AgRevival Research

2023

YOUR GUIDE TO BETTER FARMING

WWW.AGREVIVAL.COM

AgRevival

Your guide to better farming.

We test so you don't have to guess.

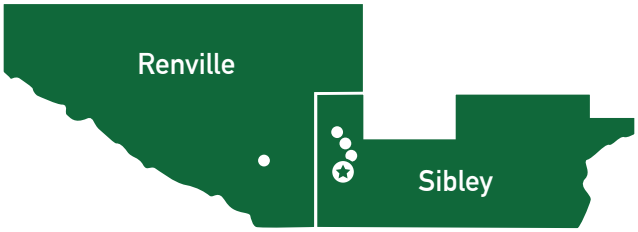
Innovation is critical in agriculture. It's why the United States leads the world in agricultural productivity. But when it comes to identifying the best new products and practices for your farm, innovation can be costly—in time and money.

We're here to help. Over the past 13 years, AgRevival has conducted research in corn, soybeans, and sugar beets. In 2023 AgRevival Research conducted 118 trials across more than 440 acres. These replicated trials are a combination of contracted research, Becks Practical Farm Research, and grower interest studies. You'll find examples of each research category in this year's publication. Use this guide as a starting point when you're looking into new products, practices, and management programs to bring the highest ROI for your farm.

Your Minnesota cooperator for Beck's Practical Farm Research.

We are excited to be working as a cooperator for Beck's Practical Farm Research (PFR) program. As a cooperator, we fill needs on certain soils, geographies, diverse acres, etc. In 2023, we performed 45 PFR studies on 75 acres. The protocols for these studies were designed by Beck's PFR team and executed by AgRevival. While not contained in this book, the PFR studies can be viewed at www.beckshybrids.com/pfresearch.

2023 AgRevival Research



★ AgRevival Headquarters
• Research Locations

More studies. Greater accuracy.

The 2023 AgRevival Research book contains data from 31 studies. To be published in this book, all studies must contain multiple data points. We are committed to delivering accurate data, as this book is intended to be the starting point in your agronomic decision-making process.

Become a Project Partner

Project Partners are vital to providing the information found in this guide to growers across the United States. The Project Partners found across the bottom of these pages helped us in many ways including, but not limited to: equipment, crop inputs, and monetary investments to get this book into your hands. We thank all of our Project Partners who helped make the 2023 AgRevival Research book a success, and we look forward to serving you in the future.

Learn How We Do Our Research

KIBBLE EQUIPMENT · LEAD MARKETING & DESIGN · MANDAKO · Max Systems LLC · NewFields Ag Innovations In Your Fields · NTS TIRE SUPPLY · SUMMERS

2023 AgRevival Research

Corn Studies

Soybean Studies

Ask AgRevival

Have questions about the studies, products, or farming practices included in this book?

Get answers at **www.agrevival.com/ask-agrevival**

Important Crop Development Stages

VE – V4

Root and plant establishment takes place.

V5 – V8

Yield potential is established.

V9 – VT

Vegetative growth takes place. The focus is on fulfilling the yield potential that was set earlier.

R1 – R3

Grain establishment takes place.

R4 – R6

Grain fill takes place.

VE – V3

Root and plant establishment takes place.

V3 – R1

Nodule development increases.

R2 – R3

Pod determination takes place. (Number of pods per node that can be filled.)

R4 – R5

Grain establishment takes place. (Number of beans per pod that can be filled.)

R6 – R8

Grain fill takes place.

Note:

Soybeans can have several functions occurring simultaneously during reproductive stages. This diagram is a generalization of the average function taking place.

Calculating Return-on-Investment

Pricing:

To calculate the 2023 commodity prices, we averaged the Friday Chicago Board of Trade closing future prices from September 3, 2022, through August 26, 2023. Recalculate your own return per acre using prices that you expect, should they differ significantly from the commodity and input prices used here.

Calculations:

We used commodity prices and product costs only in these ROI calculations. Feel free to factor in additional charges, such as application costs, to calculate your own return. Individual product prices are listed in the data footer on each page.

Test weight and bu./ac. were corrected to 15% moisture for corn and 13% moisture for soybeans.

Net Return =
Gross Income (Bushel Per Acre x Commodity Price Per Bushel) – Treatment Cost

Return-on-Investment =
Bushel Per Acre Difference x Commodity Price Per Bushel – Treatment Cost

Commodity Prices

5^{69}/Bu.

13^{39}/Bu.

Weather Summary

Was 2023 the new 1988? It became evident in the conversations this year with farmers that we are in a generational change. Half spoke of their experience farming the drought of 1988, the others spoke of their fathers' experience farming the drought of 1988. 2023 weather tried our patience for moisture, and in most cases can be the attributing factor to the variable yields experienced. Our three farms near the facility averaged just over 195 Bu/Acre, and the three farms six miles north averaged 155: a 40-bushel yield swing in a matter of six miles. We experienced plots averaging 250 bushels per acre, and plots in the 140 average range—the story of the haves and have nots, meaning that the little rain showers during reproductive and grain fill stages still made the difference. For most of 2023, our crops were living on the edge of a large bushel per acre difference. This created challenges in the data but did not void the year.

We have a saying here: a good year for farming is a poor year for research; a poor year for farming is a good year for research. When crops are stressed, and environments are variable, lessons tend to reveal themselves. See Figure 1, for example. This yield map from Exodus reveals a 120-bushel swing from one end of a 40 to the other. Soil type changes are so small that it does not show up in the SURRGO database. However, looking carefully at the satellite image in the background, there is a difference in the plant health. What we learned here is that proper fall tillage makes a difference. We took this farm over after 2021, a wet fall. The previous renter "carried" the ripper through these areas because they were wet, which compacted the soil and thus prevented water penetration during the critical rain periods. A small thing that normal years would show zero yield difference showed up in big financial ways this year.

Figure 1

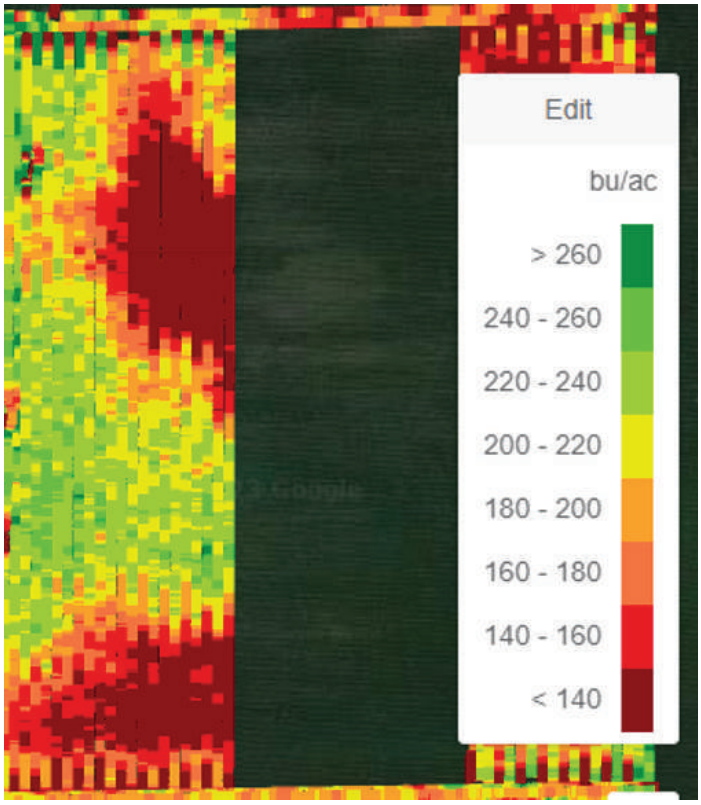


Figure 2

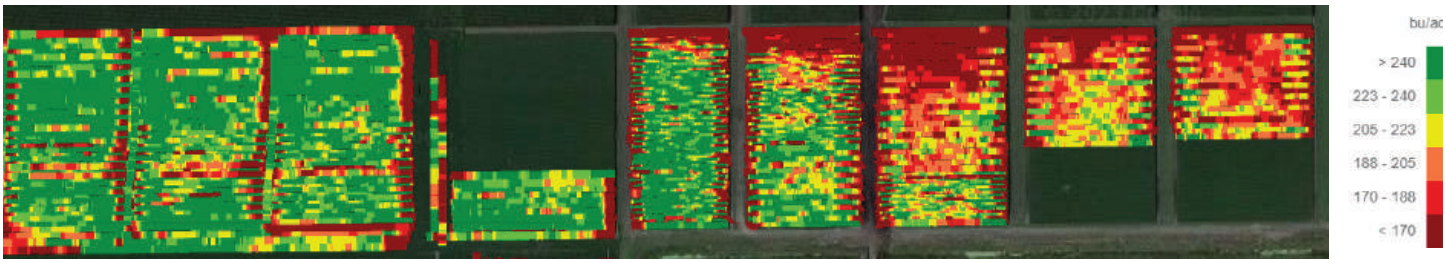


Figure 2 is the yield maps from Malachi. It is ¾ mile from left to right on the map. According to FARMserver, there was a 1.9-inch rainfall difference from the east side of the farm to the west side, with the west side receiving more. We can attribute the 45-bushel difference to the rainfall received. Figures 3 and 4 are snapshots of the FARMserver app that we are using to track rainfall and GDU accumulation from planting until October 1st. It also provides us a predictive growth stage to help us manage the scouting activities, and to ensure proper growth stage applications. The accuracy of the decision-making platform has benefited our research in a large way. The great thing, it is not exclusive to our research farm, nor is it a software platform that charges you for the information you need to make profitable decisions. To sign your farm up for FARMserver, or to learn more, go to www.farmserver.com.

