Graves-Chapple Research Center

2016 Annual Report

Northwest Missouri Demonstration Site

http://graveschapple.cafnr.org/

Graves-Chapple Research Center
University of Missouri

UNIVERSITY OF MISSOURI Extension

Acknowledgements

The Graves-Chapple Research Center is a University of Missouri research and demonstration site located in southwest Atchison County. Graves-Chapple East is located on the east side of I-29 at the foot of the bluffs. Graves-Chapple Heitman Farm is on the west side of I-29 adjacent to State Highway 111.

The site was established in 1988 as a collaborative effort between Atchison County MU Extension, Holt County MU Extension, the University of Missouri's Agricultural Experiment Station, local agribusinesses and local producers. Primary funding is provided by University of Missouri Extension and the Agricultural Experiment Station.

Projects at this site are devoted to various agronomic practices, with a major emphasis on the production of corn and soybeans. Work with forages, other row crops and alternative crops is also conducted. This site is somewhat unique in the state due to the soil types and the predominance of no-till planting techniques. Soil conservation and water quality issues are also addressed. The farm strives to perfect practices that will maintain or increase the profitability for area crop producers.

Acknowledgements

We appreciate the time and effort of the advisory committee that guides the work at this site.

Atchison County

Steve Klute - Chairman
Russell Herron - Vice Chair
Phil Graves
Jason Garst

Holt County

John Dudek - Secretary
Greg Biermann
Greg Hall
Morris Heitman

Andrew County

Dick Townsend

Nodaway County

Jason Hull

We want to thank the following people who have helped in so many ways throughout the year. A special thanks go to CAFNR Deans Tom Payne and Marc Linit, Director of Field Operations Tim Reinbott and University of Missouri Extension Northwest Regional Director Karma Metzgar for their continuing support of Graves-Chapple Research Center.

Janet Nauman	Marilyn Graves	Morris Heitman	Bruce Burdick
Larry Hecker	Jay McCoy	Dean Adkins	Liz Klute
Rick Breedlove	Donna Thomas	Rhonda Turner	Mike Herron
Robert Gibson	Bill Heitman	Linda Herron	Peggy Ingram

Regional MU Extension Faculty using the center:

Jim Crawford - Natural Resource Engineering Specialist
Amie Schleicher - Livestock Specialist
Shawn Deering - Livestock Specialist
Jim Humphery - Livestock Specialist
Wayne Flanary - Agronomy Specialist
Bob Kelly - Ag Business Specialist
Tom Fowler - Horticulture
Randa Doty - Ag Business Specialist

Next Field Day - August 22, 2017

From the Faculty and Staff

Graves-Chapple Research Center
University of Missouri

Over the past 10 years, the faculty and staff at the Graves-Chapple Research Center have added more research and demonstration projects to the mix. The result is we have had to turn down several projects due to a lack of space. With the generous assistance of our landlords we were able to add 120 acres to the center in 2016. An added benefit was the land was contiguous to land already leased by the center.

When the center was first started in 1988, the goal was to demonstrate the viability of no-till farming practices in northwest Missouri. To help express their confidence in the system, all trials and demonstrations at the center were conducted using no-till, a practice that continues to this day.

One of the new production practices being discussed is the use of cover crops. After several years of literature review and limited demonstrations at the center, we decided in 2014 that the benefits of cover crops are tangible and offer an opportunity to help producers increase their bottom line. However, there are still many more questions than answers about incorporating cover crops into a farming operation.

To help answer these questions, the center is broadening its research and demonstrations on cover crops. The additional acres we have leased will allow more research and demonstrations into cover crops be conducted. Methods of sowing the cover crops, fertility, and herbicide programs can all be addressed on a larger scale. We feel this commitment to cover crops will allow local producers to decided how and what types of cover crops best fit their production system.

The Graves-Chapple Research Center is here to provide research-based information to area producers under local conditions. Whether it is floods, drought, insect pressure, resistant weeds or new technologies, our goal is to trial and demonstrate products and techniques to increase profitability for producers in this region. This report includes some of these results.

Visitors are always welcome whether you are attending a field day, special tour, meeting, or just passing through the area. We are pleased that you have picked up this copy of the annual report. The information in this report is a brief overview of some of the current research and demonstrations at the farm and we hope that you find the information beneficial to your operation.

If you are not on our mailing list or email list for flyers or meetings and would like to be, please let us know. We encourage you to ask questions. You are the reason this center exists and sometimes your questions or suggestions lead to an entire experiment or demonstration that benefits many people.

We would also like to thank the members of our advisory board for their support and guidance. Their time and efforts are greatly appreciated.

Jim Crawford
Superintendent

Wayne Flanary
Agronomist

Center Supporters

We would like to thank the following companies and individuals for their contributions to this year's work. Their assistance is greatly appreciated.

AC Bins
Ag Choice, Rock Port
AgriGold Hybrids
Atchison County Mail
Atchison County MU Extension Council
Atchison-Holt Electric Cooperative
Bayer Crop Science
Best Seeds
Burrus Power Hybrids
Citizens Bank & Trust, Rock Port
Craig Grain
Cunningham Farms, Inc.
Danny Burke
Derr Equipment, Savannah
Doug Garrison
Lois Dodd Trust
Exchange Bank of Fairfax
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Farmers State Bank, Fairfax
Farmers State Bank, Maitland
Farmers State Bank, Mound City
Farmers State Bank, Tarkio
Farmers Supply Ag Service,
FCS Financial
Gavilon
Grebe Farm & Home
Hoegemeyer Hybrids
Holt County MU Extension Council
Ingredion
Kelly's Welding and Repair
Kent Fisher Insurance
KMA Radio
Lance Seed
LG Seeds
Larry Hecker
Linda Herron
Mark Buntz, Pioneer Seed
McCoy Repair
MFA Fairfax
MFA Incorporated
Mike Herron
Missouri Corn Growers Association
Missouri Soybean Merchandising Council
Missouri Valley Tractor Club
Monsanto
MO Valley Ag
Morning Sun Seed
Morris Heitman
Mycogen Seeds
Nodaway Valley Bank, Mound City
Northwest Fertilizer
Phil Graves
Pioneer Hybrids
Producers Hybrids
River Valley Ag
Robert Gibson
Rock Port Oil
Rock Port Rotary
Scheib Drainage
Scott Milne Pioneer Seed, Oregon
Simmons MFA
St. Joseph News-Press
Sur-Gro, Savannah
Sur-Gro, Forest City
Syngenta
Tarkio Co-op
Taylor Seed Farms
Weber Seeds Inc.
Yocum Fertilizer

Tillage Systems in Corn

Introduction

The objective of this demonstration is to evaluate the effect of different tillage systems on corn yields and on the profitability of the enterprise. This is the 26th year for this demonstration.

Methods and Materials

The four most common tillage systems practiced in this region were used for this demonstration. The tillage systems used were:

Fall and spring disk
Spring disk
No-till
Fall chisel and spring disk

Each plot consisted of eight 30 inch rows that were 250 feet long. Yield results were taken from the center four rows of each plot. The plots were planted on May 7, 2016 with a population of 32,401 seeds per acre into a field that raised soybeans in 2015. Harvest was conducted on October 20, 2016.

Results and Discussion

History has shown that if the fall and spring experience prolonged periods of excessive moisture that the fall and spring disked plots will have increased yield. These were the conditions experienced in 2016. The light turning of the soil promotes drying and helps prevent the crop from having wet feet. The downside is if the summer turns dry, that lost soil moisture will significantly reduce yields.

In 2016, the fall and spring disk plot had the highest yield with 213.4 bu/acre. The lowest yielding system was the fall chisel/ spring disked plot which yielded 200.8 bu/ acre. The average for the four systems was 205.2 bu/acre with a standard deviation of 5.6 bu/acre. Yield results for all four tillage systems are shown in Table 1 and Figure 1.

Corn tillage system	Harvest moisture %	Yield at 15.5% moisture bu/acre
Fall and spring disk	16.0	213.4
Spring disk	16.3	202.8
No-till	16.1	203.6
Fall chisel/spring disk	16.1	200.8
Trial averages	**16.1**	**205.2**
Standard deviation		**5.6**

Table 1 - 2016 Corn tillage systems yield results.

The best comparison can be made by looking at the cumulative results of the study as shown in Figure 2. This long term collection of data allows the weather variable to be minimized since we have had greatly varying weather patterns during this time period. During this 26-year period, the spring disk system had the highest average at 180.3 bu/acre. The fall chisel and spring disk treatment had the lowest average of 174.9 bu/ acre. With a standard deviation of only 2.7 bu/acre over this period, there is no significant difference between the yields of all four tillage systems.

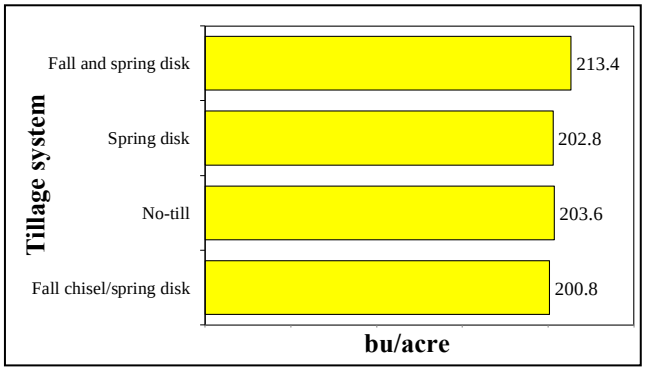

Figure 1 - 2016 Corn tillage systems yield results.

