface water. The amount of RSN measured after harvest at 0-4 foot depth ranged from **59-71 lb N/ac** in the treatments and **56 lb N/ac** in the check. There were no significant differences between treatments and likely the result of above normal rainfall late in the season (97% above normal).

Nitrogen Uptake and Use Efficiency

N Rate lbs N/ac	Average Yield bu/ac LSD = 15	Total Corn N Uptake lbs N/ac	N Supplied by Soil %	N Fertilizer Recovery %	Bushels produced per unit of N bu/lb N
10 (check)*	164	71**			
100	232 (a)	131	54%	60%	2.3
100 w/ inhibitor	223 (a)	126	56%	55%	2.2

Least significant difference (LSD) is the amount needed to be considered statistically different from the treatment mean. Treatment means with the same letter in the respective column are not significantly different at the 90% level. *Check includes incidental N from starter at planting. **Excludes incidental commercial N that may be in the control. Note that incidental N rates above 10 lbs N/ac in the control may increase uncertainty in how much N is provided by the soil.

- The total corn N uptake in the grain and stover for the zero rate check was **71 lbs N/ac**. This is an estimate of how much **N was supplied by the soil**. Across both treatments about **55%** of the corn N uptake was from the soil.
- The amount of N fertilizer recovered by both treatments ranged from **55-60%**.
- Both treatments produced **2.2 to 2.3** bu. per lb of N applied.

NMI is a collaborative project between farmers of southeast Minnesota, Minnesota Department of Agriculture and University of Minnesota Extension
December 2016

28%/ATS: 125 lbs N/acre at planting with Instinct

Field Trial ID	BSES	Trial	Nitrogen Stabilizer	N source ²	28-0-0
Previous Crop	Soybeans	County	Olmsted	Cost/ton	\$275
		Township	Dover	28% N cost/lb	\$0.49



2016 NMI

Soil Test Info		Field Info	
Date	5/31/13	Variety	DJC52-85
OM%	2	Population	34000
pH	6.7	Row Width	30
Nitrogen		Planting Date	4/26/16
P (bray)	16	Harvest Date	
P (olsen)		Soil Texture	silt loam
Potassium	140	Tillage	Strip Till
Sulfur		Manure History	No
Zinc		Alfalfa History	No
		Irrigated	No

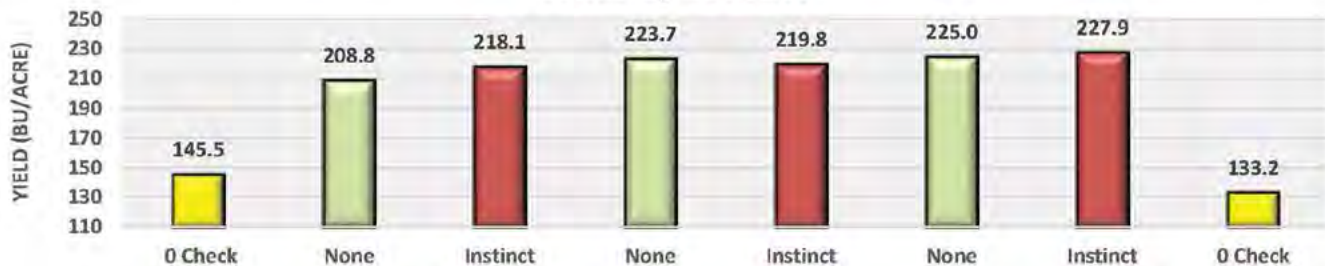
28% / ATS with no stabilizer				Normal Practice				
source	cost	rate	application	N	P	K	S	stabilizer
28-0-0	\$275	416	At Planting Band	116.5				None
12-0-0-26	\$641	72	At Planting Band	8.64			18.7	None
10-34-0	\$580	35	At Planting Band	3.5	11.9			
18-46-0	\$465	125	Fall Preplant Broadcast	22.5	57.5			
0-0-60	\$365	125	Fall Preplant Broadcast			75		
Totals				151	69	75	19	

Stabilizer Cost / ac **\$0**

28% / ATS with Instinct				Alternative Practice				
source	cost	rate	application	N	P	K	S	stabilizer
28-0-0	\$275	416	At Planting Band	116.5				Instinct
12-0-0-26	\$641	72	At Planting Band	8.64			18.7	Instinct
10-34-0	\$580	35	At Planting Band	3.5	11.9			
18-46-0	\$465	125	Fall Preplant Broadcast	22.5	57.5			
0-0-60	\$365	125	Fall Preplant Broadcast			75		
Totals				151	69	75	19	

Stabilizer cost / ac **\$11**

Yields By Practice



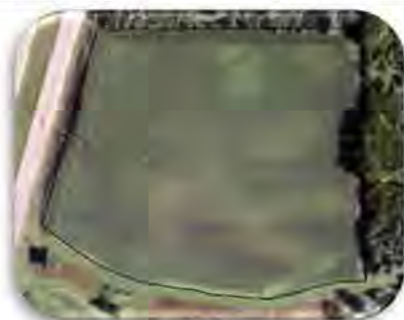
Practice	Stabilizer	ID	Yield	NUE ¹	Stabilizer cost per acre ²	% MT	Test Weight
28% / ATS with no stabilizer	None	BSESnorm	219.2	0.69	\$0.00	15.3	56.9
28% / ATS with Instinct	Instinct	BSESalt	221.9	0.68	\$11.00	15.1	56.9

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Instinct with dry blend at planting

Field Trial ID	DSStSES	Trial	Nitrogen Stabilizer	N source ²	46-0-0
Previous Crop	Soybeans	County	Olmsted	Cost/ton	na
		Township	High Forest	46% N cost/lb	na



2016 NMI

Soil Test Info		Field Info	
Date	11/10/15	Variety	DKC 53-7855
OM%	3	Population	32000
pH	5.8	Row Width	30
Nitrogen		Planting Date	4/25/16
P (bray)	12	Harvest Date	10/24/16
P (olsen)		Soil Texture	silt loam
Potassium	142	Tillage	No-Till
Sulfur		Manure History	No
Zinc		Alfalfa History	No
		Irrigated	No

No Instinct				Normal Practice				
source	cost	rate	application	N	P	K	S	stabilizer
46-0-0		217	At Planting Band	100				None
21-0-0-24		50	At Planting Band	11			12	None
18-46-0		65	At Planting Band		30			None
0-0-60		50	At Planting Band			30		None
Totals				111	30	30	12	
Stabilizer Cost / ac		\$0						

Instinct				Alternative Practice				
source	cost	rate	application	N	P	K	S	stabilizer
46-0-0		217	At Planting Band	100				Instinct
21-0-0-24		50	At Planting Band	11			12	Instinct
18-46-0		65	At Planting Band		30			Instinct
0-0-60		50	At Planting Band			30		Instinct
Totals				111	30	30	12	
Stabilizer cost / ac		na						

All fertilizer put on dry at planting with planter 3" to side of row and 4" deep. 18 rows with instinct, 18 rows without instinct.

Yields By Practice



Practice	Stabilizer	ID	Yield	NUE ¹	Stabilizer cost per acre ²	% MT	Test Weight
No Instinct	None	DSStSESnorm	180.5	0.61	\$0.00	16.4	56.3
Instinct	Instinct	DSStSESalt	171.9	0.65	na	16.7	56.3

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Preplant 28% UAN with Factor (Agrotain)

Field Trial ID	JBSES	Trial	Nitrogen Stabilizer	N source ²	28-0-0
Previous Crop	Soybeans	County	Fillmore	Cost/ton	na
		Township	Arendahl	28% N cost/lb	na



2016 NMI

Soil Test Info		Field Info	
Date	4/16/15	Variety	Dekalb 50-84
OM%	4.2	Population	34k
pH	6.5	Row Width	30
Nitrogen		Planting Date	4/25/16
P (bray)	6	Harvest Date	11/8/16
P (olsen)		Soil Texture	
Potassium	104	Tillage	Spring Tillage Only
Sulfur	9	Manure History	No
Zinc	0.9	Alfalfa History	No
		Irrigated	No

28% UAN with no stabilizer

Normal Practice

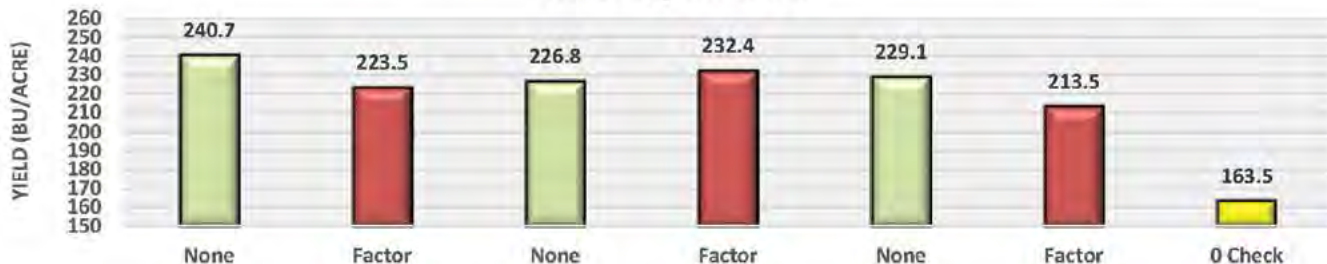
source	cost	rate	application	N	P	K	S	stabilizer	
28-0-0		30 gal	Spring Preplant Broadcast	90				None	
18-46-0		25	At Planting Band	4.5	11.5				
0-0-60		50	At Planting Band			30			
21-0-0-24		25	At Planting Band	5.25			6		
Stabilizer Cost / ac				\$0	Totals				100 12 30 6

28% UAN with Factor (Agrotain)

Alternative Practice

source	cost	rate	application	N	P	K	S	stabilizer	
28-0-0		30 gal	Spring Preplant Broadcast	90				Factor (Agrotain)	
18-46-0		25	At Planting Band	4.5	11.5				
0-0-60		50	At Planting Band			30			
21-0-0-24		25	At Planting Band	5.25			6		
Stabilizer cost / ac				\$0	Totals				100 12 30 6

Yields By Practice



No evidence of a statistical yield difference between treatments

Practice	Stabilizer	ID	Yield	NUE ¹	Stabilizer cost per acre ²	Moisture	Test Weight
28% UAN with no stabilizer	None	JBSESnorm	232.2	0.43	na	14.5	58.0
28% UAN with Factor (Agrotain)	Factor(Agrotain)	JBSESalt	223.1	0.45	na	14.3	58.3

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

ESN vs Urea Preplant

Field Trial ID	RMSES	Trial	Nitrogen Stabilizer	N source ²	44-0-0
Previous Crop	Soybeans	County	Winona	Cost/ton	\$550
		Township	Warren	ESN N cost/lb	\$0.63
				46% N cost/lb	\$0.41



2016 NMI

Soil Test Info	
Date	11/6/14
OM%	2.8
pH	6.6
Nitrogen	
P (bray)	16.2
P (olsen)	
Potassium	130.5
Sulfur	
Zinc	

Field Info	
Variety	Pioneer 0157 AMX
Population	35500
Row Width	30
Planting Date	4/16/16
Harvest Date	
Soil Texture	clay loam
Tillage	Conventional
Manure History	No
Alfalfa History	No
Irrigated	No

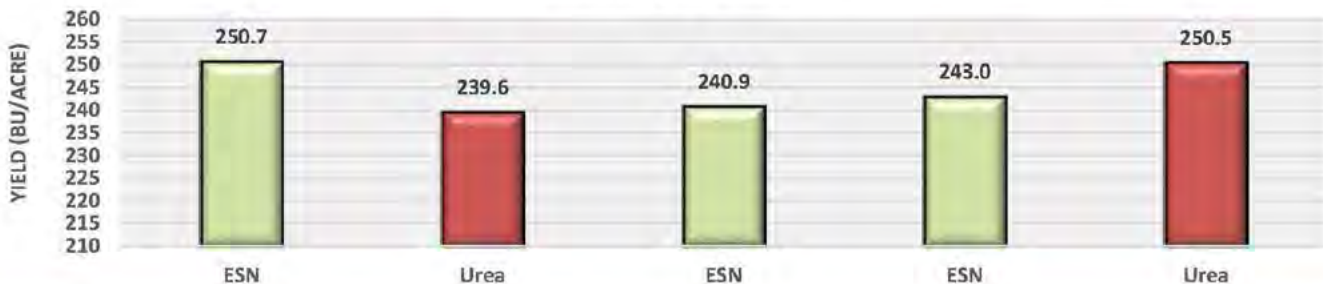
ESN 110/ Urea 16 lbs N Preplant				Normal Practice				
source	cost	rate	application	N	P	K	S	stabilizer
17-15-19-4-1	\$465	200	At Planting Band	34	30	38	8	
46-0-0	\$380	35	Spring Preplant Broadcast	16				
44-0-0	\$550	250	Spring Preplant Broadcast	110				ESN
21-0-0-24	\$365	75	Spring Preplant Broadcast	15.75			18	
Elemental Sulfur	\$1,100	10	Spring Preplant Broadcast				9	
Totals				176	30	38	35	

Stabilizer Cost / ac **na**

125 lbs N Urea Preplant				Alternative Practice				
source	cost	rate	application	N	P	K	S	stabilizer
17-15-19-4-1	\$465	200	At Planting Band	34	30	38	8	
46-0-0	\$380	275	Spring Preplant Broadcast	125				
21-0-0-24	\$365	75	Spring Preplant Broadcast	15.75			18	
Elemental Sulfur	\$1,100	10	Spring Preplant Broadcast				9	
Totals				175	30	38	35	

Stabilizer cost / ac **\$0**

Yields By Practice



Practice	Stabilizer	ID	Yield	NUE ¹	N cost per acre ²	% MT	Test Weight
ESN 110/ Urea 16 lbs N Preplant	ESN	RMSESnorm	244.9	0.72	\$75.36	18.9	57.8
125 lbs N Urea Preplant	None	RMSESalt	245.0	0.71	\$51.63	18.4	58.2

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Urea: 50 lbs N/acre after Alfalfa

Field Trial ID	DSHSERA	Trial	N Rate after Alfalfa	N source ²	46-0-0
Previous Crop	Alfalfa (SE MN)	County	Winona	Cost/ton	\$375
		Township	Whitewater	46% N cost/lb	\$0.41



2016 NMI

Soil Test Info		Field Info	
Date	4/29/15	Variety	Producer's Hybrids 5514 VT3P
OM%	2.5	Population	32500
pH	7.1	Row Width	30
Nitrogen		Planting Date	4/25/16
P (bray)	33.0	Harvest Date	11/2/16
P (olsen)		Soil Texture	silty clay
Potassium	126.0	Tillage	No-Till
Sulfur		Manure History	No
Zinc		Alfalfa History	Yes
		Irrigated	No

No Urea preplant				Normal Practice				
source	S ton	rate	application	N	P	K	S	stabilizer
Alfalfa Credits Year 1			Previous Credits	100				
18-46-0	\$475	50	At Planting Band	9	23			
0-0-60	\$335	50	At Planting Band			30		
21-0-0-24	\$379	25	At Planting Band	5			6	
Totals				114	23	30	6	

Stabilizer Cost / ac \$0

50 lbs N preplant				Alternative Practice				
source	S ton	rate	application	N	P	K	S	stabilizer
Alfalfa Credits Year 1			Previous Credits	100				
18-46-0	\$475	50	At Planting Band	9	23			
0-0-60	\$335	50	At Planting Band			30		
21-0-0-24	\$379	25	At Planting Band	5			6	
46-0-0	\$375	110	Spring Preplant Broadcast	50				
Totals				164	23	30	6	

Stabilizer cost / ac \$0



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
No Urea preplant	114	DSHSERAnorm	235.9	0.48	\$0.00	\$0.00	15.9	58.0
50 lbs N preplant	164	DSHSERAalt	234.8	0.70	\$20.50	\$0.09	16.0	57.6

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

South Central

2016 Nutrient Management Initiative (NMI)

Spencer Herbert

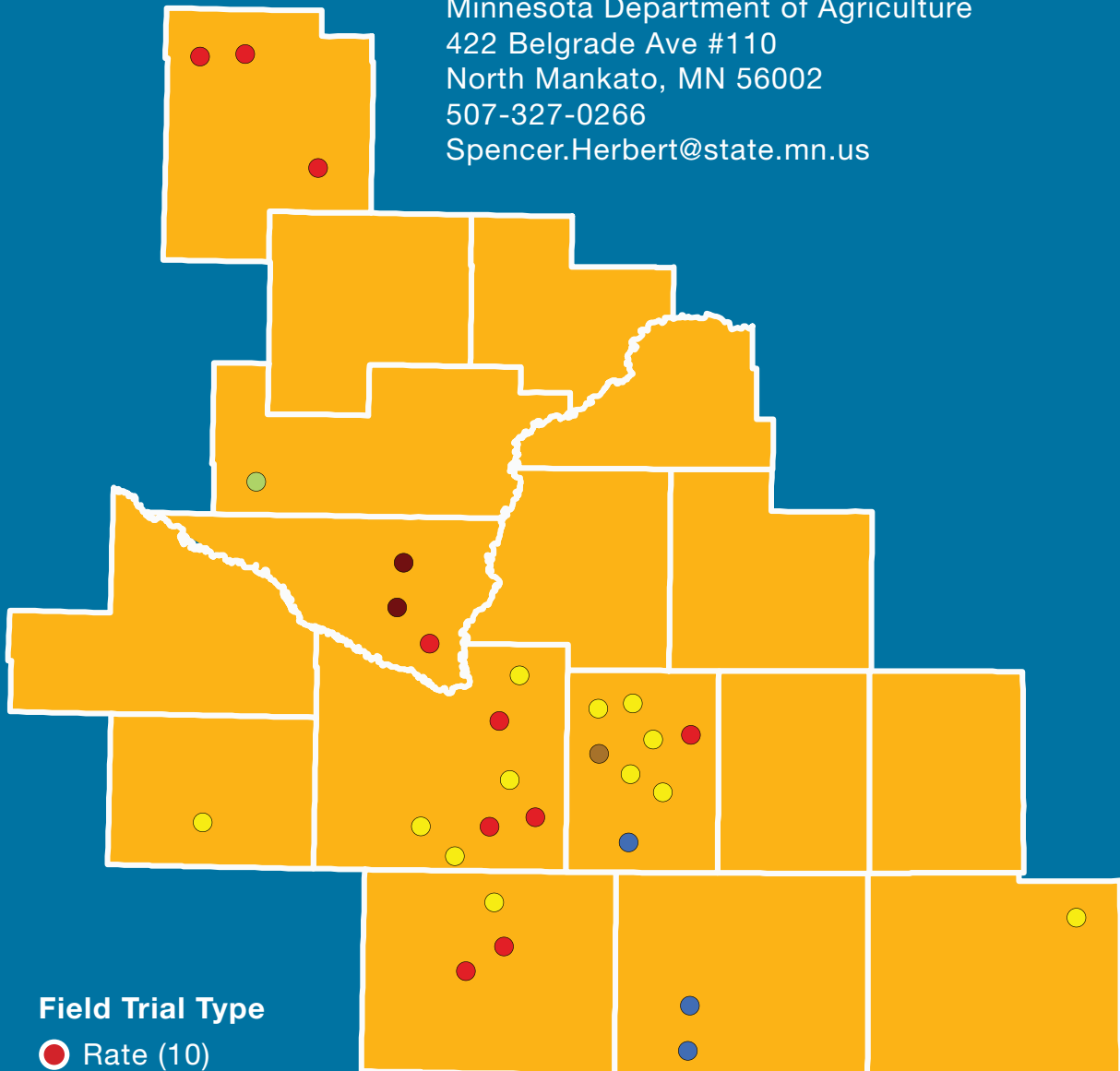
Minnesota Department of Agriculture

422 Belgrade Ave #110

North Mankato, MN 56002

507-327-0266

Spencer.Herbert@state.mn.us



Field Trial Type

- Rate (10)
- Timing (12)
- Advanced Rate (2)
- Rate after Manure (1)
- Stabilizer (3)
- Interseed Cover Crop (1)

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Corn following corn trials

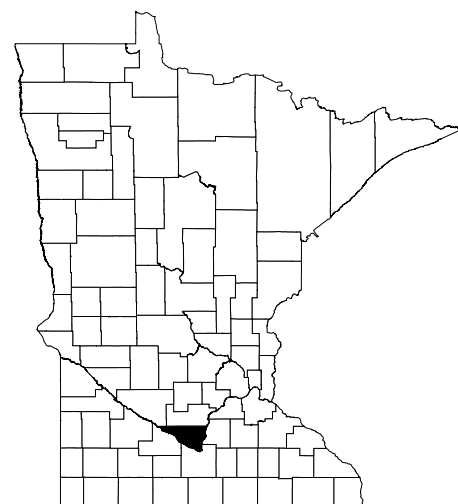
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Advanced Nitrogen Rate Evaluations

Site Details	
County:	Nicollet
Soil series:	Klossner muck + Harps clay loam
Previous crop:	Soybean
Strips:	2 (1170' x 70' each)
Plot Design:	Randomized complete block
Tillage System:	Conventional DMI ripper in fall, field cultivator in spring.
Corn hybrid:	Channel 197-150 (97 days)
Planting date:	May 5, 2016
Population:	33,000
Starter fertilizer:	150 lb/ac in DAP + 75 lb/ac AMS
Base nitrogen (N):	43 lb/ac in DAP + AMS
Additional N:	Applied as unrea, May 5, 2016
Additional N rates:	6 (0, 32, 57, 107, 157, and 207 lb/ac)
Harvest date:	10/17/2016



Soil-test results	
Organic matter (%)	6.8
pH	7.5
Phosphorus (Olsen) (ppm)	4.0
Potassium (ppm)	163
Zinc (ppm)	2.0

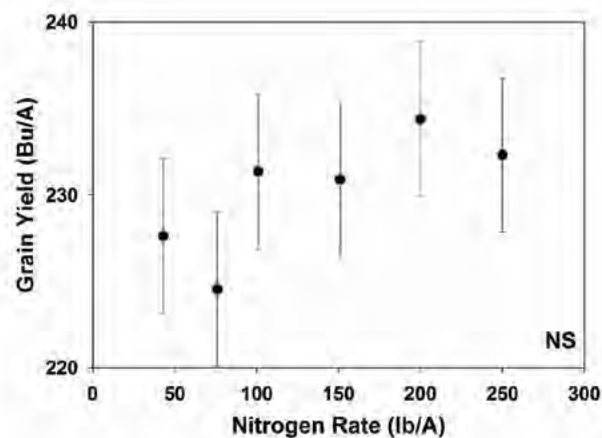
Trial Layout



Total monthly precipitation (inch) and departure from normal (DN)				
Percipitation	May	June	July	August
Observed	5.26	3.84	6.25	6.75
Normal	3.34	4.75	3.91	4.22
DN	+1.92	-0.91	+2.34	+2.53

N Rate	2016 corn grain yield (bu/ac)			
	lb/ac	Rep1	Rep 2	Rep 3
43	218	234	231	228
75	207	232	234	225
100	n/a*	234	232	233
150	230	226	236	231
200	234	236	233	234
250	232	233	232	232

Corn response to N rates



Treatments were not significant at this site. Numerically, maximum grain yield was obtained when 200 lb N/ac was applied. The increase in yield produced by the 200 lb reate was not economical.

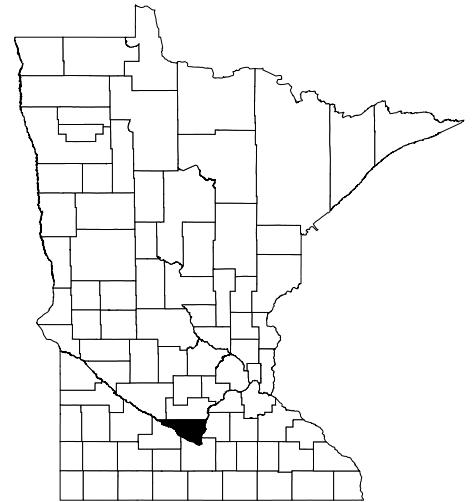
* Data not available

A collaborative project between the Minnesota Department of Agriculture and the University of Minnesota.

January 2017, Apurba k. Sutradhar

Advanced Nitrogen Rate Evaluations

Site Details	
County:	Nicollet
Soil series:	Cordova clay loam + Nicollet clay loam
Previous crop:	Soybean
Strips:	2 (945' x 70' each)
Plot Design:	Randomized complete block
Tillage System:	Conventional, DMI ripper in fall, cultivator in spring
Corn hybrid:	199-29 (99 days)
Planting date:	May 5, 2016
Population:	33,000
Starter fertilizer:	100 lb/ac in DAP + 50 lb/ac AMS
Base nitrogen (N):	29 lb/ac in DAP + AMS
Additional N:	Applied as unrea, May 5, 2016
Additional N rates:	6 (0, 22, 72, 122, 172, and 222 lb/ac)
Harvest date:	10/17/2016



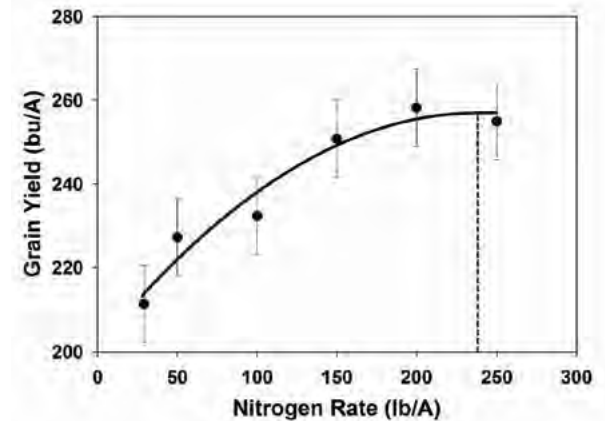
Soil-test results	
Organic matter (%)	5.9
pH	6.9
Phosphorus (Olsen) (ppm)	8.0
Potassium (ppm)	164
Zinc (ppm)	1.4

Trial Layout



Total monthly precipitation (inch) and departure from normal (DN)				
Percipitation	May	June	July	August
Observed	5.26	3.84	6.25	6.75
Normal	3.34	4.75	3.91	4.22
DN	+1.92	-0.91	+2.34	+2.53

Corn response to N rates



- Average highest grain yield = 257 bu/ac
- N rate needed = 238 lb N/ac
- Grain yield = 201 + 0.47 (N rate) – 0.0009 (N rate)²
- R² = 0.60, P < 0.01

Price ratio	EONR (lb N/ac)
0.05	214
0.10	188
0.15	162

Economic Optimum Nitrogen Rates (EONR) at three price ratios were less than the N rate needed for average highest yield. To ensure maximum profit, EONR rates should be used.

N Rate	2016 corn grain yield (bu/ac)			
lb/ac	Rep1	Rep 2	Rep 3	Average
29	204	220	210	211
50	201	249	232	227
100	246	208	243	232
150	252	260	240	251
200	276	249	249	258
250	254	261	250	255

A collaborative project between the Minnesota Department of Agriculture and the University of Minnesota.

January 2017, Apurba k. Sutradhar

South Central BMP Region SUMMARY

Averages									
Previous Crop	All trial practices combined				Rate trials		Timing trials	Stabilizer trials	
	Total N (ac)	Yield (bu/acre)	NUE (rate/yield)	Price per pound of N	Additional N (lbs)	Yield from additional N (bu)	Split App Advantage (bu)	Stabilizer Advantage (bu)	Stabilizer Cost (ac)
Corn	150.56	208.42	0.70	\$0.49	31.00	0.20	32.3*		
Soybeans	151.59	213.20	0.71	\$0.51	36.75	5.13	5.49	na	7.6
Averages	151.08	210.81	0.71	0.50	33.88	2.67	5.49		7.60

* One trial preplant 32% UAN vs Split (2 app)

The average cost for a pound of nitrogen was **\$0.50**. When considering an average of all nitrogen rate trials, an additional **33.88** lbs N/acre cost **\$16.94** per acre, resulting in an average yield difference of only **2.67** bushels/acre in 2016.