Some final thoughts and actionable insights from this past year's weather: Don't become discouraged. Use weather information to make decisions to hedge your bets against the thing we cannot control, and don't give up on the crop at hand. When we look back over 2023, there are little yield losses we can attribute to the investments or decisions we made. When you keep hope alive and catch the rain or GDUs needed, one can say "I'm glad we did…." When one gives up, one says "I wish we would have…." Don't wish, be intentional, make calculated decisions and at times risks, and pray the good Lord provides your needs.

Figure 3

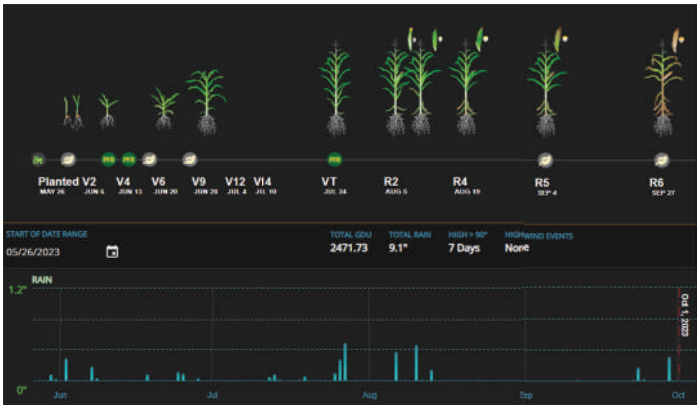
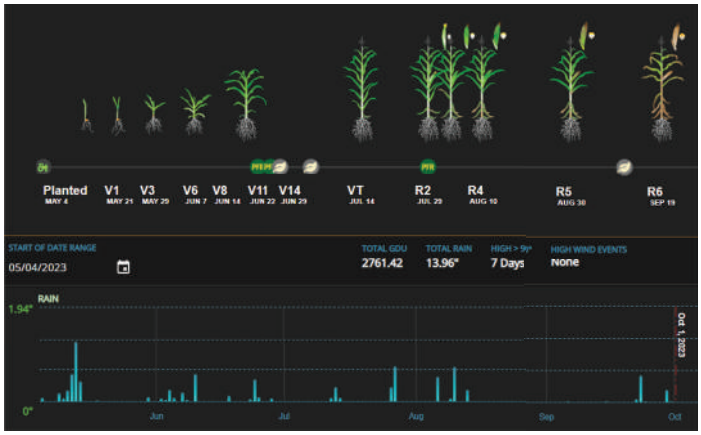


Figure 4



Research Plot Descriptions

We are thankful for the various locations on our research farm. The distance spread between farms north to south is 9 miles, east to west is 11 miles. Just enough to experience different weather conditions, but close enough to evaluate different soil types or crop rotations within similar environments. As you may notice, we name our farms after books of the Bible. The most important lessons in life live in the best guide to life, the Bible. As the stories and parables in the Bible, these farms don't just provide us data, they are the platform for the experiences we share through stories, to help you gain a better understanding of how something may work on your farm. Here is a little bit about each one.

Genesis (15 acres)

Genesis is AgRevival's original research location and remains our most consistently high-yielding ground. Genesis has provided a great base for in-furrow research, as well as research and development for testing new project ideas.

Romans (53 acres)

Romans serves as the Beck's Practical Farm Research acres for Minnesota. The studies we conduct on these acres are part of a vast network of acres across the Midwest and add depth and placement understanding to the data. This site also serves as our event grounds, where we share our research and understanding with hundreds of farmers through the Beck's Minnesota Field Show in August, as well as private tours throughout July and August.

Malachi (84 acres)

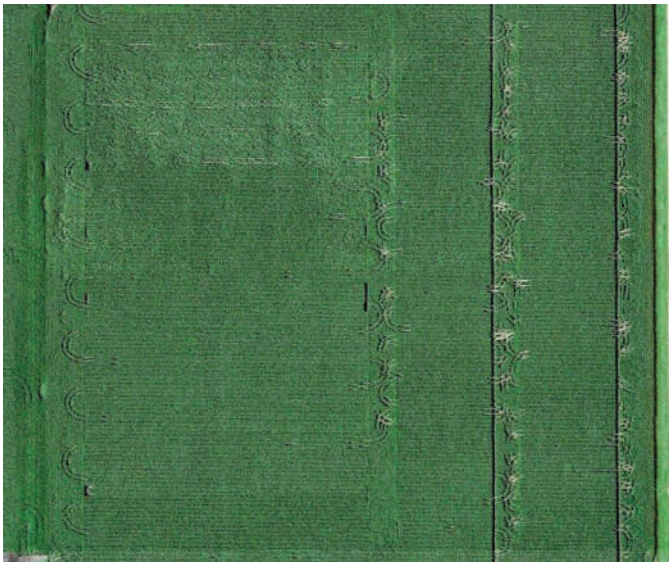
We call Malachi our "Minnesota farm" because of the many unique soil variations represented, much like our state. There is an area of 5.5% organic matter on silty clay loam soil, as well as a 12-acre silty sand hilltop with 1.4% organic matter. This allows us to conduct the same study on completely different soils, but with the same temperature swings and precipitation, within a half mile radius. With newly established grass alleys, the data, visuals, and learning opportunities are unique on Malachi.

Isaiah (102 acres)

Isaiah is our most localized research ground and represents the average soil in the area. Years of great manure management have set the stage for some great research. This location is the host for much of our partnered research because of the observed performance. Isaiah provides a great host for longer strip trials that stretch more than 500 feet. Isaiah is also where we host genetic research for both corn and soybeans. Grass alleys throughout give easy access for plot tours that want data sets spread across multiple locations.

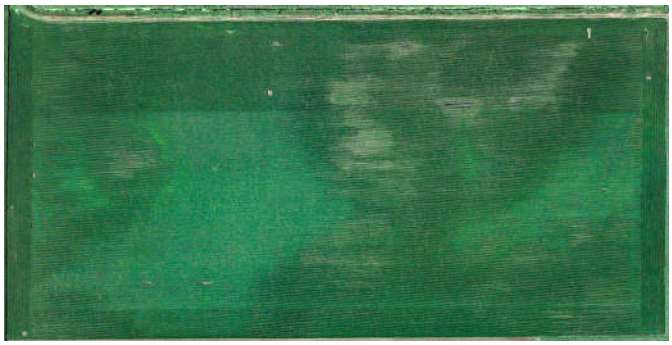
Titus (53 acres)

Titus serves as an expansion of Minnesota Practical Farm Research as well as the ground for multiyear fertilizer studies. After two years of learning this farm, we have also placed our multiyear tillage study on this field to take advantage of the varying soil types and make a multiyear data set that gives us an opportunity to best understand each tillage program. This study will span 11 acres and be rotated so the tillage treatments will cover the same area for both corn and soybeans.



Esther (37 acres)

Variable is the best word to describe this farm, which is now a great asset for our trial research. Here we have room for a few replicated studies, but plenty of room for larger trials to test equipment and geospatially collect data. We're setting up Esther as a corn-on-corn farm to test tillage, nutrient programs, products to fight pests, and other products or practices associated with growing corn following corn. This farm was a great addition and will serve as a medium between replicated research and practical application.



Exodus (78 acres)

Exodus gives us the ability to test strategies we can't test in 250–400-foot passes, such as tillage equipment, high-speed planting, and the use of NH3 as a base nitrogen to name a few. We also use it to test field-scale trials, in conjunction with our replicated studies, to identify how closely our data aligns with the experience you may have on your farm. In the Bible, the book of Exodus tells the story of the Israelites' journey toward the promised land. This farm will be the first of many that will take the learning and understanding of your replicated research toward your land.