The most important aspect of the tillage trials is the net bottom line. The application of fertilizer, herbicides, seed, planting and harvesting were identical for each of the tillage systems used. Thus, the economic

Corn tillage system	26-year yield ave. bu/acre	Gross income @ $3.50/bu	Tillage costs $/acre	Gross income less tillage costs $/acre
Fall and spring disk	175.4	$613.89	$31.50	$582.39
Spring disk	180.3	$630.89	$14.65	$616.24
No-till	179.0	$626.44	$0.00	$626.44
Fall chisel/spring disk	174.9	$612.02	$32.60	$579.42

Table 2 - Gross income per acre minus tillage costs over a 26-year period.

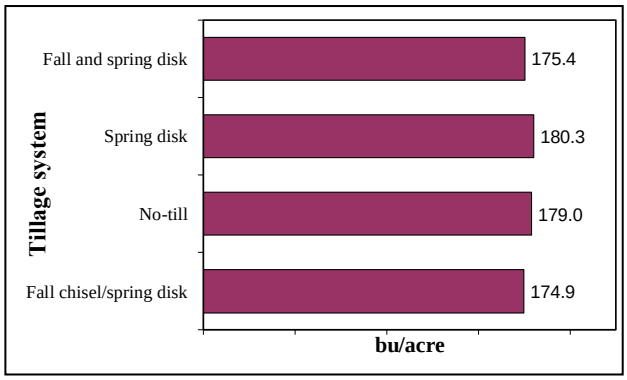

Figure 2 - Corn tillage systems 26-year yield averages.

differences shown are a result of the tillage procedures conducted on each plot and the associated costs.

It is difficult to estimate tillage costs as each grower's operating costs are different. Age and size of the equipment, field shape and size as well as soil type will effect the tillage costs. A large variable most seasons is fuel cost. To come up with a standard comparison value, we used the rates from the University of Missouri Extension custom rates guide for the tillage operations performed. These values are based on data collected from producers across Missouri. The most recent guide was updated in 2012. There is no assurance that these rates would cover a particular producer's costs. However, this is the best estimate we can find for a comparison.

One factor not considered in the economic analysis is labor. It is almost impossible to place a value on a producer's labor per hour, so no labor costs are included in the analysis.

Table 2 provides a summary of the gross income per acre minus the costs for the tillage work that was conducted. If we use a value of $3.50 per bushel, over this 26-year period the no-till plots grossed $10.19 per acre more than the spring disk plots, $47.01 per acre more than the fall chisel/spring disk and $44.04 per acre more than the fall and spring disk plots.

Another important factor that is often not considered is the benefit to the environment with no-till programs, which greatly reduce the amount of soil erosion caused by wind and water runoff. Soil particles are the number-one contaminant found in the rivers and streams of northwest Missouri. These particles not only cloud the water but they also may have other pollutants - herbicides, insecticides, fertilizer - adhered to them which may contaminate the water.

Introduction

The objective of this demonstration is to evaluate the effect of different tillage systems on soybean yields and profitability. This is the 16th year for this demonstration.

Methods and Materials

The four most common tillage systems practiced in this region were used for this demonstration. The tillage systems used were:

Fall chisel/spring disk
No-till
Spring disk
Fall and spring disk

Each plot consisted of eight 30 inch rows that were 250 feet long. Yield results were taken from the center four rows of each plot. The plots were planted on May 24, 2016 with a population of 162,003 seeds per acre into corn residue. Harvest was conducted on November 3, 2016.

Results and Discussion

Previous years have shown that if the fall and spring experience prolonged periods of excessive moisture that the fall and spring disked plots will have increased yield. The light turning of the soil promotes drying and helps prevent the crop from having wet feet. The downside is if the summer turns dry, that lost soil moisture will significantly reduce yields. This was the situation in 2016.

In 2016, the no-till plot had the highest yield with 60.1 bu/acre. The lowest yielding systems were the fall chisel/spring disk plot which yielded 46.7 bu/acre. The average for the four systems was 54.0 bu/acre with a standard deviation of 6.0 bu/acre. Yield results for all four tillage systems are shown in Table 1 and Figure 1.

Soybean tillage system	Harvest moisture %	Yield at 13.0% moisture bu/acre
Fall chisel/spring disk	13.7	46.7
No-till	13.5	60.1
Spring disk	13.0	57.5
Fall and spring disk	12.7	51.9
Trial averages	**13.2**	**54.0**
Standard deviation		**6.0**

Table 1 - Soybean tillage systems yield results for 2016.

With 16 years of data, you can see a trend in the yields for each tillage method. This longer term collection of data allows the weather variable to be minimized since we have had varying weather patterns during this time period.

If you compare the data obtained over the 16 years of the study, the no-till treatment has had the highest average yield for any of the tillage methods with an average of 60.3 bu/acre per year. The fall chisel/spring disk treatment has had the lowest average yield for any of the treatments with an average of 55.9 bu/acre per year. These yields are shown in Figure 2. The 16-year average for all the plots is 58.1 bu/acre with only a 1.8 bu/acre standard deviation. This is not a significant variation between the various tillage systems over this time frame.

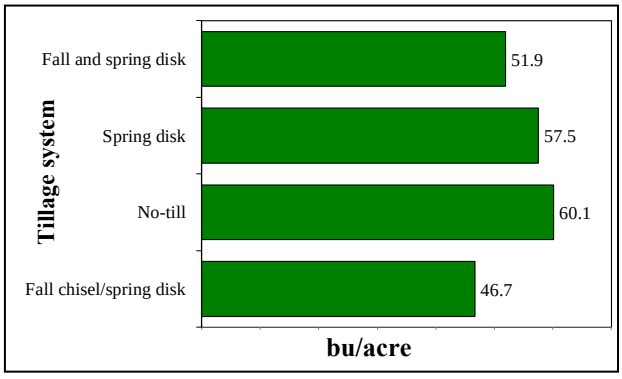

Figure 1 - 2016 Soybean tillage systems yield results.

Soybean tillage system	16-year yield ave. bu/acre	Gross income @ $9.00/bu	Tillage costs $/acre	Gross income less tillage costs $/acre
Fall chisel/spring disk	55.9	$503.01	$32.60	$470.41
No-till	60.3	$542.52	$0.00	$542.52
Spring disk	58.6	$527.12	$14.65	$512.47
Fall and spring disk	57.6	$518.53	$31.50	$487.03

Table 2 - Gross income per acre minus tillage costs over a 16-year period.

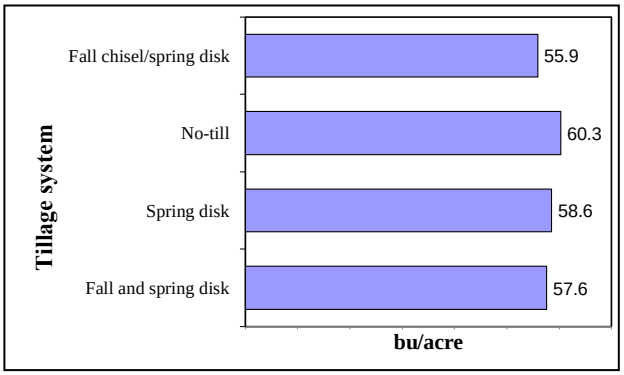

Figure 3 - Soybean tillage 15-year yield averages.

The economic analysis follows the pattern we have seen in the corn tillage demonstrations. The application of the fertilizer, herbicides, seed, planting and harvesting were identical for each of the tillage methods used. With only a 1.8 bu/acre variation between the treatments, the economic difference is a result of the tillage procedures conducted on each plot and the associated costs.

It is difficult to estimate tillage costs as each grower's operating costs are different. Age and size of the equipment, field shape and size as well as soil type will effect the tillage costs. A large variable most seasons is fuel cost. To come up with a standard comparison value, we used the rates from the University of Missouri Extension custom rates guide for the tillage operations performed. These values are based on data collected from producers across Missouri. The most recent guide was updated in 2012. There is no assurance that these rates would cover a particular producer's costs. However, this is the best estimate we can find for a comparison.

One factor not considered in the economic analysis is labor. It is almost impossible to place a value on a producer's labor per hour, so no labor costs are included in the analysis.

Table 2 provides a summary of the gross income per acre minus the costs for the tillage work that was conducted. If we use a value of $9.00 per bushel, over this 16-year period the no-till plots grossed $30.05 per acre more than the spring disk plots, $72.11 per acre more than the fall chisel/spring disk and $55.49 per acre more than the fall and spring disk plots.

Another important factor that is often not considered is the benefit to the environment of no-till programs, which greatly reduce the amount of soil erosion caused by wind and water runoff. Soil particles are the number-one contaminant found in the rivers and streams of northwest Missouri. These particles not only cloud the water but they also may have other pollutants - herbicides, insecticides, fertilizer - adhered to them which may contaminate the water.

The Effect of Different Nitrogen Application Timings on Corn Yield

Introduction

Nitrogen applications to standing corn in wet springs has benefited many growers by maintaining corn yield potential. Depending on the amount of nitrogen lost to denitrification, this additional application can help producers maintain their yield goals.

Methods and Materials

Preplant nitrogen was applied at three levels; 120 lbs./acre, 180 lbs./acre and 240 lbs./acre on April 11.