CORN AFTER CORN: Top Nitrogen Use Efficiencies (NUE)							
Total N Rate/Yield - lbs of N Per Bushel							
Page	NUE	County	Trial Practice ID	Total N Rate (lbs/ac)	Yield (bu/ac)	Variety	Type of Trial
80	0.33	Blue Earth	DPSCRnorm*	66	201.3	DKC 46-20	Rate
80	0.48	Blue Earth	DPSCRalt*	96	200.00	DKC 46-20	Rate
79	0.54	Meeker	CRFSCRalt	107	196.3	Legend 9697VIP	Rate

* Peat soil with 38.7% Organic Matter

CORN AFTER CORN: Top Yields							
bu/acre							
Page	Yield (bu/ac)	County	Trial Practice ID	NUE	Total N Rate (lbs/ac)	Variety	Type of Trial
81	232.6	Watonwan	GRSCTalt	0.93	217	na	Timing
81	229.7	Watonwan	GRSCTalt2	0.94	217	na	Timing
78	209.8	Waseca	BKSCRnorm	0.74	155	Pioneer PO533AM1	Rate

CORN AFTER SOYBEANS: Top Nitrogen Use Efficiencies (NUE)							
Total N Rate/Yield - lbs of N per bushel							
Page	NUE	County	Trial Practice ID	Total N Rate (lbs/ac)	Yield (bu/ac)	Variety	Type of Trial
87	0.54	Faribault	LFSCRalt	107	198	Golden Harvest E01P5	Rate
85	0.55	Blue Earth	DLSCRalt	115	209.2	DKC 54-38	Rate
83	0.58	Meeker	ACSCRnorm	105	180.6	Legend 40J592VT2	Rate

CORN AFTER SOYBEANS: Top Yields							
bu/acre							
Page	Yield (bu/ac)	County	Trial Practice ID	NUE	Total N Rate (lbs/ac)	Variety	Type of Trial
101	249.6	Freeborn	DHSCSalt	0.77	193	Producers 6100	Stabilizer
86	247.8	Faribault	GPSCRalt	0.77	190	G02W74-3000GT	Rate
95	240.2	Blue Earth	HGSCalt	0.68	164	Producers 6108	Timing

Urea/AMS blend: Sidedress 83 vs 67 lbs N/acre

Field Trial ID	BKSCR	Trial	Nitrogen Rate	N source ²	46-0-0
Previous Crop	Corn	County	Waseca	Cost/ton	\$380
		Township	108	Urea N cost/lb	\$0.41



2016 NMI

Soil Test Info

Date	10/1/14
OM%	4
pH	6.4
Nitrogen	
P (bray)	31
P (olsen)	-
Potassium	197.3
Sulfur	-
Zinc	-

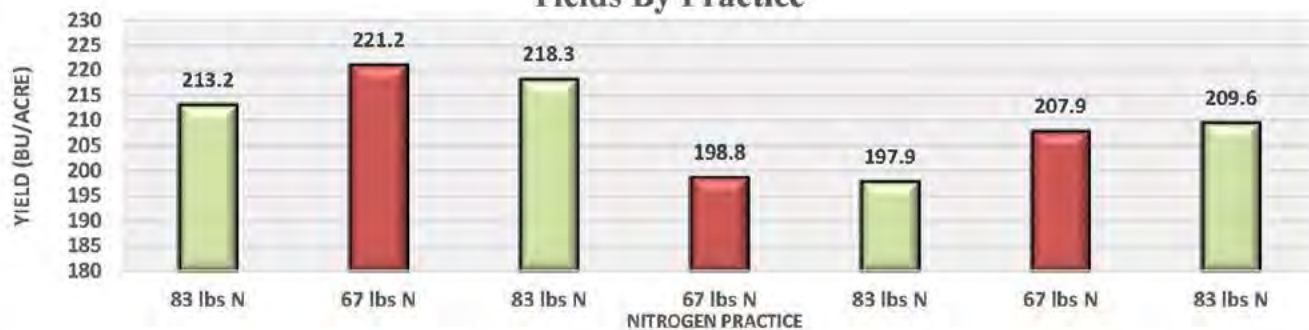
Field Info

Variety	pioneer P0533AM1
Population	34500
Row Width	30
Planting Date	na
Harvest Date	na
Soil Texture	clay loam
Tillage	Strip Till
Manure History	
Alfalfa History	
Irrigated	

83 lbs N sidedress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
44-0-0ESN	\$582	121	Fall Preplant Band	53.1				ESN
10-50-0	\$597	150	Fall Preplant Band	15	75			
0-0-60	\$470	107	Fall Preplant Band			64		
Sulfur 90%	\$900	16	Fall Preplant Band				14.4	
46-0-0	\$380	145	Sidedress Band	66.7				
21-0-0-24		79	Sidedress Band	16.6			19	
10-50-0		31	Sidedress Band	3.1	15.5			
Stabilizer Cost / ac \$0				Totals	155	91	107	33

67 lbs N sidedress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
44-0-0ESN	\$582	121	Fall Preplant Band	53.1				ESN
10-50-0	\$597	150	Fall Preplant Band	15	75			
0-0-60	\$470	107	Fall Preplant Band			64		
Sulfur 90%	\$900	16	Fall Preplant Band				14.4	
46-0-0	\$380	116	Sidedress Band	53.4				
21-0-0-24		63	Sidedress Band	13.3			15	
10-50-0		25	Sidedress Band	2.5	12.5			
Stabilizer cost / ac \$0				Totals	137	88	64	29

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
83 lbs N sidedress	155	BKSCRnorm	209.8	0.74	\$27.35	\$0.13	21.3	na
67 lbs N sidedress	137	BKSCRalt	209.3	0.66	\$21.89	\$0.10	21.5	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

28% UAN: V3 Sidedress 75 vs 30 lbs N/acre

Field Trial ID	CRFSCR	Trial	Nitrogen Rate	N source ²	28-0-0
Previous Crop	Sweet Corn	County	Meeker	Cost/ton	\$290
		Township	Darwin	28% N cost/lb	\$0.52



2016 NMI

Soil Test Info

Date	11/1/14
OM%	2.5
pH	7.1
Nitrogen	5
P (bray)	31
P (olsen)	23
Potassium	98
Sulfur	8
Zinc	1.7

Field Info

Variety	Legend 9697VIP
Population	35000
Row Width	30
Planting Date	5/6/16
Harvest Date	11/7/16
Soil Texture	sand
Tillage	No-Till
Manure History	No
Alfalfa History	No
Irrigated	Yes

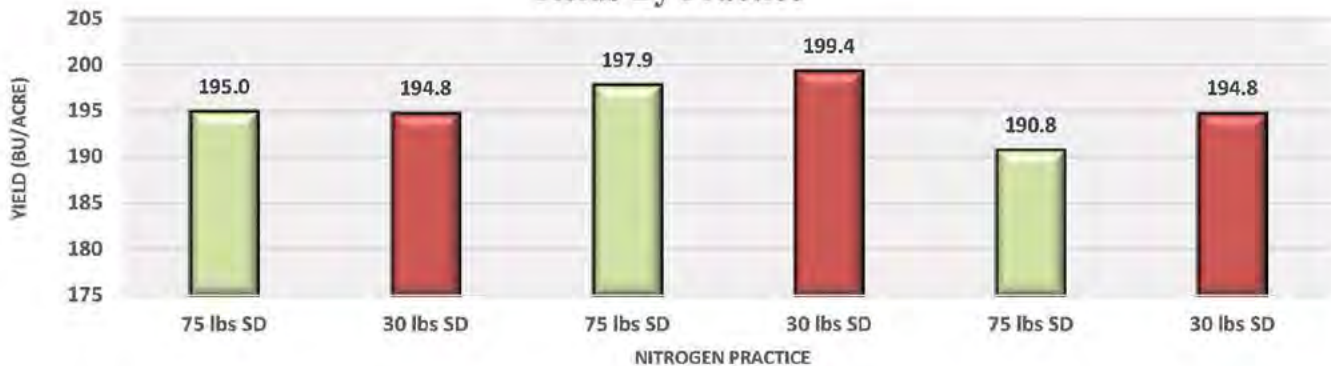
75 lbs N sidedress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
3-15-19-3	\$2,715	5 gal	At Planting Band	1.7	8.3	10.5	1.7	Guardian
28-0-0	\$290		Sidedress Band V3	75				
28-0-0	\$290		Sidedress Band V8	75				
Totals				152	8	11	2	

Stabilizer Cost / ac **\$11**

30 lbs N sidedress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
3-15-19-3	\$2,715	5 gal	At Planting Band	1.7	8.3	10.5	1.7	Guardian
28-0-0	\$290		Sidedress Band V3	30				
28-0-0	\$290		Sidedress Band V8	75				
Totals				107	8	11	2	

Stabilizer cost / ac **\$11**

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
75 lbs N sidedress	152	CRFSCRnorm	194.5	0.78	\$38.84	\$0.20	13.7	55.1
30 lbs N sidedress	107	CRFSCRalt	196.3	0.54	\$15.54	\$0.08	13.7	56.4

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

28% UAN: Sidedress 30 vs 60 lbs N/acre on peat

Field Trial ID	DPSCR	Trial	Nitrogen Rate	N source ²	28-0-0
Previous Crop	Corn	County	Blue Earth	Cost/ton	\$280
		Township	LeRay	28% N cost/lb	\$0.50



2016 NMI

Soil Test Info		Field Info	
Date	6/1/15	Variety	DKC 46-20
OM%	38.7	Population	34500
pH	6.2	Row Width	30
Nitrogen		Planting Date	
P (bray)	29	Harvest Date	10/6/16
P (olsen)		Soil Texture	clay loam
Potassium	115	Tillage	Ridge-Till
Sulfur		Manure History	No
Zinc	5	Alfalfa History	No
		Irrigated	No

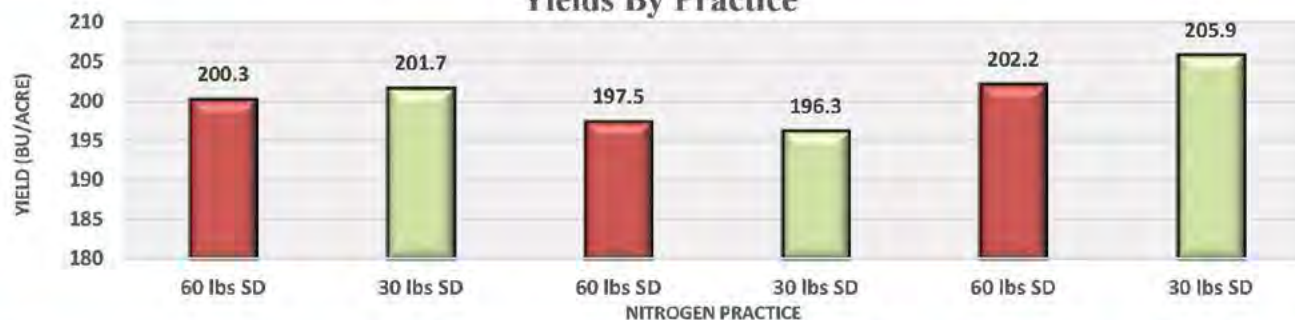
30 lbs N sidedress			Normal Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
28-0-0	\$280	107	At Planting Dribble	30			2.5	
11-52-0	\$530	50	Spring Preplant Broadcast	6	26			
0-0-62	\$376	100	Spring Preplant Broadcast	0	0	31		
28-0-0	\$280	107	Sidedress Dribble	30			2.5	
Totals				66	26	31	5	

Stabilizer Cost / ac \$0

60 lbs N sidedress			Alternative Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
28-0-0	\$280	107	At Planting Dribble	30			2.5	
11-52-0	\$530	50	Spring Preplant Broadcast	6	26			
0-0-62	\$376	100	Spring Preplant Broadcast	0	0	31		
28-0-0	\$280	214	Sidedress Dribble	60			5	
Totals				96	26	31	8	

Stabilizer cost / ac \$0

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
30 lbs N sidedress	66	DPSCRnorm	201.3	0.33	\$15.00	\$0.07	19.1	na
60 lbs N sidedress	96	DPSCRalt	200.0	0.48	\$30.00	\$0.15	18.6	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

32% UAN: 1 app Preplant vs 2 app Split vs 3 app Split(Y drop)

Field Trial ID	GRSCT	Trial	Nitrogen Timing	N source ²	32-0-0
Previous Crop	Corn	County	Watonwan	Cost/ton	\$330
		Township	Long Lake	32% N cost/lb	\$0.52



2016 NMI

Soil Test Info

Date	8/12/14
OM%	5.1
pH	6.3
Nitrogen	
P (bray)	25
P (olsen)	26
Potassium	147
Sulfur	4.6
Zinc	1.7

Field Info

Variety	
Population	
Row Width	30
Planting Date	
Harvest Date	
Soil Texture	clay loam
Tillage	Conventional
Manure History	No
Alfalfa History	No
Irrigated	No

1 app preplant				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
Other Credits			Spring Preplant Broadcast	27	66	72	17	
32-0-0	\$330	51 gal	Spring Preplant Broadcast	181				Instinct
Totals				208	66	72	17	

2 app split (V5)				Alternative Practice 1				
source	\$ ton	rate	application	N	P	K	S	stabilizer
Other Credits			Spring Preplant Broadcast	27	66	72	17	
32-0-0	\$330	10 gal	Spring Preplant Broadcast	35.5				Instinct
32-0-0	\$330	44 gal	Sidedress Dribble at V5	154				
Totals				217	66	72	17	

3 app split (Y drop)R1				Alternative Practice 2				
source	\$ ton	rate	application	N	P	K	S	stabilizer
Other Credits			Spring Preplant Broadcast	27	66	72	17	
32-0-0		10 gal	Spring Preplant Broadcast	35.5				Instinct
32-0-0		22 gal	Sidedress Dribble at V5	77				
32-0-0	\$330	22 gal	Sidedress Dribble at R1 (Ydrops)	77				
Totals				217	66	72	17	



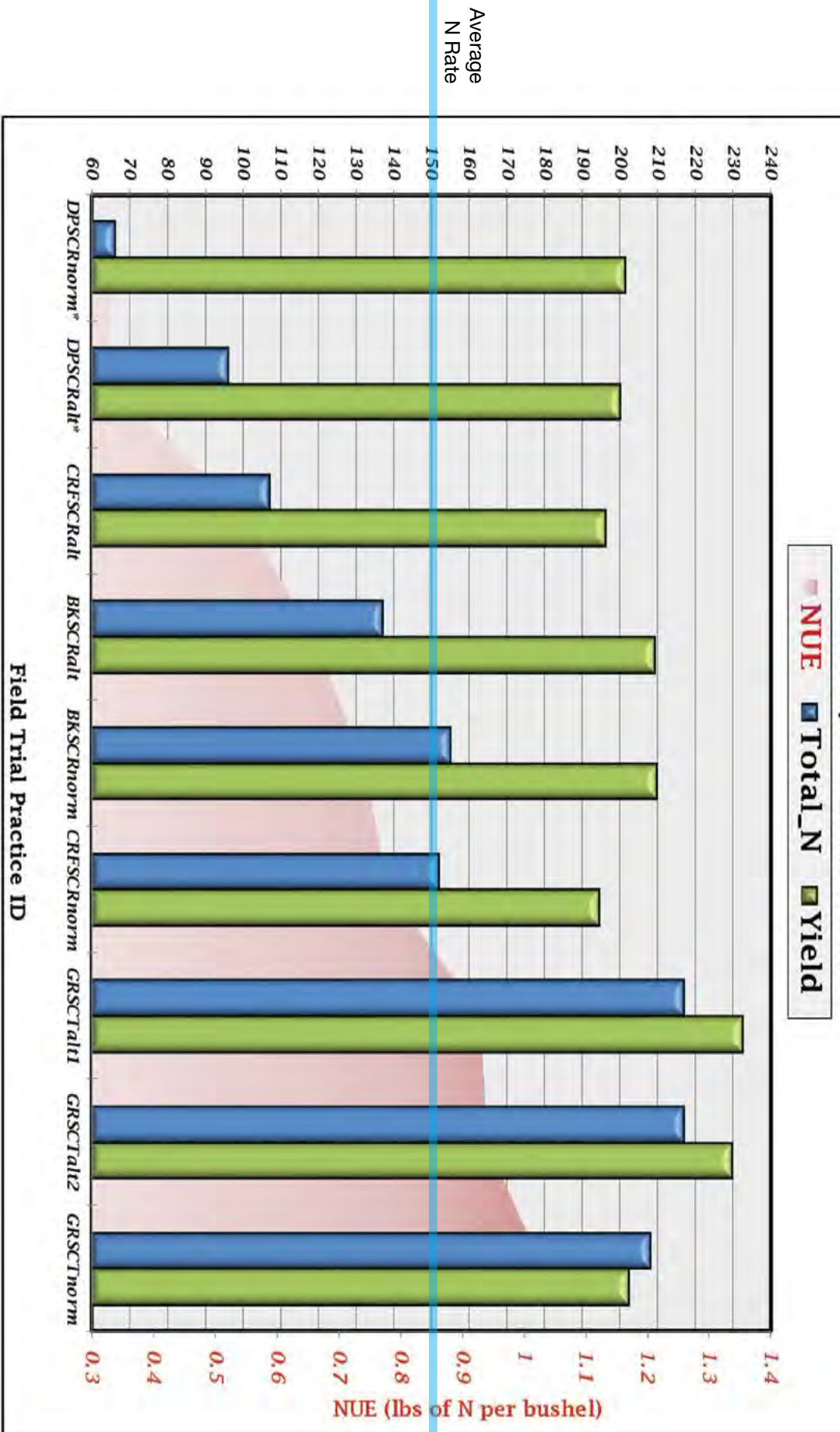
Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
1 app preplant	208	GRSCTnorm	202.3	1.03	\$94.12	\$0.47	16.7	na
2 app split (V5)	217	GRSCTalt	232.6	0.93	\$98.54	\$0.42	17.1	na
3 app split (Y drop)R1	217	GRSCTalt2	229.7	0.94	\$98.54	\$0.43	17.1	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Nitrogen Use Efficiency (NUE) South Central Region

All Corn after Corn NMI trials



28 % UAN: 0 vs. 50 lbs N acre sidedress

Field Trial ID	ACSCR	Trial	Nitrogen Rate	N source ²	28-0-0
Previous Crop	Soybeans	County	Meeker	Cost/ton	\$295
		Township	Mannonah	28% N cost/lb	\$0.53



2016 NMI

Soil Test Info		Field Info	
Date	10/2/15	Variety	Legend 40J592VT2
OM%	3	Population	34300
pH	6.7	Row Width	30
Nitrogen		Planting Date	4/23/16
P (bray)	25	Harvest Date	10/20/16
P (olsen)		Soil Texture	sandy loam
Potassium	95	Tillage	Minimum
Sulfur	6	Manure History	No
Zinc	.85 ppm	Alfalfa History	No
		Irrigated	No

0 lbs N sidedress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
Urea / AMS / Potash	\$377	100	Spring Preplant Broadcast	100		80	24	
8-16-11-2 Conklin Li	\$935	5 gal	At Planting Band	4.5	9	6	1.1	
Totals				105	9	86	25	

50 lbs N sidedress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
Urea / AMS / Potash	\$377	100	Spring Preplant Broadcast	100		80	24	
8-16-11-2 Conklin Li	\$935	5 gal	At Planting Band	4.5	9	6	1.1	
28-0-0	\$295		Sidedress Band	50				
Totals				155	9	86	25	



Nitrogen rate AND timing differences.

Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
0 lbs N sidedress	105	ACSCRnorm	180.6	0.58	\$0.00	\$0.00	16.6	57.0
50 lbs N sidedress	155	ACSCRalt	183.5	0.84	\$26.34	\$0.14	16.3	57.3

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

28% UAN: Sidedress 50 lbs N/acre

Field Trial ID	CLFSCR	Trial	Nitrogen Rate	N source ²	28-0-0
Previous Crop	Soybeans	County	Meeker	Cost/ton	\$295
		Township	Union Grove	28% N cost/lb	\$0.53



2016 NMI

Soil Test Info		Field Info	
Date	10/8/15	Variety	9495VT2
OM%	3	Population	34300
pH	6.5	Row Width	30
Nitrogen		Planting Date	4/16/16
P (bray)	45	Harvest Date	10/21/16
P (olsen)	38	Soil Texture	sandy clay loam
Potassium	212	Tillage	Minimum
Sulfur	15	Manure History	No
Zinc	2.1	Alfalfa History	No
		Irrigated	No

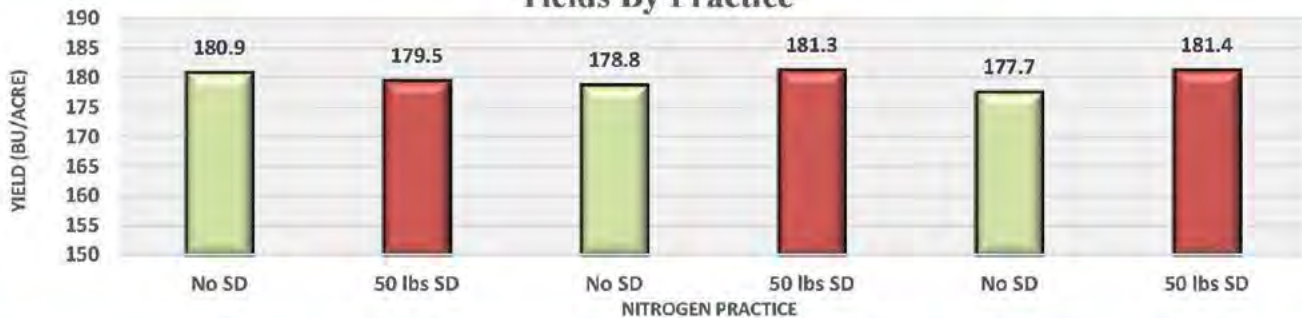
0 lbs N sidedress			Normal Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
11-52-0	\$534	357	Fall Preplant Broadcast	4.3	211.3	34.5		
Urea / AMS/ Potash	\$444	276	Spring Preplant Broadcast	100		24		
Conklin 8-16-11-2	\$935	5 gal	At Planting Band	4.5	9	6	1.1	
Totals				109	220	65	1	

Stabilizer Cost / ac \$0

50 lbs N sidedress			Alternative Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
11-52-0	\$534	357	Fall Preplant Broadcast	4.3	211.3	34.5		
Urea / AMS/ Potash	\$444	276	Spring Preplant Broadcast	100		24		
Conklin 8-16-11-2	\$935	5 gal	At Planting Band	4.5	9	6	1.1	
28-0-0	\$295		Sidedress Band	50				
Totals				159	220	65	1	

Stabilizer cost / ac \$0

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
0 lbs N sidedress	109	CLFSCRnorm	179.2	0.61	\$0.00	\$0.00	17.3	58.8
50 lbs N sidedress	159	CLFSCRalt	180.7	0.88	\$26.34	\$0.15	17.1	58.8

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Sidedress 28% UAN: 30 vs 0 lbs N/acre

Field Trial ID	DLSCR	Trial	Nitrogen Rate	N source ²	28-0-0
Previous Crop	Soybeans	County	Blue Earth	Cost/ton	na
		Township	McPherson	28% N cost/lb	na

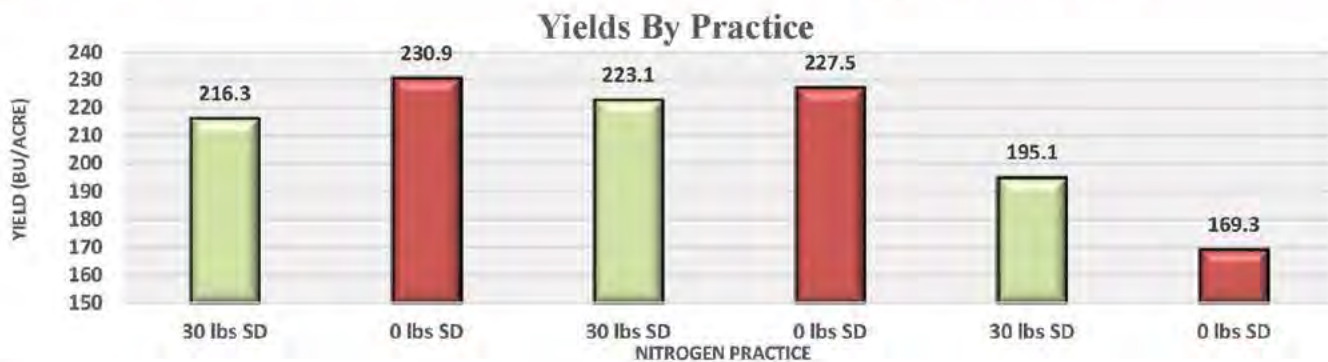


2016 NMI

Soil Test Info		Field Info	
Date	Fall 2014	Variety	DKC 54-38
OM%	5.4	Population	36000
pH	6.7	Row Width	30
Nitrogen		Planting Date	4/22/16
P (bray)	37.4	Harvest Date	
P (olsen)		Soil Texture	clay loam
Potassium	195	Tillage	Conventional
Sulfur		Manure History	No
Zinc		Alfalfa History	No
		Irrigated	No

30 lbs N sidedress				Normal Practice				
source	S ton	rate	application	N	P	K	S	stabilizer
82-0-0		140	Spring Preplant Band	115				
0-0-62		100	Fall Preplant Broadcast	0	0	62		
28-0-0		107	Sidedress Dribble	30				
Stabilizer Cost / ac				\$0				
Totals				145	0	62	0	

0 lbs N sidedress				Alternative Practice				
source	S ton	rate	application	N	P	K	S	stabilizer
82-0-0		140	Spring Preplant Band	115				
0-0-62		100	Fall Preplant Broadcast	0	0	62		
28-0-0		0	Sidedress Dribble	0				
Stabilizer cost / ac				\$0				
Totals				115	0	62	0	



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
30 lbs N sidedress	145	DLSCRnorm	211.5	0.69	na	na	15.6	na
0 lbs N sidedress	115	DLSCRalt	209.2	0.55	na	na	15.4	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

32% UAN At Planting : 0 vs 32 lbs N/acre

Field Trial ID	GPSCR	Trial	Nitrogen Rate	N source ²	32-0-0
Previous Crop	Soybeans	County	Faribault	Cost/ton	\$315
		Township	Barber	32% N cost/lb	\$0.49



2016 NMI

Soil Test Info		Field Info	
Date	6/1/10	Variety	G02W74-3000GT
OM%	3.2	Population	33000
pH	5.8	Row Width	30
Nitrogen		Planting Date	
P (bray)		Harvest Date	11/5/16
P (olsen)	22	Soil Texture	clay loam
Potassium	190	Tillage	Conventional
Sulfur		Manure History	No
Zinc		Alfalfa History	No
		Irrigated	No

0 lbs N sidedress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
11-52-0	\$560	128	Fall Preplant Broadcast	14	66			
0-0-60	\$440	173	Fall Preplant Broadcast			103		
9-18-9	\$740	40	At Planting Dribble	4	7	4		
82-0-0	\$645	171	Fall Preplant Band	140				None
Stabilizer Cost / ac				\$0				
Totals				158	73	107	0	

32 lbs N at planting (32%)				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
11-52-0	\$560	128	Fall Preplant Broadcast	14	66			
0-0-60	\$440	173	Fall Preplant Broadcast			103		
9-18-9	\$740	40	At Planting Dribble	4	7	4		
82-0-0	\$645	171	Fall Preplant Band	140				None
32-0-0	\$315	100	At Planting Broadcast	32				
Stabilizer cost / ac				\$0				
Totals				190	73	107	0	



Nitrogen rate AND timing differences.								
Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
0 lbs N sidedress	158	GPSCRnorm	235.9	0.67	0.00	\$0.00	16.7	58.0
32 lbs N at planting (32%)	190	GPSCRalt	247.8	0.77	\$15.68	\$0.06	16.5	58.0

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)
² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

32% UAN: Sidedress 80 vs 40 lbs N/acre

Field Trial ID	LFSCR	Trial	Nitrogen Rate	N source ²	32-0-0
Previous Crop	Soybeans	County	Faribault	Cost/ton	\$275
		Township	Barber	32% N cost/lb	\$0.43



2016 NMI

Soil Test Info		Field Info	
Date	9/25/15	Variety	Golden Harvest E01P5
OM%	5	Population	35500
pH	6.9	Row Width	30
Nitrogen	10 ppm	Planting Date	4/22/16
P (bray)	61	Harvest Date	
P (olsen)	xxx	Soil Texture	clay loam
Potassium	257	Tillage	Other
Sulfur	7	Manure History	No
Zinc	4.1	Alfalfa History	No
		Irrigated	No

80 lbs N sidedress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
32-0-0	\$275	18 gal	Carrier (Weed and Feed)	63				Guardian
12-0-0-26	\$390	2 gal	Carrier (Weed and Feed)	2.6			5.7	
3-18-18	\$1,260	4 gal	At Planting Band	1.3	8	8		
32-0-0		22 gal	Sidedress Band	80				
Totals				147	8	8	6	

Stabilizer Cost / ac **\$0**

40 lbs N sidedress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
32-0-0	\$275	18 gal	Carrier (Weed and Feed)	63				Guardian
12-0-0-26	\$390	2 gal	Carrier (Weed and Feed)	2.6			5.7	
3-18-18	\$1,260	4 gal	At Planting Band	1.3	8	8		
32-0-0		11 gal	Sidedress Band	40				
Totals				107	8	8	6	

Stabilizer cost / ac **\$0**



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
80 lbs N sidedress	147	LFSCRnorm	206.0	0.71	\$34.40	\$0.17	na	na
40 lbs N sidedress	107	LFSCRalt	198.0	0.54	\$17.20	\$0.09	na	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

28% UAN: Sidedress 30 vs 60 lbs N/acre

Field Trial ID	MLSCR	Trial	Nitrogen Rate	N source ²	28-0-0
Previous Crop	Soybeans	County	Blue Earth	Cost/ton	na
		Township	McPherson	28% N cost/lb	na



2016 NMI

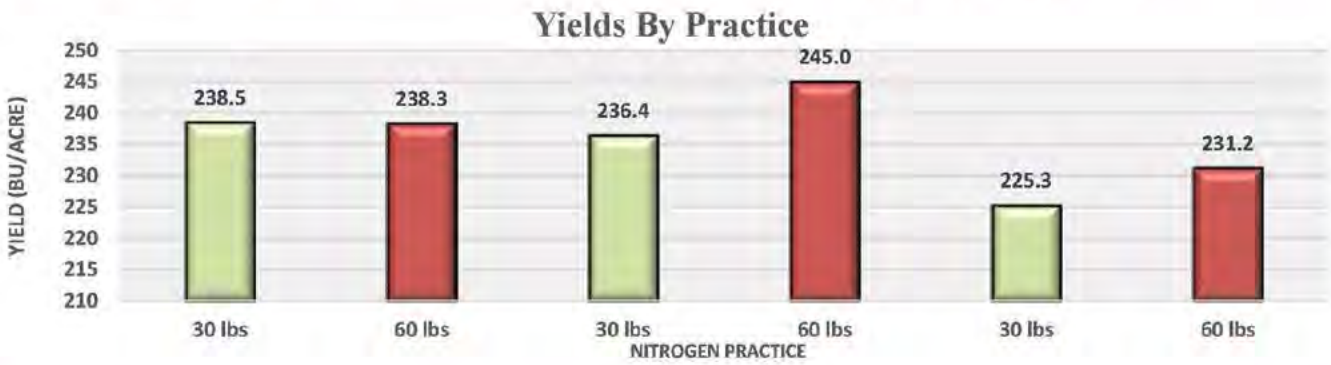
Soil Test Info		Field Info	
Date	Fall 2014	Variety	DKC 57-75
OM%	6.7	Population	36000
pH	6.7	Row Width	30
Nitrogen		Planting Date	
P (bray)	30	Harvest Date	11/8/16
P (olsen)		Soil Texture	clay loam
Potassium	147	Tillage	Conventional
Sulfur		Manure History	No
Zinc	1.9	Alfalfa History	No
		Irrigated	No

30 lbs N sidedress				Normal Practice				
source	S ton	rate	application	N	P	K	S	stabilizer
82-0-0		146	Spring Preplant Band	120				None
11-52-0		82	Fall Preplant Broadcast	9	43			
0-0-62		263	Fall Preplant Broadcast	0	0	163		
28-0-0		107	Sidedress Dribble	30				
Totals				159	43	163	0	

Stabilizer Cost / ac \$0

60 lbs N sidedress				Alternative Practice				
source	S ton	rate	application	N	P	K	S	stabilizer
82-0-0		146	Spring Preplant Band	120				None
11-52-0		82	Fall Preplant Broadcast	9	43			
0-0-62		263	Fall Preplant Broadcast	0	0	163		
28-0-0		214	Sidedress Dribble	60				
Totals				189	43	163	0	

Stabilizer cost / ac \$0



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
30 lbs N sidedress	159	MLSCRnorm	233.4	0.68	na	na	15.6	na
60 lbs N sidedress	189	MLSCRalt	238.2	0.79	na	na	15.7	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)
² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

28% UAN: Sidedress 34 vs 67 lbs N/acre

Field Trial ID	MVSCR	Trial	Nitrogen Rate	N source ²	28-0-0
Previous Crop	Soybeans	County	Blue Earth	Cost/ton	\$445
		Township	Lime	28% N cost/lb	\$0.79



2016 NMI

Soil Test Info		Field Info	
Date	7/23/14	Variety	DKC 52-84
OM%	4.5	Population	34800
pH	6.6	Row Width	30
Nitrogen	n/a	Planting Date	5/5/16
P (bray)	30	Harvest Date	
P (olsen)	n/a	Soil Texture	clay loam
Potassium	164	Tillage	Strip Till
Sulfur	n/a	Manure History	No
Zinc	2	Alfalfa History	No
		Irrigated	No