Haggai (18 acres)

Haggai is an isolated 18-acre plot that is very consistent from end to end. This ground is currently in a 3-year study, which allows us to take the data points and stretch them across a longer data set while designating an area of these footages and conducting learning objectives without affecting the data. The isolation of these acres and the knowledge of the farm excite our team for future projects.

Tillage Program Study

Purpose:

To evaluate a variety of tillage program and how each program impacts plant health, soil structure and overall yield.

Project Partners:

SUMMERS

Great Plains "Harvest Starts Here."

Tillage Program	Percent Moisture	bu./ac.	bu./ac. Difference
No Till	16.9	206.0	N/A
Fall Strip Till	16.6	219.3	+ 13.3
AgRevival Conventional Tillage Program (Fall Disc Rip, Spring Field Cultivator)	16.1	210.5	+ 4.5
Great Plains Vertical Tillage Program (Fall Max-Chisel®, Spring Turbo-Max®)	15.5	200.1	- 5.9
Summers MFG Vertical Tillage Program (Fall and Spring VRT Renegade®)	15.2	207.2	+ 1.2

(Individual results may vary.)

Observation:

This new multi-year study, in cooperation with Great Plains and Summers, in which we're able to compare different tillage programs side by side, is one that we have been looking forward to for quite some time. In our experience, there is a time and a place for every piece of tillage equipment, and every grower has a different approach and thought on what works best for his soil and operation. It would be impossible to test every program. However, our goal in designing this study will answer some of the most frequent questions around tillage. We believe this study encompasses a majority of common practices across the corn belt and looks at strictly the tillage pass and how that impacts plant growth, soil structure, and yield. Year one results were of little surprise based on our weather and conditions. The goal with this three-year study is to build a baseline data set to guide year by year tillage decisions.

Price Information:

Corn	**$5.69/bu**

Fall Urea Study

Purpose:

To evaluate: nitrogen applied in the fall as a base for the following year's corn crop; and how the use of additives helps reduce losses over the winter and how these products impact yield and ROI.

Fall Treatment	Percent Moisture	bu./ac.	bu./ac. Difference	ROI
Control: 250 lbs/ac Urea	22.1	214.9	N/A	N/A
250 lbs/ac Urea + 10 oz. CarbonWorks CetaiN®	21.0	222.3	+ 7.4	+ $36.33
250 lbs/ac Urea + 13 oz. Factor®	21.6	226.9	+ 12.0	+ $59.14
250 lbs/ac 1/3 Urea + 2/3 ESN Blend	21.6	218.3	+ 3.4	+ $12.69

(Individual results may vary.)

Observation:

The use of additives with fall-applied urea is a must to reduce the chance of nitrogen loss. ESN can be effective in limiting loss when mixed in to the soil in the fall, as long as freeze up happens before the ESN coating is broken down. Carbon and Urease inhibitors are effective ways of preventing nitrogen loss over the winter and keeping the nitrogen in the root zone for the following year's corn crop.

Price Information:

Corn	**$5.69/bu**
Urea	$0.66/unit
CarbonWorks CetaiN®	$74.00/gal
Factor®	$90.00/gal
ESN	$705/ton

Residue Management Study Corn after Corn

Purpose:

To evaluate a biological crop residue decomposing product and its impacts on residue degradation, plant health, yield, and ROI.

Project Partner:

DakotaBIO THE BIOLOGICAL COMPANY

Pre-Emerge Treatment	Percent Moisture	bu./ac.	bu./ac. Difference	ROI
Control	20.9	137.1	N/A	N/A
12.8 oz. DB32	20.1	148.8	+ 11.7	+ $49.69

(Individual results may vary.)

Observation:

This is a new study on a product that is showing a really good ROI for growers looking to help break down residue and get more usable nutrients available to the plant during the growing season. We're looking forward to more data from this product next year as we test it with both a fall and spring application to corn stalks.

Price Information:

Corn	**$5.69/bu**
DB32	$16.88/ac

Planting Time After Spring Tillage Study

Purpose:

To evaluate the yield impacts on planting directly after spring tillage or waiting for the soil to dry and warm one day before planting.

Planting Date (Field was worked on May 22nd)	Percent Moisture	bu./ac.	bu./ac. Difference
May 22nd	21.1	215.8	N/A
May 23rd	21.0	221.9	+ 6.1

(Individual results may vary.)

2 year average for waiting one day

Observation:

Year 2 of this study showed similar results to last year in the importance of waiting a day after spring tillage before planting corn. Ensuring adequate seed to soil contact and preventing sidewall compaction (due to fluffy or wet soil conditions) is critical during early growth of corn.

Price Information:

Corn	**$5.69/bu**

Nitrogen Program Study Corn after Corn

Purpose:

To evaluate nitrogen programs and how each program impacts yield and ROI.

Treatment	Percent Moisture	bu./ac.	bu./ac. Difference	Net ROI
All Nitrogen UAN				
Total N 220 lbs. Spring Applied: 60 lbs. N UAN 2x2x2 & 160 lbs. N UAN Side Dress @ V3	17.8	161.6	N/A	$763.30
Base Nitrogen Urea				
Total N 160 lbs. Spring Applied: 120 lbs. N Urea PPI & 40 lbs. N UAN @ V3	17.4	157.5	N/A	$788.58
Total N 220 lbs. Spring Applied: 120 lbs. N Urea PPI & 100 lbs. N UAN @V3	17.5	170.7	+ 13.2	$821.08
Total N 220 lbs. Spring Applied: 120 lbs. N Urea PPI & 60 lbs. N UAN 2x2x2 & 40 lbs. N UAN @ V3	17.6	163.7	+ 6.2	$781.25
Total N 220 lbs. Spring Applied: 120 lbs. N Urea PPI & Spring: 60 lbs. N UAN SB & 40 lbs. N UAN @ V3	17.7	173.8	+ 16.3	$838.72
Base Nitrogen Anhydrous Ammonia				
Total N 160 lbs. Fall Applied: 120 lbs. N Anhydrous Ammonia & Spring: 40 lbs. N UAN @ V3	18.2	167.3	N/A	$868.34
Total N 220 lbs. Fall applied: 120 lbs. N Anhydrous Ammonia & Spring: 100 lbs. N UAN @ V3	18.7	165.7	- 1.6	$816.63
Total N 220 lbs. Fall applied: 120 lbs. N Anhydrous Ammonia & Spring: 60 lbs. N UAN 2x2x2 & 40 lbs. N UAN @ V3	18.3	166.6	- 0.7	$821.75
Total N 220 lbs. Fall applied: 120 lbs. N Anhydrous Ammonia & Spring: 60 lbs. N UAN SB & 40 lbs. N UAN @ V3	19.0	167.9	+ 0.6	$829.15

(Individual results may vary.)

Observation:

This year, this study showed that nitrogen was not a limiting factor in yield, and more or less nitrogen didn't contribute to a lot of yield differences. Form of nitrogen played a small role in some of the yield data. However, the biggest factor was drought conditions throughout the growing season on this farm. Comparing urea and anhydrous on our dry growing season showed that the anhydrous drew a more consistent yield across the farm. The urea, which is more dependent on in-season moisture, was variable and changed with soil types and topography of the field.

Price Information:

Corn	**$5.69/bu**
Urea	$0.66/unit
UAN	$0.71/unit
Anhydrous Ammonia	$0.46/unit

Nitrogen Program Study Corn after Soybeans

Purpose:

To evaluate nitrogen programs, looking at both timing and source, and how each program impacts yield and ROI.

Treatment	Percent Moisture	bu./ac.	bu./ac. Difference	Net ROI
All Nitrogen UAN				
Total N 180 lbs. Spring Applied: 60 lbs. N UAN 2x2x2 & 120 lbs. N UAN Side Dress @ V3	23.0	250.3	N/A	$1,296.41
Base Nitrogen Urea				
Total N 120 lbs. Spring Applied: 120 lbs. N Urea PPI	23.1	243.0	N/A	$1,303.47
Total N 180 lbs. Spring Applied: 120 lbs. N Urea PPI & 60 lbs. N UAN @ Stream Bar	23.0	243.9	+ 0.9	$1,265.99
Total N 180 lbs. Spring Applied: 120 lbs. N Urea PPI & 60 lbs. N UAN @V3	22.9	243.9	+ 0.9	$1,265.99
Base Nitrogen Anhydrous Ammonia				
Total N 120 lbs. Fall applied: 120 lbs. N Anhydrous Ammonia	22.8	255.5	N/A	$1,398.60
Total N 180 lbs. Fall applied: 120 lbs. N Anhydrous Ammonia & Spring: 60 lbs. N UAN @ Stream Bar	22.7	259.8	+ 4.3	$1,380.46
Total N 180 lbs. Fall applied: 120 lbs. N Anhydrous Ammonia & Spring: 60 lbs. N UAN @ V3	23.0	261.0	+ 5.5	$1,387.29

(Individual results may vary.)