Pioneer P1197AM seed was planted on May 5 with five replications per treatment. At the corn V8 stage, June 28, supplemental nitrogen in the form of Agrotain® treated urea was applied.

Results and Discussion

Supplement nitrogen increased yield in all 120 pound preplant applications as shown in Figure 1. The 180 preplant yielded more than the 240 pound but was not statistically different. This was the result of plot variability. Weather and wind damage reduced all corn yields.

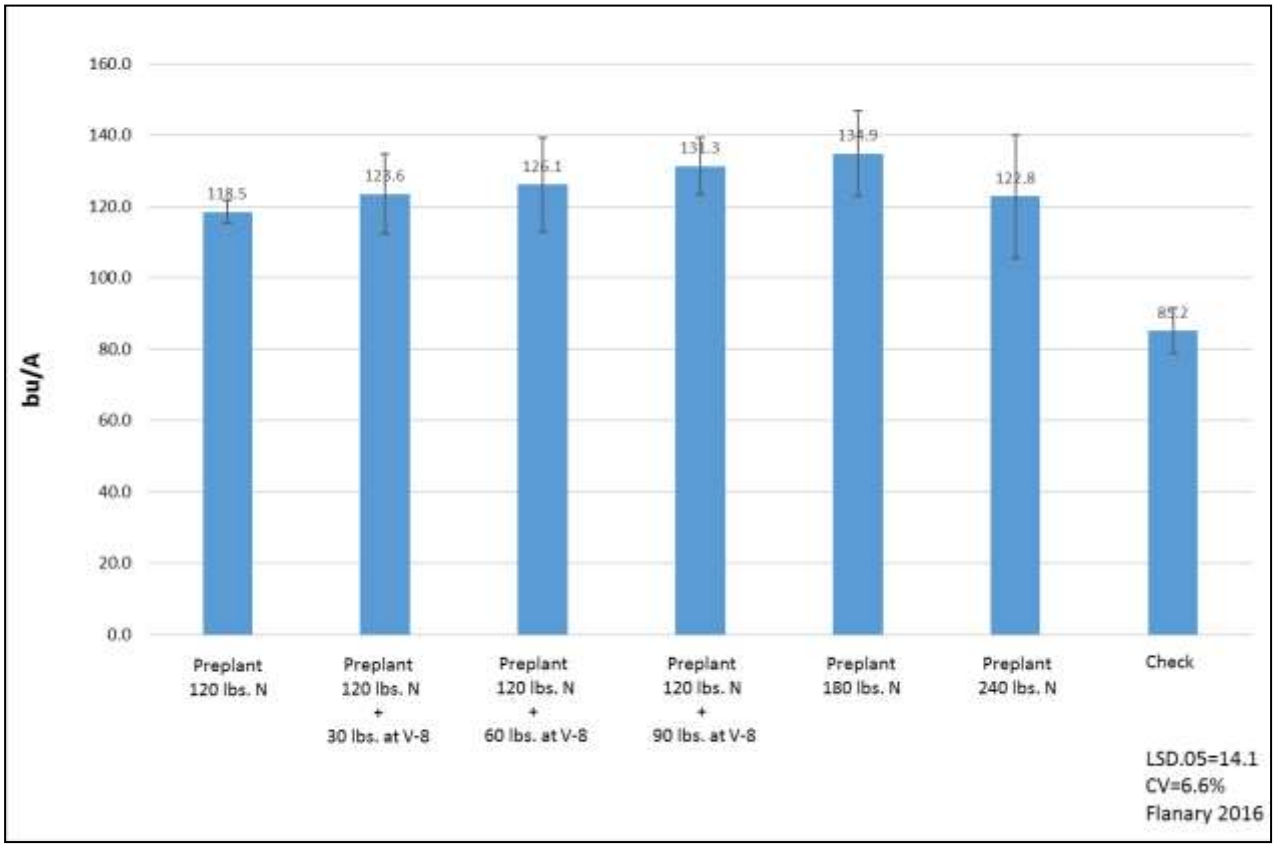

Figure 1 - The effect of different nitrogen application timings on corn yield.

Introduction

The use of foliar-applied nutrients has been promoted heavily by industry. University research has shown limited yield responses to foliar application of nutrients. Experiments where a response has occurred have been in specific conditions where a nutrient deficiency has existed. The objective of this experiment was to test and evaluate the response different nutrients had on soybean yield.

Methods and Materials

Four experiments were established to foliarly apply:
Megafol® 4-0-2, rate 2 qt./ac
Coron® 12-0-0, 4 qt./ac
Elemax ENC® 11-8-5, 3 qt./ac
ENC +Mn 5-4-2, 3 qt./ac.

The treatments were applied on July 21st. Each experiment was replicated five times and compared to a non-treated check. The Megafol® and Coron® were applied to Pioneer P93Y82 and the other treatments were applied to Pioneer P25T59R. Seeding rate was 165,000 plants per acre.

Results and Discussion

As shown in Figure 1, each of the four experiments in which foliar nutrients were applied did not significantly increase soybean yields. Foliar nutrients when averaged across all experiments yielded 40.4 bushels per acre and the untreated check yielded 40.2 bushels per acre.

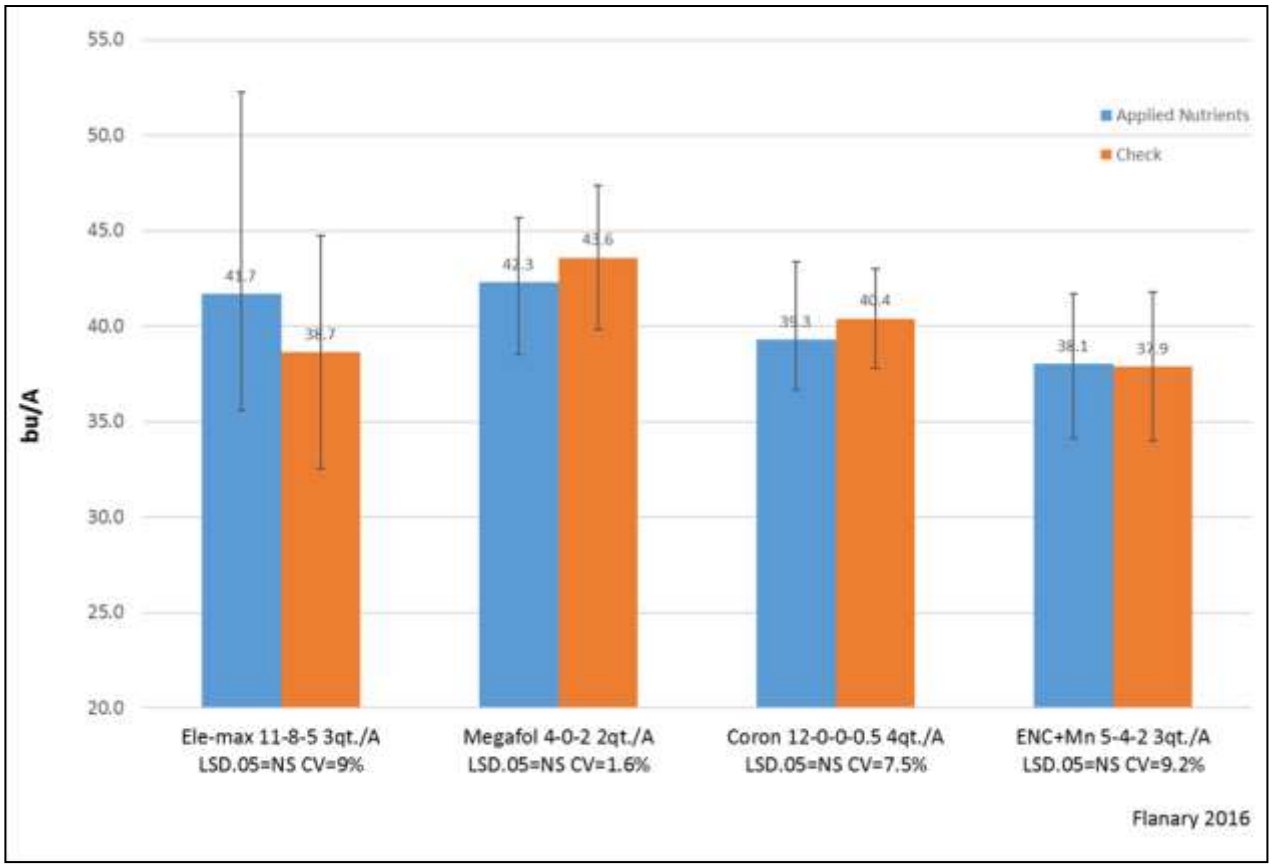

Figure 1 – Effect of foliar-applied nutrients on soybean yields.

The Effect of Corn Nitrogen Rate on Corn Yield

Introduction

The amount of nitrogen that is needed to optimize corn yield differs significantly from one field to another and within fields. Yield goal is the primary factor in Missouri when recommending a nitrogen fertilizer use rate.

Using yield as a goal when determining nitrogen application rate generally optimizes the amount of nitrogen for corn growth when there are not any losses of nitrogen from the system. Dr. Peter Scharf, MU soil fertility state specialist, recommends fertilizing for normal yields. Even in years with high yield potential, increasing nitrogen rates above normal yields is generally not needed.

This nitrogen rate study has been conducted for 14-years at the Graves-Chapple Research Center.