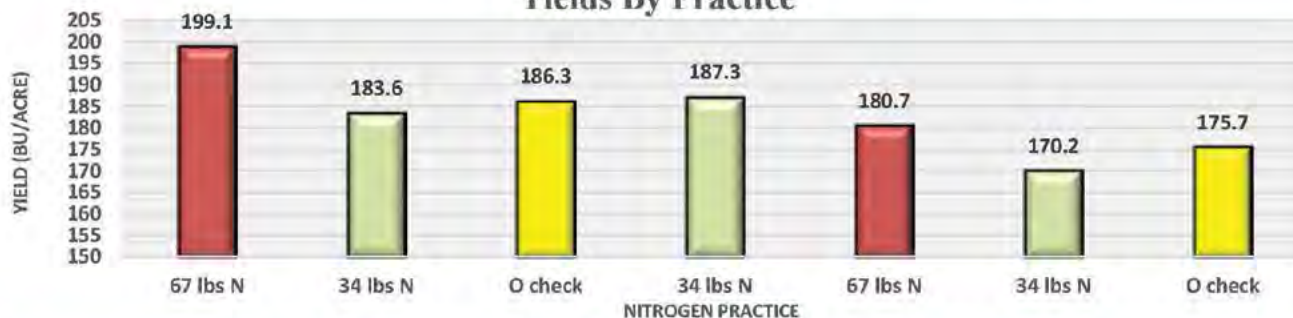
34 lbs N sidedress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
10-34-0	\$695	4	At Planting Band	4.56	15.5			N-Serve
18-46-0	\$544	125	Fall Preplant Band	22.5	57.5			
46-0-0	\$384	125	Fall Preplant Band	57.5				
0-0-60	\$440	75	Fall Preplant Band			45		
28-0-0	\$445	11.3 g	Sidedress Band	33.7				
Totals				118	73	45	0	

Stabilizer Cost / ac \$0

67 lbs N sidedress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
10-34-0	\$695	4	At Planting Band	4.56	15.5			N-Serve
18-46-0	\$544	125	Fall Preplant Band	22.5	57.5			
46-0-0	\$384	125	Fall Preplant Band	57.5				
0-0-60	\$440	75	Fall Preplant Band			45		
28-0-0	\$445	22.6 g	Sidedress Band	67.4				
Totals				152	73	45	0	

Stabilizer cost / ac \$0

Yields By Practice



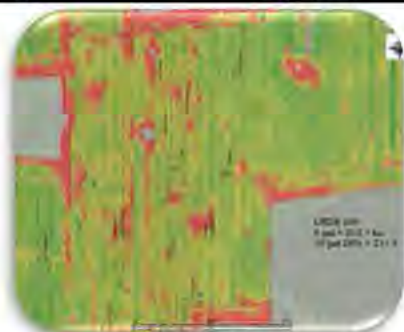
Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
34 lbs N sidedress	118	MVSCRnorm	180.3	0.66	\$26.78	\$0.15	21.1	56.7
67 lbs N sidedress	152	MVSCRalt	189.9	0.80	\$53.56	\$0.28	20.6	56.0

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

28%/ATS Mix: 0 vs 28 lbs N/acre sidedress after swine manure

Field Trial ID	ADSCRM	Trial	N Rate after Manure	N source ²	28%/ATS Mix
Previous Crop	Soybeans	County	Waseca	Cost/acre	\$15
		Township	Alton	28%/ATS N cost/lb	\$0.54



Soil Test Info

Date	6/15/13
OM%	4.5
pH	6.3
Nitrogen	
P (bray)	20
P (olsen)	
Potassium	161
Sulfur	
Zinc	2.1

Field Info

Variety	DKC 53-68RIB
Population	35500
Row Width	30
Planting Date	April 17th
Harvest Date	
Soil Texture	clay loam
Tillage	Fall Disc & Spring FC
Manure History	Yes
Manure Type	Swine (Finishing)
Liquid or Solid	Liquid
Application Method	Injection (Sweep)

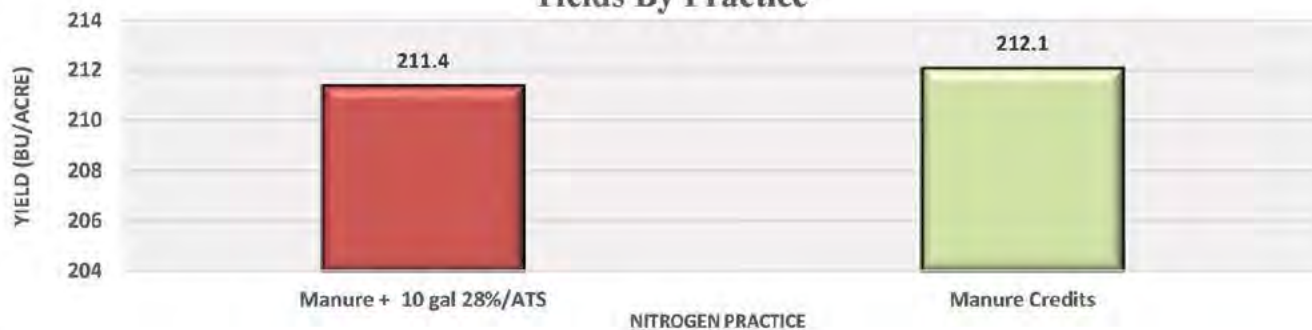
Manure Credits				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
Manure Credits Year 1	\$125	3200 gal	Fall Preplant Band	151	67	112	19	None
Totals				151	67	112	19	

Stabilizer Cost / ac \$0

Manure Credits + 28%/ATS				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
Manure Credits Year 1	\$125	3200 gal	Fall Preplant Band	151	67	112	19	None
28%/ATS Mix	\$15	10 gal	Sidedress Band	28	0	0	2	None
Totals				179	67	112	21	

Stabilizer cost / ac \$0

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
Manure Credits	151	ADSCRMnorm	212.4	0.71	\$0.00	\$0.00	18.0	58.0
Manure Credits + 28%/ATS	179	ADSCRMmalt	211.4	0.85	\$15.00	\$0.07	18.0	58.0

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

32% UAN: 80 lbs N applied at V6 vs. VT (Y drop)

Field Trial ID	ALSCT	Trial	Nitrogen Timing	N source ²	32-0-0
Previous Crop	Soybeans	County	Faribault	Cost/ton	\$275
		Township	Barber	32% N cost/lb	\$0.43



2016 NMI

Soil Test Info

Date	9/25/15
OM%	5
pH	6.9
Nitrogen	10 ppm
P (bray)	61
P (olsen)	xxx
Potassium	257
Sulfur	7
Zinc	4.1

Field Info

Variety	Golden Harvest E01P5
Population	35500
Row Width	30
Planting Date	4/22/16
Harvest Date	
Soil Texture	clay loam
Tillage	Other
Manure History	No
Alfalfa History	No
Irrigated	No

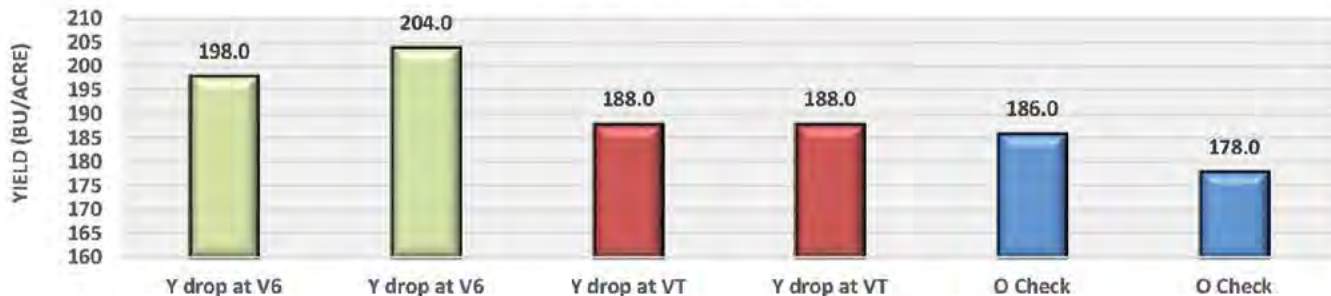
80 lbs N at V6 (Ydrop)				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
32-0-0	\$275	18	Carrier (Weed and Feed)	63				Guardian
12-0-0-26	\$390	2	Carrier (Weed and Feed)	2.6			5.7	
3-18-18	\$1,260	4	At Planting Band	1.3	8	8		
32-0-0 at V6		22	Top Dress Dribble	77				
Totals				144	8	8	6	

Stabilizer Cost / ac **\$0**

80 lbs N at VT (Ydrop)				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
32-0-0	\$275	18	Carrier (Weed and Feed)	63				
12-0-0-26	\$390	2	Carrier (Weed and Feed)	2.6			5.7	
3-18-18	\$1,260	4	At Planting Band	1.3	8	8		
32-0-0 at VT		22	Top Dress Dribble	77				
Totals				144	8	8	6	

Stabilizer cost / ac **\$0**

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
80 lbs N at V6 (Ydrop)	144	ALSC Tnorm	201.0	0.72	\$33.11	\$0.16	na	na
80 lbs N at VT (Ydrop)	144	ALSC Talt	188.0	0.77	\$33.11	\$0.18	na	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

26.4% N: Spring Preplant 99 vs Split 71/28lbs N/acre

Field Trial ID	AGSCT	Trial	Nitrogen Timing	N source ²	26.4-0-0-2.6
Previous Crop	Soybeans	County	Waseca	Cost/ton	\$290
		Township	Janesville	26% N cost/lb	\$0.55



2016 NMI

Soil Test Info

Date	10/28/13
OM%	3.3
pH	6.5
Nitrogen	0
P (bray)	30.6
P (olsen)	1.1
Potassium	192.7
Sulfur	0.1
Zinc	2.1

Field Info

Variety	Producers 6108
Population	34000
Row Width	30
Planting Date	4/28/16
Harvest Date	11/4/16
Soil Texture	clay loam
Tillage	Conventional
Manure History	No
Alfalfa History	No
Irrigated	No

Preplant 99 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
11-52-0	\$530	125	Fall Preplant Broadcast	14	65			
0-0-62	\$376	125	Fall Preplant Broadcast			78		
26.4-0-0-2.6	\$290	374	Spring Preplant Broadcast	99			10	
28-0-0	\$280	107	Carrier (Weed and Feed)	30				
12-0-0-26	\$428	55	Carrier (Weed and Feed)	7			14	
Totals				150	65	78	24	

Stabilizer Cost / ac

\$0

Totals

150 65 78 24

Split 71/28 lbs N acre				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
28-0-0	\$280	125	Fall Preplant Broadcast	14	65			
0-0-62	\$376	125	Fall Preplant Broadcast			78		
26.4-0-0-2.6	\$290	268	Spring Preplant Broadcast	71			7	
28-0-0	\$280	107	Carrier (Weed and Feed)	30				
12-0-0-26	\$428	55	Carrier (Weed and Feed)	7			14	
26.4-0-0-2.6	\$290	107	Sidedress Dribble	28			3	
Totals				150	65	78	24	

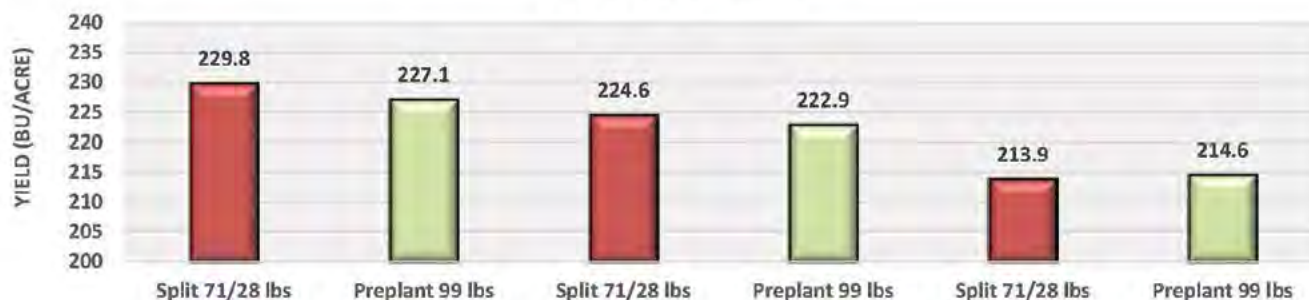
Stabilizer cost / ac

\$0

Totals

150 65 78 24

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 99 lbs N	150	AGSCTnorm	221.5	0.68	\$54.45	\$0.25	17.1	56.2
Split 71/28 lbs N acre	150	AGSCTalt	222.8	0.67	\$54.45	\$0.24	17.0	17.0

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

26.4%: Preplant 96 vs Split 68/28 lbs N/acre

Field Trial ID	GWSCT	Trial	Nitrogen Timing	N source ²	26.4-0-0-2.6
Previous Crop	Soybeans	County	Waseca	Cost/ton	\$290
		Township	Janesville	26% N cost/lb	\$0.55



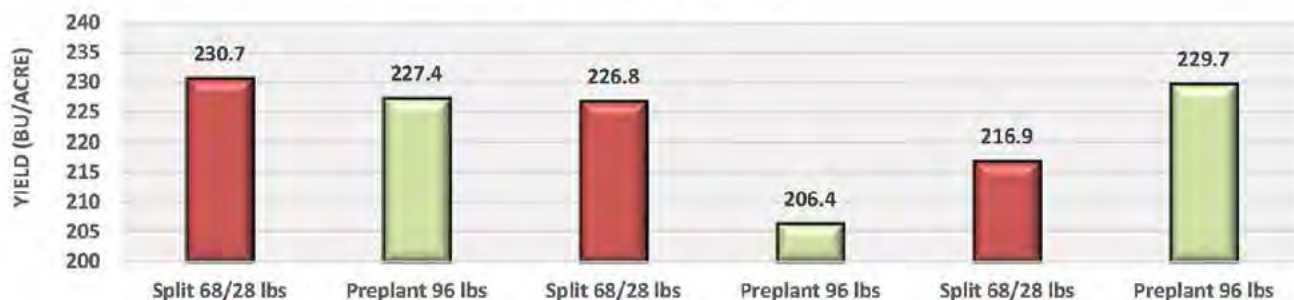
2016 NMI

Soil Test Info		Field Info	
Date	10/28/13	Variety	DKC 53-56
OM%	8.4	Population	34000
pH	7.1	Row Width	30
Nitrogen	0	Planting Date	4/22/16
P (bray)	14.4	Harvest Date	11/5/16
P (olsen)	7	Soil Texture	clay loam
Potassium	209.1	Tillage	Conventional
Sulfur	0.2	Manure History	No
Zinc	1.5	Alfalfa History	No
		Irrigated	No

Preplant 96 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
11-52-0	\$530	186	Fall Preplant Broadcast	20	97			
0-0-62	\$376	178	Fall Preplant Broadcast			110		
26.4-0-0-2.6	\$290	364	Spring Preplant Broadcast	96			9	
28-0-0	\$280	107	Carrier (Weed and Feed)	30				
12-0-0-26	\$428	55	Carrier (Weed and Feed)	7			14	
Stabilizer Cost / ac				\$0				
Totals				153	97	110	23	

Split 68 / 28lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
11-52-0	\$530	186	Fall Preplant Broadcast	20	97			
0-0-62	\$376	178	Fall Preplant Broadcast			110		
26.4-0-0-2.6	\$290	257	Spring Preplant Broadcast	68			6	
28-0-0	\$280	107	Carrier (Weed and Feed)	30				
12-0-0-26	\$428	55	Carrier (Weed and Feed)	7			14	
26.4-0-0-2.6	\$290	107	Sidedress Dribble	28			3	
Stabilizer cost / ac				\$0				
Totals				153	97	110	23	

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 96 lbs N	153	GWSCInorr	221.2	0.69	\$52.80	\$0.24	17.1	55.3
Split 68 / 28lbs N	153	GWSCTalt	224.8	0.68	\$52.80	\$0.23	17.0	55.8

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

26.4%: Preplant 127 vs Split 99/28 lbs N/acre

Field Trial ID	HGSCT	Trial	Nitrogen Timing	N source ²	26.4-0-0-2.6
Previous Crop	Soybeans	County	Blue Earth	Cost/ton	\$290
		Township	McPherson	26% N cost/lb	\$0.55



2016 NMI

Soil Test Info

Date	10/15/11
OM%	5.9
pH	6.1
Nitrogen	0
P (bray)	13.2
P (olsen)	1.3
Potassium	163.3
Sulfur	0.2
Zinc	1.5

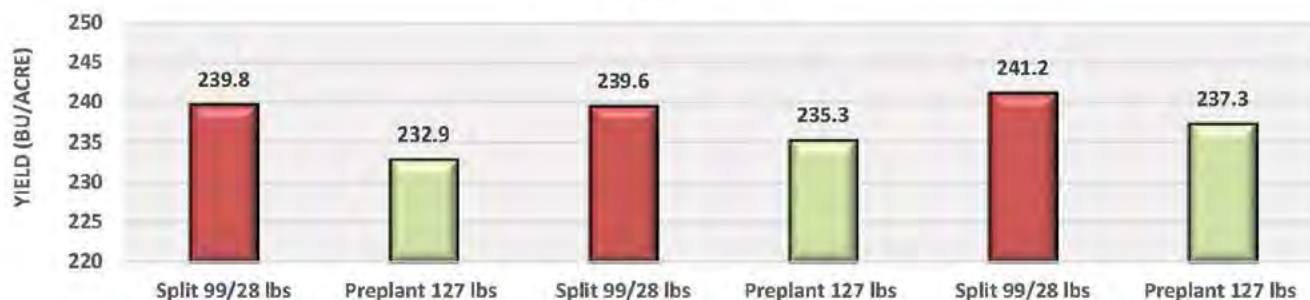
Field Info

Variety	Producers 6108
Population	35000
Row Width	30
Planting Date	5/5/16
Harvest Date	10/21/16
Soil Texture	clay loam
Tillage	Conventional
Manure History	No
Alfalfa History	No
Irrigated	No

Preplant 127 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
11-52-0	\$530	284	Fall Preplant Broadcast	31	148			
0-0-62	\$376	207	Fall Preplant Broadcast			128		
26.4-0-0-2.6	\$290	481	Spring Preplant Broadcast	127			12	
10-34-0	\$550	58	At Planting Band	6	20			
Stabilizer Cost / ac				\$0				
Totals				164	168	128	12	

Split 99/28 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
11-52-0	\$530	284	Fall Preplant Broadcast	31	148			
0-0-62	\$376	207	Fall Preplant Broadcast			128		
26.4-0-0-2.6	\$290	374	Spring Preplant Broadcast	99			9	
10-34-0	\$550	58	At Planting Band	6	20			
26.4-0-0-2.6	\$290	107	Sidedress Dribble	28			3	
Stabilizer cost / ac				\$0				
Totals				164	168	128	12	

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 127 lbs N	164	HGSCThorm	235.1	0.70	\$69.85	\$0.30	17.3	56.0
Split 99/28 lbs N	164	HGSCtalt	240.2	0.68	\$69.85	\$0.29	17.1	56.0

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Spring Preplant 119 vs Split 91/28 lbs N/acre

Field Trial ID	KG SCT	Trial	Nitrogen Timing	N source ²	26.4-0-0-2.6
Previous Crop	Soybeans	County	Waseca	Cost/ton	\$290
		Township	Iosco	26% N cost/lb	\$0.55



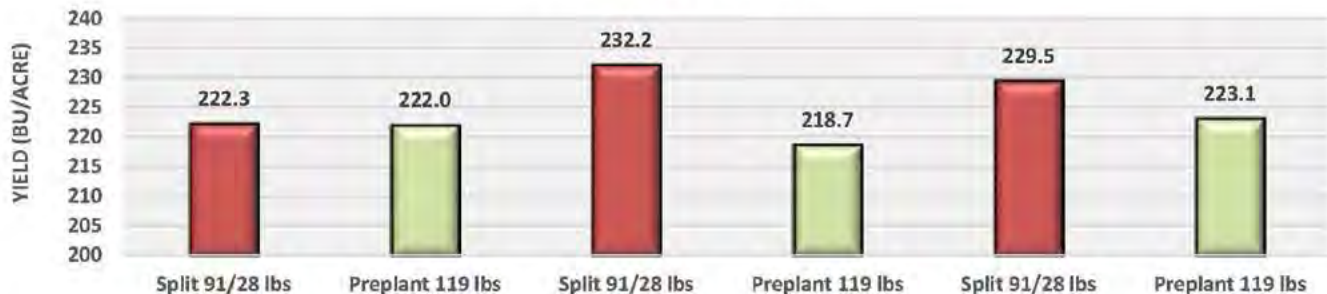
2016 NMI

Soil Test Info		Field Info	
Date	10/12/11	Variety	DKC 54-38
OM%	4.8	Population	34000
pH	6.5	Row Width	30
Nitrogen	0	Planting Date	4/16/16
P (bray)	5.2	Harvest Date	10/16/16
P (olsen)	3.5	Soil Texture	clay loam
Potassium	160.1	Tillage	Conventional
Sulfur	0.2	Manure History	No
Zinc	2.1	Alfalfa History	No
		Irrigated	No

Preplant 119 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
11-52-0	\$530	216	Fall Preplant Broadcast	24	112			
0-0-62	\$376	213	Fall Preplant Broadcast			132		
26.4-0-0-2.6	\$290	449	Spring Preplant Broadcast	119			9	
10-34-0	\$550	58	At Planting Band	6	20			
Stabilizer Cost / ac				\$0				
Totals				149	132	132	9	

Split 91 / 28 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
11-52-0	\$530	216	Fall Preplant Broadcast	24	112			
0-0-62	\$376	213	Fall Preplant Broadcast			132		
26.4-0-0-2.6	\$290	342	Spring Preplant Broadcast	91			6	
10-34-0	\$550	58	At Planting Band	6	20			
26.4-0-0-2.6	\$290	107	Sidedress Dribble	28			3	
Stabilizer cost / ac				\$0				
Totals				149	132	132	9	

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 119 lbs N	149	KG SCTnorm	221.3	0.67	\$65.45	\$0.30	18.2	56.5
Split 91 / 28 lbs N	149	KG SCTalt	228.0	0.65	\$65.45	\$0.29	17.8	56.4

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

26.4 %: Preplant 96 vs Split 68/28 lbs N/acre

Field Trial ID	KTSC T	Trial	Nitrogen Timing	N source ²	26,4-0-0-2.6
Previous Crop	Soybeans	County	Waseca	Cost/ton	\$290
		Township	Alton	26% N cost/lb	\$0.55



2016 NMI

Soil Test Info

Date	10/29/15
OM%	5
pH	5.8
Nitrogen	0
P (bray)	26.8
P (olsen)	1.4
Potassium	129.4
Sulfur	0.2
Zinc	2.2

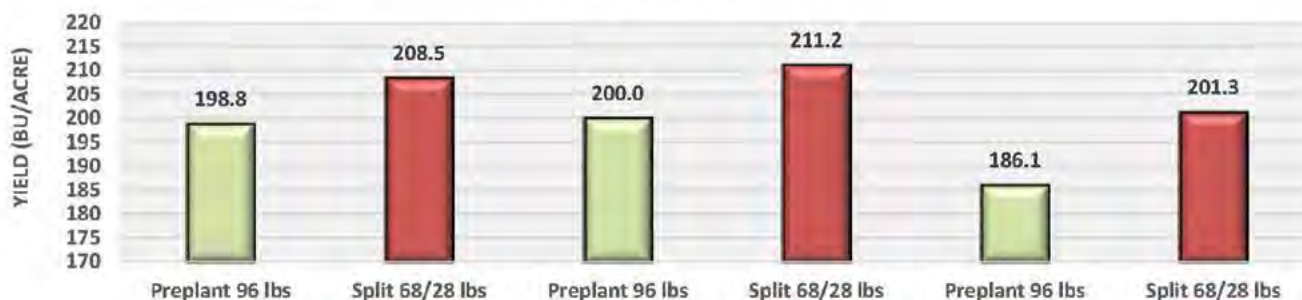
Field Info

Variety	Gold Country 9904
Population	34000
Row Width	30
Planting Date	4/23/16
Harvest Date	11/2/16
Soil Texture	clay loam
Tillage	Conventional
Manure History	No
Alfalfa History	No
Irrigated	No

Preplant 96 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
11-52-0	\$530	100	Fall Preplant Broadcast	11	52			
0-0-62	\$376	150	Fall Preplant Broadcast			93		
26.4-0-0-2.6	\$290	364	Spring Preplant Broadcast	96			9	
28-0-0	\$280	107	Carrier (Weed and Feed)	30				
12-0-0-26	\$428	55	Carrier (Weed and Feed)	7			14	
10-34-0	\$550	58	At Planting Band	6	20			
Stabilizer Cost / ac				\$0				
Totals				150	72	93	23	

Split 68/28 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
11-52-0	\$530	100	Fall Preplant Broadcast	11	52			
0-0-62	\$376	150	Fall Preplant Broadcast			93		
26.4-0-0-2.6	\$290	257	Spring Preplant Broadcast	68			6	
28-0-0	\$280	107	Carrier (Weed and Feed)	30				
12-0-0-26	\$428	55	Carrier (Weed and Feed)	7			14	
26.4-0-0-2.6	\$290	107	Sidedress Dribble	28			3	
10-34-0	\$550	58	At Planting Band	6	20			
Stabilizer cost / ac				\$0				
Totals				150	72	93	23	

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 96 lbs N	150	KTSC Tnorm	189.1	0.79	\$52.80	\$0.28	16.6	56.7
Split 68/28 lbs N	150	KTSC Talt	204.3	0.73	\$52.80	\$0.26	16.6	56.7

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

32% UAN: Preplant vs Sidedress 35 lbs N/acre

Field Trial ID	PDSCT	Trial	Nitrogen Timing	N source²	32-0-0
Previous Crop	Soybeans	County	Blue Earth	Cost/ton	\$260
		Township	Mapleton	32% N cost/lb	\$0.41



2016 NMI

Soil Test Info	
Date	6/1/15
OM%	5
pH	6
Nitrogen	
P (bray)	55
P (olsen)	
Potassium	255
Sulfur	
Zinc	

Field Info	
Variety	NK E101P5-3011A Entogen
Population	35000
Row Width	30
Planting Date	4/17/16
Harvest Date	Oct. 8 & 19, 2016
Soil Texture	clay loam
Tillage	Fall Chisel & Spring FC
Manure History	no
Alfalfa History	no
Irrigated	no

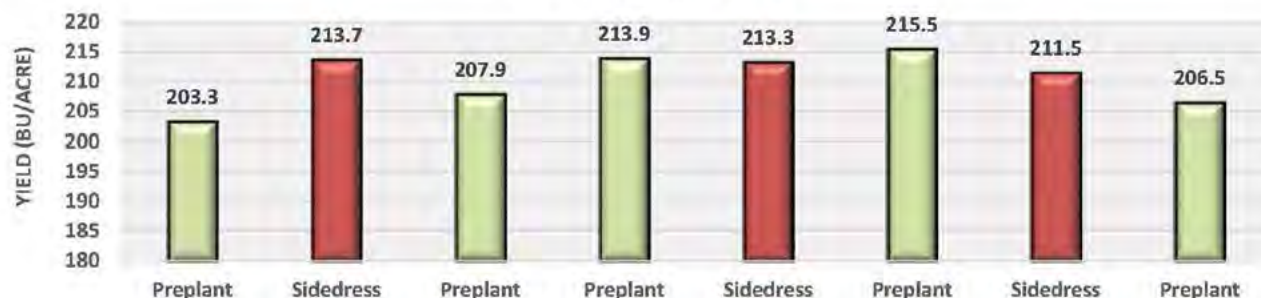
Preplant 35 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
32-0-0	\$260	35	Spring Preplant Broadcast	35	0	0		no
urea	\$370	120	Spring Preplant Broadcast	100	0	0	0	yes
Totals				135	0	0	0	

Stabilizer Cost / ac **\$9**

Sidedress 35 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
32-0-0	\$260	35	Sidedress Dribble	35	0	0		no
urea	\$370	120	Spring Preplant Broadcast	100	0	0	0	yes
Totals				135	0	0	0	

Stabilizer cost / ac **\$11**

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 35 lbs N	135	PDSCInorm	209.4	0.64	\$14.35	\$0.07	17.4	na
Sidedress 35 lbs N	135	PDSCalt	212.8	0.63	\$14.35	\$0.07	17.5	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

26.4%: Preplant 96 vs 68/28 lbs N/acre

Field Trial ID	SMSCT	Trial	Nitrogen Timing	N source ²	26.4-0-0-2.6
Previous Crop	Soybeans	County	Waseca	Cost/ton	\$290
		Township	St Mary	26% N cost/lb	\$0.55



2016 NMI

Soil Test Info

Date	9/21/11
OM%	4.7
pH	6
Nitrogen	0
P (bray)	19.6
P (olsen)	1.3
Potassium	157
Sulfur	0.2
Zinc	1.8

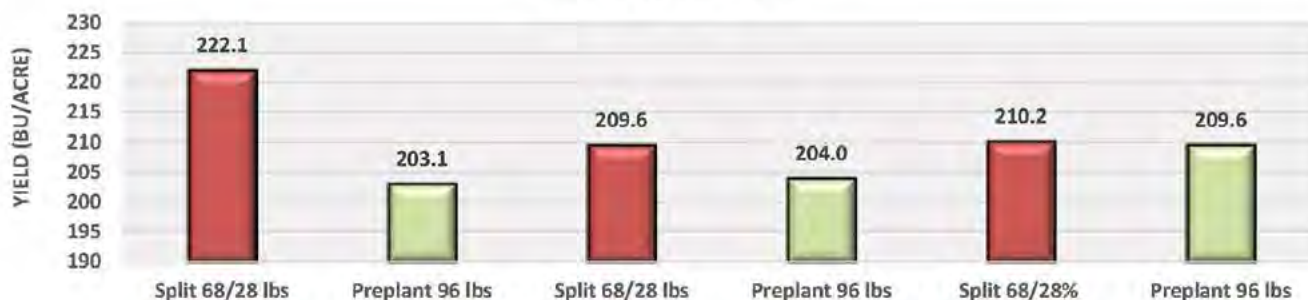
Field Info

Variety	DKC 53-68
Population	34000
Row Width	30
Planting Date	4/17/16
Harvest Date	10/19/16
Soil Texture	clay loam
Tillage	Conventional
Manure History	No
Alfalfa History	No
Irrigated	No

Preplant 96 lbs N				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
11-52-0	\$530	198	Fall Preplant Broadcast	22	103			
0-0-62	\$376	278	Fall Preplant Broadcast			172		
26.4-0-0-2.6	\$290	320	Spring Preplant Broadcast	96			9	
28-0-0	\$280	107	Carrier (Weed and Feed)	30				
12-0-0-26	\$428	55	Carrier (Weed and Feed)	7			14	
10-34-0	\$550	58	At Planting Band	6	20			
Stabilizer Cost / ac				\$0				
Totals				161	123	172	23	