Observation:

Similar to the corn-on-corn study, we saw no big yield increases with an increased amount of nitrogen. However, in this study the different forms of nitrogen played a larger role. Fall-applied anhydrous and planter-applied UAN showed to be available earlier in the growing season compared to the urea application, which in turn led to a higher yield potential. With that being said, we see yield increase in the increased rate of nitrogen on the anhydrous strips due to more nitrogen available, signaling the plant during ear determination. Nitrogen availability is a function of environment and time; the environment and time favored the anhydrous.

Price Information:

Corn	**$5.69/bu**
Urea	$0.66/unit
UAN	$0.71/unit
Anhydrous Ammonia	$0.46/unit

Tire PSI Compaction Study

Purpose:

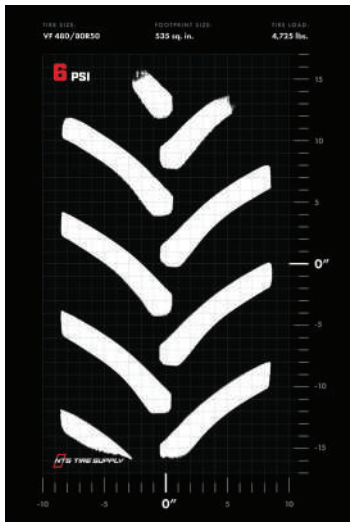
To evaluate plant health, root structure, emergence, and yield when operating equipment at various tire PSI.

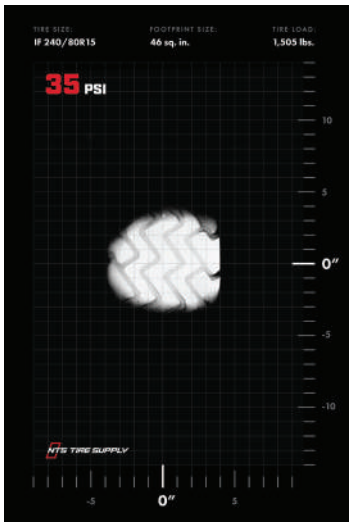
Project Partner:

NTS TIRE SUPPLY

Treatment	Percent Moisture	bu./ac.	bu./ac. Difference
35 PSI Front Tires & 35 PSI Rear Tires & 35 PSI Planter Tires	21.2	190.3	N/A
28 PSI Front Tires & 28 PSI Rear Tires & 28 PSI Planter Tires	21.2	193.4	+ 3.1
20 PSI Front Tires & 20 PSI Rear Tires & 20 PSI Planter Tires	21.2	195.2	+ 4.9
12 PSI Front Tires & 12 PSI Rear Tires & 12 PSI Planter Tires	20.9	190.9	+ 0.6
6 PSI Front Tires & 6 PSI Rear Tires & 6 PSI Planter Tires	21.3	196.1	+ 5.8

(Individual results may vary.)

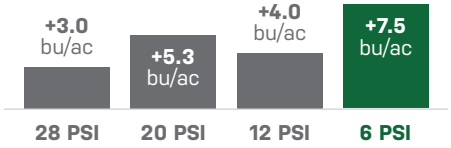




Observation:

Three-year data from this study showed a consistent yield increase year after year as we dropped air pressure on both the planter and tractor tires—all axles involved in the pass. With this study, we have found more benefits past the yield increase at the end of the year. Some of those benefits include better water infiltration, more traction, and less fuel use. With this three-year study coming to an end, it has not only presented more benefits than we thought in the beginning, but it has also provided us with more factors to consider when it comes to tires and every pass that equipment makes across the soil in a single growing season. Stay tuned for more tire pressure studies in the future!

3-Year Bushel Increase Average



Price Information:

Corn	**$5.69/bu**

Tire PSI Compaction Study: Static Planter Tires

Purpose:

To evaluate plant health, root structure, emergence, and yield when adjusting the planter tractor tires and leaving the planter tires at a consistent PSI.

Project Partner:

NTS TIRE SUPPLY

Treatment	Percent Moisture	bu./ac.	bu./ac. Difference
35 PSI Front Tires & 35 PSI Rear Tires & 30 PSI Planter Tires	22.2	201.8	N/A
28 PSI Front Tires & 28 PSI Rear Tires & 30 PSI Planter Tires	22.0	202.5	+ 0.7
20 PSI Front Tires & 20 PSI Rear Tires & 30 PSI Planter Tires	22.0	204.9	+ 3.1
12 PSI Front Tires & 12 PSI Rear Tires & 30 PSI Planter Tires	22.2	205.9	+ 4.1
6 PSI Front Tires & 6 PSI Rear Tires & 30 PSI Planter Tires	22.0	211.7	+ 9.9

(Individual results may vary.)

BONUS STUDY

Sprayer Tire Pressure & Compaction

Observation:

The focus of this study is to take a closer look at the full pass approach and figure out which tires are giving the most benefit when lowering tire pressure. We know tractors with fertilizer tanks are heavier than the full planter. What would happen if we left the planter tires at a higher pressure and only dropped pressures on the tractor tires? According to the first-year study data, it seems that dropping only the tractor tires' pressures is sufficient. Keep in mind this is one-year data, and as you look at the soybean data from this study later in this book, you'll see more data is needed to see if all the tires need to be decreased or not.

Price Information:

Corn	**$5.69/bu**

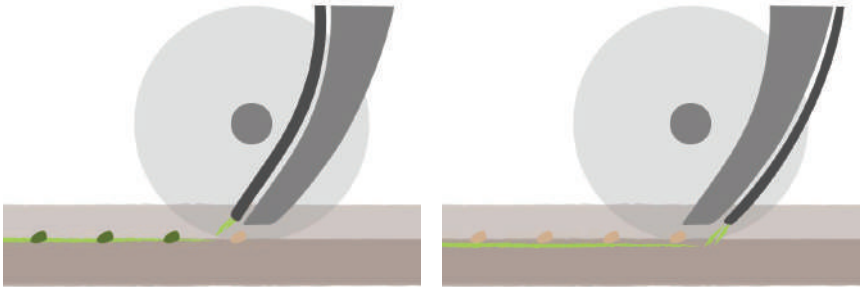
In-Furrow Placement Study

Purpose:

To evaluate the placement of a starter solution in relation to the seed and how this impacts germination, yield, and ROI.

Treatment	Percent Moisture	bu./ac.	bu./ac. Difference	ROI
Control: No additional treatments	20.6	159.4	N/A	N/A
5 gal. 10-34-0 + 16 oz. eXceed™ Nano Brown Sugar applied in-furrow under the seed	20.5	164.5	+ 5.1	+ $3.77
5 gal. 10-34-0 + 16 oz. eXceed™ Nano Brown Sugar applied in-furrow on top of seed	19.9	162.2	+ 2.8	- $9.31
16 oz. CarbonWorks RSTC 17® + 16 oz. MicroBoost + 16 oz. BioGreen applied in-furrow under the seed	20.7	160.9	+ 1.5	- $6.71
16 oz. CarbonWorks RSTC 17® + 16 oz. MicroBoost + 16 oz. BioGreen applied in-furrow on top of seed	20.5	162.7	+ 3.3	+ $3.53

(Individual results may vary.)



Observation:

This new study for 2023 answers a fairly popular question when it come to products and fertilizers in-furrow and their relation to the seed. We know from past research that 10-34-0 in-furrow can cause some seedling injury if the salt load is too high and there is not enough water present to dilute the salt in the seed sphere. First year results show that the best placement for such fertilizer is under the seed, where it is more likely to dilute out and down but is still usable for early season growth. On the opposite side, products like carbon, sugar, and biologicals see a higher yield response placed on top of the seed where they can come in contact with the seedling more quickly and work in the seed sphere during early season growth.

Price Information:

Corn	**$5.69/bu**
10-34-0	$4.25/gal
eXceed™ Nano Brown Sugar	$32.00/gal
CarbonWorks RSTC 17®	$74.00/gal
MicroBoost	$16.00/gal
BioGreen	$32.00/gal

In- Furrow Biological Additive Study

Purpose:

To evaluate the addition of products to the biological product BioRed IF and the impacts they have on yield and ROI.