Methods and Materials

Urea coated with Agrotain® was surface applied on May 3 as preplant nitrogen. Rates of nitrogen include 0, 60, 120, 160, 180, 240, and 300 pounds per acre. A Pioneer corn hybrid was planted at a rate of 32,400 plants per acre. There were five replications in a randomized complete block design.

Results and Discussion

Harvest results are shown in Figure 1 below. The LSD of the study was 16.7 bushels/ acre. The difference between 120 pounds and 240 pounds was 10 bushels/acre of corn. All yields were lower because of wind damage and environmental conditions.

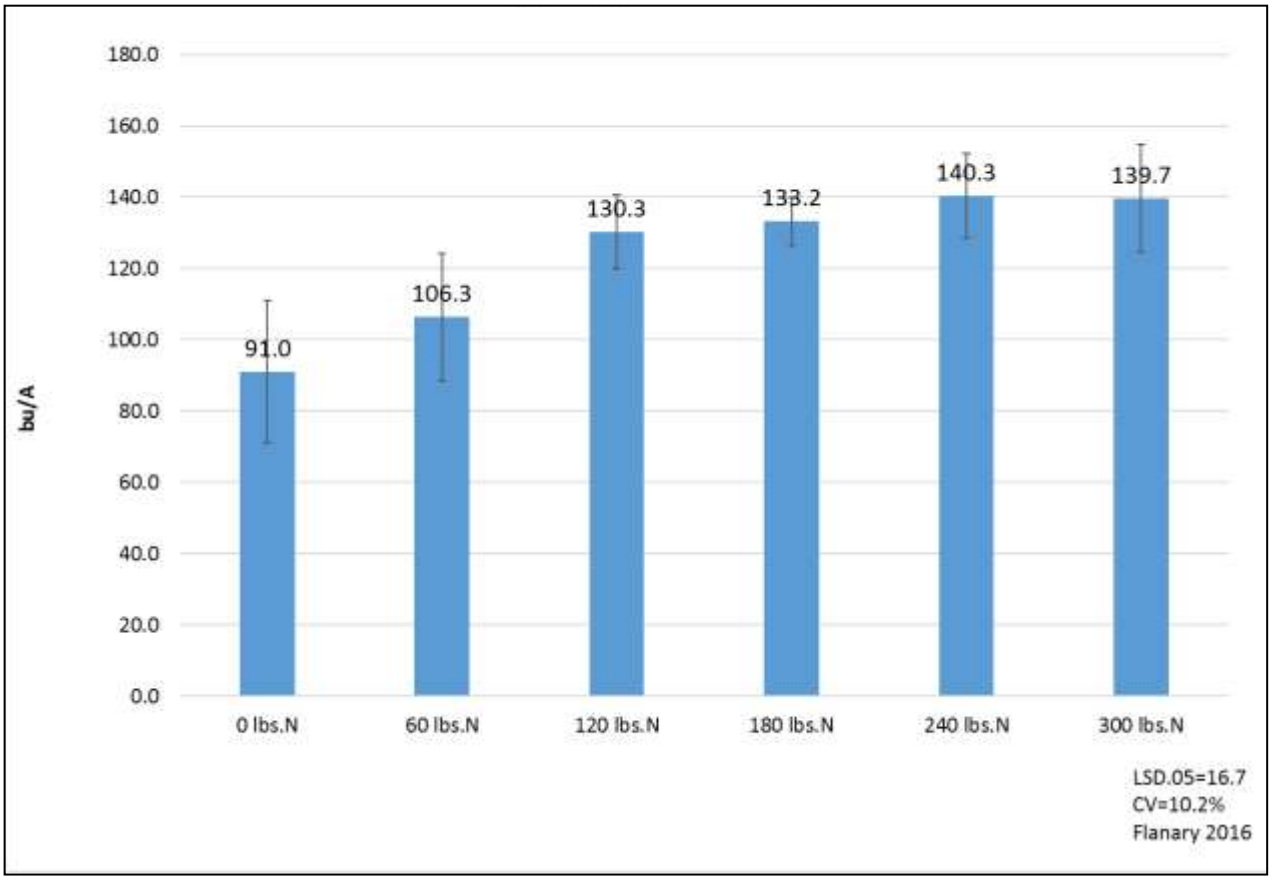

Figure 1 - The effect of nitrogen application rates on corn yield.

Introduction

Headline® fungicide was applied to six varieties of soybean. The purpose of the six experiments was to aid growers in determining the yield response of fungicide applications across soybean varieties.

Methods and Materials

Headline® at six fluid ounces per acre was applied with 15 gallons of water per acre. The experiment contained five replications and each variety was an individual experiment. The fungicide was applied July 22 when growth stage was R-3.

Results and Discussion

The yield results are shown in Figure 1 below. Statistically, there were no differences between fungicide application and the untreated check in each variety. The standard deviation of the experiment is shown in the whisker bars which indicates variability along with the CV. Averaged across all varieties, fungicide treated yielded 44.7 bushels per acre and the untreated check averaged 44.1 bushels per acre.

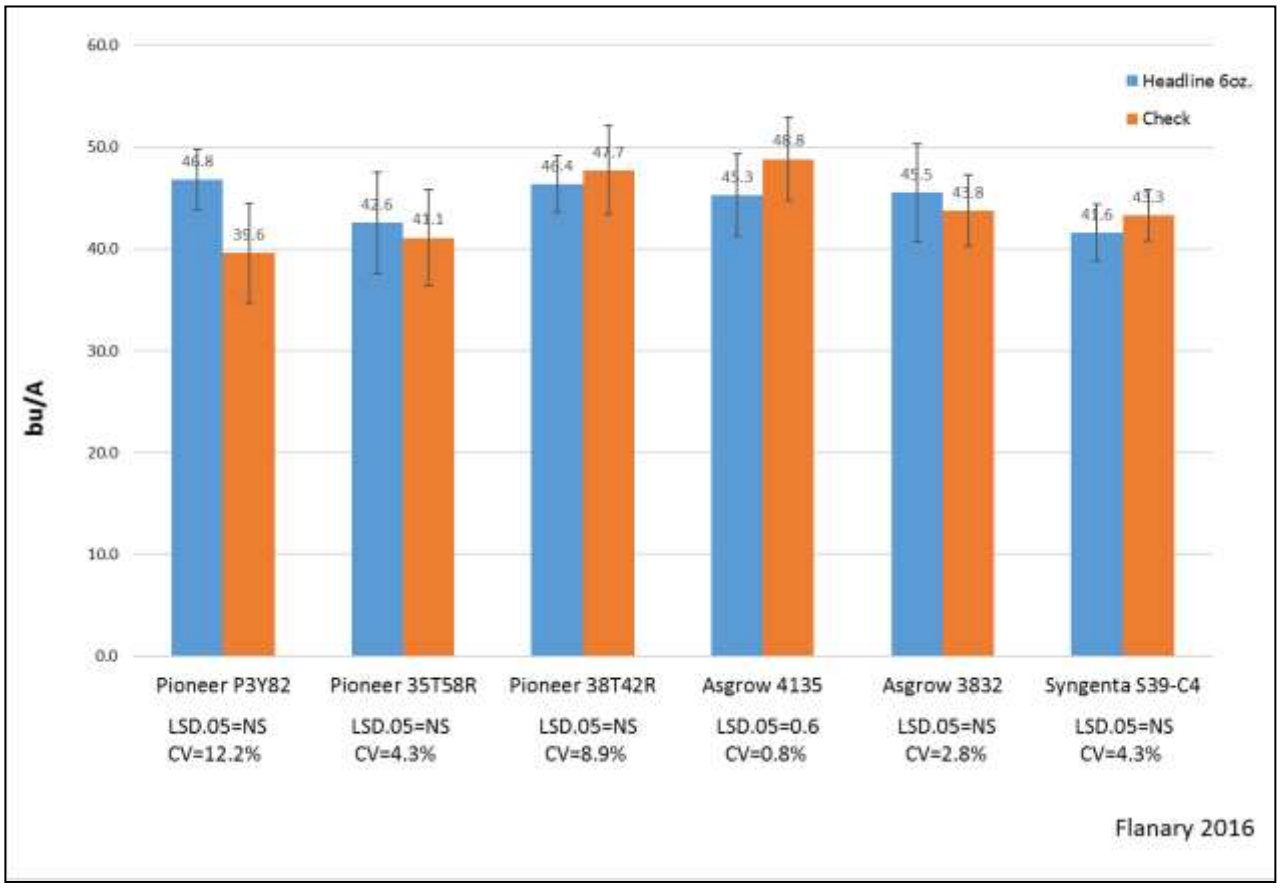

Figure 1 - The effect of Headline® fungicide on the yield of six soybean varieties.

Soybean Planting Population and Its Effect on Yield

Introduction

As margins become narrower, producers are looking for ways to reduce inputs. Seeding rates are an area many are considering reducing. However they want to reduce rates but also not harm potential yields. This trial is designed to compare the yields for different planting populations.

Methods and Materials

Six different planting populations of Asgrow 3832 soybeans were no-till planted into corn residue in plots six rows wide and 200 feet long on June 1, 2016. Each planting population was replicated three times in a randomized block design. The planting populations used ranged from a low of 103,000 seeds per acre to a high of 218,000 seeds per acre.

Results and Discussion

Yield results are shown in Figure 1. Statistically, the only significant difference is between the yields for the lowest planting population and the other five planting populations. There is no significant yield difference between the 5 higher populations.