Split 68/28 lbs N				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
11-52-0	\$530	198	Fall Preplant Broadcast	22	103			
0-0-62	\$376	278	Fall Preplant Broadcast			172		
26.4-0-0-2.6	\$290	214	Spring Preplant Broadcast	68			6	
28-0-0	\$280	107	Carrier (Weed and Feed)	30				
12-0-0-26	\$428	55	Carrier (Weed and Feed)	7			14	
26.4-0-0-2.6	\$290	107	Sidedress Dribble	28			3	
10-34-0	\$550	58	At Planting Band	6	20			
Stabilizer cost / ac				\$0				
Totals				161	123	172	23	

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 96 lbs N	161	SMSC Tnorm	205.6	0.78	\$52.80	\$0.26	17.6	57.7
Split 68/28 lbs N	161	SMSC Talt	214.0	0.75	\$52.80	\$0.25	17.4	57.7

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

32% UAN: Preplant vs. Sidedress 35 lbs N/acre after hog manure

Field Trial ID	DGSCTM	Trial	Nitrogen Timing	N source²	32-0-0
Previous Crop	Soybeans	County	Blue Earth	Cost/ton	\$260
		Township	Lyra	32% N cost/lb	\$0.41



2016 NMI

Soil Test Info

Date	6/1/13
OM%	5
pH	6
Nitrogen	
P (bray)	22
P (olsen)	
Potassium	200
Sulfur	
Zinc	

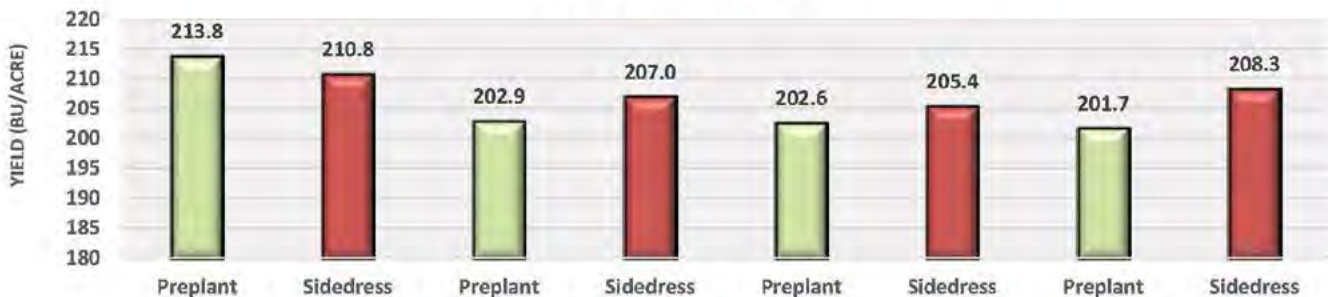
Field Info

Variety	Titam Pro 3096
Population	35000
Row Width	30
Planting Date	4/16/16
Harvest Date	9/27/16
Soil Texture	clay loam
Tillage	Fall Chisel & Spring FC
Manure History	Yes
Manure Type	Swine (Finishing)
Liquid or Solid	Liquid
Application	Broadcast inc <12 hours

Spring Preplant 35 lbs N				Normal Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer	
32-0-0	\$260	35	Spring Preplant Broadcast	35				no	
urea	\$370	60	Spring Preplant Broadcast	50				no	
Manure Credits Year 1		2500	Fall Preplant Broadcast	60	37	85		yes	
Stabilizer Cost / ac				\$8	Totals				145 37 85 0

Sidedress 35 lbs N				Alternative Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer	
32-0-0	\$260	35	Sidedress Dribble	35					
urea	\$370	60	Spring Preplant Broadcast	50				no	
Manure Credits Year 1		2500	Fall Preplant Broadcast	60	37	85		yes	
Stabilizer cost / ac				\$11	Totals				145 37 85 0

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Spring Preplant 35 lbs N	145	DGSCTMnorm	205.3	0.71	\$14.35	\$0.07	20.5	na
Sidedress 35 lbs N	145	DGSCTMalt	207.9	0.70	\$14.35	\$0.07	20.5	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

30 lbs N/acre with Instinct at sidedress

Field Trial ID	DHSCS	Trial	Nitrogen Stabilizer	N source ²	28-0-0
Previous Crop	Soybeans	County	Freeborn	Cost/ton	na
		Township	Nunda	28% N cost/lb	na



2016 NMI

Soil Test Info		Field Info	
Date	10/15/16	Variety	Producers 6100
OM%	4.05	Population	34000
pH	6	Row Width	30
Nitrogen		Planting Date	
P (bray)	29	Harvest Date	10/22/16
P (olsen)		Soil Texture	clay loam
Potassium	98	Tillage	Conventional
Sulfur		Manure History	No
Zinc	2.46	Alfalfa History	No
		Irrigated	No

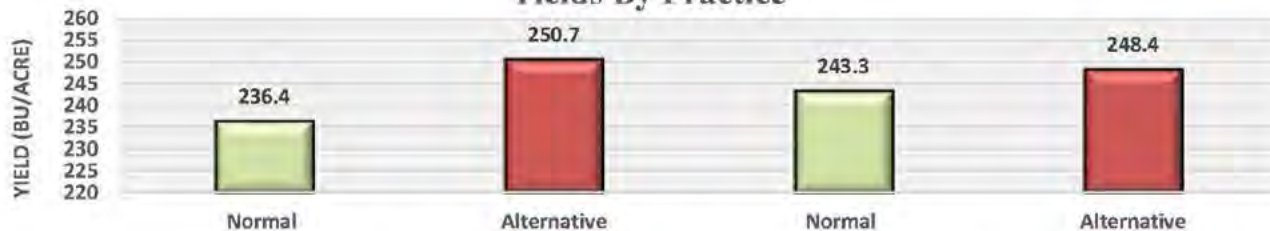
No sidedress				Normal Practice				
source	cost	rate	application	N	P	K	S	stabilizer
28-0-0		428.57	Spring Preplant Broadcast	120				Instinct
12-0-0-26		77.7	Spring Preplant Broadcast	9.3			20.2	
18-46-0		153	Spring Preplant Broadcast	27.5	70.38			
0-0-60		217	Spring Preplant Broadcast			130.2		
10-34-0		59	At Planting Band	5.9	20.06			
Totals				163	90	130	20	

Stabilizer Cost / \$6

Sidedress 28% with Instinct				Alternative Practice				
source	cost	rate	application	N	P	K	S	stabilizer
28-0-0		428.57	Spring Preplant Broadcast	120				Instinct
12-0-0-26		77.7	Spring Preplant Broadcast	9.3			20.2	
18-46-0		153	Spring Preplant Broadcast	27.5	70.38			
0-0-60		217	Spring Preplant Broadcast			130.2		
28-0-0		107.14	Sidedress Band	30				Instinct
10-34-0		59	At Planting Band	5.9	20.1			
Totals				193	90	130	20	

Stabilizer cost / \$11

Yields By Practice



Different nitrogen timing and rate applied with a stabilizer. These variables do not provide any information on what created the yield difference or potential water quality benefit. Applying additional nitrogen above normal farm practice is not recommended for the NMI.

Practice	Stabilizer	ID	Yield	NUE ¹	Stabilizer cost per acre ²	% MT	Test Weight
No sidedress	None	DHSCSnorm	239.8	0.68	\$6.00	16.4	58.7
Sidedress 28% with Instinct	Instinct	DHSCSalt	249.6	0.77	\$11.00	15.6	60.1

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Additional 30 lbs N/acre with Instinct at sidedress

Field Trial ID	MBCS	Trial	Nitrogen Stabilizer	N source ²	28-0-0
Previous Crop	Soybeans	County	Freeborn	Cost/ton	na
		Township	Nunda	28% N cost/lb	na



2016 NMI

Soil Test Info		Field Info	
Date	6/1/15	Variety	201-37VT RIB
OM%	7.9	Population	34000
pH	6.7	Row Width	30
Nitrogen		Planting Date	
P (bray)	60	Harvest Date	10/16/16
P (olsen)		Soil Texture	clay loam
Potassium	277	Tillage	Conventional
Sulfur	6.3	Manure History	No
Zinc	1.9	Alfalfa History	No
		Irrigated	No

No sidedress				Normal Practice				
source	cost	rate	application	N	P	K	S	stabilizer
28-0-0		430	Spring Preplant Broadcast	120.4				None
0-0-60		125	Spring Preplant Broadcast			75		
11-52-0		150	Spring Preplant Broadcast	16.5	78			
10-34-0		69	At Planting Band	5.9	20.06			
Totals				143	98	75	0	

Stabilizer Cost / \$6

Sidedress 28% with Instinct				Alternative Practice				
source	cost	rate	application	N	P	K	S	stabilizer
28-0-0		430	Spring Preplant Broadcast	120.4				None
0-0-60		125	Spring Preplant Broadcast			75		
11-52-0		150	Spring Preplant Broadcast	16.5	78			
10-34-0		69	At Planting Band	5.9	20.06			
28-0-0		107.14	Sidedress Band	30				Instinct
Totals				173	98	75	0	

Stabilizer cost / \$6



Different nitrogen timing and rate with a stabilizer. These variables do not provide any information on what created the yield difference or potential water quality benefit. Applying additional nitrogen above normal farm practice is not recommended for the NMI.

Practice	Stabilizer	ID	Yield	NUE ¹	Stabilizer cost per acre ²	% MT	Test Weight
No sidedress	None	MBSCSnorm	221.9	0.64	\$6.00	17.2	58.3
Sidedress 28% with Instinct	Instinct	MBSCSalt	224.5	0.77	\$6.09	16.9	58.5

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Preplant Urea with Instinct

Field Trial ID	SHSCS	Trial	Nitrogen Stabilizer	N source ²	46-0-0
Previous Crop	Soybeans	County	Waseca	Cost/ton	\$283
		Township	Freedom	46% N cost/lb	\$0.31



2016 NMI

Soil Test Info		Field Info	
Date	10/1/13	Variety	TP-4003 & 2M042P
OM%	6	Population	34500
pH	6.3	Row Width	30
Nitrogen		Planting Date	4/14/16
P (bray)	20	Harvest Date	10/16/16
P (olsen)		Soil Texture	clay loam
Potassium	216	Tillage	Conventional
Sulfur		Manure History	No
Zinc	1.3	Alfalfa History	No
		Irrigated	No

Spring Preplant Urea			Normal Practice					
source	cost	rate	application	N	P	K	S	stabilizer
46-0-0	\$283	250	Spring Preplant Broadcast	115				None
28-0-0	\$263	12	Sidedress Dribble	36				
6-24-6	\$707	5	At Planting Band	3.33	13.32	3.33		
11-52-0	\$481	150	Fall Preplant Broadcast	16.5	78			
0-0-60	\$333	150	Fall Preplant Broadcast			90		
Gypsum 17.5S 22Ca	\$189	100	Spring Preplant Broadcast				17.5	
Totals				171	91	93	18	

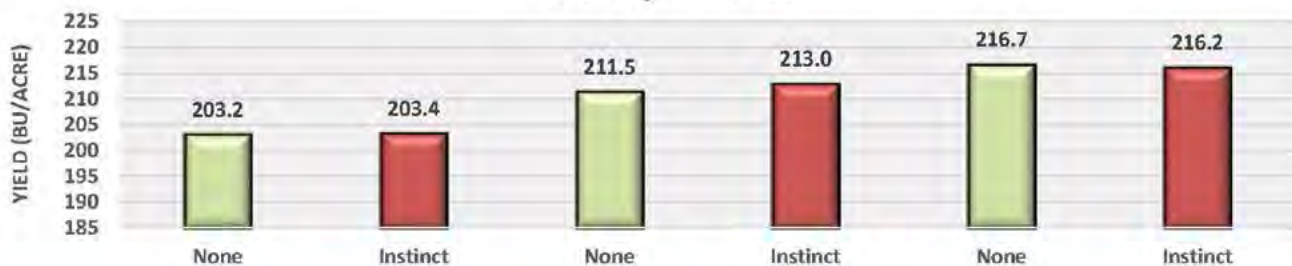
Stabilizer Cost / ac **\$0**

Spring Preplant Urea with Instinct			Alternative Practice					
source	cost	rate	application	N	P	K	S	stabilizer
46-0-0	\$283	250	Spring Preplant Broadcast	115				Instinct
28-0-0	\$263	12	Sidedress Dribble	36				
6-24-6	\$707	5	At Planting Band	3.33	13.32	3.33		
11-52-0	\$481	150	Fall Preplant Broadcast	16.5	78			
0-0-60	\$333	150	Fall Preplant Broadcast			90		
Gypsum 17.5S 22Ca	\$189	100	Spring Preplant Broadcast				17.5	
Totals				171	91	93	18	

Stabilizer cost / ac **\$9**

Instinct was sprayed on in strips before the pre-emerge herbicide was applied.

Yields By Practice



Practice	Stabilizer	ID	Yield	NUE ¹	Stabilizer cost per acre ²	% MT	Test Weight
Spring Preplant Urea	None	SHSCSnorm	210.4	0.81	\$0.00	16.8	na
Spring Preplant Urea with Instinct	Instinct	SHSCSalt	210.9	0.81	\$9.00	17.0	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Interseeding Cover Crop Mix at Sidedress V7

Field Trial ID	KHSCC	Trial	Interseeding Cover Crops	N source ²	28-0-0
Previous Crop	Soybeans	County	Sibley	Cost/ton	\$275
		Township	Severance	28% N cost/lb	\$0.49



2016 NMI

Soil Test Info

Date	10/10/13
OM%	5.4
pH	6.9
Nitrogen	
P (bray)	15.8
P (olsen)	
Potassium	121
Sulfur	5
Zinc	1.3

Field Info

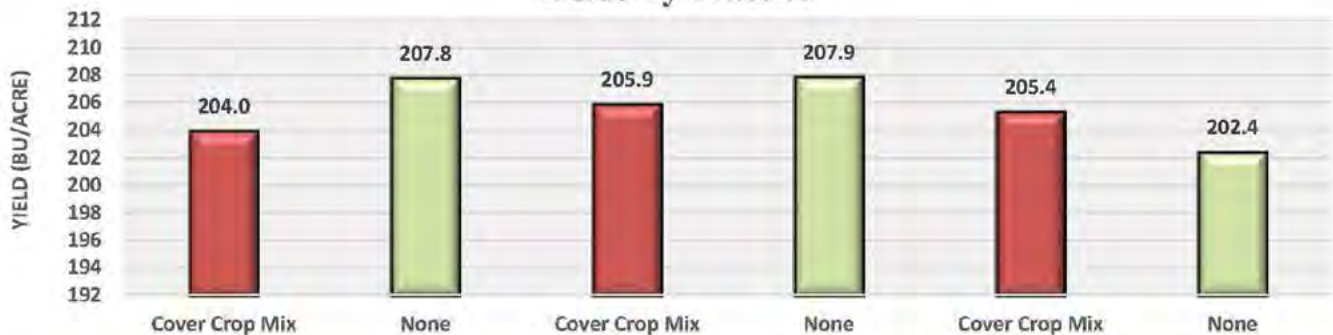
Variety	NK 45P 3011A
Population	35000
Row Width	30
Planting Date	5/8/16
Harvest Date	
Soil Texture	clay loam
Tillage	Conventional
Manure History	No
Alfalfa History	No
Irrigated	No

No Cover Crops			Normal Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
18-46-0	\$510	184	Spring Preplant Broadcast	33	85			
0-0-60	\$366	133	Spring Preplant Broadcast			80		
Sulfur	\$620	11	Spring Preplant Broadcast				10	
46-0-0	\$371	92	Spring Preplant Broadcast	42				
28-0-0	\$275	298	Sidedress Band	84				
Stabilizer Cost / ac			\$0	Totals	159	85	80	10

Interseed Cover Crops at V7			Alternative Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
18-46-0	\$510	184	Spring Preplant Broadcast	33	85			
0-0-60	\$366	133	Spring Preplant Broadcast			80		
Sulfur	\$620	11	Spring Preplant Broadcast				10	
46-0-0	\$371	92	Spring Preplant Broadcast	42				
28-0-0	\$275	298	Sidedress Band	84				
Stabilizer cost / ac			\$0	Totals	159	85	80	10

Seeded 10lb mix of Annual Ryegrass, Radish, Turnip, Crimson Clover and Rapeseed between corn rows @ V7

Yields By Practice



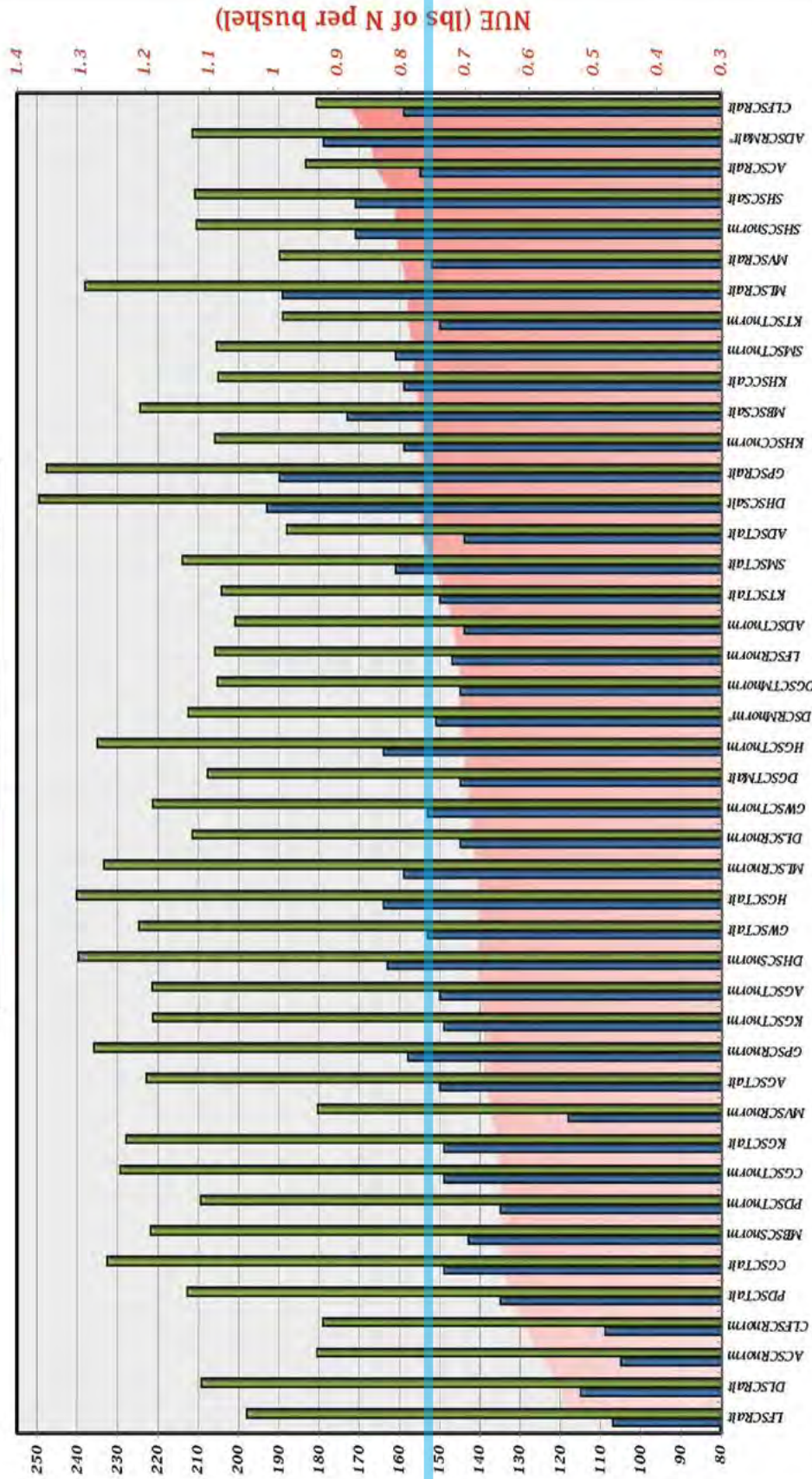
Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
No Cover Crops	159	KHSCCnorm	206.0	0.77	\$41.16	\$0.20	19.0	58.3
Interseed Cover Crops at V7	159	KHSCCalt	205.1	0.78	\$41.16	\$0.20	19.0	59.0

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Nitrogen Use Efficiency (NUE) South Central Region

All Corn after Soybeans NMI trials



*Manure History
Field Trial Practice ID

Average
N Rate

Southwest / West Central

2016 Nutrient Management Initiative (NMI)

Ryan Lemickson

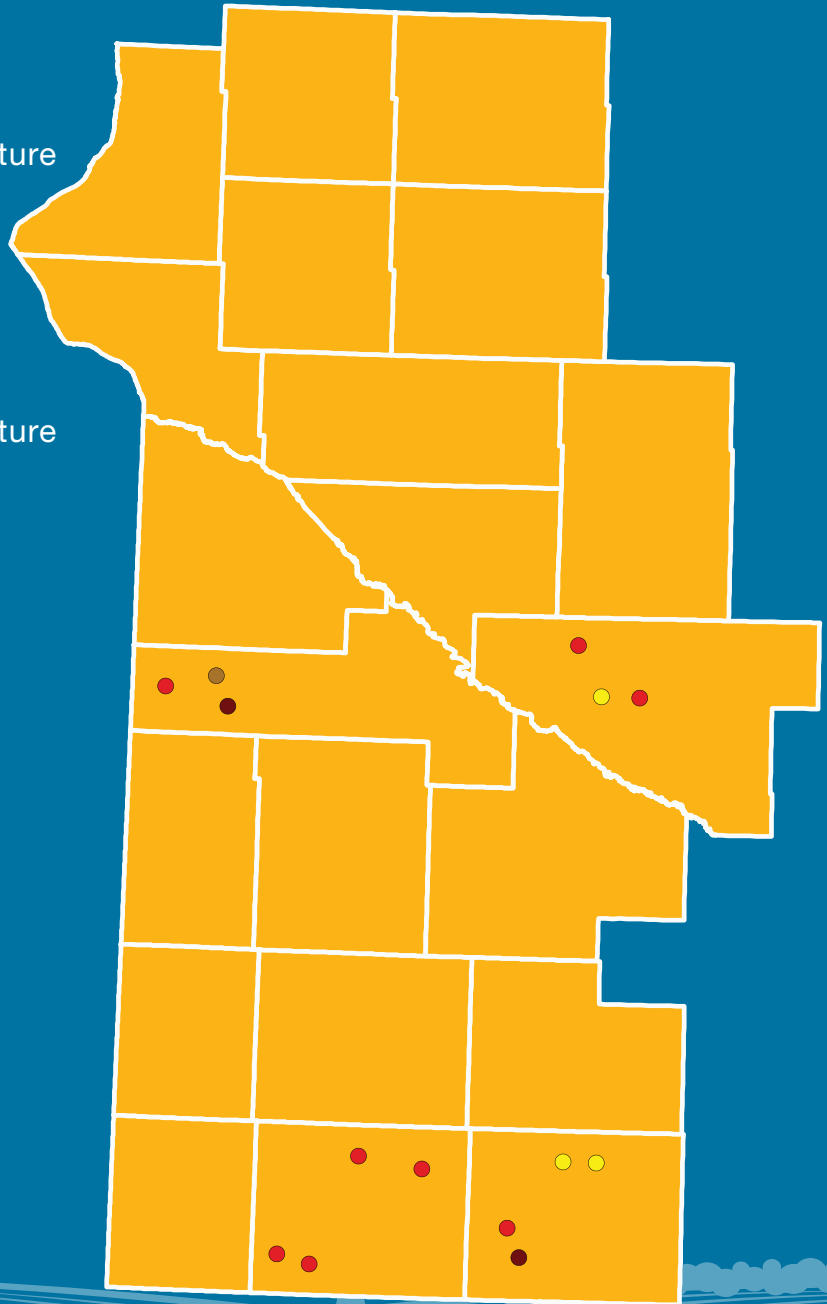
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Field Trial Type

- Rate (8)
- Timing (3)
- Advanced Rate (2)
- Rate after Manure (1)



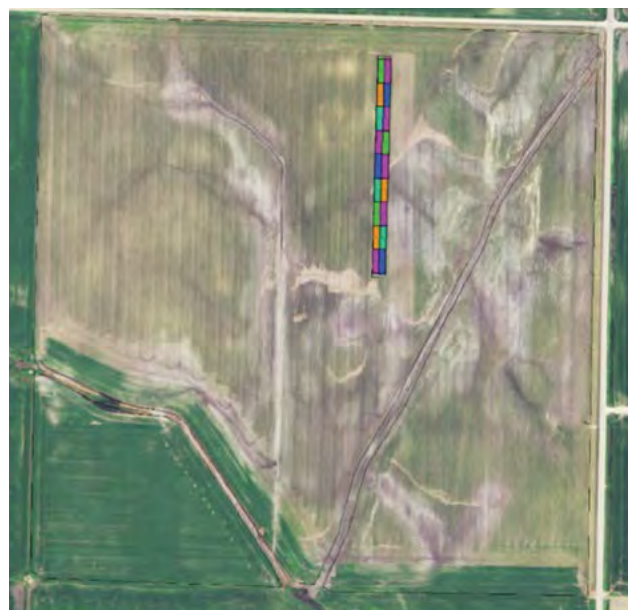
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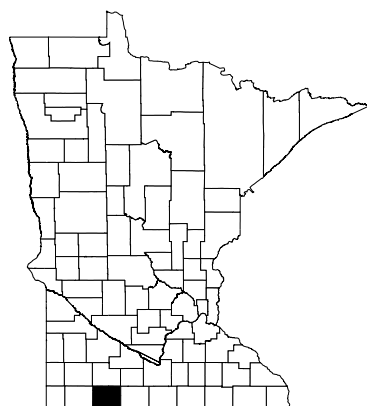
Advanced Nitrogen Rate Evaluations

Site Details	
County:	Jackson
Soil series:	Crippin loam + Spicer-Lura complex
Previous crop:	Soybean
Strips:	2 (30' x 990' each)
Plot Design:	Randomized complete block
Tillage System:	Conventional
Corn hybrid:	Dekalb 52-84
Planting date:	May 8, 2016
Population:	36,000
Starter fertilizer:	5 gal/ac 10-34-0 + 1 qt/ac 10% zinc, applied in furrow
Base nitrogen (N):	6 lb/ac, applied as starter fertilizer
Additional N:	UAN, applied as sidedress
Additional N rates:	6 (0, 44, 94, 144, 194, and 244 lb/ac)
Harvest date:	11/10/2016

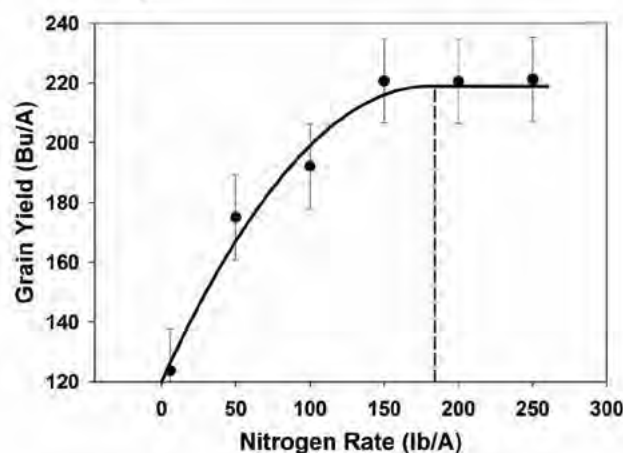
Trial Layout



Soil-test results	
Organic matter (%)	4.5
pH	7.1
Phosphorus (Olsen) (ppm)	12
Potassium (ppm)	181
Zinc (ppm)	0.7



Corn response to N rates



- Average highest grain yield = 221 bu/ac
- N rate needed = 185 lb N/ac
- Grain yield = $120 + 1.09(N \text{ rate}) - 0.0030(N \text{ rate})^2$
- $R^2 = 0.74$, $P < 0.01$

Price ratio	EONR (lb N/ac)
0.05	173
0.10	165
0.15	156

Economic Optimum Nitrogen Rates (EONR) at three price ratios were less than the N rate needed for average highest yield. To ensure maximum profit, EONR rates should be used.

Total monthly precipitation (inch) and departure from normal (DN)				
Percipitation	May	June	July	August
Observed	6.1	5.0	4.7	2.3
Normal	3.6	4.6	3.7	4.0
DN	+2.5	+0.4	+1.0	-1.7

N Rate 2016 corn grain yield (bu/ac)				
lb/ac	Rep1	Rep 2	Rep 3	Average
6	154	121	96.2	124
50	210	178	137	175
100	187	196	193	192
150	234	227	201	221
200	235	236	191	221
250	241	221	201	221

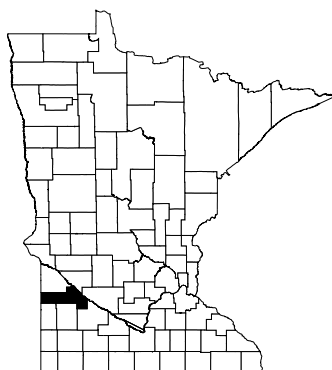
Advanced Nitrogen Rate Evaluations

Site Details	
County:	Yellow Medicine
Soil series:	Canisteo clay loam + Amiret loam + Amiret-Swanlake loam
Previous crop:	Soybean
Strips:	1 (70' x 2340' each)
Plot Design:	Randomized complete block
Tillage System:	Fall 2015 chisel, spring 2016 cultivator
Corn hybrid:	Dekalb DKC44-14 GENSSX RIB
Planting date:	April 23, 2016
Population:	35,000
Starter fertilizer:	77.4 lb/ac DAP + 83.2 lb/ac K + 55.1 lb/ac AMS
Base nitrogen (N):	26 lb/ac, applied as starter fertilizer
Additional N:	Applied as Urea, on April 15, 2016
Additional N rates:	6 (26, 76, 126, 176, 226, and 276 lb/ac)
Harvest date:	11/09/2016

Trial Layout



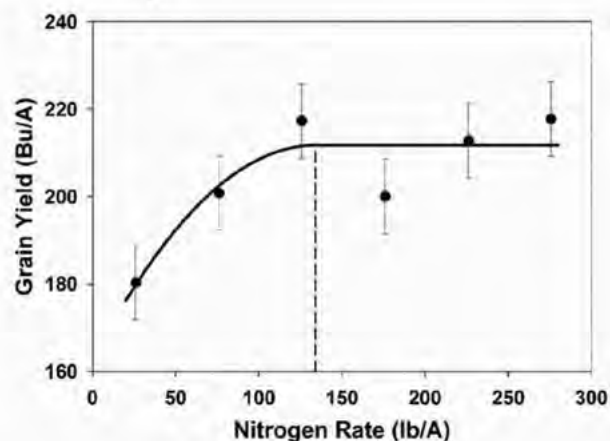
Soil-test results	
Organic matter (%)	4.1
Ph	7.5
Phosphorus (Olsen) (ppm)	21
Potassium (ppm)	370
Zinc (ppm)	1.9



Total monthly precipitation (inch) and departure from normal (DN)				
Percipitation	May	June	July	August
Observed	1.6	2.9	4.7	5.8
Normal	2.9	4.1	3.4	3.3
DN	-1.3	-1.2	+1.3	+2.5

N Rate 2016 corn grain yield (bu/ac)				
lb/ac	Rep1	Rep 2	Rep 3	Average
26	186	166	188	180
76	188	215	200	201
126	215	221	216	217
176	219	186	196	200
226	218	204	216	213
276	236	189	228	208

Corn response to N rates



- Average highest grain yield = 212 bu/ac
- N rate needed = 134 lb N/ac
- Grain yield = $163 + 0.73 (\text{N rate}) - 0.0027 (\text{N rate})^2$
- $R^2 = 0.43$, $P < 0.01$

Price ratio	EONR (lb N/ac)
0.05	126
0.10	117
0.15	107

Economic Optimum Nitrogen Rates (EONR) at three price ratios were less than the N rate needed for average highest yield. To ensure maximum profit, EONR rates should be used.