Treatment	Percent Moisture	bu./ac.	bu./ac. Difference	ROI
Control: No biological	19.7	158.6	N/A	N/A
10 oz. BioRed™ IF	19.9	160.5	+ 1.9	- $3.69
10 oz. BioRed™ IF + 1.2 oz. Regulator 3.0	19.7	161.9	+ 3.3	+ $3.49
10 oz. BioRed™ IF + 8 oz. eXceed™ Nano Brown Sugar	20.4	161.7	+ 3.1	+ $1.14
10 oz. BioRed™ IF + 16 oz. CarbonWorks RSTC 17®	20.4	161.7	+ 3.1	- $6.11
10 oz. BioMate™	19.7	165.2	+ 6.6	+ $33.80

(Individual results may vary.)

Observation:

Two new products in this year's study are BioRed IF and BioMate from Biovante. BioRed IF is a biological product and BioMate is a pre-mixed biological that incorporates a carbon and sugar source. The results from this year's study show the importance of having a food source available for the biology being applied. Whether you use a pre-mix or additive product, feeding the biology results in a higher chance for a yield increase.

Price Information:

Corn	**$5.69/bu**
BioRed™ IF	$185.60/gal
BioMate™	$48.00/gal
Regulator 3.0	$80.00/gal
eXceed™ Nano Brown Sugar	$32.00/gal
CarbonWorks RSTC 17®	$74.00/gal

2x2x2 Additive Study

Purpose:

To evaluate additive products to the 2x2x2 system to improve nitrogen use and yield.

2x2x2 Treatment	Percent Moisture	bu./ac.	bu./ac. Difference	ROI
Control: 60 Units UAN 28%	18.5	244.6	N/A	N/A
Control + 5 oz. CetaiN®	18.6	251.0	+ 6.4	+ $33.53
Control + 16 oz. Humika™	18.6	247.5	+ 2.9	+ $9.63

(Individual results may vary.)

Observation:

Using carbon to enhance a nitrogen application at any timing has shown time and time again in our research to be a safe bet for a positive return on investment.

Price Information:

Corn	**$5.69/bu**
CetaiN®	$74.00/gal
Humika™	$55.00/gal

Xylem Plus Trials

Purpose:

To evaluate various timings and rates of Xylem Plus and its impacts on plant health and ROI.

Project Partner:

Ag Performance

Corn after Corn Treatment	Percent Moisture	bu./ac.	bu./ac. Difference	ROI
Control	20.7	174.4	N/A	N/A
32 oz. Xylem Plus In-Furrow	20.8	178.8	+ 4.4	+ $12.29
32 oz. Xylem Plus @ V3	20.6	178.9	+ 4.5	+ $12.86
32 oz. Xylem Plus @ V3 & 32 oz. Xylem Plus + 8 oz. Delaro® @ VT-R1	20.2	178.0	+ 3.6	- $24.20
32 oz. Xylem Plus + 8 oz. Delaro® @ VT-R1	20.8	179.9	+ 5.5	- $0.63
8 oz. Delaro® @ VT-R1	21.0	178.5	+ 4.1	+ $4.15

Corn after Soybeans Treatment	Percent Moisture	bu./ac.	bu./ac. Difference	ROI
Control	21.0	177.3	N/A	N/A
32 oz. Xylem Plus In-Furrow	21.2	182.7	+ 5.4	+ $17.98
32 oz. Xylem Plus @ V3	22.0	192.7	+ 15.4	+ $74.88
24 oz. Xylem Plus In-Furrow & 24 oz. Xylem Plus + 8 oz. Delaro® @ VT-R1	21.4	189.3	+ 12.0	+ $29.98
24 oz. Xylem Plus @ V3 & 24 oz. Xylem Plus + 8 oz. Delaro® @ VT-R1	21.8	192.2	+ 14.9	+ $46.47
8 oz. Delaro® @ VT-R1	21.7	192.9	+ 15.6	+ $69.58

(Individual results may vary.)

Observation:

Our second year of research with the product Xylem Plus has again proved it to be a great option for disease control that can be applied early in the season for season-long protection and a profitable alternative to a late season application of fungicide.

Price Information:

Corn	**$5.69/bu**
Xylem Plus	$51.00/gal
Delaro®	$307.01/gal

Purpose:

To evaluate the effects on plant growth, recovery time, and ROI when applying products before a frost event on V3 corn.

Treatment	Percent Moisture	bu./ac.	Compared to No Frost: bu./ac. Difference	Compared to V3 Frost Event: bu./ac. Difference	Compared to V3 Frost Event: ROI
Control	15.7	186.3	N/A	N/A	N/A
Frost @ V3	15.7	180.0	- 6.3	N/A	N/A
Spray 32 oz. UptaKe™ 3 days before Frost @ V3	15.8	185.3	- 1.0	+ 5.3	+ $23.16
Spray 32 oz. Copper 7.5 3 days before Frost @ V3	15.8	186.8	+ 0.5	+ 6.8	+ $27.94
Spray 32 oz. UptaKe™ 1 day before Frost @ V3	15.9	191.7	+ 5.4	+ 11.7	+ $59.57
Spray 32 oz. Copper 7.5 1 day before Frost @ V3	15.9	183.5	- 2.8	+ 3.5	+ $9.17

Treatment	Percent Moisture	bu./ac.	bu./ac. Difference	ROI
Control	15.7	186.3	N/A	N/A
32 oz. UptaKe™ @ V3	15.7	197.5	+ 11.2	+ $56.73
32 oz. Copper 7.5 @ V3	15.8	191.3	+ 5.0	+ $17.70

(Individual results may vary.)

Observation:

After our first year of looking into proactive solutions to a frost event on corn, the results showed positive returns which prompted the second year of this study. We took two different products, one potassium and one copper, that have shown positive results outside of a frost event (see data chart 2) and applied them foliar just ahead of a simulated frost to see if they provided a proactive solution to fending off the negative affects of frost. The frosted corn data results are like last year in that applying the product before the simulated frost helped the plant mitigate the stress associated with it and in turn created a positive yield increase. One thing to keep in mind in both studies is as many growers this year including the research farm, experienced dry conditions, this may have added to the high yield increase in these products as they helped the plant mitigate drought stress as well.

Price Information:

Corn	$5.69/bu
Uptake™ (0-0-29)	$28.00/gal
Copper 7.5 (7-0-0-7.5Cu)	$43.00/gal

Nitrogen Additive Study: Coulter Applied

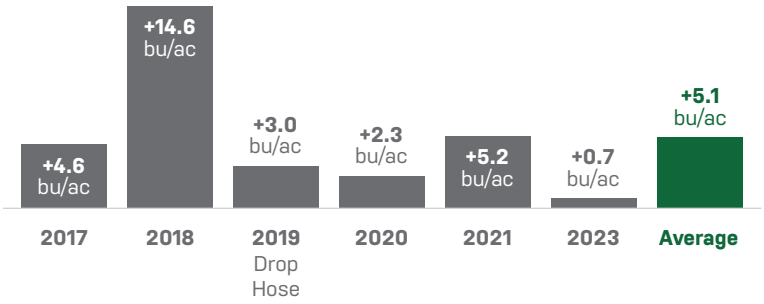
Purpose:

To evaluate the addition of nitrogen additive to UAN 28% and how each impacts plant health, yield, and ROI.

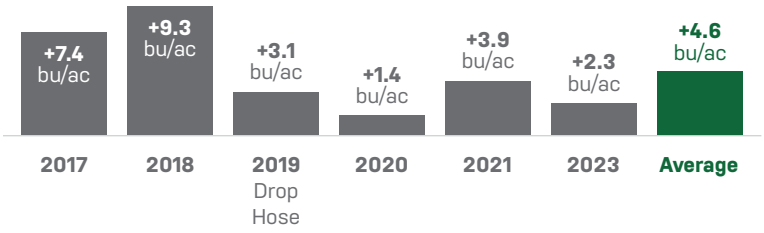
V3 Treatment	Percent Moisture	bu./ac.	bu./ac. Difference	ROI
Control: 20 gal. UAN 28%	17.3	186.0	N/A	N/A
Control + 6 oz. CarbonWorks CetaiN®	17.8	186.7	+ 0.7	+ $0.51
Control + 16 oz. Humika™	17.3	188.3	+ 2.3	+ $6.21
Control + 6 oz. NZONE Max™	18.0	187.5	+ 1.5	+ $3.46

(Individual results may vary.)

6-Year Average Yield Increase with CarbonWorks CetaiN®



6-Year Average Yield Increase with Humika™



Observation:

On a dry growing season it can be hard to see a yield increase from a side dress application with a coulter, due to the limit of nitrogen movement with water when water is limited. Having a nitrogen enhancement product mixed in the application helps to keep nitrogen ready to be used when we did receive rain throughout the growing season.