Table 1 compares the average yields to their associated seed costs. This data may be helpful to producers looking at reducing input costs.

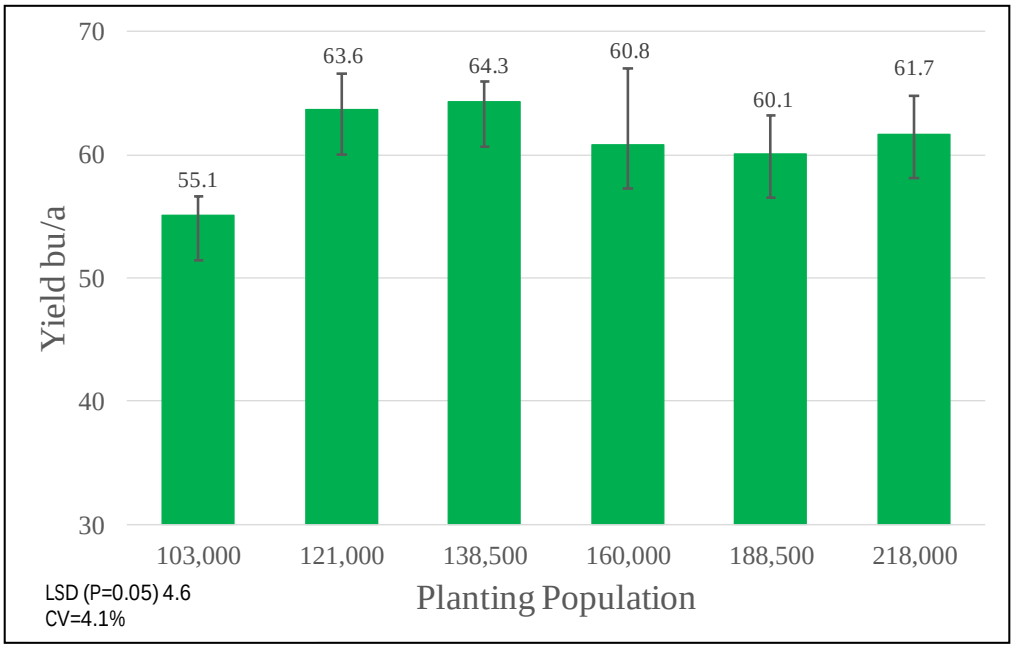

Figure 1 - The average yields for six different soybean planting populations.

Table 1 - Gross income per acre less seed costs for six different soybean planting populations.

Treatment	Seed cost per acre	Yield bu/acre	Gross $ @ $9.00/bu	Gross less seed cost $
103,000	$39.91	55.1	$495.56	$455.66
121,000	$46.88	63.6	$572.80	$525.92
138,500	$53.66	64.3	$578.42	$524.76
160,000	$61.99	60.8	$547.59	$485.60
188,500	$73.03	60.1	$540.84	$467.81
218,000	$84.46	61.7	$555.09	$470.63

Introduction

ILeVO® fungicide (fluopyram by Bayer Crop Science) is currently marketed as a seed treatment to manage sudden death syndrome (SDS). Once SDS is in a field, it will not go away. Growers in 2014 suffered considerable yield lose due to SDS and the Graves-Chapple Research Center also now has this disease in areas of the site. The objective was to determine the impact of this seed treatment on SDS.

Methods and Materials

Pioneer P36T86 PPST2030 was treated with ILeVO and other seed treatment ingredients containing Allegiance, Gaucho, PPST 120 which is an inoculant and Evergol, which is a fungicide.

Soybeans were planted May 21st at a seeding rate of 165,000 plants per acre. There were 10 replications in 30-inch row spacing.

Results and Discussion

The seed treatment did not significantly increase soybean yield statistically, however, the average yield was higher. This increase in yield may be due to other ingredients in the seed treatment.

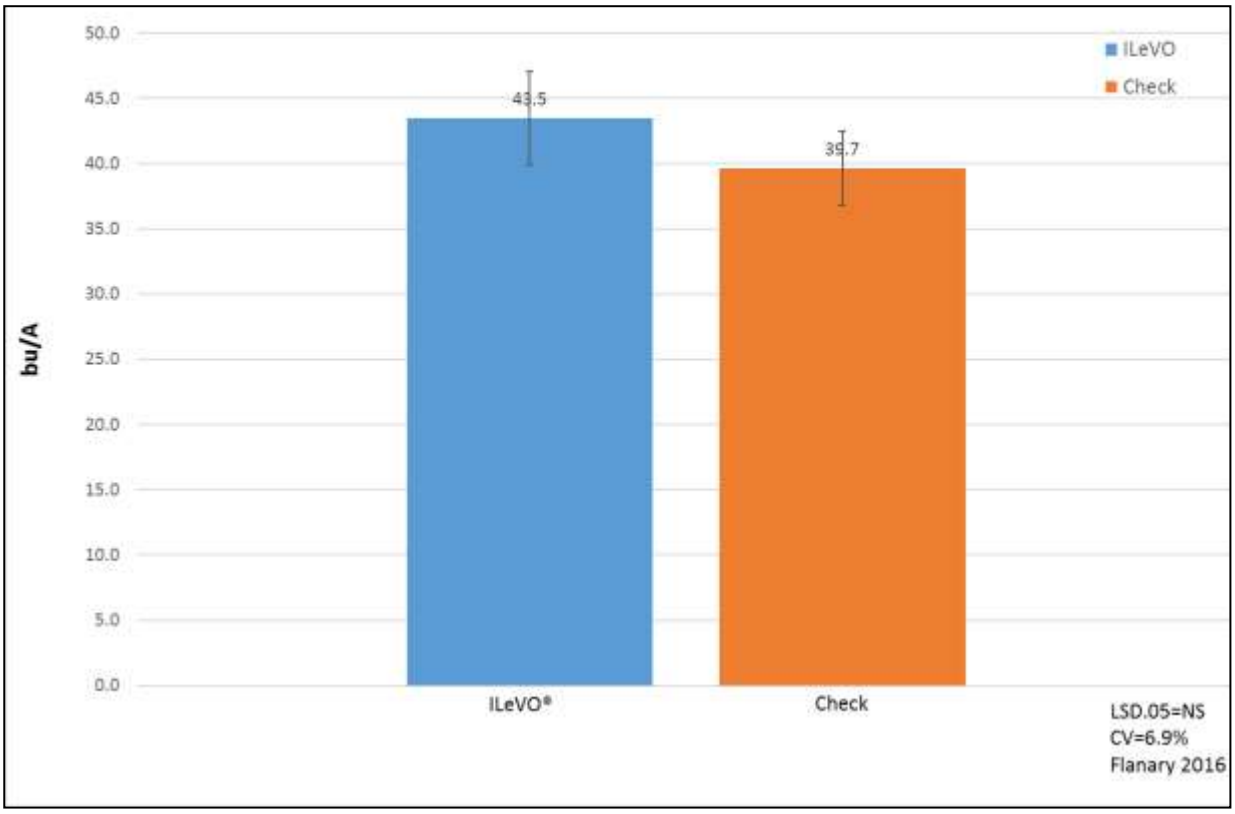

Figure 1 – The effect ILeVO® combined with other seed treatment active ingredients on soybean yiled compared to an untreated check.

Comparison of Roundup Ready® and Liberty Link® Soybean Yields and Input Costs

Introduction

Weeds resistant to our current herbicides have become a major issue for area producers the past few year. Soybean production has been the hardest hit trying to cope with resistant waterhemp and marestail.

One of the newer technologies available to combat this issue is the use of Liberty® herbicide and Liberty® resistant soybeans. However, many questions are still unanswered with the application of this technology.

This trial was designed to answer some of these questions; Do LL® soybeans yield as well as Roundup® resistant soybeans? Does it control these weeds? What is the cost for this technology?

Methods and Materials

Twenty-two varieties of RR® and twenty-two varieties of LL® soybeans were planted in separate plots. A check variety was planted on one side of each individual variety so that any variations across the plots could be removed.

Each plot received the same pre-emergent herbicide program prior to planting. Each plot was sprayed post-emergence when weeds were approximately 4 inches tall with either 3 pt/acre glyphosate or 29 oz/acre Liberty® as well as a herbicide and adjuvants to remove volunteer corn.

Results and Discussion

Statistically, while there was a statistical difference between varieties within a treatment, there was no significant difference in yields between the two different herbicide. Figure 1 shows a scatter plot of the different yields as well as a trend line for each. The averages for each plot were 62.7 bu/acre for the RR® varieties and 62.1 bu/acre for the LL® varieties. If you remove the yields for the two RR® varieties which vary greatly from the trend line, the difference in averages is even smaller at less than 0.1 bu/acre.

Weed pressure was monitored throughout the year with no recordable differences between the two different post-emerge herbicides applied. Seed was no-till planted into a clean field that produced corn in 2015 and had pre-emergent herbicides applied.

All inputs were the same for the two treatments with the only exception being one set of plots was sprayed post-emergent with glyphosate and the other with Liberty®. The costs for each treatment are shown in Table 1 along with the gross revenue per acre less the post-emerge chemical costs.

Treatment	Ave Yield bu/acre	Gross $ @ $9.00/bu	Cost of Liberty®/glyphosate per acre	Net $ per acre less post-emergent chemical cost
Glyphosate	62.7	$564.30	$6.54	$557.76
Liberty®	61.8	$556.20	$17.75	$538.45

Figure 1 - Comparison of gross revenue per acre when using Roundup Ready® or Liberty Link® soybeans.