Southwest / West Central BMP Region SUMMARY

Averages									
Previous Crop	All Trials Combined				Rate Trials		Timing Trials	Stabilizer Trials	
	Total N	Yield	NUE	Price / lb	Additional N (lbs)	Yield from additional N (bu)	Split App Advantage (bu)	Stabilizer Advantage (bu)	Stabilizer Cost (ac)
Soybeans	159.53	216.02	0.73	\$0.42	31.76	3.97	5.60		
Dry Beans	167.50	207.49	0.81	\$0.49	30.00	1.63	2.52		
Corn (1)	177.00	239.00	0.74	-	30.00	0.00			
Averages	168.01	220.84	0.76	0.46	30.59	1.87	4.06		

The average cost for a pound of nitrogen was **\$0.46**. When considering an average of all nitrogen rate trials, an additional **30.59** lbs N/acre cost **\$14.07** per acre, resulting in an average yield difference of only **1.87** bushels/acre in 2016.

Top Nitrogen Use Efficiency (NUE)								
Total N Rate/Yield — Lbs of N Per Bushel								
Page	NUE	County	Previous Crop	Trial Practice ID	Total N Rate (lbs/ac)	Yield (bu/ac)	Variety	Type of Trial
115	0.5	Nobles	Soybeans	GKSWRalt	120	237.7	Dekalb 54-38	Rate
117	0.51	Jackson	Soybeans	PHSWRalt	93	181.6	Gold Country 99044	Rate
120	0.54	Jackson	Soybeans	PSSWTalt1	110	204.7	DK 54-38	Timing

Top Yields								
bu/acre								
Page	Yield (bu/ac)	County	Previous Crop	Trial Practice ID	NUE	Total N Rate (lbs/ac)	Variety	Type of Trial
111	242.00	Nobles	Corn	JKSWRalt	0.67	162	Dekalb 54-38	Rate
115	237.70	Nobles	Soybeans	GKSWRalt	0.5	120	Dekalb 54-38	Rate
112	237.60	RENVILLE	Soybeans	BLSWRnorm	0.78	186	9701VT2 Legend Seed	Rate

32% UAN: Sidedress 129 vs 99 lbs N/acre

Field Trial ID	JKSWR	Trial	Nitrogen Rate	N source ²	32-0-0
Previous Crop	Corn	County	Nobles	Cost/ton	na
		Township	Little Rock	32% N cost/lb	na



2016 NMI

Soil Test Info

Date	11/19/13
OM%	3.5
pH	6.2
Nitrogen	N/A
P (bray)	27
P (olsen)	
Potassium	200
Sulfur	N/A
Zinc	N/A

Field Info

Variety	Dekalb 54-38
Population	34843
Row Width	30
Planting Date	5/6/16
Harvest Date	
Soil Texture	silty clay loam
Tillage	Fall Chisel & Spring FC
Manure History	No
Alfalfa History	No
Irrigated	No

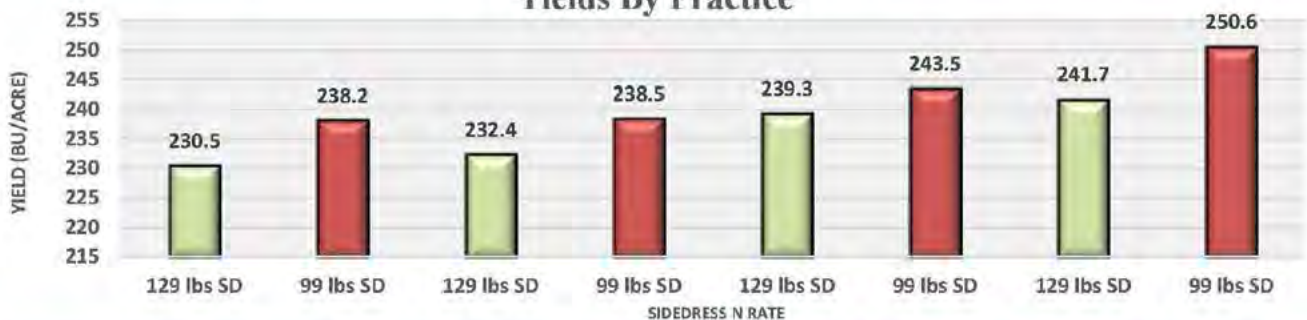
129 lbs N sidedress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
11-52-0		181	Spring Preplant Broadcast	19	94	0	0	None
0-0-60		195	Spring Preplant Broadcast	1	0	117	0	None
9-18-9		55	At Planting Band	4.9	9.8	4.9		None
32-0-0		99	At Planting Dribble	31				None
12-0-0-26		11	At Planting Dribble	1.32			2.8	None
32-0-0		402.6	Sidedress Band	128.8				None
12-0-0-26		48.4	Sidedress Band	5.8			12.5	None
Totals				192	104	122	15	

Stabilizer Cost / ac \$0

99 lbs N sidedress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
11-52-0		181	Spring Preplant Broadcast	19	94	0	0	None
0-0-60		195	Spring Preplant Broadcast	1	0	117	0	None
9-18-9		55	At Planting Band	4.9	9.8	4.9		None
32-0-0		99	At Planting Dribble	31				None
12-0-0-26		11	At Planting Dribble	1.32			2.8	None
32-0-0		308.9	Sidedress Band	98.8				None
12-0-0-26		48.4	Sidedress Band	5.8			12.5	None
Totals				162	104	122	15	

Stabilizer cost / ac \$0

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
129 lbs N sidedress	192	JKSWRnorm	236.0	0.81	na	na	20.0	60.0
99 lbs N sidedress	162	JKSWRalt	242.7	0.67	na	na	20.2	60.0

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Urea: Sidedress 150 vs 120 lbs N/acre

Field Trial ID	BLSWR	Trial	Nitrogen Rate	N source ²	46-0-0
Previous Crop	Soybeans	County	Renville	Cost/ton	\$396
		Township	Crooks	46% N cost/lb	\$0.43



2016 NMI

Soil Test Info

Date	10/5/15
OM%	7.2
pH	7.7
Nitrogen	
P (bray)	12
P (olsen)	26.4
Potassium	193.7
Sulfur	60
Zinc	2.2

Field Info

Variety	9701VT2 Legend Seed
Population	34000
Row Width	30
Planting Date	4/17/16
Harvest Date	10/27/16
Soil Texture	clay loam
Tillage	Ridge-Till
Manure History	No
Alfalfa History	No
Irrigated	No

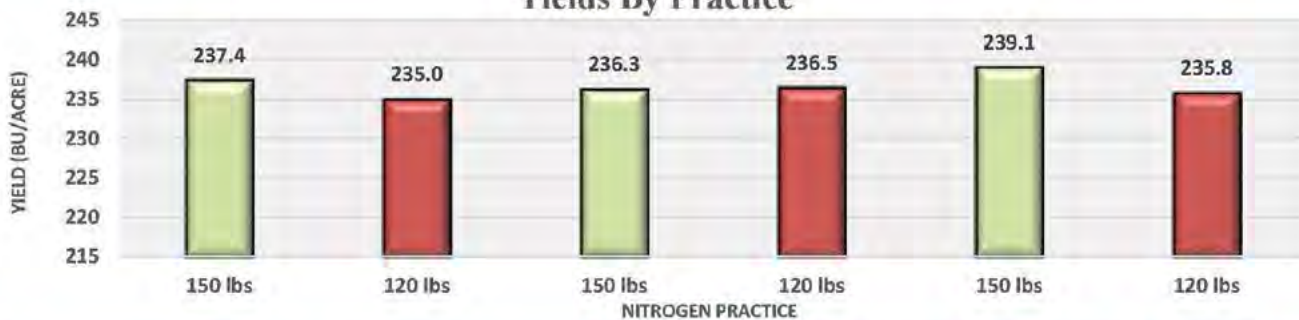
150 lbs N sidedress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
10-34-0	\$588	6 gal	At Planting Band	6.6	22.4			
46-0-0	\$396	150	Sidedress Broadcast	150				
29-75-45-2Zn	\$53/ac	243	Fall Preplant Band	29	75	45		
Totals				186	97	45	0	

Stabilizer Cost / ac \$0

120 lbs N sidedress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
10-34-0	\$588	6 gal	At Planting Band	6.6	22.4			
46-0-0	\$396	120	Sidedress Broadcast	120				
29-75-45-2Zn	\$53/ac	243	Fall Preplant Band	29	75	45		
Totals				156	97	45	0	

Stabilizer cost / ac \$0

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
150 lbs N sidedress	186	BLSWRnorm	237.6	0.78	\$64.57	\$0.27	19.2	55.9
120 lbs N sidedress	156	BLSWRalt	235.8	0.66	\$51.65	\$0.22	19.6	55.8

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Sidedress 32% UAN: 35 vs 0 lbs N/acre

Field Trial ID	EGSWR	Trial	Nitrogen Rate	N source ²	32-0-0
Previous Crop	Soybeans	County	Nobles	Cost/ton	\$305
		Township	Bloom	32% N cost/lb	\$0.48



2016 NMI

Soil Test Info		Field Info	
Date	8/1/13	Variety	Wensman 8268VT2Rib
OM%	4.5	Population	35400
pH	7.38	Row Width	30
Nitrogen	16 (0-6")	Planting Date	5/19/16
P (bray)	7.6	Harvest Date	11/1/16
P (olsen)		Soil Texture	clay loam
Potassium	188	Tillage	Conventional
Sulfur	13	Manure History	No
Zinc	1.47	Alfalfa History	No
		Irrigated	No

35 lbs N sidedress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
10-50-0	\$570	120	Fall Preplant Broadcast	15	60			None
0-0-60	\$420	150	Fall Preplant Broadcast			90		
46-0-0	\$365	184	Spring Preplant Broadcast	85				None
8-20-5-5S-.5Zn	\$600	55	At Planting Band	4.4	11	2.75	2.75	None
8-0-0-10Zn		2.4	At Planting Band					None
32-0-0	\$305	121	At Planting Broadcast	38.7				
32-0-0	\$305	110	Sidedress Band	35				
Stabilizer Cost / ac				\$0				
Totals				178	71	93	3	

0 lbs N sidedress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
10-50-0	\$570	120	Fall Preplant Broadcast	15	60			None
0-0-60	\$420	150	Fall Preplant Broadcast			90		
46-0-0	\$365	184	Spring Preplant Broadcast	85				None
8-20-5-5S-.5Zn	\$600	55	At Planting Band	4.4	11	2.75	2.75	None
8-0-0-10Zn		2.4	At Planting Band					None
32-0-0	\$305	121	At Planting Broadcast	38.7				
Stabilizer cost / ac				\$0				
Totals				143	71	93	3	

Yields By Practice



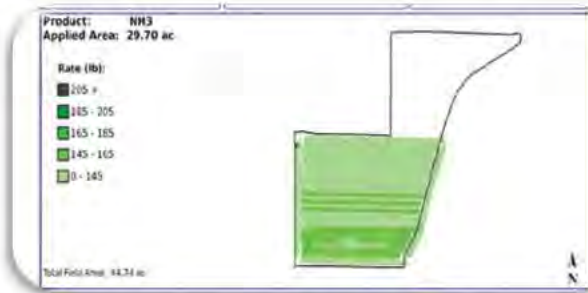
Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
35 lbs N sidedress	178	EGSWRnorm	211.1	0.84	\$16.80	\$0.08	17.4	57.0
0 lbs N sidedress	143	EGSWRalt	210.4	0.68	\$0.00	\$0.00	17.4	57.0

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

82-0-0: Sidedress 100 vs 130 lbs N/acre after solid beef manure

Field Trial ID	GGSWRM	Trial	Nitrogen Rate	N source ²	82-0-0
Previous Crop	Soybeans	County	Yellow Medicine	Cost/ton	\$546
		Township	oshkosh	82% N cost/lb	\$0.33



2016 NMI

Soil Test Info

Date
OM%
pH
Nitrogen
P (bray)
P (olsen)
Potassium
Sulfur
Zinc

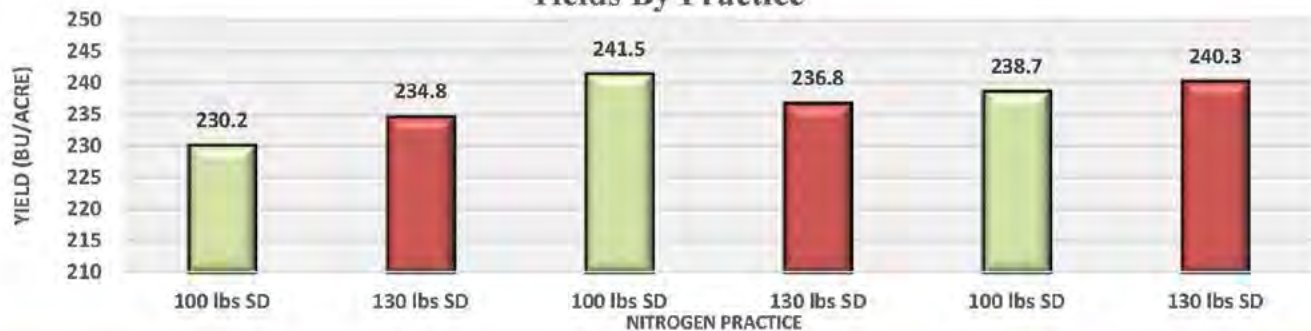
Field Info

Variety wiensmen W91073
Population 33000
Row Width 30
Planting Date 4/14/16
Harvest Date 10/26/16
Soil Texture
Tillage Spring Tillage Only
Manure History Yes
Manure Type Beef (Cows)
Liquid or Solid Solid
Application Method Broadcast Inc >96 hours

100 lbs N sidedress			Normal Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
82-0-0	\$546	122	Sidedress Band	100				none
0-0-60	\$381	100	Spring Preplant Broadcast			60		None
46-0-0	\$365	35	Spring Preplant Broadcast	15				None
18-46-0	\$517	130	Spring Preplant Broadcast	23	60			None
21-0-0-24	\$370	50	Spring Preplant Broadcast	11			12	None
8-24-4	\$1,345	33	At Planting Dribble	2.6	7.9	1.3		None
Soybean Credit			Previous Credits	45				None
Manure Credits Year 1			Fall Preplant Broadcast	10				None
Stabilizer Cost / ac			\$0	Totals	207	68	61	12

130 lbs N sidedress			Alternative Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
82-0-0	\$546	158	Sidedress Band	130				none
0-0-60	\$381	100	Spring Preplant Broadcast			60		None
46-0-0	\$365	35	Spring Preplant Broadcast	15				None
18-46-0	\$517	130	Spring Preplant Broadcast	23	60			None
21-0-0-24	\$370	50	Spring Preplant Broadcast	11			12	None
8-24-4	\$1,345	33	At Planting Dribble	2.6	7.9	1.3		None
Soybean Credit			Previous Credits	45				None
Manure Credits Year 1			Fall Preplant Broadcast	10				None
Stabilizer cost / ac			\$0	Totals	237	68	61	12

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
100 lbs N sidedress	207	GGSWRMnorm	236.8	0.87	\$33.00	\$0.14	20.5	57.0
130 lbs N sidedress	237	GGSWRMalt	237.3	1.00	\$42.90	\$0.18	20.5	57.0

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

32% UAN: Sidedress 87 vs 57 lbs N/acre

Field Trial ID	GKSWR	Trial	Nitrogen Rate	N source ²	32-0-0
Previous Crop	Soybeans	County	Nobles	Cost/ton	na
		Township	Grand Prairie	32% N cost/lb	na



2016 NMI

Soil Test Info		Field Info	
Date	11/13/13	Variety	Dekalb 54-38
OM%	0.035	Population	35784
pH	6	Row Width	30
Nitrogen	N/A	Planting Date	4/23/16
P (bray)	21	Harvest Date	
P (olsen)		Soil Texture	silty clay loam
Potassium	187	Tillage	Strip Till
Sulfur	N/A	Manure History	No
Zinc	N/A	Alfalfa History	No
		Irrigated	No

87 lbs N sidedress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
11-52-0		181	Spring Preplant Broadcast	19	94	0	0	None
0-0-60		195	Spring Preplant Broadcast	1	0	117	0	None
9-18-9		55	At Planting Band	4.9	9.8	4.9		None
32-0-0		99	At Planting Dribble	31				None
12-0-0-26		11	At Planting Dribble	1.32			2.8	None
32-0-0		271.8	Sidedress Band	87				None
12-0-0-26		48.4	Sidedress Band	5.8			12.5	None
Totals				150	104	122	15	

Stabilizer Cost / ac \$0

57 lbs N sidedress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
11-52-0		181	Spring Preplant Broadcast	19	94	0	0	None
0-0-60		195	Spring Preplant Broadcast	1	0	117	0	None
9-18-9		55	At Planting Band	4.9	9.8	4.9		None
32-0-0		99	At Planting Dribble	31				None
12-0-0-26		11	At Planting Dribble	1.32			2.8	None
32-0-0		178.1	Sidedress Band	57				None
12-0-0-26		48.4	Sidedress Band	5.8			12.5	None
Totals				120	104	122	15	

Stabilizer cost / ac \$0



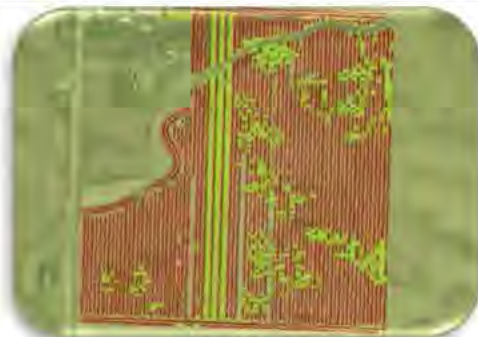
Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
87 lbs N sidedress	150	GKSWRnorm	235.5	0.64	na	na	19.1	na
57 lbs N sidedress	120	GKSWRalt	237.7	0.50	na	na	18.8	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

82-0-0: Sidedress 110 vs 70 lbs N/acre

Field Trial ID	JGSRW	Trial	Nitrogen Rate	N source ²	82-0-0
Previous Crop	Soybeans	County	Yellow Medicine	Cost/ton	\$546
		Township	Florida	82% N cost/lb	\$0.33



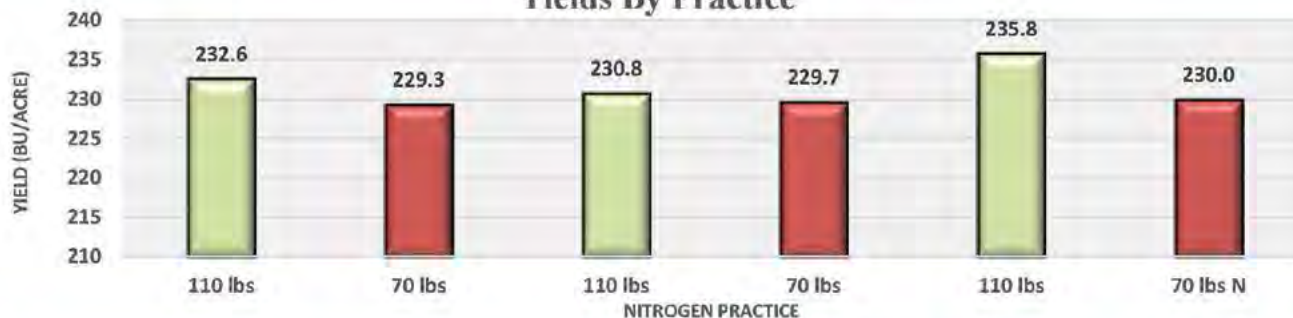
2016 NMI

Soil Test Info		Field Info	
Date	10/14/15	Variety	DKC 45-65 RIB
OM%	3.8	Population	34000
pH	5.8	Row Width	30
Nitrogen		Planting Date	5/2/16
P (bray)	20	Harvest Date	10/27/16
P (olsen)		Soil Texture	clay loam
Potassium	174	Tillage	Other
Sulfur	9	Manure History	No
Zinc	1.6	Alfalfa History	No
		Irrigated	No

110 lbs N sidedress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
82-0-0	\$546	134.1	Sidedress Band	110				None
0-0-60	\$471	84	Fall Preplant Band			50.4		None
46-0-0	\$439	44	Fall Preplant Band	20.24				None
18-46-0	\$570	109	Fall Preplant Band	19.62	50.14			None
21-0-0-24	\$373	50	Fall Preplant Band	10.5			12	None
8-24-4	\$1,345	33	At Planting Dribble	2.6	7.9	1.3		None
Soybean Credit			Previous Credits	45				None
Stabilizer Cost / ac				\$0				
Totals				208	58	52	12	

70 lbs N sidedress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
82-0-0	\$546	85.4	Sidedress Band	70				None
0-0-60	\$471	84	Fall Preplant Band			50.4		None
46-0-0	\$439	44	Fall Preplant Band	20.24				None
18-46-0	\$570	109	Fall Preplant Band	19.62	50.14			None
21-0-0-24	\$373	50	Fall Preplant Band	10.5			12	None
8-24-4	\$1,345	33	At Planting Dribble	2.6	7.9	1.3		None
Soybean Credit			Previous Credits	45				None
Stabilizer cost / ac				\$0				
Totals				168	58	52	12	

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
110 lbs N sidedress	208	JGSRWnorm	233.0	0.89	\$36.62	\$0.16	17.2	na
70 lbs N sidedress	168	JGSRWalt	229.7	0.73	\$23.30	\$0.10	17.1	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Preplant 32% UAN: 100 vs 71 lbs N/acre

Field Trial ID	PHSWR	Trial	Nitrogen Rate	N source ²	32-0-0
Previous Crop	Soybean	County	Jackson	Cost/ton	\$305
		Township	Ewington	32% N cost/lb	\$0.48



2016 NMI

Soil Test Info		Field Info	
Date	10/13/15	Variety	Gold Country 99044
OM%	5.1	Population	33834
pH	7.9	Row Width	30
Nitrogen	11 lbs	Planting Date	5/18/16
P (bray)	9 to 33	Harvest Date	11/8/16
P (olsen)		Soil Texture	clay loam
Potassium	173	Tillage	Conventional
Sulfur	12	Manure History	No
Zinc	0.2	Alfalfa History	No
		Irrigated	No

100 lbs N preplant				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
11-52-0	\$508	360	Fall Preplant Broadcast	20.1	100.6	95.6		
Riser	\$1,878	26.6	At Planting Band	1.9	4.5	0.8		
32-0-0	\$305	312	At Planting Broadcast	99.8				None
Stabilizer Cost / ac				\$0				
Totals				122	105	96	0	

71 lbs N preplant				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
11-52-0	\$508	360	Fall Preplant Broadcast	20.1	100.6	95.6		
Riser	\$1,878	26.6	At Planting Band	1.9	4.5	0.8		
32-0-0	\$305	220	At Planting Broadcast	70.5				None
Stabilizer cost / ac				\$0				
Totals				93	105	96	0	



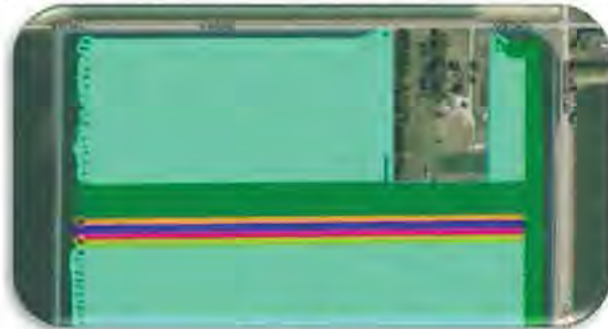
Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
100 lbs N preplant	122	PHSWRnorm	196.4	0.62	\$47.90	\$0.24	15.5	60.7
71 lbs N preplant	93	PHSWRalt	181.6	0.51	\$33.84	\$0.19	15.2	61.3

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

32% UAN: Sidedress 70 vs 40 vs 100 lbs N/acre

Field Trial ID	SCSWR	Trial	Nitrogen Rate	N source ²	32-0-0
Previous Crop	Soybeans	County	Nobles	Cost/ton	\$300
		Township	Graham Lakes	32% N cost/lb	\$0.47



2016 NMI

Soil Test Info

Date	
OM%	
pH	
Nitrogen	60
P (bray)	
P (olsen)	
Potassium	
Sulfur	
Zinc	

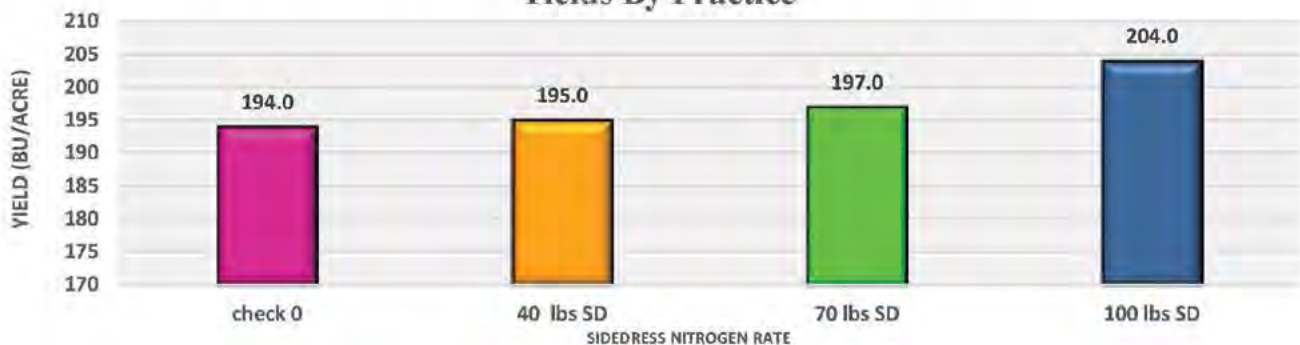
Field Info

Variety	DKC46-36
Population	37500
Row Width	30
Planting Date	5/9/16
Harvest Date	
Soil Texture	
Tillage	Conventional
Manure History	No
Alfalfa History	No
Irrigated	No

70 lbs N sidedress			Normal Practice					
source	S ton	rate	application	N	P	K	S	stabilizer
10-50-0	\$560	180	Fall Preplant Broadcast	18	90			None
0-0-60	\$420	150	Fall Preplant Broadcast			90		
21-0-0-24	\$425	62.5	Fall Preplant Broadcast	12				
32-0-0	\$300	70	At Planting Band	70				Agrotain
8-20-5-5S-.5Zn	\$590	55	At Planting Band	4.4	11	2.8	2.8	None
8-0-0-10Zn	\$4/ac	2.4	At Planting Band					
32-0-0	\$300	70	Sidedress Band	70				
Stabilizer Cost / ac			\$0	Totals	174	101	93	3

40 lbs N sidedress			Alternative Practice					
source	S ton	rate	application	N	P	K	S	stabilizer
10-50-0	\$560	180	Fall Preplant Broadcast	18	90			None
0-0-60	\$420	150	Fall Preplant Broadcast			90		
21-0-0-24	\$425	62.5	Fall Preplant Broadcast	12				
32-0-0	\$300	70	At Planting Band	70				Agrotain
8-0-0-10Zn	\$4/ac	55	At Planting Band	4.4	11	2.8	2.8	None
32-0-0	\$300	40	Sidedress Band	40				
Stabilizer cost / ac			\$0	Totals	144	101	93	3

Yields By Practice



Also applied +30 lbs UAN (100 lbs sidedress)

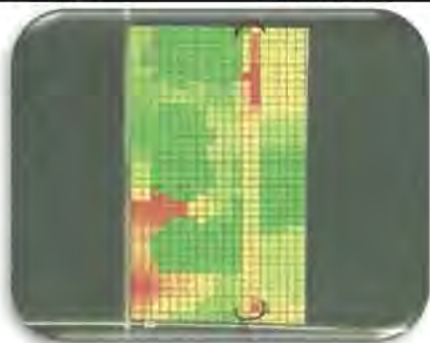
Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
70 lbs N sidedress	174	SCSWRnorm	197.0	0.89	\$32.90	\$0.17	17.9	na
40 lbs N sidedress	144	SCSWRalt	195.0	0.74	\$18.80	\$0.10	17.7	na
100 lbs N sidedress	204	SCSWRalt2	204.0	1.00	\$47.00	\$0.23	17.7	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Preplant Urea 108 vs Split 78/30 lbs N/acre

Field Trial ID	GSSWT	Trial	Nitrogen Timing	N source ²	46-0-0
		County	Jackson	Cost/ton	\$376
Previous Crop	Soybeans	Township	Weimer	46-0-0 N cost/lb	\$0.41
				32-0-0 N cost/lb	\$0.55



2016 NMI

Soil Test Info

Date	10/24/13
OM%	6 Avg
pH	7 Avg
Nitrogen	
P (bray)	13 Avg
P (olsen)	
Potassium	203 Avg
Sulfur	
Zinc	2 Avg

Field Info

Variety	DK 54-38
Population	34478
Row Width	30
Planting Date	5/4/16
Harvest Date	
Soil Texture	
Tillage	Conventional
Manure History	No
Alfalfa History	No
Irrigated	No

Preplant 108 lbs N				Normal Practice				
source	S ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$376	304	Spring Preplant Broadcast	108.1				None
18-46-0	\$520	176 Avg	Fall Preplant Broadcast	31.7	81			
0-0-60	\$426	50.3 Avg	Fall Preplant Broadcast			30.2		
Totals				140	81	30	0	

Stabilizer Cost / \$0

Split 78 / 30 lbs				Alternative Practice				
source	S ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$376	239	Spring Preplant Broadcast	78.3				None
18-46-0	\$520	176 avg	Fall Preplant Broadcast	31.7	81			
0-0-60	\$426	50.3 Avg	Fall Preplant Broadcast			30.2		
32-0-0	\$350	9 gals	Sidedress Band	30				
Totals				140	81	30	0	

Stabilizer cost / \$0

Yields By Practice



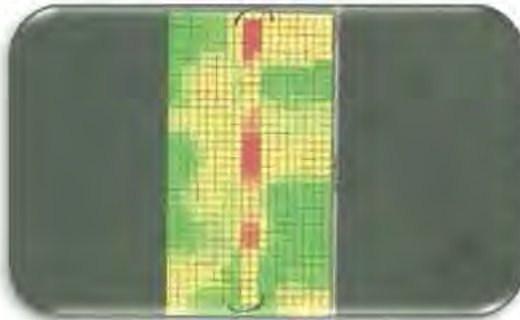
Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Preplant 108 lbs N	140	GSSWTnorm	207.0	0.68	\$44.32	\$0.21	19.4	na
Split 78 / 30 lbs	140	GSSWTalt	214.0	0.65	\$48.51	\$0.23	19.5	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Preplant Urea 117 vs. Preplant 87 vs. Split 87/30 lbs N/acre