Price Information:

Corn	**$5.69 /bu**
CarbonWorks CetaiN®	$74.00/gal
Humika™	$55.00/gal
NZONE Max™	$108.50/gal

Foliar Nozzle Spacing Study

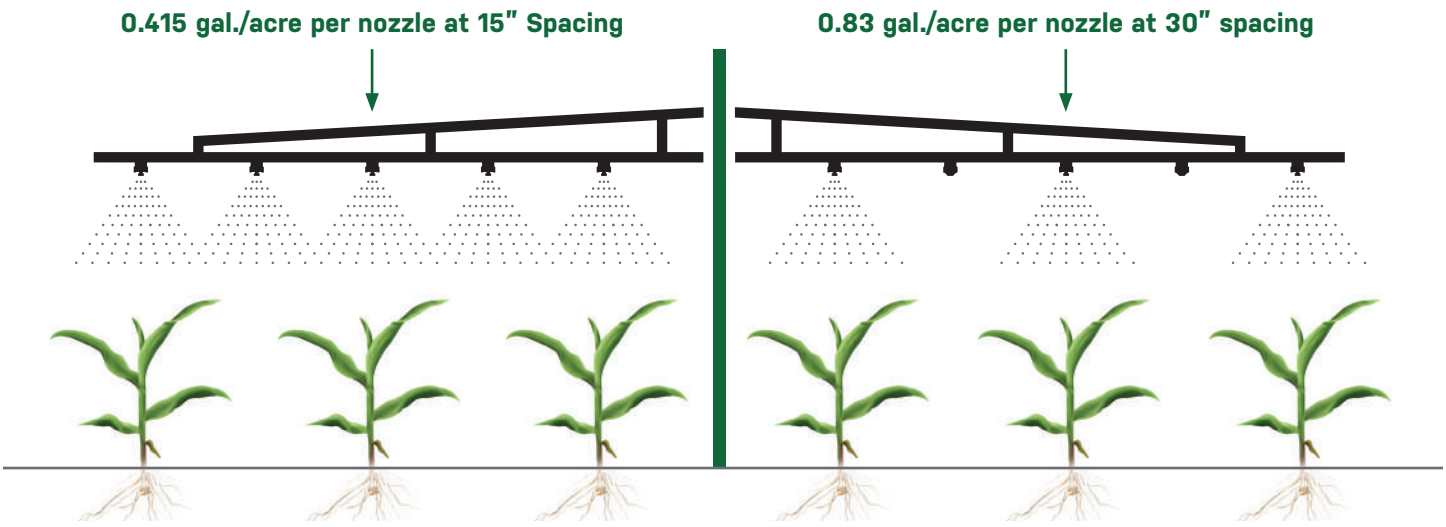
Purpose:

To evaluate the placement of a foliar application and its impact on yield and ROI.

V4 Treatment: 32 oz. MicroBoost + 32 oz. BioGreen	Percent Moisture	bu./ac.	bu./ac. Difference	ROI
Control: No Foliar Application	16.9	169.2	N/A	N/A
Foliar sprayed through all nozzles (15-in. spacing)	16.5	172.3	+ 3.1	+ $5.64
Foliar sprayed through every other nozzle (30-in. spacing)	16.8	173.9	+ 4.7	+ $14.74

(Individual results may vary.)

60-foot boom 20 gal./Acre



Observation:

We conducted this study on soybeans in 2020 and saw good results from concentrating foliar applications to the plant row instead of a blanket application. Considering advancements in precision sprayer technology including nozzle spacing and individual nozzle control, we decided to bring this study back on both corn and soybeans to test products and the ability to increase ROI through intentional application.

Price Information:

Corn	**$5.69/bu**
MicroBoost	$16.00/gal
BioGreen	$32.00/gal

Foliar Study

Purpose:

To evaluate the impacts of foliar products on plant health, yield, and ROI.

V4 Treatment	Percent Moisture	bu./ac.	bu./ac. Difference	ROI
Control: No Additional Treatments	19.5	160.4	N/A	N/A
16 oz. eXceed™ Nano Brown Sugar	19.6	162.8	+ 2.4	+ $9.66
16 oz. eXceed™ Nano Brown Sugar + 32 oz. BioGreen	19.6	164.3	+ 3.9	+ $10.19
32 oz. MicroBoost + 32 oz. BioGreen	19.7	163.1	+ 2.7	+ $3.36
32 oz. MicroBoost	19.7	163.0	+ 2.6	+ $10.79

(Individual results may vary.)

Observation:

Early season foliar products helped to push plants through the first wave of drought stress they endured after application. Good growing conditions around the time of application gave the crop a yield bump.

Price Information:

Corn	**$5.69/bu**
eXceed™ Nano Brown Sugar	$32.00/gal
BioGreen	$32.00/gal
MicroBoost	$16.00/gal

Tillage Program Study

Purpose:

To evaluate a variety of tillage program and how each program impacts plant health, soil structure and overall yield.

Project Partners:

SUMMERS

Great Plains "Harvest Starts Here."

Tillage Program	Percent Moisture	bu./ac.	bu./ac. Difference
No Till	9.5	54.1	N/A
Fall Strip Till	9.6	57.2	+ 3.1
AgRevival Conventional Tillage Program (Fall Disc Rip, Spring Field Cultivator)	9.7	54.4	+ 0.3
Great Plains Vertical Tillage Program (Fall Max-Chisel®, Spring Turbo-Max®)	9.8	57.8	+ 3.7
Summers MFG Vertical Tillage Program (Fall and Spring VRT Renegade®)	10.0	58.3	+ 4.2

(Individual results may vary.)

Observation:

As we mentioned on the corn Tillage Study page, there aren't a lot of conclusions we want to jump to after one year of data. However, we'd like to lay out more of the study's design and the objectives we will be looking at as we continue. This trial combines both corn and soybean blocks and covers approximately 12 acres. We will be rotating these blocks each year. The no-till block will be no-till for three years and the Summers program will be in the same area for all three years, etc. We wanted to keep these blocks treated the same year after year to take a look at multi-year pros and cons. After three years of data, we hope to be able to look at weather and soil conditions and be able to determine which tools work or don't work for various conditions.

Price Information:

Soybeans	**$13.39/bu**

Residue Management Study

Purpose:

To evaluate a biological residue management product applied pre-emergence and how it impacts residue breakdown and ROI.

Project Partner:

DakotaBIO THE BIOLOGICAL COMPANY

Pre-Emergence Treatment	Percent Moisture	bu./ac.	bu./ac. Difference	ROI
Control	11.6	53.1	N/A	N/A
12.8 oz. DB32	11.7	54.6	+ 1.5	+ $3.21

(Individual results may vary.)

Observation:

When using biological products, a lack of moisture limits the benefit of these products to the growing plants. As we know all living organisms need 3 things to survive: oxygen, water, and food. This year, the limited moisture at some of our research farms showed in the performance of various products.

Price Information:

Soybeans	**$13.39/bu**
DB32	$16.88/ac

Tire PSI Compaction Study

Purpose:

To evaluate plant health, root structure, emergence, and yield when operating equipment at various tire PSI.

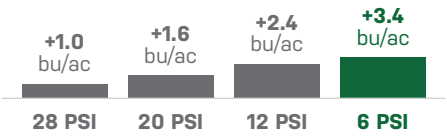
Project Partner:

NTS TIRE SUPPLY

Treatment	Percent Moisture	bu./ac.	bu./ac. Difference
35 PSI Front Tires & 35 PSI Rear Tires & 35 PSI Planter Tires	9.4	57.1	N/A
28 PSI Front Tires & 28 PSI Rear Tires & 28 PSI Planter Tires	9.3	57.8	+ 0.7
20 PSI Front Tires & 20 PSI Rear Tires & 20 PSI Planter Tires	9.3	58.5	+ 1.4
12 PSI Front Tires & 12 PSI Rear Tires & 12 PSI Planter Tires	9.3	59.9	+ 2.8
6 PSI Front Tires & 6 PSI Rear Tires & 6 PSI Planter Tires	9.3	60.6	+ 3.5

(Individual results may vary.)

3-Year Bushel Increase Average



Observation:

Finding the correct tire pressure to run in both the tractor and planter tires has shown over the last three years to be a positive yield increase, whether dropping 7 pounds of pressure to over 25 pounds of pressure. Having proper PSI your tires (for the weight they are carrying) not only helps with tire wear, but also helps maximize other benefits. These benefits include better traction, thanks to more lugs in contact with the ground. We recommend going with a VF or IF tire, which are meant to be used at lower pressure. Whether you are in the market for new tires or not, a thing to note from our tire PSI research is that it takes intention to identify the proper PSI, and the results of doing so are worth the invested time. Be sure to contact a tire specialist at NTS Tire Supply to find the right tire and PSI configuration for your operation.