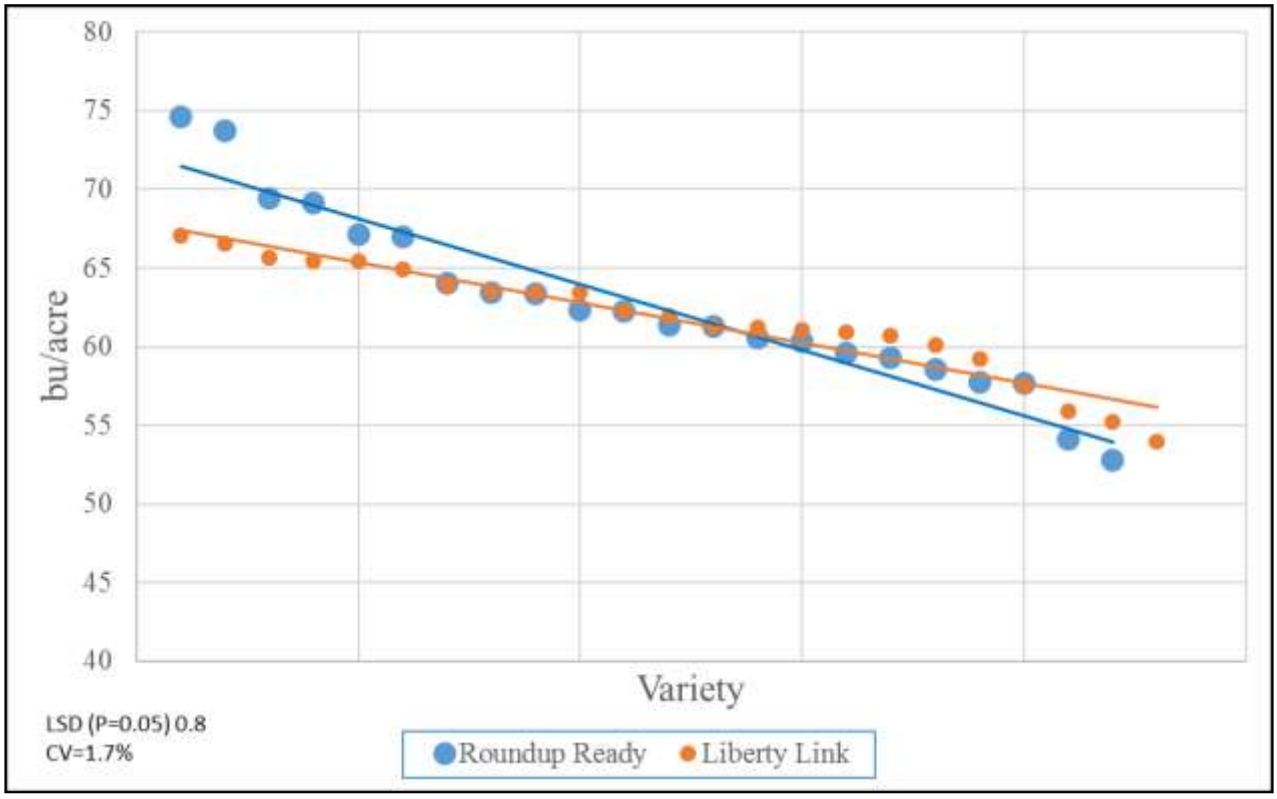

Figure 1 - Scatter plot of yields for 22 varieties of Roundup Ready® soybeans and 22 varieties of Liberty Link® soybeans.

Comparing Yields for Corn and Soybeans Treated With Amplify-D® Dry Seed Emergence Aid

Introduction

Many products are available that claim to enhance yield and provide a greater net bottom line. One of these products is Amplify -D® Dry Seed Emergence Aid manufactured by Conklin. Amp-D®, as it is referred to, is to be mixed with the seed before it is planted. Containing micronutrients, blue powder and talc, this product also contains adenosine monophosphate (AMP) to enhance seedling vigor. The talc also helps with seed flow and seed meter lubrication.

This trial was designed to test the effect on the yield of corn and soybeans using this product. The plots were replicated in two soil types: A Haynie silt loam representative of the soils found in the hills of the region, and in a the Dockery clay found on the Missouri river bottom and representative of the gumbo found in many river/stream flood plains.

Methods and Materials

The corn and soybeans were planted in five replicated plots of six rows each and 250 feet long. Amp-D® was added to half of the plots at the recommended rate of 2 oz per 50 pounds of seed. The seed was mixed thoroughly to ensure even distribution of the product.

The corn plots were no-till planted at 32,000 seeds per acre into soybean residue. The soybean plots were no-till planted at 160,000 seeds per acre into corn residue.

Results and Discussion

The soybean yields are shown in Figure 1. There was no significant yield increase in the plots treated with the Amp-D®.

The corn yields in the Haynie silt loam are shown in Figure 2. This is the second year we have conducted this trial with corn in the Dockery clay and those results are shown in Figure 3. There was no statistically significant difference in yields for either location or in ether year in corm.

At a cost of $5.58 per oz. and a seeding rate of 32,000 seeds/acre, the product cost was $4.46 per acre in corn. With a seeding rate in soybeans of 160,000 seeds per acre, the product cost was $5.95 per acre. Neither of these includes the labor to mix the product with the seed.

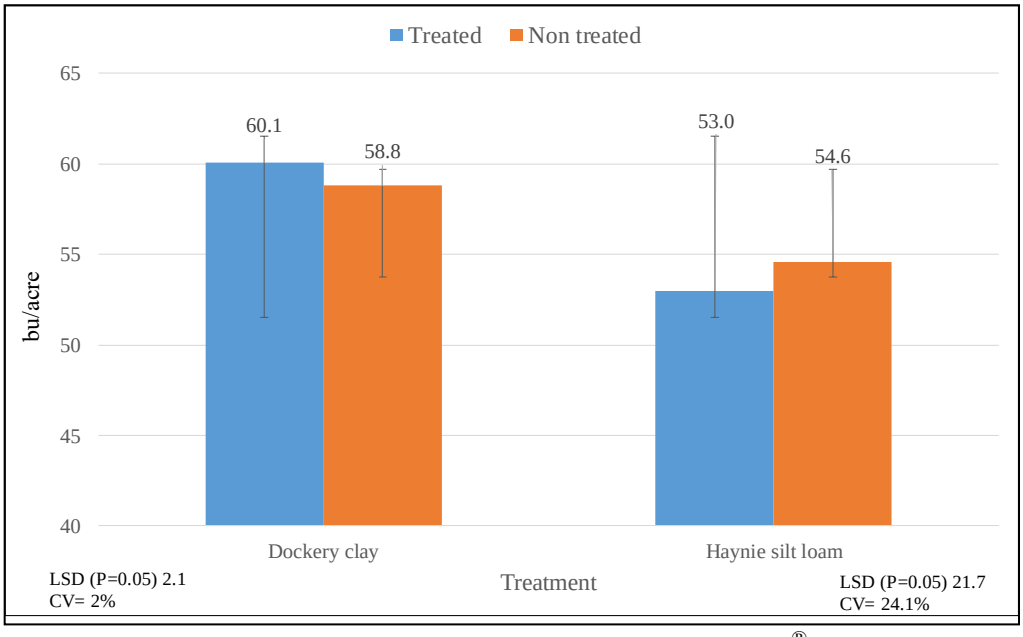

Figure 1 - Yields comparing soybean seed treated with Amplified D® vs. untreated seed and planted into two different soil types.

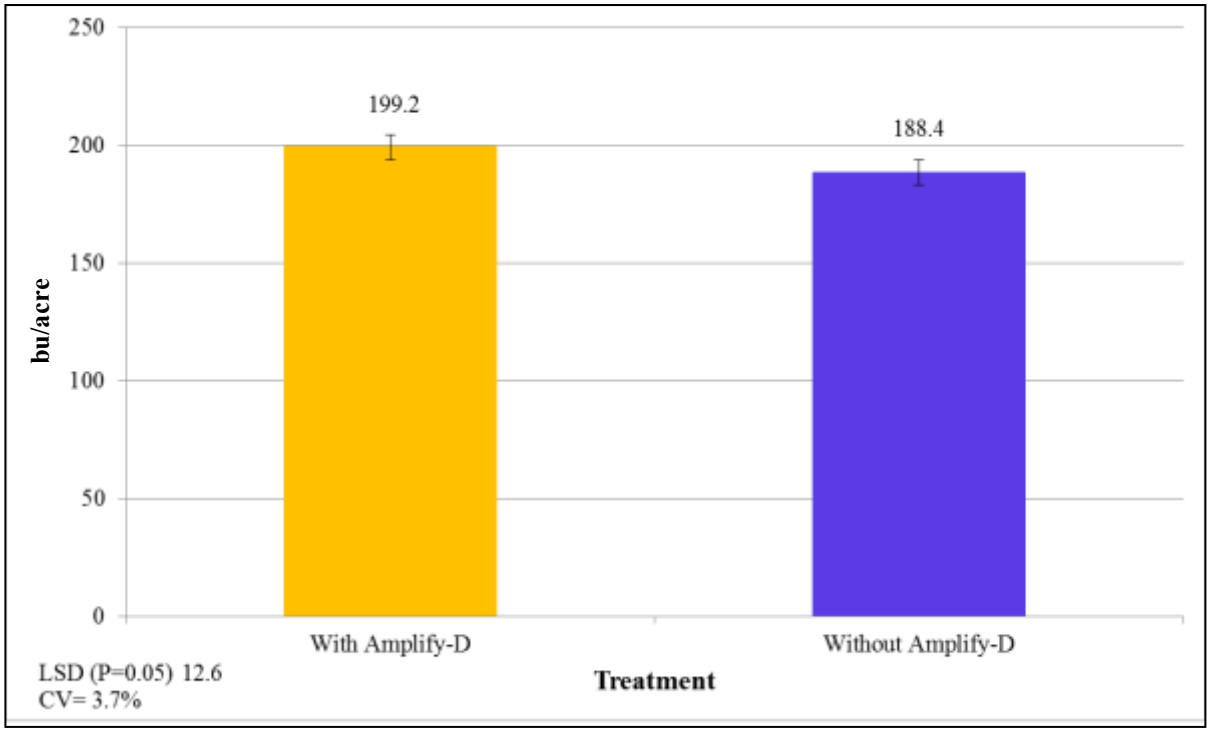

Figure 2—Yields comparing corn treated with Amplified D® vs. untreated seed and planted into a Haynie silt loam soil in 2016.