Field Trial ID	PSSWR	Trial	Nitrogen Rate/Timing	N source²	46-0-0
Previous Crop	Soybeans	County	Jackson	Cost/ton	\$376
		Township	Weimer	46-0-0 N cost/lb	\$0.41
				32-0-0 N cost/lb	\$0.48



2016 NMI

Soil Test Info

Date	10/29/14
OM%	5.83 Avg
pH	6.34 Avg
Nitrogen	
P (bray)	18.48 Avg
P (olsen)	10.41 Avg
Potassium	183.56 Avg
Sulfur	
Zinc	.92 Avg

Field Info

Variety	DK 54-38
Population	35126
Row Width	30
Planting Date	5/5/16
Harvest Date	10/17/16
Soil Texture	
Tillage	Conventional
Manure History	No
Alfalfa History	No
Irrigated	No

140 lbs N Preplant

Normal Practice

source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$376	304 vr	Spring Preplant Broadcast	116.9				None
11-52-0	\$545	60 - 470 VR	Fall Preplant Broadcast	23.1	52			
0-0-60	\$426	100	Fall Preplant Broadcast			60		
Stabilizer Cost / ac				\$0				
Totals				140	52	60	0	

110 lbs N Preplant (no SD)

Alternative Practice 1

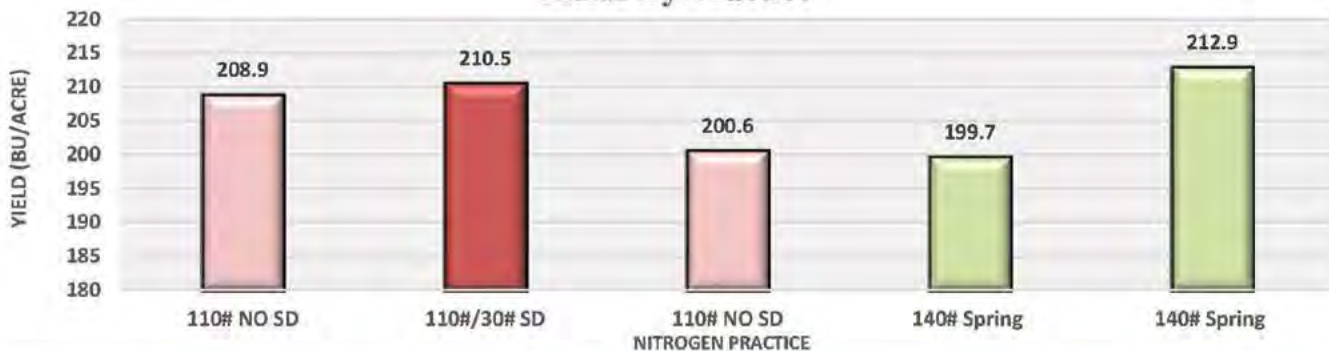
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$376	239 vr	Spring Preplant Broadcast	86.9				None
11-52-0	\$545	60 - 470 VR	Fall Preplant Broadcast	23.1	52			
0-0-60	\$426	100	Fall Preplant Broadcast			60		
Stabilizer Cost / ac				\$0				
Totals				110	52	60	0	

110/30 lbs N Split

Alternative Practice 2

source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$376	239 vr	Spring Preplant Broadcast	86.9				None
11-52-0	\$545	60 - 470 VR	Fall Preplant Broadcast	23.1	52			
0-0-60	\$426	100	Fall Preplant Broadcast			60		
32-0-0	\$305	9 gal	Sidedress Band (6/8/16)	30				
Stabilizer cost / ac				\$0				
Totals				140	52	60	0	

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
140 lbs N Preplant	140	PSSWRnorm	206.3	0.68	\$47.93	\$0.23	19.8	na
110 lbs N Preplant (no SD)	110	PSSWRalt1	204.7	0.54	\$35.63	\$0.17	19.6	na
110/30 lbs N Splt	140	PSSWRalt2	210.5	0.66	\$49.93	\$0.24	19.9	na

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Sidedress 28% UAN: 15 vs. 5 gallons/acre

Field Trial ID	BNSWR	Trial	Nitrogen Rate	N source²	28-0-0
Previous Crop	Dry beans	County	Renville	Cost/ton	\$275
		Township	Troy	28% N cost/lb	\$0.49



2016 NMI

Soil Test Info

Date	12/1/15
OM%	4.50%
pH	7.7
Nitrogen	N/A
P (bray)	N/A
P (olsen)	5 ppm
Potassium	159 ppm
Sulfur	6 lbs
Zinc	1.44 ppm

Field Info

Variety	Pioneer 36V51
Population	34000
Row Width	30"
Planting Date	4/23/16
Harvest Date	11/2/16
Soil Texture	clay loam
Tillage	Conventional
Manure History	No
Alfalfa History	No
Irrigated	No

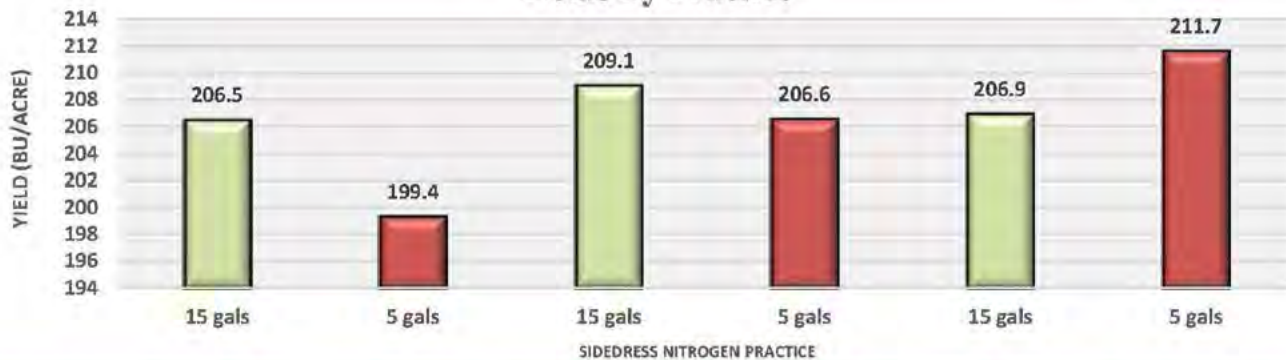
15 gals 28% sidedress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
Custom Blend			Spring Preplant Broadcast	100	140	60	10	
28-0-0	\$275	10 gal	Carrier (Weed and Feed)	30				
28-0-0	\$275	15 gal	Sidedress Band	45				
Totals				175	140	60	10	

Stabilizer Cost / ac \$0

5 gals 28% sidedress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
Custom Blend			Spring Preplant Broadcast	100	140	60	10	
28-0-0	\$275	10 gal	Carrier (Weed and Feed)	30				
28-0-0	\$275	5 gal	Sidedress Band	15				
Totals				145	140	60	10	

Stabilizer cost / ac \$0

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
15 gals 28% sidedress	175	BNSWRnorm	207.5	0.84	\$22.05	\$0.11	18.9	55.6
5 gals 28% sidedress	145	BNSWRalt	205.9	0.70	\$7.35	\$0.04	18.5	55.5

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

28 % UAN: 15 gal/acre Sidedress vs. At planting

Field Trial ID	KVSWT	Trial	Nitrogen Timing	N source ²	28-0-0
Previous Crop	Dry beans	County	Renville	Cost/ton	\$275
		Township	Troy	28% N cost/lb	\$0.49



2016 NMI

Soil Test Info

Date	12/1/15
OM%	4.5
pH	7.7
Nitrogen	N/A
P (bray)	N/A
P (olsen)	5 ppm
Potassium	159 ppm
Sulfur	6 lbs
Zinc	1.44 ppm

Field Info

Variety	Pioneer 36V51
Population	34000
Row Width	30"
Planting Date	4/23/16
Harvest Date	11/2/16
Soil Texture	clay loam
Tillage	Conventional
Manure History	No
Alfalfa History	No
Irrigated	No

Sidedress 28% 15 gals				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
Custom Blend			Spring Preplant Broadcast	100	140	60	10	
28-0-0	\$275	10 gal	Carrier (Weed and Feed)	30				
28-0-0	\$275	15 gal	Sidedress Dribble	45				
Totals				175	140	60	10	

Stabilizer Cost / ac \$0

At Planting 28% 15 gals				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
Custom Blend			Spring Preplant Broadcast	100	140	60	10	
28-0-0	\$275	10 gal	Carrier (Weed and Feed)	30				
28-0-0	\$275	15 gal	At Planting Broadcast	45				
Totals				175	140	60	10	

Stabilizer cost / ac \$0

Yields By Practice



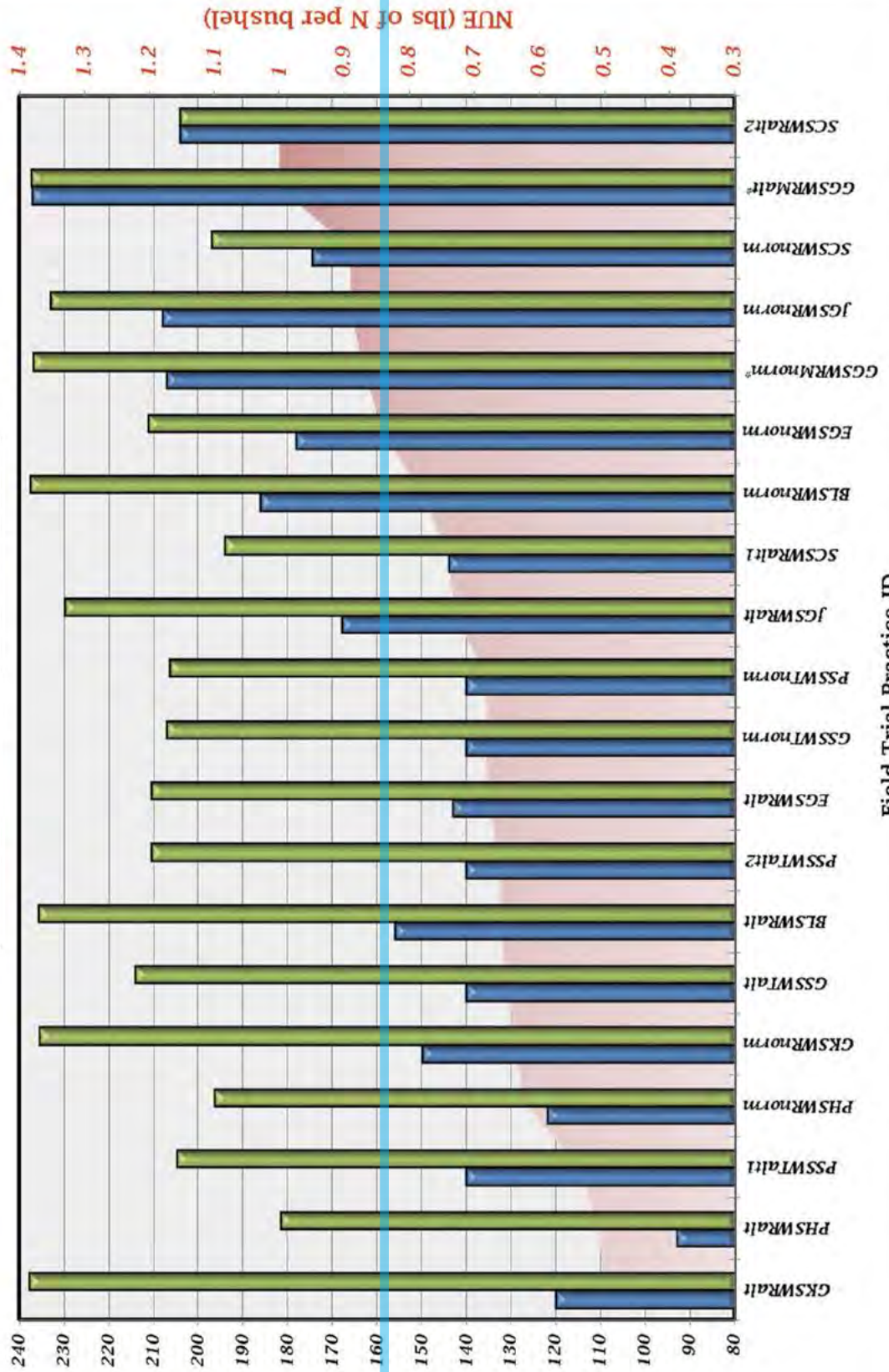
Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
Sidedress 28% 15 gals	175	KVSWTnorm	209.5	0.84	\$22.05	\$0.11	55.7	18.4
At Planting 28% 15 gals	175	KVSWTalt	207.0	0.85	\$22.05	\$0.11	55.9	18.4

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Nitrogen Use Efficiency (NUE) Southwest/West Central Region

All Corn after Soybeans NMI trials

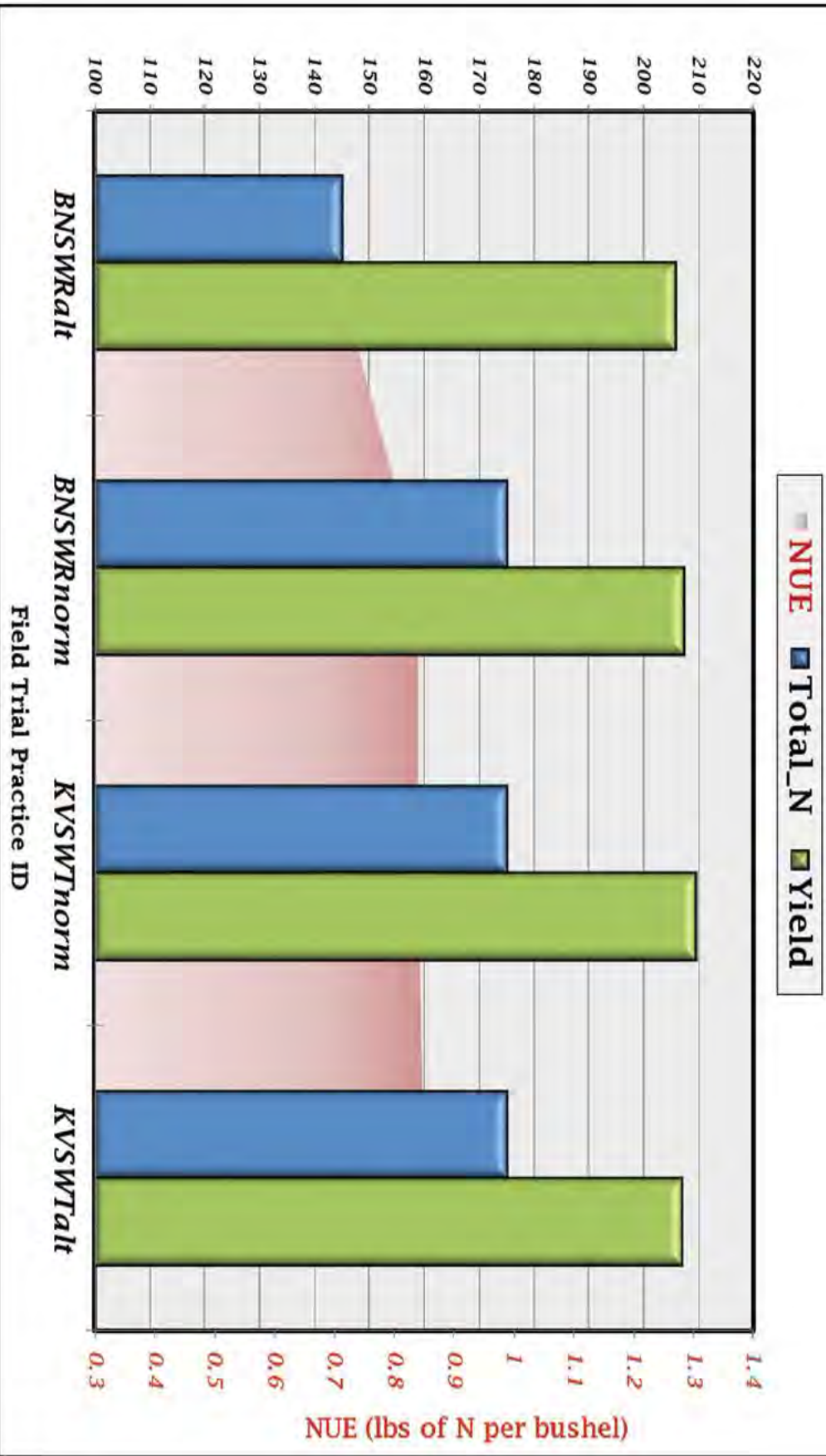


Average
N Rate

Field Trial Practice ID

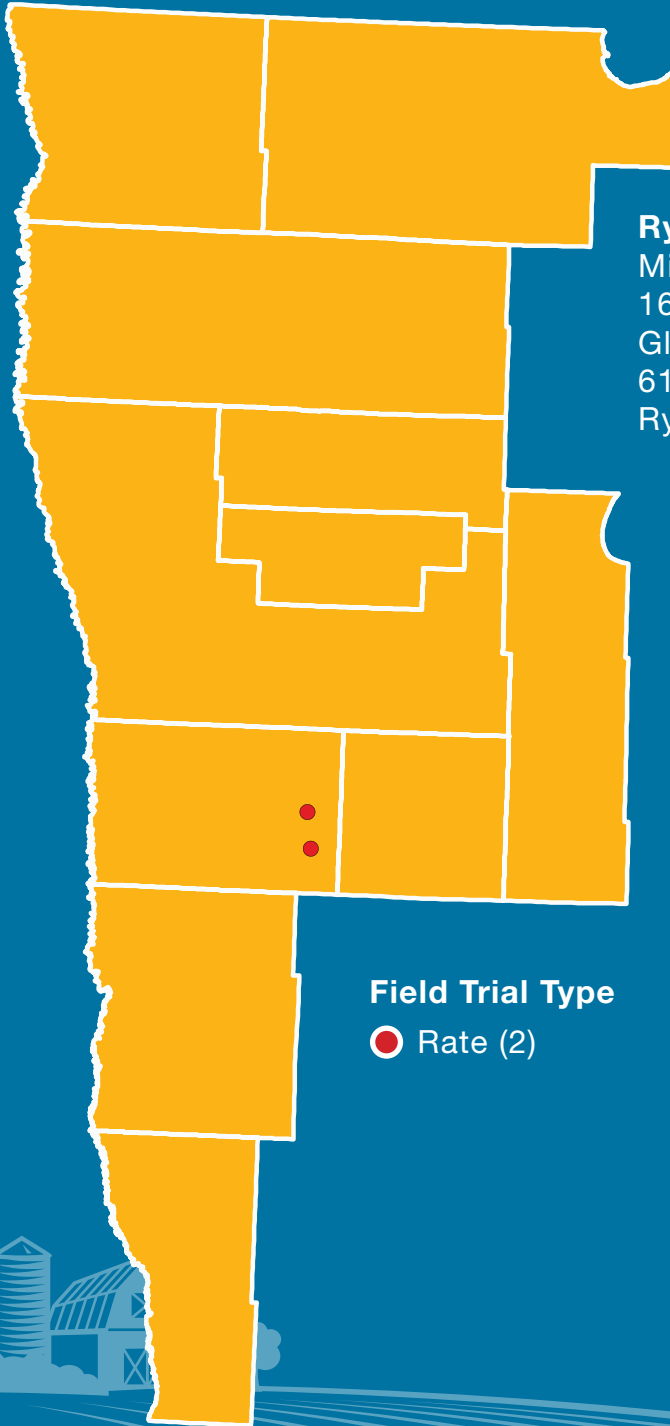
Nitrogen Use Efficiency (NUE) Southwest/West Central Region

All Corn after Dry Beans NMI trials



Northwest

2016 Nutrient Management Initiative (NMI)



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Field Trial Type

● Rate (2)

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Corn after dry beans trials	
● Nitrogen rate trials	129
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Northwest BMP Region SUMMARY

Averages									
Previous Crop	All Trials Combined				Rate Trials		Timing Trials	Stabilizer Trials	
	Total N	Yield	NUE	Price / lb	Additional N (lbs)	Yield from additional N (bu)	Split App Advantage (bu)	Stabilizer Advantage (bu)	Stabilizer Cost (ac)
Dry Beans	114.92	213.93	0.54	\$0.45	20.00	2.73			
Averages	114.92	213.93	0.54	\$0.45	20.00	2.73			

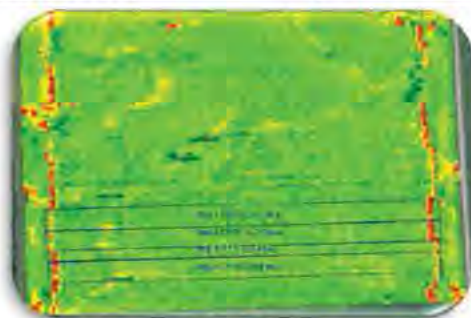
The average cost for a pound of nitrogen was **\$0.45**. When considering an average of all nitrogen rate trials, an additional 20 lbs N/acre cost **\$9** per acre, resulting in an average yield difference of only **2.73** bushels/acre in 2016.

Top Nitrogen Use Efficiency (NUE)								
Total N Rate/Yield								
Page	NUE	County	Previous Crop	Trial Practice ID	Total N Rate (lbs/ac)	Yield (bu/ac)	Variety	Type of Trial
129	0.42	Norman	Dry Beans	SFNWR2alt2	88.5	211.4	DeKalb 43-10	Rate
128	0.48	Norman	Dry Beans	SFNWR1alt2	101	210.4	DeKalb 38-03	Rate
129	0.50	Norman	Dry Beans	SFNWR2norm	109	216.4	DeKalb 43-10	Rate

Top Yields								
bu/acre								
Page	Yield (bu/ac)	County	Previous Crop	Trial Practice ID	NUE	Total N Rate (lbs/ac)	Variety	Type of Trial
129	219.6	Norman	Dry Beans	SFNWR2alt	0.59	129	DeKalb 43-10	Rate
129	216.4	Norman	Dry Beans	SFNWR2norm	0.5	109	DeKalb 43-10	Rate
128	213.1	Norman	Dry Beans	SFNWR1norm	0.57	121	DeKalb 38-03	Rate

41-0-0-4.8s at planting: 85 vs 105 vs 125 lbs N/acre

Field Trial ID	SFNWR1	Trial	Nitrogen Rate	N source ²	41-0-0-4.8s
		County	Norman	Cost/ton	\$368
Previous Crop	Dry beans	Township	Fossum	41% N cost/lb	\$0.45



2016 NMI

Soil Test Info

Date	9/13/15
OM%	3.2
pH	8.2
Nitrogen	26
P (bray)	
P (olsen)	3
Potassium	90
Sulfur	118
Zinc	0.7

Field Info

Variety	DeKalb 38-03
Population	36000
Row Width	22" not tiled
Planting Date	Soil Test Results
Harvest Date	42260
Soil Texture	Agvise
Tillage	Conventional
Manure History	No
Alfalfa History	No
Irrigated	No

105 lbs N at planting			Normal Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
Other	\$430		Fall Preplant Band	8	36	60		
10-34-0	\$499	7.5	At Planting Band	7.5	30	0		
41-0-0-4.8s	\$368	257	At Planting Broadcast	105			12.3	None
Totals				121	66	60	12	

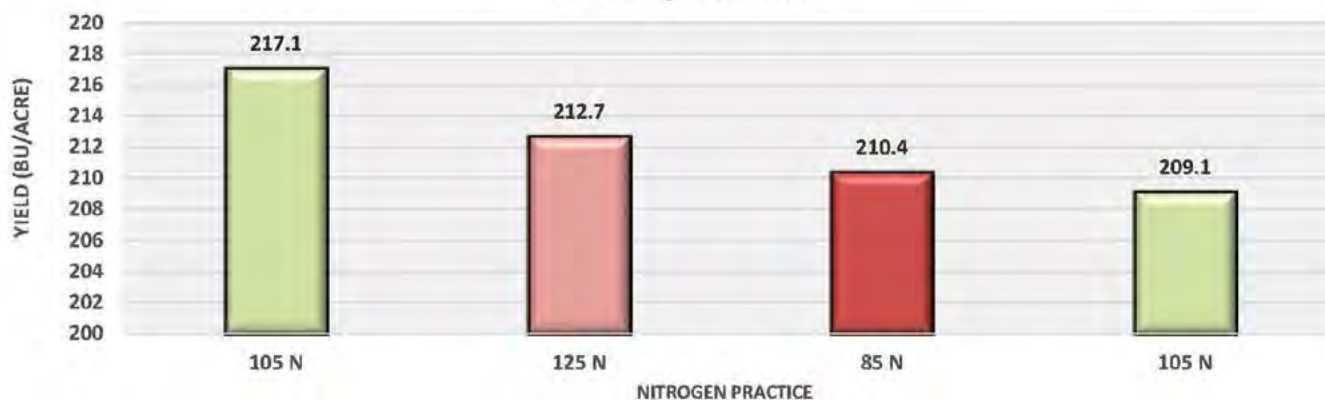
Stabilizer Cost / ac \$0

125 lbs N at planting			Alternative Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
Other	\$430		Fall Preplant Band	8	36	60		
10-34-0	\$499	7.5	At Planting Band	7.5	30	0		
41-0-0-4.8s	\$368	305	At Planting Broadcast	125			14.6	None
Totals				141	66	60	15	

Stabilizer cost / ac \$0

Also have a 207 #/A strip of 41-0-0-4.8s for a 85-0-0-10s strip (40 #/A N swing top to bottom).

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight	Residual soil N
105 lbs N at planting	121	SFNWRInorm	213.1	0.57	\$47.25	\$0.22	18.9	56.5	30 lbs/ac
125 lbs N at planting	141	SKNWR1alt	212.7	0.66	\$56.25	\$0.26	18.9	56.5	32 lbs/ac
85 lbs N at planting	101	SKNWR1alt2	210.4	0.48	\$38.25	\$0.18	18.9	56.5	19 lbs/ac

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

41-0-0-4.8s at planting: 74 vs 94 vs 115 lbs N/acre

Field Trial ID	SFNWR2	Trial	Nitrogen Rate	N source ²	41-0-0-4.8s
Previous Crop	Dry beans	County	Norman	Cost/ton	\$368
		Township	Fossum	41% N cost/lb	\$0.45



2016 NMI

Soil Test Info

Date	9/2/15
OM%	3.4
pH	8.2
Nitrogen	49
P (bray)	
P (olsen)	13
Potassium	132
Sulfur	20
Zinc	1.6

Field Info

Variety	DeKalb 43-10
Population	36000
Row Width	22" - tiled
Planting Date	4/23/16
Harvest Date	10/28/16
Soil Texture	clay loam
Tillage	Conventional
Manure History	No
Alfalfa History	No
Irrigated	No

94 lbs N at planting

Normal Practice

source	\$ ton	rate	application	N	P	K	S	stabilizer
Other? (Type in)	\$430		Fall Preplant Band	7	34	60		
10-34-0	\$499	7.5	At Planting Band	7.5	30	0		
41-0-0-4.8s	\$368	230	At Planting Broadcast	94.3			11	None
Totals				109	64	60	11	

Stabilizer Cost / ac \$0

Totals 109 64 60 11

115 lbs N at planting

Alternative Practice

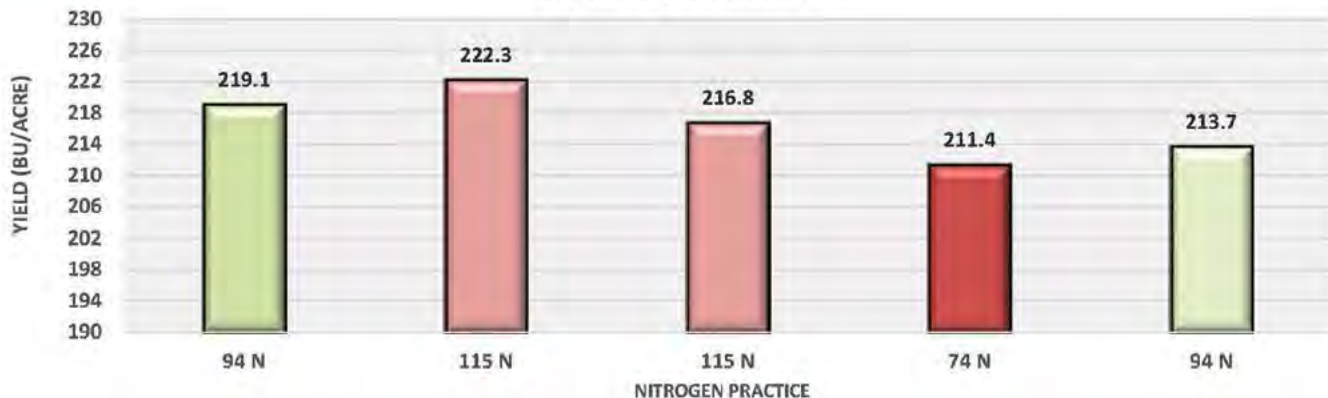
source	\$ ton	rate	application	N	P	K	S	stabilizer
Other? (Type in)	\$430		Fall Preplant Band	7	34	60		
10-34-0	\$499	7.5	At Planting Band	7.5	30	0		
41-0-0-4.8s	\$368	280	At Planting Broadcast	114.8			13.4	None
Totals				129	64	60	13	

Stabilizer cost / ac \$0

Totals 129 64 60 13

Also had a 180 #/A strip of 41-0-0-4.8s for a 74-0-0-9s strip (40 #/A N swing top to bottom).