Price Information:

Soybeans	**$13.39/bu**

Tire PSI Compaction Study: Static Planter Tires

Purpose:

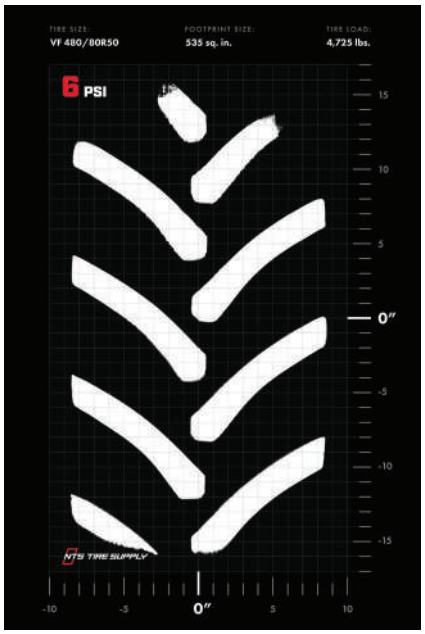
To evaluate plant health, root structure, emergence, and yield when adjusting the planter tractor tires but leaving the planter tires at a consistent PSI.

Project Partner:

NTS TIRE SUPPLY

Treatment	Percent Moisture	bu./ac.	bu./ac. Difference
35 PSI Front Tires & 35 PSI Rear Tires & 30 PSI Planter Tires	9.7	61.2	N/A
28 PSI Front Tires & 28 PSI Rear Tires & 30 PSI Planter Tires	9.7	61.8	+ 0.6
20 PSI Front Tires & 20 PSI Rear Tires & 30 PSI Planter Tires	9.6	60.5	- 0.7
12 PSI Front Tires & 12 PSI Rear Tires & 30 PSI Planter Tires	9.6	61.6	+ 0.4
6 PSI Front Tires & 6 PSI Rear Tires & 30 PSI Planter Tires	9.6	59.6	- 1.6

(Individual results may vary.)



35 PSI

6 PSI

Observation:

Unlike the corn study, where we left the tire pressure on the planter at 30 PSI for all treatments, we are seeing variable results in the soybean study. We have observed a higher response to lower PSI in the corn research. However, the three-year soybean data has seen a consistent response as we drop pressure in all tires on the planter pass. The variable increase and decrease of yield across all treatments in this study might point to the importance of optimizing PSI in all tires in the planter pass. Keeping the planter tires higher when dropping the tractor tires is essentially erasing the benefits of less compaction from the tractor.

Price Information:

Soybeans	**$13.39/bu**

Planting Time After Spring Tillage Study

Purpose:

To evaluate the yield impacts on planting directly after spring tillage or waiting for the soil to dry and warm one day before planting.

Planting Date (Field was worked on May 22nd)	Percent Moisture	bu./ac.	bu./ac. Difference
May 22nd	9.3	67.9	N/A
May 23rd	9.3	65.7	- 2.2

(Individual results may vary.)

Observation:

Our first year looking at planting time after spring tillage for soybeans has gave us opposite results in what we have seen in the 2-year data in the same study on corn. Here's one potential explanation: The soybeans, planted shallower than corn, may have run into more dry soil due to waiting a day. Follow along with this study for the coming years to see if this trend continues.

Price Information:

Soybeans	**$13.39/bu**

Talc Study

Purpose:

To evaluate talc replacement products available on the market compared to a standard 80% talc and 20% graphite blend.

Planter Box Treatment	Percent Moisture	bu./ac.	bu./ac. Difference	ROI
Control: Standard Talc 80/20	10.2	61.3	N/A	N/A
0.5 oz./unit DUST™	10.2	61.9	+ 0.6	+ $7.76
0.5 oz./unit DUST™ + B4	10.1	63.5	+ 1.2	+ $9.07
0.5 oz./unit DUST™ + Terrasym 401	10.2	61.8	+ 0.5	- $0.06

(Individual results may vary.)

Observation:

This year we tested two additional formulations of the original DUST™ product. Both of these products add beneficial microbes and biology to the DUST™ product as the carrier. Adding these microbes to the planter box treatment gives an opportunity to use the in-furrow system to add a carbon or sugar source to feed the soil biology and increase nutrient uptake in the plant.

Price Information:

Soybeans	**$13.39/bu**
DUST™	$0.27/unit
DUST™ + B4	$7.00/unit
DUST™ + Terrasym 401	$6.75/unit

2x2x2 Study

Purpose:

To evaluate the use of products with nitrogen, phosphorus, and potassium and how they impact return on investment.

2x2x2 Treatment	Percent Moisture	bu./ac.	bu./ac. Difference	ROI
Control	11.7	45.3	N/A	N/A
5 lbs. N-Rich 20-14-12-6 applied 2x2x2	11.6	47.2	+ 1.9	+ $16.69
3 gal. ATS applied 2x2x2	11.6	46.2	+ 0.9	+ $4.55
3 gal. ATS + 1 oz. CarbonWorks CetaiN® 2x2x2	11.6	45.5	+ 0.2	- $5.40
5 lbs. N-Rich 20-14-12-6 applied IF	11.7	46.9	+ 1.6	+ $12.67

(Individual results may vary.)

Observation:

N-Rich is a new product we tested this year, which is a water-soluble concentrated fertilizer. This low-salt and low-cost-per-acre investment helps to provide key nutrients in the root zone to be used when the plant needs them. Both 2x2x2 and in-furrow applications provided a great return on investment for soybeans this year.

Price Information:

Soybeans	**$13.39/bu**
N-Rich 20-14-12-6S	$1.75/lb
ATS 12-0-0-26S	$2.50/gal
CarbonWorks CetaiN®	$74.00/gal

In-Furrow Biological Additive Study

Purpose:

To evaluate additive products added to a biological product and how these impact ROI.

In-Furrow Treatment	Percent Moisture	bu./ac.	bu./ac. Difference	ROI
Control: No biological	10.1	42.5	N/A	N/A
10 oz. BioMate™	10.1	43.1	+ 0.7	+ $5.62
10 oz. BioRed™ IF	10.1	45.0	+ 2.6	+ $20.31
10 oz. BioRed™ IF + 1.2 oz. Regulator 3.0	10.1	43.8	+ 1.4	+ $3.50
10 oz. BioRed™ IF + 8 oz. eXceed™ Nano Brown Sugar	10.1	42.7	+ 0.2	- $13.82
10 oz. BioRed™ IF + 16 oz. CarbonWorks RSTC 17®	10.2	42.6	+ 0.2	- $21.07

(Individual results may vary.)

Observation:

BioRed IF on its own had the highest yield increase and ROI this year. Adding carbon, sugar, and oxygen to the biological helps it become energized in the soil with everything it needs to thrive. When one of the biological's lifelines (in this case moisture) is taken away, like we had over this growing season, the biological tends to struggle in the soil. In our opinion, when you give a biological a lot of energy and food right away, it works hard early in the season, but when a drought hits, it can't survive. On the other hand, a biological on its own has to find its own energy source and is more likely in better shape if/when drought conditions arrive and it will survive for a longer period of time. This in turn helps to generate the highest yield increase.

Price Information:

Soybeans	**$13.39/bu**
BioMate™	$48.00/gal
BioRed™ IF	$185.60/gal
Regulator 3.0	$80.00/gal
eXceed™ Nano Brown Sugar	$32.00/gal
CarbonWorks RSTC17®	$74.00/gal

Starter Placement Study

Purpose:

To evaluate the placement of a carbon and sugar source placed in-furrow and its impacts on germination and ROI.

Treatment	Percent Moisture	bu./ac.	bu./ac. Difference	ROI
Control: No additional treatments	10.0	40.5	N/A	N/A
24 oz. CarbonWorks RSTC 17® + 16 oz. eXceed™ Nano Brown Sugar applied in-furrow under the seed	10.1	41.1	+ 0.7	- $8.50
24 oz. CarbonWorks RSTC 17® + 16 oz. eXceed™ Nano Brown Sugar applied in-furrow on top of seed	10.1	42.0	+ 1.5	+ $2.21

(Individual results may vary.)

Observation:

This new study looks at the placement of the in-furrow solution in relation to the seed. With the addition of a second planter to the research fleet with an in-furrow system that placed the liquid on top of the seed (versus a total tubular system on our other planter) we saw a difference between the same product planted with different planters. After further thought, we decided to test this theory by adding an additional tube on top of the seed tube with a valve to switch from over the seed to under the seed. By doing this, we are eliminating all variables as every thing is the same except *where* the liquid is placed in relation to the seed. First year results in both corn and soybeans suggest that some products are going to work better over the seed then under.

Price Information:

Soybeans	**$13.39/bu**
CarbonWorks RSTC 17®	$74.00/gal
eXceed™ Nano Brown Sugar	$32.00/gal

Land Roller Study

Purpose:

To evaluate the use of a land roller on soybeans planted at different populations and rolled at different times and how this impacts yield.