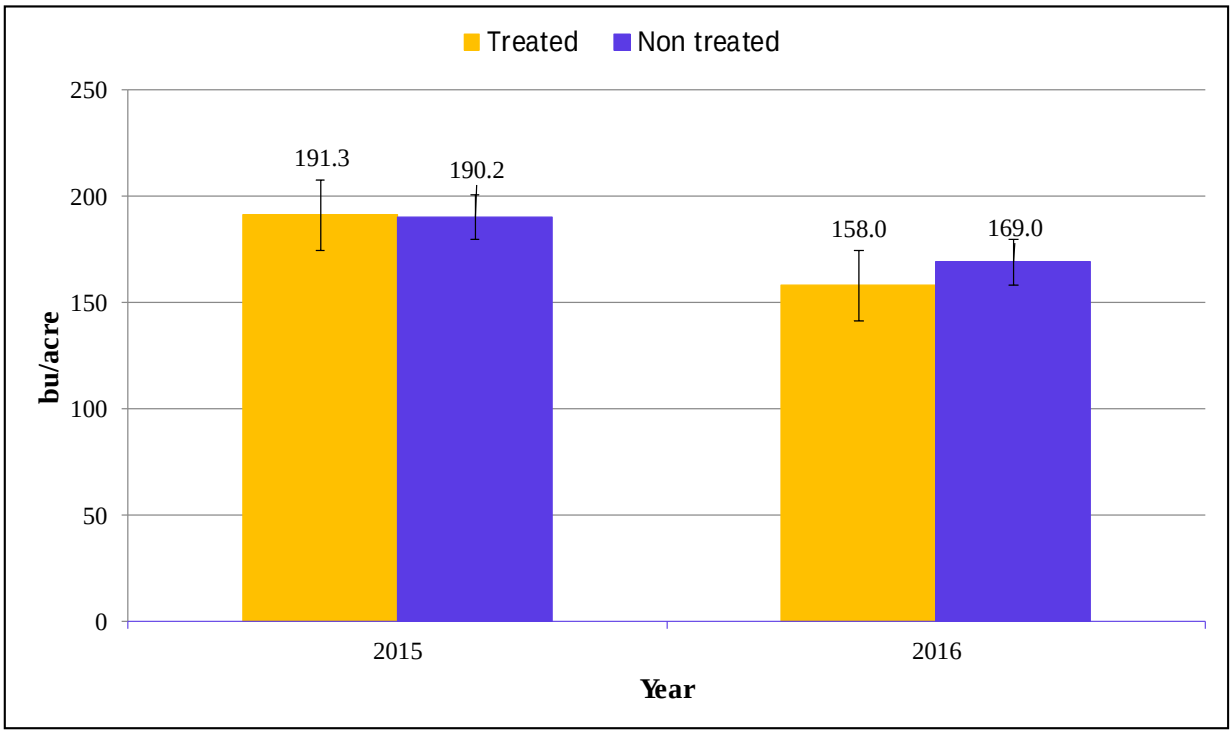

Figure 3 - Two year yield results comparing corn treated with Amplified D® vs. untreated seed and planted into a Dockery clay soil.

Comparing Yields of Different Corn Maturity Groups

Introduction

There are many benefits to cover crops, but one of the biggest challenges we face in northwest Missouri is getting them seeded in a timely manner. One of the recommendations producers hear from producers in other areas of the country that have had success with cover crops is to plant a shorter maturity corn so that it can be harvested earlier to facilitate the planting of the cover crop.

Methods and Materials

Based on results from the previous two years, the upper maturity range was modified in 2016. The 116 day corn was replaced by a 118 day variety and a fifth maturity date, 105 days, was added.

The five maturity dates of corn were planted on April 28 in six row wide and 250 foot long plots, replicated three times and at a population of 32,000 seeds/acre. A randomized block design was used.

Each maturity was harvested when the grain moisture for that treatment was approximately 18% so cereal rye could be drilled into the residue. This would allow us to compare growth rates of the cereal rye as well as any potential benefits to the soil.

Results and Discussion

As shown in Figure 1, the yields for the different maturities were significantly different. In most cases, the earlier the maturity the lower the yield.

In 2016 the 118 day corn was the lowest yielding maturity. We believe the yield loss was due to a wind storm on July 7 that severely damaged any corn that had not yet tasseled. The 118 day corn was the only variety in the plot that had not tasseled at that time as suffered wind damage.

We want to thank Hoegemeyer Hybrids for providing the seed for this demonstration.

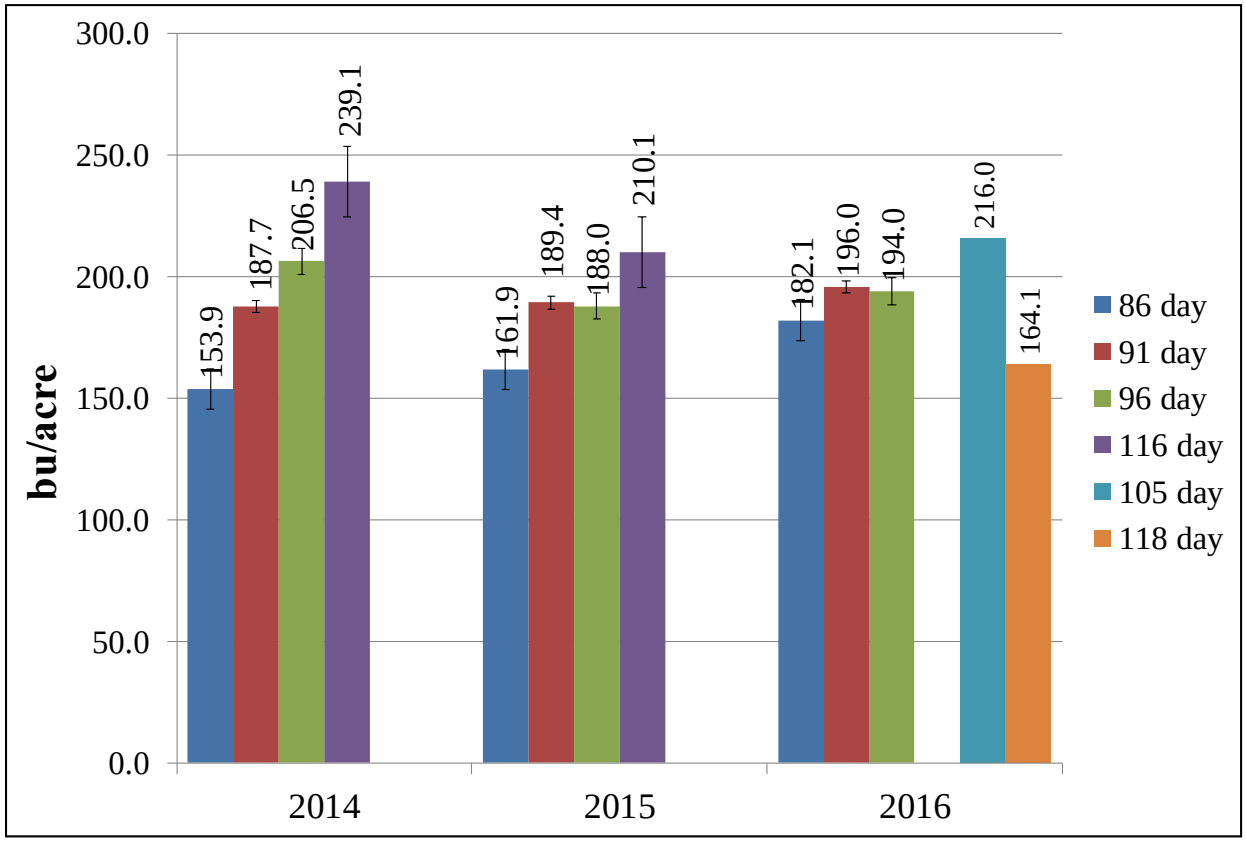

Figure 1 - Three-year comparison of yields for different corn maturity dates.

Introduction

The objective of this study was to test the effect row spacing has on soybean yield. Two common row spacing, 15-inch and 30-inch, were compared. Due to the interest in 20-inch rows for corn, this row spacing was also compared as growers would like to utilize the same planter for both crops.