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
94 lbs N at planting	109	SKNWR2norm	216.4	0.50	\$42.44	\$0.20	19.1	56.7
115 lbs N at planting	129	SFNWR2alt	219.6	0.59	\$51.66	\$0.24	19.1	56.7
74 lbs N at planting	88.5	SFNWR2alt2	211.4	0.42	\$33.30	\$0.16	19.1	56.7

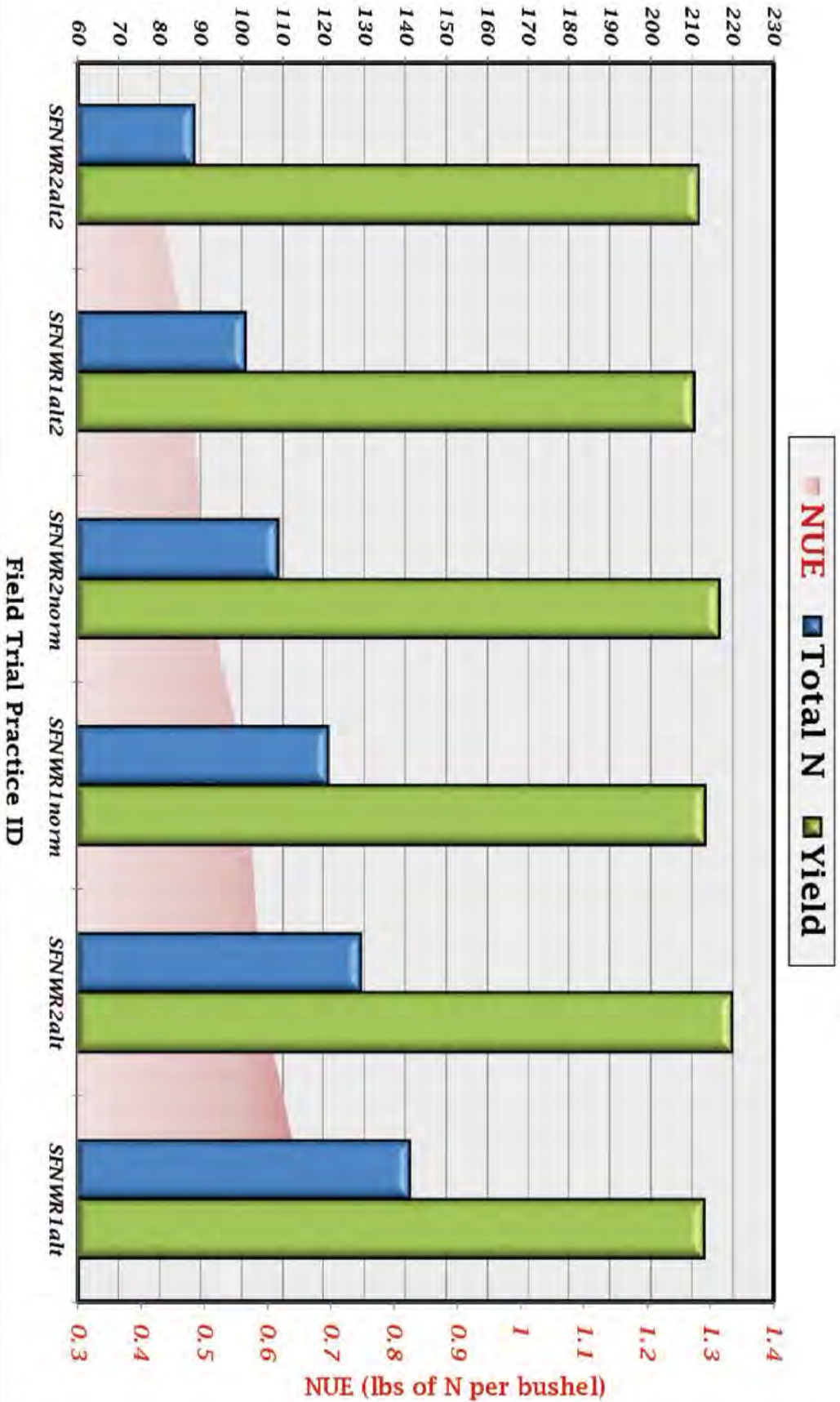
¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Nitrogen Use Efficiency (NUE)

Northwest Region

Nitrogen Rate after Dry Beans NMI trials

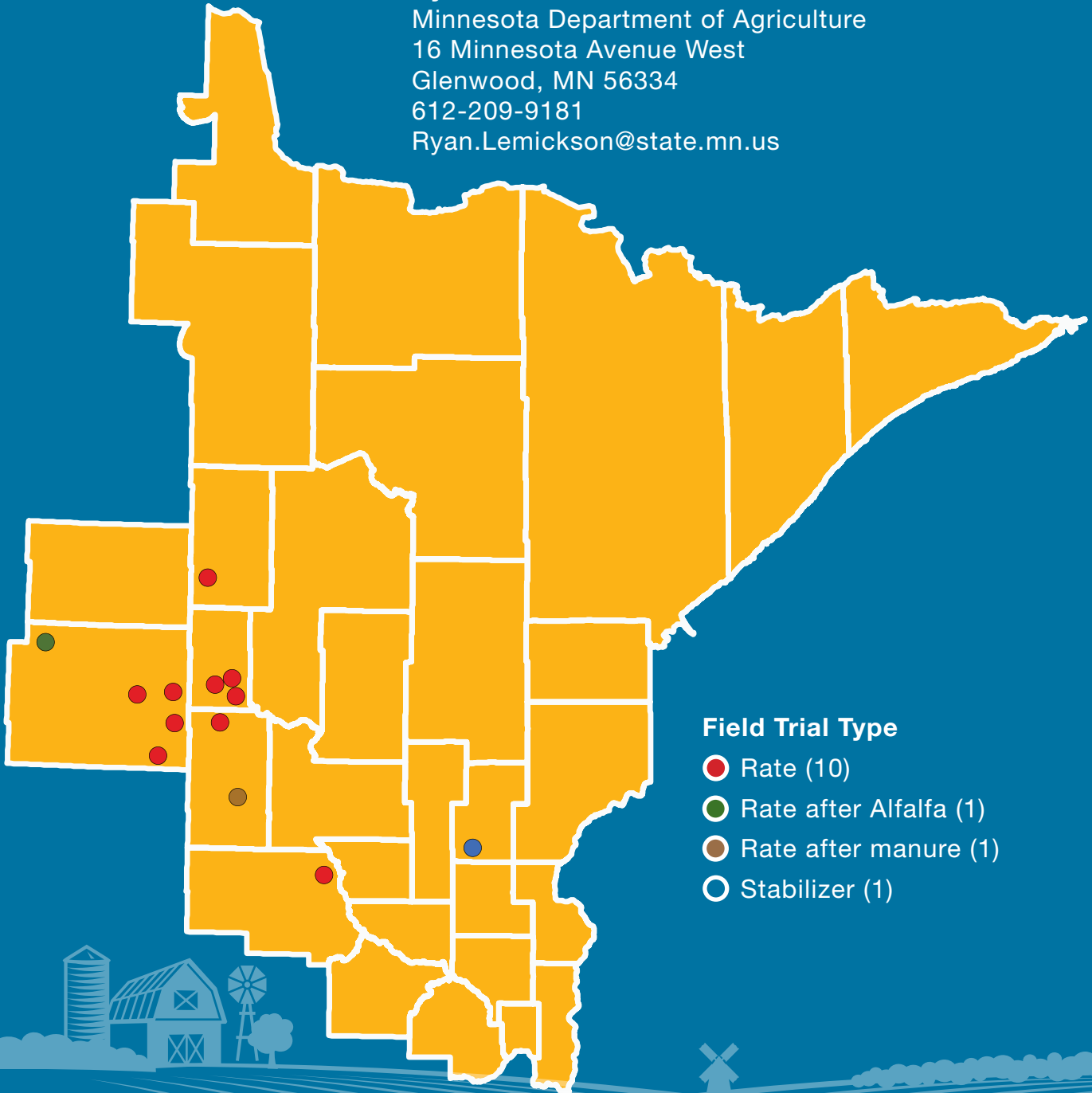


Northeast

2016 Nutrient Management Initiative (NMI) *Irrigated and Non-irrigated Sandy Soils BMP Region*

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Field Trial Type

- Rate (10)
- Rate after Alfalfa (1)
- Rate after manure (1)
- Stabilizer (1)

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Northeast BMP Region SUMMARY

Averages									
Farm Practice (all previous crops)	All trials combined				Rate trials		Timing trials	Stabilizer trials	
	Total N (acre)	Yield (bu/ acre)	NUE (lbs of N per bushel)	Price per pound of N	Additional N (lbs)	Yield from Additional N (bu)	Split App Advantage (bu)	Stabilizer Advantage (bu)	Stabilizer Cost (ac)
Irrigated	186.69	193.44	0.98	\$0.38	30.63	3.24			
Non-Irrigated	172.13	182.68	0.94	\$0.42	48.97	8.9*		0.30	NA
Averages	179.41	188.06	0.96	\$0.40	39.80	3.24		0.30	

* only 1 out of 4 rate non-irrigated rate trials had a response to additional N (8.9 bu with additional 49 lbs of N)

The average cost for a pound of nitrogen was **\$0.40**. When considering an average of all nitrogen rate trials, an additional **39.80** lbs N/acre cost **\$15.92** per acre, resulting in an average yield difference of only **3.24** bushels/acre in 2016.

Top Nitrogen Use Efficiency (NUE)									
Total N Rate/Yield									
Page	NUE	Farm	County	Previous Crop	Trial Practice ID		Yield (bu/ac)	Variety	Type of Trial
144	0.55	Non-irrigated	Todd	Wheat	NWNERalt	90	162.2	Dekalb 36-30	Rate
137	0.82	Irrigated	Wadena	Barley	CLNERalt	171	208.1	Cropland 2845 VT2	Rate
140	0.82	Irrigated	Stearns	Corn	RTNERnorm	176	214.9	Pioneer 9526	Rate

Top Yields									
bu/acre									
Page	Yield (bu/ac)	Farm	County	Previous Crop	Trial Practice ID	NUE	Total N Rate (lbs/ac)	Variety	Type of Trial
140	218.3	Irrigated	Stearns	Corn	RTNERalt	0.97	211	Pioneer 9526	Rate
140	214.9	Irrigated	Stearns	Corn	RTNERnorm	0.82	176	Pioneer 9526	Rate
141	211.2	Irrigated	Hubbard	Potatoes	TBNERnorm	0.95	200	NK 18Q	Rate

Urea: 135 vs 105 lbs N/acre Topdress

Field Trial ID	ASNER	Trial County	Nitrogen Rate	N source ²	46-0-0
Previous Crop	Potatoes	Township	WADENA	Cost/ton	na
			THOMASTOWN	46% N cost/lb	na



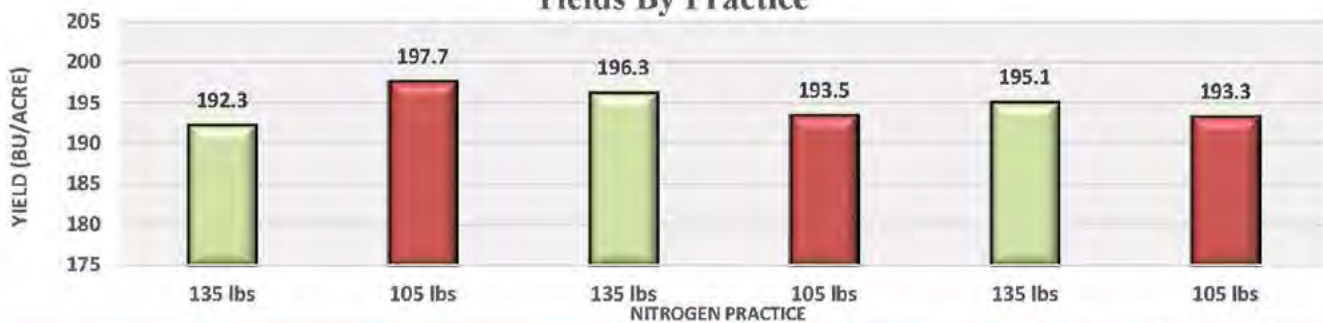
2016 NMI

Soil Test Info		Field Info	
Date	10/12/15	Variety	MYCOGEN 2G162
OM%	0.015	Population	32500
pH	5.6	Row Width	30
Nitrogen	-	Planting Date	5/1/16
P (bray)	47	Harvest Date	
P (olsen)	-	Soil Texture	sandy loam
Potassium	186	Tillage	Fall Chisel & Spring FC
Sulfur	12 lbs/ac	Manure History	No
Zinc	2.16 ppm	Alfalfa History	No
		Irrigated	Yes

135 lbs N topdress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
0-0-60		100	Fall Preplant Broadcast			60		
6-24-6		34	At Planting Band	2	8.2	2		
7-13-3		10	At Planting Band	1	2	0.3		
28-0-0		75	At Planting Band	21				
12-0-0-26		22	At Planting Band	2.7			5.74	
46-0-0		294	Top Dress Broadcast	135				
21-0-0-24		75	Top Dress Broadcast	15			15	
28-0-0		107	Fertigation	30				
12-0-0-26		22	Fertigation	2.6			6	
Stabilizer Cost / ac \$0				Totals	209	10	62	27

105 lbs N topdress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
0-0-60		100	Fall Preplant Broadcast			60		
6-24-6		34	At Planting Band	2	8.2	2		
7-13-3		10	At Planting Band	1	2	0.3		
28-0-0		75	At Planting Band	21				
12-0-0-26		22	At Planting Band	2.7			5.74	
46-0-0		228	Top Dress Broadcast	105				
21-0-0-24		75	Top Dress Broadcast	15			15	
28-0-0		107	Fertigation	30				
12-0-0-26		22	Fertigation	2.6			6	
Stabilizer cost / ac \$0				Totals	179	10	62	27

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
135 lbs N topdress	209	ASNERnorm	194.6	1.08	na	na	19.9	56.8
105 lbs N topdress	179	ASNERalt	194.8	0.92	na	na	19.9	56.9

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Y Drop Sidedress 28% UAN: 60 vs. 90 lbs N/acre

Field Trial ID	ADNER	Trial	Nitrogen Rate	N source ²	28-0-0
Previous Crop	Soybeans	County	East Otter Tail	Cost/ton	\$260
		Township	Compton	28% N cost/lb	\$0.46



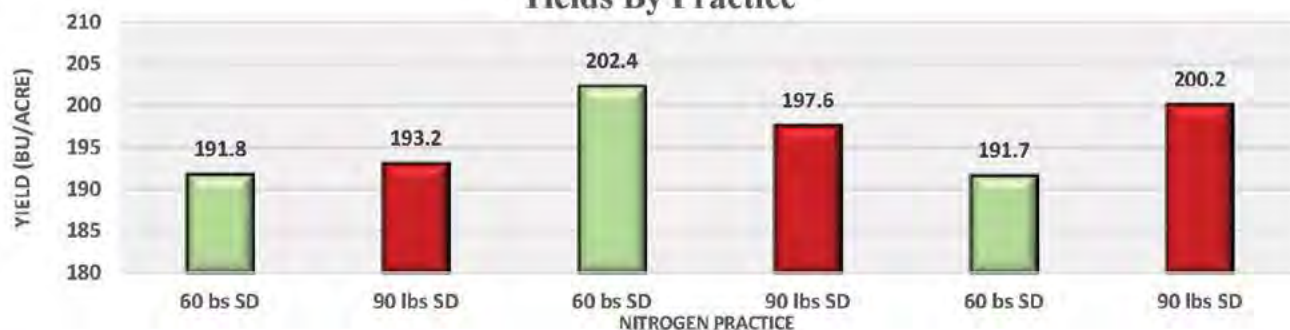
2016 NMI

Soil Test Info		Field Info	
Date	10/9/15	Variety	Renk 299vt2p
OM%	2.3	Population	31000
pH	6.8	Row Width	30
Nitrogen	9.5	Planting Date	5/5/16
P (bray)	41.8	Harvest Date	10/23/16
P (olsen)	13	Soil Texture	sandy loam
Potassium	136	Tillage	Strip Till
Sulfur	10.8	Manure History	No
Zinc	2.4	Alfalfa History	No
		Irrigated	Yes

60 lbs N sidedress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
18-46-0	\$510	130#	Spring Preplant Band	23.4	59.8			None
21-0-0-24	\$360	41#	Spring Preplant Band	8.4			9.8	None
0-0-60	\$365	95#	Spring Preplant Band			57		None
gypsoil	\$80	300#	Fall Preplant Broadcast				48	None
28-0-0	\$260	11	Sidedress Band	32.8				None
28-0-0	\$260	15	Sidedress Band	44.73				None
28-0-0	\$260	20	Sidedress Y drops	59.64				None
Stabilizer Cost / ac \$0				Totals	169	60	57	58

90 lbs N sidedress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
18-46-0	\$510	130#	Spring Preplant Band	23.4	59.8			None
21-0-0-24	\$360	41#	Spring Preplant Band	8.4			9.8	None
0-0-60	\$365	95#	Spring Preplant Band			57		None
gypsoil	\$80	300#	Fall Preplant Broadcast				48	None
28-0-0	\$260	11	Sidedress Band	32.8				None
28-0-0	\$260	15	Sidedress Band	44.73				None
28-0-0	\$260	30	Sidedress Y drops	89.64				None
Stabilizer cost / ac \$0				Totals	199	60	57	58

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
60 lbs N sidedress	169	ADNERnorm	195.3	0.87	\$27.43	\$0.14	19.7	55.1
90 lbs N sidedress	199	ADNERalt	197.0	1.01	\$41.23	\$0.21	19.6	55.6

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Urea: Topdress 100 vs 70 lbs N/acre

Field Trial ID	BJNER	Trial	Nitrogen Rate	N source ²	46-0-0
Previous Crop	Soybeans	County	OTTERTAIL	Cost/ton	na
		Township	PARKERS PRAIRIE	46% N cost/lb	na

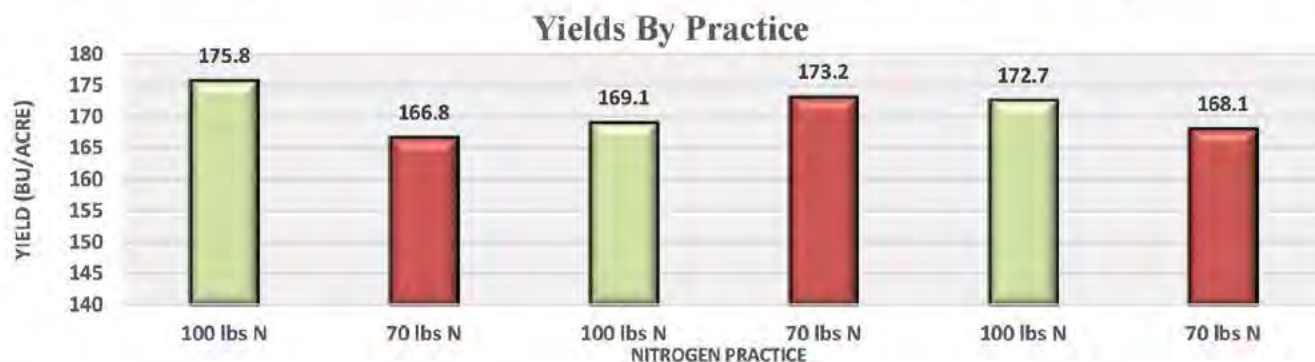


2016 NMI

Soil Test Info		Field Info	
Date	10/29/15	Variety	DEKALB 34-82
OM%	0.025	Population	28000
pH	6.1	Row Width	30
Nitrogen	-	Planting Date	4/29/16
P (bray)	6	Harvest Date	
P (olsen)	-	Soil Texture	sandy loam
Potassium	60	Tillage	Fall Chisel & Spring FC
Sulfur	-	Manure History	No
Zinc	1.03 PPM	Alfalfa History	No
		Irrigated	Yes

100 lbs N top dress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
0-0-60		183	Spring Preplant Broadcast			110		
11-52-0		106	Spring Preplant Broadcast	12	55			
21-0-0-24		42	Spring Preplant Broadcast	9			10	
46-0-0		41	Spring Preplant Broadcast	19				
46-0-0		92	Top Dress Broadcast	43				None
21-0-0-24		83	Top Dress Broadcast	17			20	
46-0-0		217	Top Dress Broadcast	100				None
Stabilizer Cost / ac \$0				Totals 200 55 110 30				

70 lbs N top dress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
0-0-60		183	Spring Preplant Broadcast			110		
11-52-0		106	Spring Preplant Broadcast	12	55			
21-0-0-24		42	Spring Preplant Broadcast	9			10	
46-0-0		41	Spring Preplant Broadcast	19				
46-0-0		92	Top Dress Broadcast	43				None
21-0-0-24		83	Top Dress Broadcast	17			20	
46-0-0		152	Top Dress Broadcast	70				None
Stabilizer cost / ac \$0				Totals 170 55 110 30				



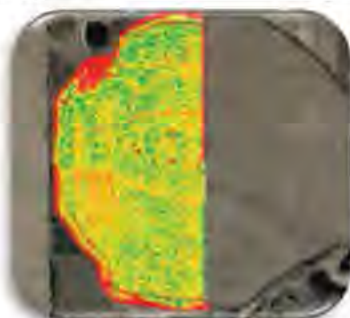
Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
100 lbs N top dress	200	BJNERnorm	172.5	1.16	na	na	16.7	57.2
70 lbs N top dress	170	BJNERalt	169.4	1.00	na	na	16.7	56.2

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Topdress Urea: 75 vs 45 lbs N/acre

Field Trial ID	CLNER	Trial County	Nitrogen Rate	N source ²	46-0-0
Previous Crop	Barley	Township	Wadena	Cost/ton	\$378
			Thomastown	Urea N cost/lb	\$0.41



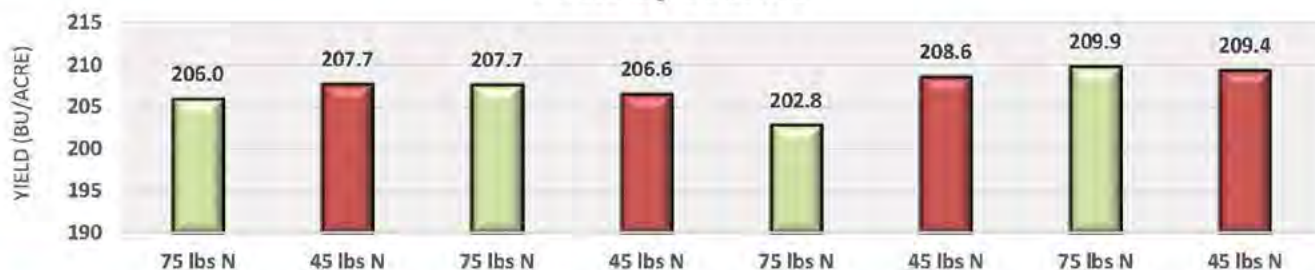
2016 NMI

Soil Test Info		Field Info	
Date	Sp 2014	Variety	Croplan 2845 VT2
OM%	1.8	Population	34000
pH	6.6	Row Width	30
Nitrogen		Planting Date	4/22/16
P (bray)	23.8	Harvest Date	10/24/16
P (olsen)		Soil Texture	sandy loam
Potassium	147	Tillage	Conventional
Sulfur	7	Manure History	No
Zinc	5	Alfalfa History	No
		Irrigated	Yes

75 lbs N topdress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$360	55.74	Spring Preplant Broadcast	25.6				None
21-40-0-10s-1zn	\$525	25	Spring Preplant Broadcast	5.3	10.0		2.5	None
21-0-0-24	\$350	31.25	Spring Preplant Broadcast	6.6			7.5	None
0-0-60	\$360	58.33	Spring Preplant Broadcast			35.0		None
46-0-0	\$378	58.5	Top Dress Broadcast	26.9				None
21-0-0-24	\$375	62.5	Top Dress Broadcast	13.1			15.0	None
Boron	\$1,750	3.5	Top Dress Broadcast					None
46-0-0	\$378	162	Top Dress Broadcast	75.0				None
28-0-0	\$320	85.6	Fertigation	24.0				None
28-0-0	\$320	85.6	Fertigation	24.0				None
Totals				201	10	35	25	
Stabilizer Cost / ac		\$0						

45 lbs N topdress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$360	55.74	Spring Preplant Broadcast	25.6				None
21-40-0-10s-1zn	\$525	25	Spring Preplant Broadcast	5.3	10.0		2.5	None
21-0-0-24	\$350	31.25	Spring Preplant Broadcast	6.6			7.5	None
0-0-60	\$360	58.33	Spring Preplant Broadcast			35.0		None
46-0-0	\$378	58.5	Top Dress Broadcast	26.9				None
21-0-0-24	\$375	62.5	Top Dress Broadcast	13.1			15.0	None
Boron	\$1,750	3.5	Top Dress Broadcast					None
46-0-0	\$378	98	Top Dress Broadcast	45.1				None
28-0-0	\$320	85.6	Fertigation	24.0				None
28-0-0	\$320	85.6	Fertigation	24.0				None
Totals				171	10	35	25	
Stabilizer cost / ac		\$0						

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	MT	Test Weight
75 lbs N topdress	201	CLNERnorm	206.6	0.97	\$30.75	\$0.15	16.9	55.8
45 lbs N topdress	171	CLNERalt	208.1	0.82	\$18.48	\$0.09	16.5	55.1

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Urea: Top dress 115 vs. 85 lbs N/acre

Field Trial ID	DSNER	Trial	Nitrogen Rate	N source ²	46-0-0
Previous Crop	Dry beans	County	WADENA	Cost/ton	na
		Township	WING RIVER	46% N cost/lb	na



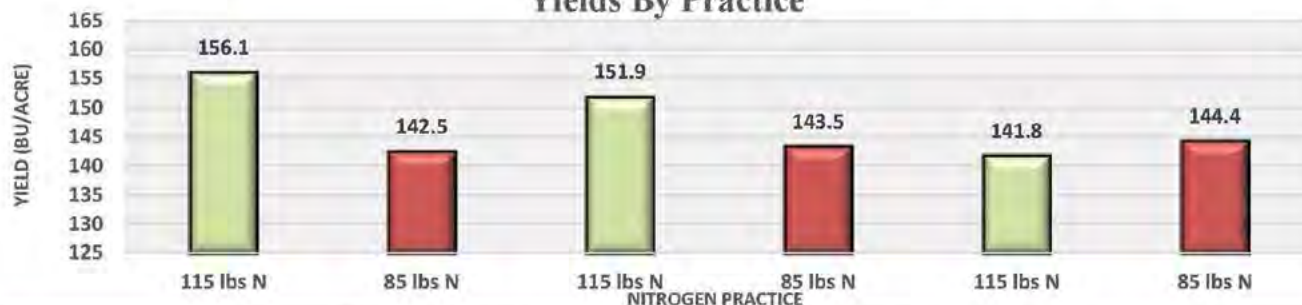
2016 NMI

Soil Test Info		Field Info	
Date	10/12/15	Variety	PIONEER P8210
OM%	1.0%	Population	36000
pH	6.3	Row Width	30
Nitrogen	-	Planting Date	4/28/16
P (bray)	61	Harvest Date	
P (olsen)	-	Soil Texture	loamy sand
Potassium	103	Tillage	Spring Tillage Only
Sulfur	12 lbs/ac	Manure History	No
Zinc	1.83 ppm	Alfalfa History	No
		Irrigated	Yes

115 lbs N top dress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
0-0-60		100	Fall Preplant Broadcast			60		
6-24-6		34	At Planting Band	2	8.2	2		
7-13-3		10	At Planting Band	1	2	0.3		
28-0-0		75	At Planting Band	21				
12-0-0-26		22	At Planting Band	2.7			5.74	
46-0-0		250	Top Dress Broadcast	115				
21-0-0-24		75	Top Dress Broadcast	15			18	
28-0-0		110	Fertigation	30				
12-0-0-26		22	Fertigation	2.6			6	
Stabilizer Cost / ac \$0				Totals	189	10	62	30

85 lbs N top dress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
0-0-60		100	Fall Preplant Broadcast			60		
6-24-6		34	At Planting Band	2	8.2	2		
7-13-3		10	At Planting Band	1	2	0.3		
28-0-0		75	At Planting Band	21				
12-0-0-26		22	At Planting Band	2.7			5.74	
46-0-0		185	Top Dress Broadcast	85				
21-0-0-24		75	Top Dress Broadcast	15			18	
28-0-0		110	Fertigation	30				
12-0-0-26		22	Fertigation	2.6			6	
Stabilizer cost / ac \$0				Totals	159	10	62	30

Yields By Practice



Grower reported anthracnose killed corn middle of August before blacklayer

Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
115 lbs N top dress	189	DSNERnorm	150.0	1.26	na	na	18.0	56.7
85 lbs N top dress	159	DSNERalt	143.5	1.11	na	na	18.2	56.4

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Urea: Top dress 92 vs. 62 lbs N/acre

Field Trial ID	DZNER	Trial	Nitrogen Rate	N source ²	46-0-0
Previous Crop	Corn	County	East Otter Tail	Cost/ton	na
		Township	LEAF LAKE	46% N cost/lb	na



2016 NMI

Soil Test Info

Date	4/5/16
OM%	2.3
pH	6.9
Nitrogen	
P (bray)	77
P (olsen)	
Potassium	156
Sulfur	
Zinc	3.37

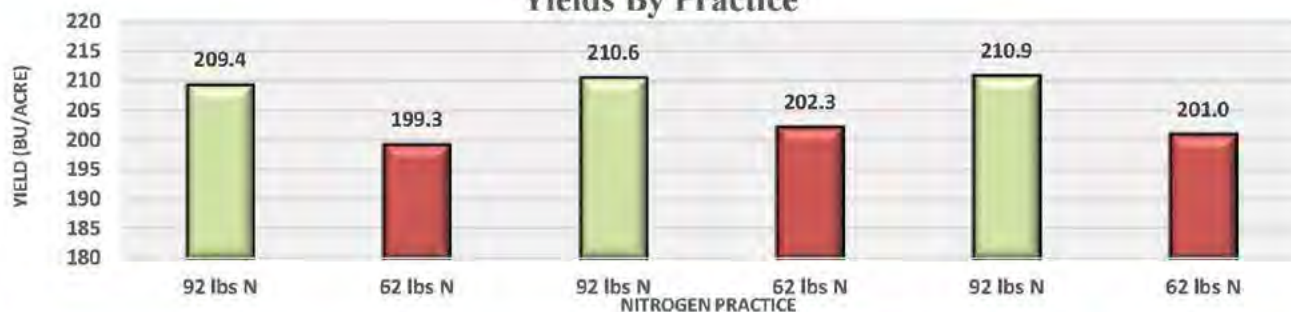
Field Info

Variety	DKC 39-27
Population	34000
Row Width	30
Planting Date	4/23/16
Harvest Date	
Soil Texture	sandy loam
Tillage	Fall Chisel & Spring FC
Manure History	
Alfalfa History	
Irrigated	Yes

92 lbs N top dress				Normal Practice				
source	S ton	rate	application	N	P	K	S	stabilizer
25-0-0-5		54	At Planting Band	15			3	
8-20-5-5-0.5		110	At Planting Band	9	23	6	6	
46-0-0		100	Top Dress Broadcast	46				
21-0-0-24		50	Top Dress Broadcast	10			12	
46-0-0		200	Top Dress Broadcast	92				
21-0-0-24		40	Top Dress Broadcast	10			12	
25-0-0-5		110	Fertigation	25			5	
Stabilizer Cost / ac \$0				Totals	207	23	6	38

62 lbs N top dress				Alternative Practice				
source	S ton	rate	application	N	P	K	S	stabilizer
25-0-0-5		54	At Planting Band	15			3	
8-20-5-5-0.5		110	At Planting Band	9	23	6	6	
46-0-0		100	Top Dress Broadcast	46				
21-0-0-24		50	Top Dress Broadcast	10			12	
46-0-0		135	Top Dress Broadcast	62				
21-0-0-24		40	Top Dress Broadcast	10			12	
25-0-0-5		110	Fertigation	25			5	
Stabilizer cost / ac \$0				Totals	177	23	6	38

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
92 lbs N top dress	207	DZNERnorm	210.3	0.98	na	na	18.9	56.0
62 lbs N top dress	177	DZNERalt	200.9	0.88	na	na	18.7	56.0