Project Partner:

MANDAKO

Treatment	Planted Population	Percent Moisture	bu./ac.	bu./ac. Difference	3 yr. Avg. bu./ac. Difference
Control: No Land Roller	100,000	9.9	38.4	N/A	N/A
Mechanical Roll Pre-Emerge	100,000	9.9	41.3	+ 2.9	+ 2.3
Mechanical Roll at V1	100,000	9.9	38.8	+ 0.4	+ 0.3
Control: No Land Roller	115,000	9.9	39.5	N/A	N/A
Mechanical Roll Pre-Emerge	115,000	9.9	41.0	+ 1.5	+ 1.3
Mechanical Roll at V1	115,000	9.9	39.3	- 0.2	- 0.1
Control: No Land Roller	130,000	9.9	39.9	N/A	N/A
Mechanical Roll Pre-Emerge	130,000	9.9	43.3	+ 3.5	+ 2.6
Mechanical Roll at V1	130,000	9.8	40.8	+ 0.9	+ 0.4

(Individual results may vary.)

3-Year Average (All Populations)

Observation:

The third and final year of this study has provided us with a great data set that relates to the goal of this study. The best time to roll soybeans is pre-emerge after the planter pass, no matter the population. If this can't be accomplished due to conditions or work load, it is safe to wait until V1 and choose a warm day where plants will be more likely to bend instead of snap. Overall population isn't of concern due to the ability of soybeans to branch to fill voids. However, anything less then 100,000 may run into a situation where your population should be thickened before rolling to increase plants per acre. Lastly, remember the other benefit of rolling: to push rocks or root balls into the ground that will make for a smoother ride for the combine head and a better chance for low pods to make it into the combine.

Price Information:

Soybeans	**$13.39/bu**

Xylem Plus Program Trial

Purpose:

To evaluate the product Xylem Plus at different rates and timings and its impacts on disease suppression, plant health, and ROI.

Treatment	Percent Moisture	bu./ac.	bu./ac. Difference	ROI
Control	11.95	42.0	N/A	N/A
32 oz. Xylem Plus In-Furrow	11.975	44.1	+ 2.1	+ $15.37
32 oz. Xylem Plus @ R1	12.125	43.6	+ 1.6	+ $8.67
24 oz. Xylem Plus @ V3 & 24 oz. Xylem Plus + 5 oz. Lucento® @ R1	11.975	45.2	+ 3.2	+ $0.07
24 oz. Xylem Plus @ First Bloom & 24 oz. Xylem Plus + 5 oz. Lucento® @ R1	11.975	44.3	+ 2.3	- $11.98
32 oz. Xylem Plus In-Furrow & 32 oz. Xylem Plus + 5 oz. Lucento® @ R1	11.95	44.0	+ 2.0	- $22.37
32 oz. Xylem Plus + 5 oz. Lucento® @ R1	11.9	44.7	+ 2.7	- $0.25
5 oz. Lucento® @ R3	11.9	44.0	+ 2.0	+ $3.13

(Individual results may vary.)

Observation:

Xylem Plus is a systemic fungicide that controls a range of diseases in soybeans. Having a systemic product in the plant before stress or disease attacks is important to the performance of any product. Early applications this year, such as in-furrow and V3 applications, had the best plant response due do the product being in the plant before both drought stress and late-season disease pressure.

Price Information:

Soybeans	**$13.39/bu**
Xylem Plus	$51.00/gal
Lucento	$605.42/gal

AMS Study

Purpose:

To evaluate water conditioning products when applying Liberty and Roundup and how each impacts weed kill and yield.

Treatment	Percent Moisture	bu./ac.	bu./ac. Difference	ROI
Control: 3 lbs. AMS	9.7	51.9	N/A	N/A
3 lbs. AMS + 1.6 oz. Regulator 3.0	9.6	52.7	+ 0.8	+ $9.71
1 gal. Precinct™	9.7	53.2	+ 1.3	+ $4.76

(Individual results may vary.)

Observation:

We are seeing similar benefits on year two of this study when adding a carbon source to AMS or using a alternative liquid AMS product when applying glyphosate and glufosinate.

2-Year Bushel Increase Average

Price Information:

Soybeans	**$13.39/bu**
AMS	$0.45/lb
Regulator 3.0	$80.00/gal
Precinct™	$14.00/gal

Foliar Nozzle Spacing Study

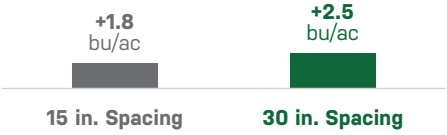
Purpose:

To evaluate the placement of a foliar application and its impact on yield and ROI.

R3 Treatment: 13.7 oz. Trivapro® + 16 oz. eXceed™ Nano Brown Sugar	Percent Moisture	bu./ac.	bu./ac. Difference	ROI
Control: No Foliar Application	10.9	43.4	N/A	N/A
Foliar sprayed through all nozzles (15 in. spacing)	10.9	46.5	+ 3.0	+ $14.56
Foliar sprayed through every other nozzle placed above the row (30 in. spacing)	11.0	47.1	+ 3.6	+ $22.59

(Individual results may vary.)

2-Year Bushel Increase Average



Observation:

We know, from previous years of research, that dew on leaves can help make a fungicide pass more profitable. However, can only spraying the solution over top of the row have the same effect by increasing carrier rate? Two years of this study is suggesting a better result from focusing the solution onto the plant rather a blanket approach.

Price Information:

Soybeans	**$13.39/bu**
Trivapro®	$201.96/gal
eXceed™ Nano Brown Sugar	$32.00/gal

Foliar Study

Purpose:

To evaluate products applied foliar and the impacts on plant health and yield.

V4 Treatment	Percent Moisture	bu./ac.	bu./ac. Difference	ROI
Control: No Additional Treatments	11.3	48.2	N/A	N/A
16 oz. eXceed™ Nano Brown Sugar	11.2	49.4	+ 1.2	+ $12.07
16 oz. eXceed™ Nano Brown Sugar + 32 oz. BioGreen	11.2	49.5	+ 1.3	+ $5.41
32 oz. MicroBoost + 32 oz. BioGreen	11.2	49.2	+ 1.0	+ $1.39
32 oz. MicroBoost	11.2	49.7	+ 1.5	+ $16.09

(Individual results may vary.)

Observation:

This year, we have two new products in the foliar study: BioGreen and MicroBoost. MicroBoost is a blend of sugars and proteins; BioGreen is a biological product that aids in nutrient stabilization. In year one, we saw a yield increase similar to what we've seen with eXceed™ Nano Brown Sugar in the past, which is a sugar that has delivered great results.

Price Information:

Soybeans	**$13.39/bu**
eXceed™ Nano Brown Sugar	$32.00/gal
BioGreen	$32.00/gal
MicroBoost	$16.00/gal

Fungicide and Insecticide Study

Purpose:

To evaluate the addition of sugar and insecticide to a already planned fungicide application and if the addition will provide more plant health and a higher ROI.

R3 Treatment	Percent Moisture	bu./ac.	bu./ac. Difference	ROI
Control: No Fungicide	9.8	60.5	N/A	N/A
5 oz. Lucento®	9.9	65.4	+ 4.9	+ $41.96
5 oz. Lucento® + 3.2 oz. Mustang® Maxx	9.9	65.7	+ 5.2	+ $41.59
5 oz. Lucento® + 3.2 oz. Mustang® Maxx + 16 oz. eXceed™ Nano Brown Sugar	9.8	68.1	+ 7.5	+ $68.40

Control: No Fungicide	9.8	60.5	N/A	N/A
13.7 oz. Trivapro®	9.8	65.1	+ 4.6	+ $39.97
13.7 oz. Trivapro® + 16 oz. eXceed™ Nano Brown Sugar	9.8	67.1	+ 6.5	+ $61.42

(Individual results may vary.)

BONUS STUDY

Soybean Sugar Study

Observation:

If you're applying a fungicide, do you need to apply a sugar and/or insecticide when the fungicide is protecting the plant? Often, when it comes to insecticide, people will "throw" it in the mix since they are already making the fungicide pass. Sometimes, this insecticide is not necessary (if you don't have pests causing damage). The addition of sugar to the tank mix adds multiple benefits to the plant and the bugs around the plants. Looking at this first-year data, we would say to be sure the sugar is in the tank mix. And, if the insects or pests you are targeting are at or above economic threshold, then include an insecticide.

Price Information:

Soybeans	**$13.39/bu**
Lucento®	$605.42/gal
Mustang® Maxx	$175.48/gal
Trivapro®	$201.96/gal
eXceed™ Nano Brown Sugar	$32.00/gal

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