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

82-0-0: Sidedress 110 vs 145 lbs N/acre

Field Trial ID	RTNER	Trial	Nitrogen Rate	N source ²	82-0-0
Previous Crop	Corn	County	Stearns	Cost/ton	\$540
		Township	LeSauk	82-0-0 N cost/lb	\$0.33



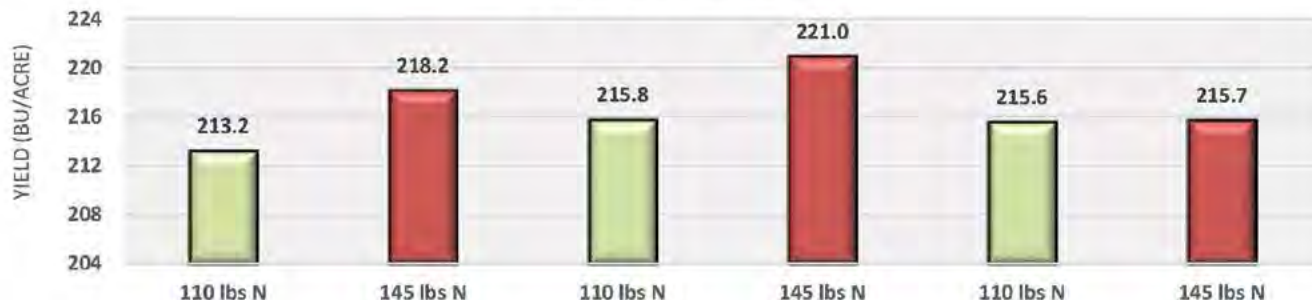
2016 NMI

Soil Test Info		Field Info	
Date	12/7/15	Variety	Pioncer 9526
OM%	1.5	Population	30000
pH	6.2	Row Width	30
Nitrogen		Planting Date	4/25/16
P (bray)	59	Harvest Date	10/20/16
P (olsen)		Soil Texture	sandy loam
Potassium	114	Tillage	Minimum
Sulfur		Manure History	No
Zinc		Alfalfa History	No
		Irrigated	Yes

110 lbs N sidedress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
Dry Fert Blend	\$403	150	At Planting Band	20	20	36	5	
46-0-0	\$390	100	Sidedress Broadcast	46				
82-0-0	\$540	110	Sidedress Band	110				
Stabilizer Cost / ac				\$0				
Totals				176	20	36	5	

145 lbs N sidedress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
Dry Fert Blend	\$403	150	At Planting Band	20	20	36	5	
46-0-0	\$390	100	Sidedress Broadcast	46				
82-0-0	\$540	145	Sidedress Band	145				
Stabilizer cost / ac				\$0				
Totals				211	20	36	5	

Yields By Practice



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	% MT	Test Weight
110 lbs N sidedress	176	RTNERnorm	214.9	0.82	\$36.30	\$0.17	17.1	56.0
145 lbs N sidedress	211	RTNERalt	218.3	0.97	\$47.85	\$0.22	17.2	56.0

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Urea/AMS: Topdress 130 vs. 100 lbs N/acre incorporated with irrigation

Field Trial ID	TBNER	Trial	Nitrogen Rate	N source ²	Urea
Previous Crop	Potatoes	County	Hubbard	Cost/ton	\$315
		Township	Todd	Urea N cost/lb	\$0.34



2016 NMI

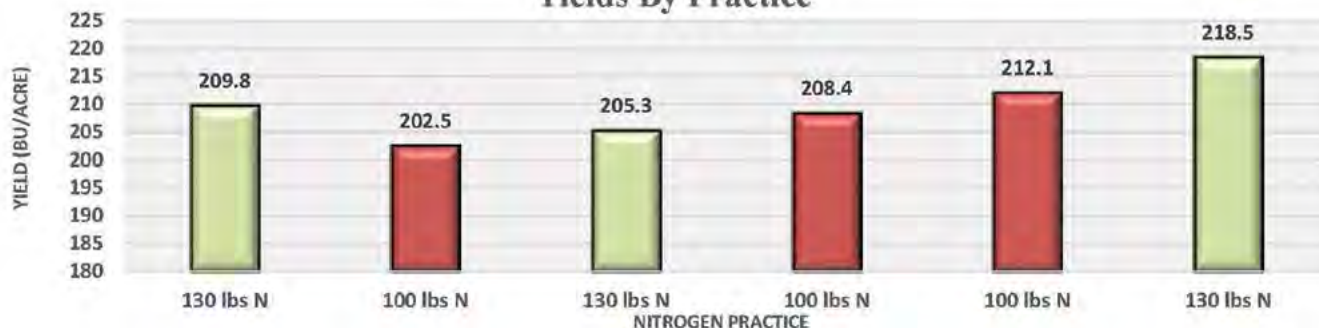
Soil Test Info	
Date	10/7/15
OM%	2.4
pH	5.3
Nitrogen	10 lb/ac
P (bray)	94 ppm
P (olsen)	
Potassium	173 ppm
Sulfur	28 lb/ac
Zinc	5.14 ppm

Field Info	
Variety	NK 18Q
Population	37000
Row Width	30
Planting Date	5/2/16
Harvest Date	10/24/16
Soil Texture	sandy loam
Tillage	Fall Chisel & Spring FC
Manure History	
Alfalfa History	
Irrigated	Yes

130 lbs N top dress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
10-34-0	7.7/ac	2.5 gal	At Planting Dribble	3	10			
Riser & Zinc	22.63/ac	2.5 gal	At Planting Dribble	1.8				
35-40-60-15-5.5mg	\$421	282	At Planting Band	35	40	60	15	
AMS	\$315	83	Top Dress Broadcast	17.4		20	10	
Urea	\$315	244.6	Top Dress Broadcast	112.5			10	
28-0-0	14/ac	10 gal	Fertigation	30				
Stabilizer Cost / ac				\$0				
Totals				200	50	80	35	

100 lbs N top dress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
10-34-0	7.7/ac	2.5 gal	At Planting Dribble	3	10			
Riser & Zinc	22.63/ac	2.5 gal	At Planting Dribble	1.8				
35-40-60-15-5.5mg	\$421	282	At Planting Band	35	40	60	15	
AMS	\$315	83	Top Dress Broadcast	17.4		20	10	
Urea	\$315	179	Top Dress Broadcast	82.34			10	
28-0-0	14/ac	10 gal	Fertigation	30				
Stabilizer cost / ac				\$0				
Totals				170	50	80	35	

Yields By Practice



Top dress incorporated with irrigation. Crop stress on strips 2,3,4.

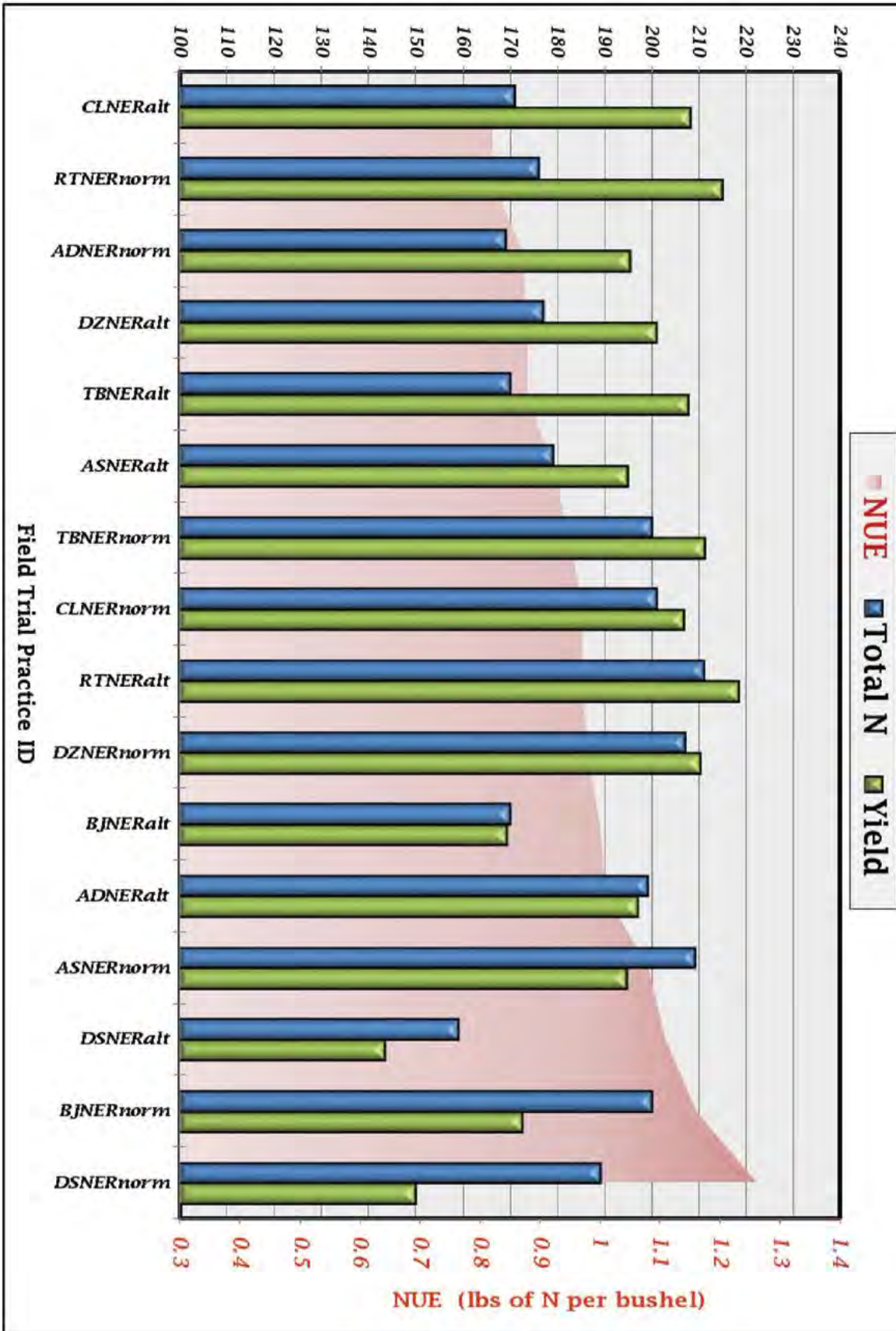
Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
130 lbs N top dress	200	TBNERnorm	211.2	0.95	\$38.25	\$0.18	20.3	55.0
100 lbs N top dress	170	TBNERalt	207.7	0.82	\$28.00	\$0.13	20.3	54.1

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Nitrogen Use Efficiency (NUE)
Northeast Region (Coarse-textured sandy soils)

All Irrigated NMI trials



Agrotain & Super U vs. Super U

Field Trial ID	BBNES	Trial	Nitrogen Stabilizer	N source ²	46-0-0
Previous Crop	Corn	County	Kanabec	Cost/ton	\$499
		Township	South Fork	Urea N cost/lb	\$0.54



2016 NMI

Soil Test Info		Field Info	
Date	3/27/16	Variety	Mycogen 2K395
OM%	2.2	Population	32000
pH	6.6	Row Width	30
Nitrogen	N/A	Planting Date	4/23/16
P (bray)	19	Harvest Date	
P (olsen)	N/A	Soil Texture	sandy loam
Potassium	99	Tillage	Fall Chisel & Spring FC
Sulfur	12	Manure History	No
Zinc	1.2	Alfalfa History	No
		Irrigated	No

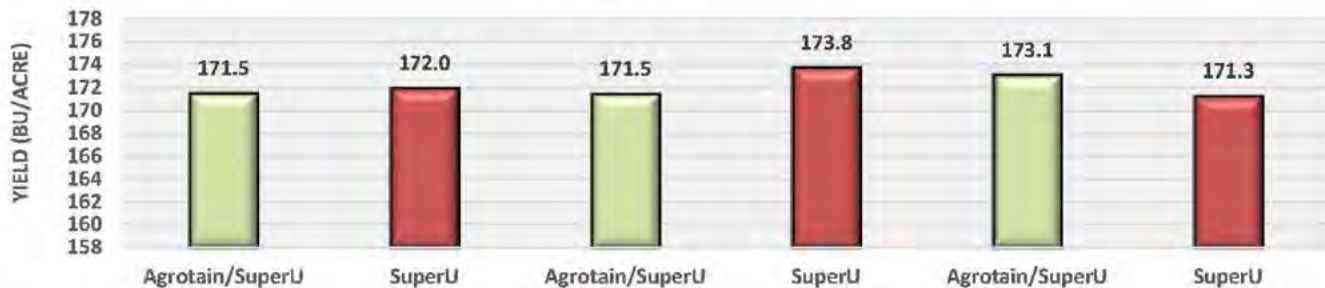
Agrotain and Super U				Normal Practice				
source	cost	rate	application	N	P	K	S	stabilizer
46-0-0	\$349	150	Top Dress Broadcast	69	0	0	0	Agrotain
46-0-0	\$499	100	Top Dress Broadcast	46	0	0	0	Super Urea
19-16-16-4	\$417	250	Spring Preplant Band	48	41	41	10	
Totals				163	41	41	10	

Stabilizer Cost / ac **na**

Super U				Alternative Practice				
source	cost	rate	application	N	P	K	S	stabilizer
46-0-0	\$499	250	Top Dress Broadcast	115	0	0	0	Super Urea
19-16-16-4	\$417	250	Spring Preplant Band	48	41	41	10	
Totals				163	41	41	10	

Stabilizer cost / ac **na**

Yields By Practice



Practice	Total N	Stabilizer	ID	Yield	NUE ¹	Stabilizer cost per acre ²	% MT	Test Weight
Agrotain and Super U	163	Agrotain/SupU	BBNESnorm	172.0	0.95	na	21.0	53.3
Super U	163	SuperU	BBNESalt	172.3	0.95	na	21.0	53.3

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Urea: Sidedress 121 vs 72 lbs N/acre incorporated with cultivator.

Field Trial ID	NWNER	Trial	Nitrogen Rate	N source ²	46-0-0
		County	Todd	Cost/ton	\$350
Previous Crop	Wheat	Township	Bartlett	46% N cost/lb	\$0.38



2016 NMI

Soil Test Info	
Date	8/30/15
OM%	1.7
pH	5.7
Nitrogen	
P (bray)	104
P (olsen)	
Potassium	151
Sulfur	16
Zinc	3.36

Field Info	
Variety	Dekalb 36-30
Population	26100
Row Width	30
Planting Date	4/30/16
Harvest Date	
Soil Texture	sandy loam
Tillage	Fall Chisel & Spring FC
Manure History	No
Alfalfa History	No
Irrigated	No

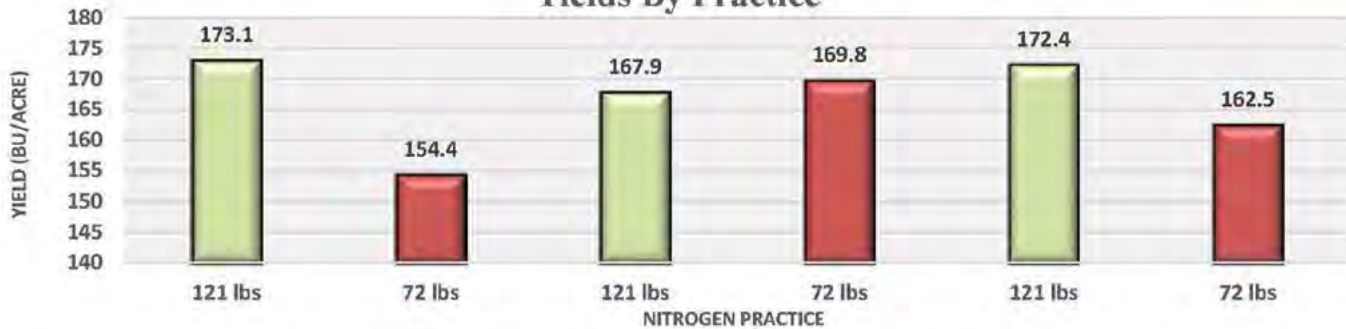
121 lbs N sidedress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
18-46-0	\$510	30	At Planting Band	5.4	13.8			
21-0-0-24	\$360	60	At Planting Band	12.6			14.4	
0-0-60	\$365	30	At Planting Band			18		
46-0-0	\$350	263	Sidedress Broadcast	121				
Totals				139	14	18	14	

Stabilizer Cost / ac \$0

72 lbs N sidedress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
18-46-0	\$510	30	At Planting Band	5.4	13.8			
21-0-0-24	\$360	60	At Planting Band	12.6			14.4	
0-0-60	\$365	30	At Planting Band			18		
46-0-0	\$350	156	Sidedress Broadcast	72				
Totals				90	14	18	14	

Stabilizer cost / ac \$0

Yields By Practice



Sidedress Broadcast incorporated with a cultivator.

Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
121 lbs N sidedress	139	NWNERnorm	171.1	0.81	\$46.03	\$0.27	16.7	57.2
72 lbs N sidedress	90	NWNERalt	162.2	0.55	\$27.39	\$0.17	16.6	57.2

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Urea: Topdress 40 lbs N/acre after turkey manure

Field Trial ID	RZNERM	Trial	N Rate after Manure	N source ²	46-0-0
Previous Crop	Soybeans	County	Todd	Cost/ton	\$355
		Township	Long Prairie	46% N cost/lb	\$0.39



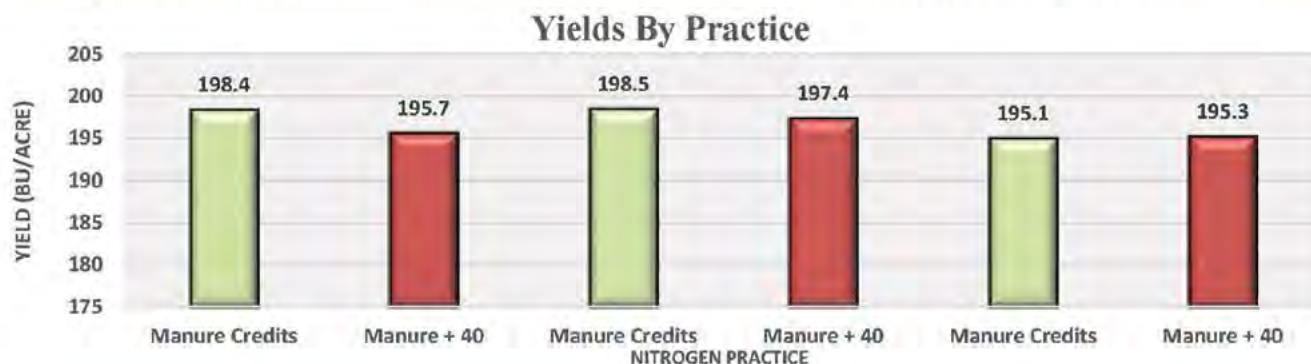
2016 NMI

Soil Test Info	
Date	10/21/13
OM%	2.8
pH	6.3
Nitrogen	
P (bray)	98
P (olsen)	
Potassium	95
Sulfur	16 lbs/acre
Zinc	1.54

Field Info	
Variety	Mycogen MY90R27 RA
Population	30000
Row Width	30
Planting Date	4/23/16
Harvest Date	10/28/16
Soil Texture	sandy loam
Tillage	Other
Manure History	Yes
Manure Type	Poultry (Tom Turkeys)
Liquid or Solid	Solid
Irrigated	No

0 lbs N Topdress			Normal Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
Manure Credits Year 1	\$23	7000	Fall Preplant Broadcast	147	171	196		
8.4-0-36-9.6	\$430	125	Spring Preplant Broadcast	10.5	0	45	12	
7-23-5	\$795	45	At Planting Dribble	3.15	10.35	2.25		
Soybean Credit				40				
Stabilizer Cost / ac	\$0		Totals	201	181	243	12	

40 lbs N Topdress			Alternative Practice					
source	\$ ton	rate	application	N	P	K	S	stabilizer
Manure Credits Year 1	\$23	7000	Fall Preplant Broadcast	147	171	196		
8.4-0-36-9.6	\$430	125	Spring Preplant Broadcast	10.5	0	45	12	
7-23-5	\$795	45	At Planting Dribble	3.15	10.35	2.25		
46-0-0	\$355	87	Top Dress Broadcast	40				
Soybean Credit				40				
Stabilizer cost / ac	\$0		Totals	241	181	243	12	



Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
0 lbs N Topdress	201	RZNERMnorm	197.3	1.02	\$0.00	\$0.00	19.7	54.1
40 lbs N Topdress	241	RZNERMalt	196.1	1.23	\$15.60	\$0.08	19.9	54.0

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

70-0-0-10 Blend : Sidedress 61 vs 122 lbs N/acre

Field Trial ID	TDNER	Trial	Nitrogen Rate	N source ²	(70-0-0-10)
Previous Crop	Soybeans	County	East Otter Tail	Cost/ton	\$360
		Township	Oak Valley	Urea N cost/lb	\$0.39



2016 NMI

Soil Test Info		Field Info	
Date	3/25/15	Variety	Legend 40J185GT
OM%	1.5	Population	29000
pH	5.5	Row Width	30
Nitrogen	2 lbs 0-6"	Planting Date	4/27/16
P (bray)		Harvest Date	11/8/16
P (olsen)	20 ppm	Soil Texture	sandy loam
Potassium	126	Tillage	Fall Chisel & Spring FC
Sulfur	0 lbs 0-6"	Manure History	No
Zinc	1.94	Alfalfa History	No
		Irrigated	No

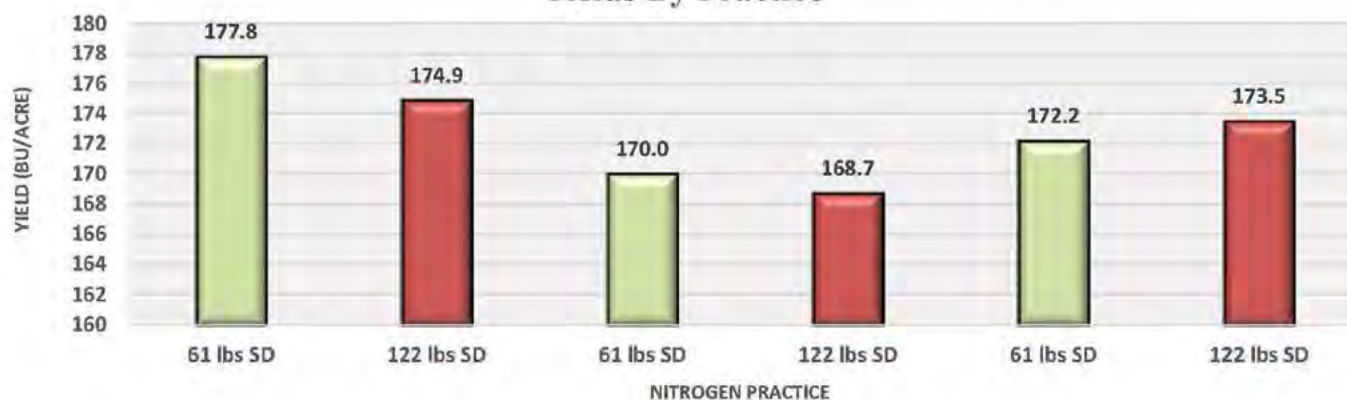
61 lbs N sidedress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
30-80-60-5s-10zn-1	\$437	298	At Planting Band	89.4	238	179	14.9	
Urea Blend (70-0-0-10)	\$360	133	Sidedress Broadcast	61.18			13.3	Agrotain Ultra
Totals				151	238	179	28	

Stabilizer Cost / ac \$5

122 lbs N sidedress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
30-80-60-5s-10zn-1	\$437	298	At Planting Band	89.4	238	179	14.9	
Urea Blend (70-0-0-10)	\$360	266	Sidedress Broadcast	122.4			13.3	Agrotain Ultra
Totals				212	238	179	28	

Stabilizer cost / ac \$9

Yields By Practice



A little damage from frost.

Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
61 lbs N sidedress	151	TDNERnorm	173.3	0.87	\$23.94	\$0.14	16.3	56.0
122 lbs N sidedress	212	TDNERalt	172.4	1.23	\$47.88	\$0.28	16.6	56.3

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Urea/ESN blend: Topdress 91 vs. 45 lbs N/acre after Alfalfa

Field Trial ID	TTNERA	Trial	N Rate after Alfalfa	N source ²	46%/ESN
Previous Crop	Alfalfa	County	West Otter Tail	Cost/ton	\$360
		Township	Scambler	46% N cost/lb	\$0.39
				ESN N cost/lb	\$0.63



2016 NMI

Soil Test Info

Date	
OM%	Uses
pH	Tissue
Nitrogen	Tests
P (bray)	throughout
P (olsen)	growing
Potassium	season
Sulfur	
Zinc	

Field Info

Variety	Rob-See-Co 4286-3220
Population	36000
Row Width	22
Planting Date	5/3/16
Harvest Date	
Soil Texture	
Tillage	Strip Till
Manure History	No
Alfalfa History	Yes
Irrigated	No

91 lbs N top dress				Normal Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$457	40	Fall Preplant Band	18.4				
11-52-0	\$679	70	Fall Preplant Band	7.7	36.4			
PotSu0-0-50-17	\$927	110	Fall Preplant Band			55	18.7	
21-0-0-24	\$418	63	Fall Preplant Band	13.23			15.12	
9-18-9	\$5.8/gal	4.5 gal	At Planting Dribble	4.475	8.951	4.475		
46-0-0	\$360	140	Top Dress Broadcast	64.4				
ESN 44-0-0	\$550	60	Top Dress Broadcast	26.4				yes
Alfalfa Credits Year 1				69				
Stabilizer Cost / ac		\$0	Totals		204	45	59	34

45 lbs N top dress				Alternative Practice				
source	\$ ton	rate	application	N	P	K	S	stabilizer
46-0-0	\$457	40	Fall Preplant Band	18.4				
11-52-0	\$679	70	Fall Preplant Band	7.7	36.4			
PotSu0-0-50-17	\$927	110	Fall Preplant Band			55	18.7	
21-0-0-24	\$418	63	Fall Preplant Band	13.23			15.12	
9-18-9	\$5.8/gal	4.5 gal	At Planting Dribble	4.475	8.951	4.475		
46-0-0	\$360	70	Top Dress Broadcast	32.2				
ESN 44-0-0	\$550	30	Top Dress Broadcast	13.2				yes
Alfalfa Credits Year 1				69				
Stabilizer cost / ac		\$0	Totals		158	45	59	34

Yields By Practice



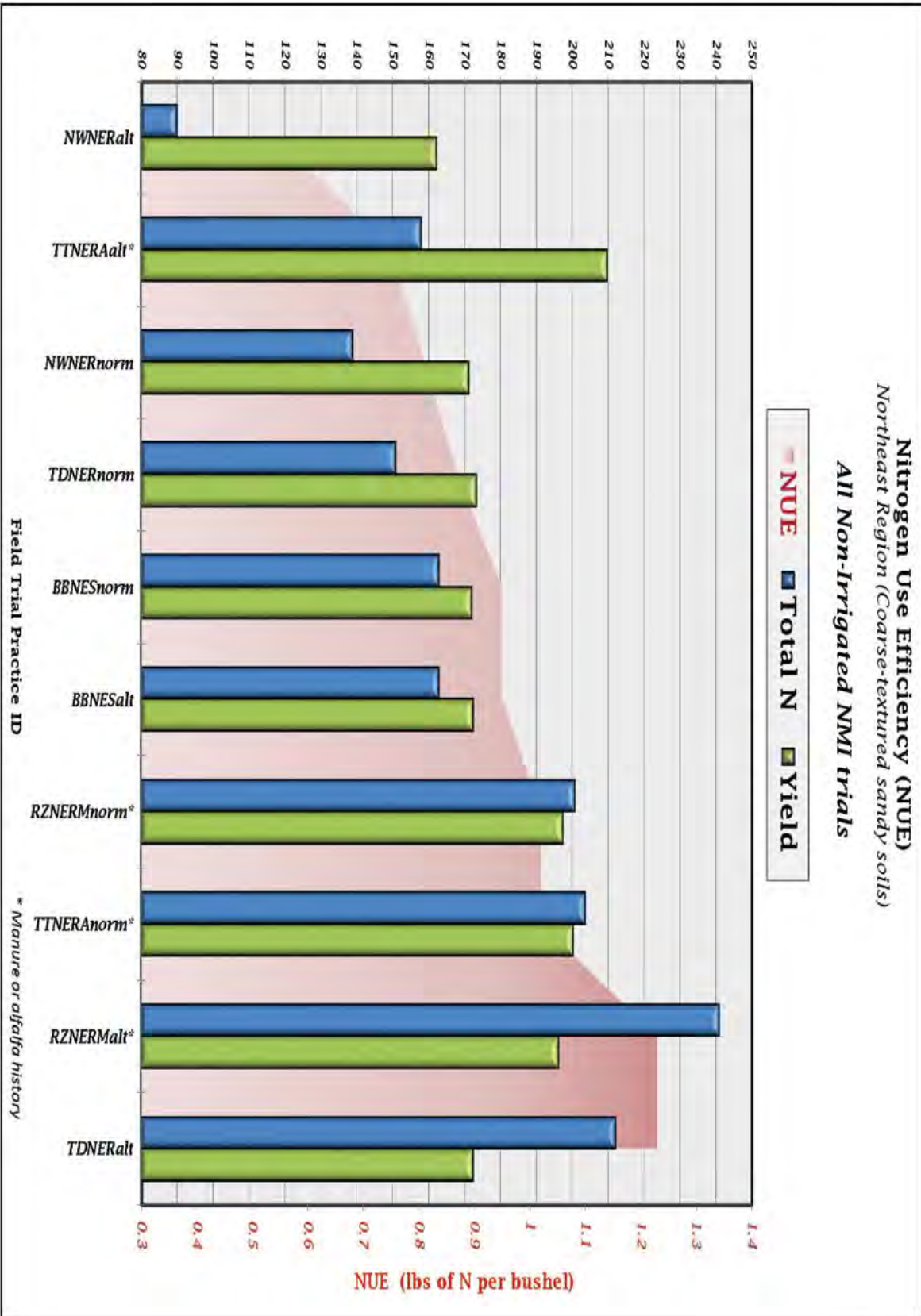
Strip 5 was inadvertently planted to a different variety. Strip 5 removed from average yields.

Practice	Total N Rate	ID	Yield	NUE ¹	N cost per acre ²	N cost per bushel ²	Moisture	Test Weight
91 lbs N top dress	204	TTNERAnorm	200.3	1.02	\$41.62	\$0.21	19.3	52.8
45 lbs N top dress	158	TTNERAalt	209.7	0.75	\$20.81	\$0.10	19.8	53.5

¹ NUE (Nitrogen Use Efficiency). Pounds of nitrogen per bushel. (Total N rate/Yield)

² Nitrogen source(s) used in comparison only. Does not include other nutrient sources or application fees.

Nitrogen Use Efficiency (NUE)
 Northeast Region (Coarse-textured sandy soils)
 All Non-Irrigated NMI trials



* Manure or alfalfa history

For more information about the Nutrient Management Initiative go to:

www.mda.state.mn.us/nmi



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