In the past few years, growers have moved from narrow rows to 30-inch row spacing. As growers trade equipment, they are concerned about choosing the row spacing that maximizes yield.

Methods and Materials

Six soybean varieties were planted on May 20 at a seeding rate of 165,000 seeds per acre. There were five replications for each of the three row spacings compared: 30-inch, 20-inch and 15-inch rows. Escaped weeds were hand weeded.

Results and Discussion

Figure 1 compares the resulting yield from each variety at 15, 20 and 30-inch row spacing. The means are at the top of the bar and the whisker bars indicate the standard deviation.

Statistically, there were no differences between row spacing however, there was a trend of lower yields with 30-inch row spacing. Averaged across experiments, the 15-inch yielded 53.4 bushels per acre, 20-inch, 51.8 bushels per acre and 30-inch, 46.1 bushels per acre.

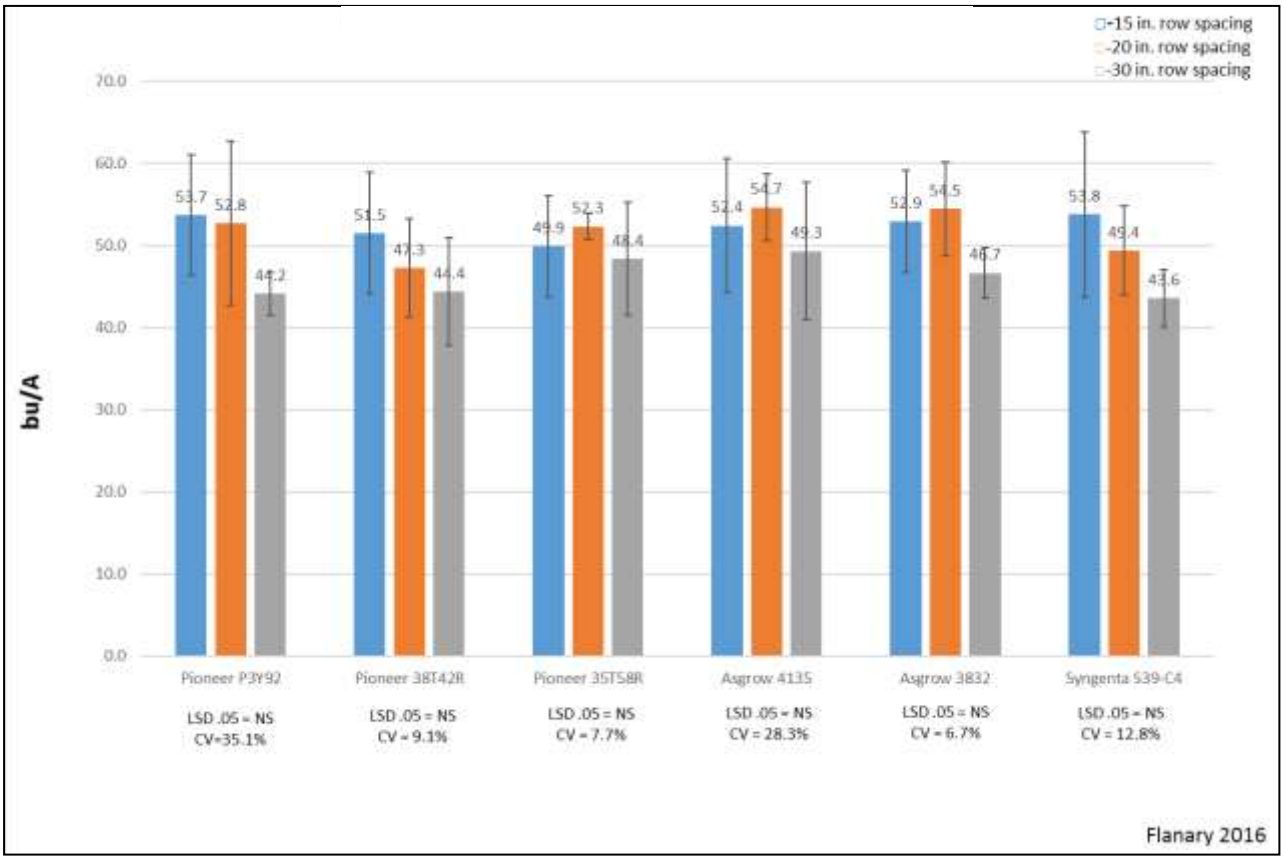

Figure 1 - The effect of 15, 20 and 30-inch row spacing using six soybean varieties and planted on May 20.

Introduction

Many growers question the benefit of applying micronutrients to their soils. Locally, sulfur is responsive in highly eroded soils or those with low organic matter. Also, zinc is important in crop production and soil tests indicate this nutrient is needed in some area fields.

Methods and Materials

Ten replications were established using Pioneer P1197AM seed corn. The experiment used a 20-pound rate of sulfur as ammonium sulfate and compared that to a non-treated check. Zinc sulfate was used in the zinc experiment at a rate of 10-pounds of zinc per acre and compared to a non-treated check.

Results and Discussion

There were no statistically significant differences between the sulfur applications and the non-treated checks as shown in Figure 1. There was a trend of higher yield though with sulfur application.

Figure 2 shows that zinc also did not exhibit any statistically significant increase in yield, however, there was also a trend of higher yield with zinc.

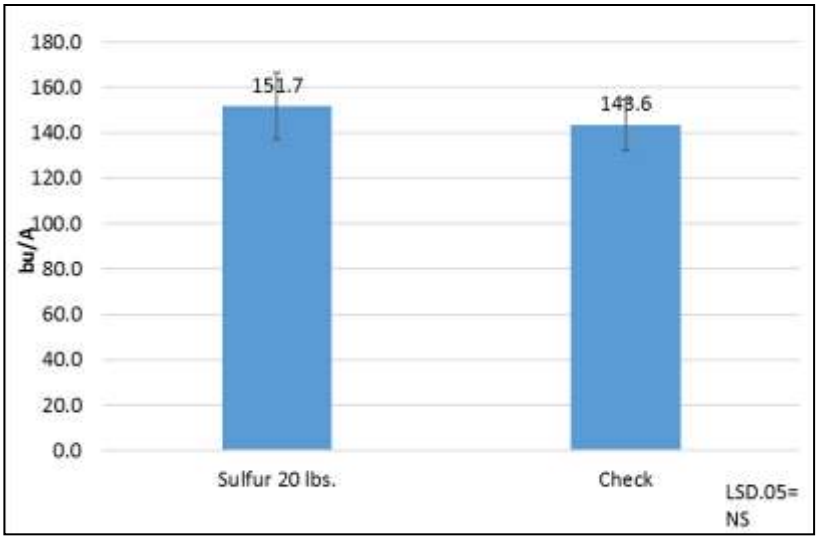

Figure 1 - The effect of sulfur fertilizer on corn yield.

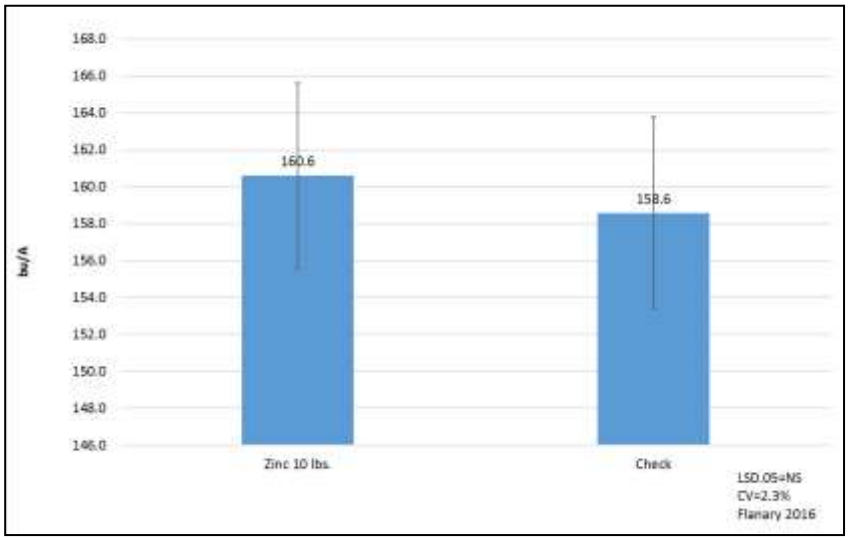

Figure 1 - The effect of zinc fertilizer on corn yield.

Introduction

The Trimble GreenSeeker® is a handheld device that emits bursts of red and infrared light and then measures the amount of each type of light that is reflected back from the plant. The sensor then displays a reading that corresponds to the normalized difference vegetation index (**NDVI**) which is a simple graphical indicator that can be used to analyze remote sensing measurements and assess whether the target being observed contains live green vegetation or not.

To use this in the field both an over fertilized area and an unfertilized area are needed as reference strips to compare to nitrogen deficient field areas.

Methods and Materials

A check treatment without nitrogen fertilizer and a check treatment with a pre-plant nitrogen application of 300 pounds per acre were compared to nitrogen applied at 60 and 120 pound preplant application. GreenSeeker® readings were used to calculate the amount of nitrogen that should be supplemented which was 50 pounds in both he 60 and 120 preplant treatments.

Results and Discussion

As shown in Figure 1, supplemental nitrogen increased yield but not significantly. Corn yields were extremely low because of wind damage.

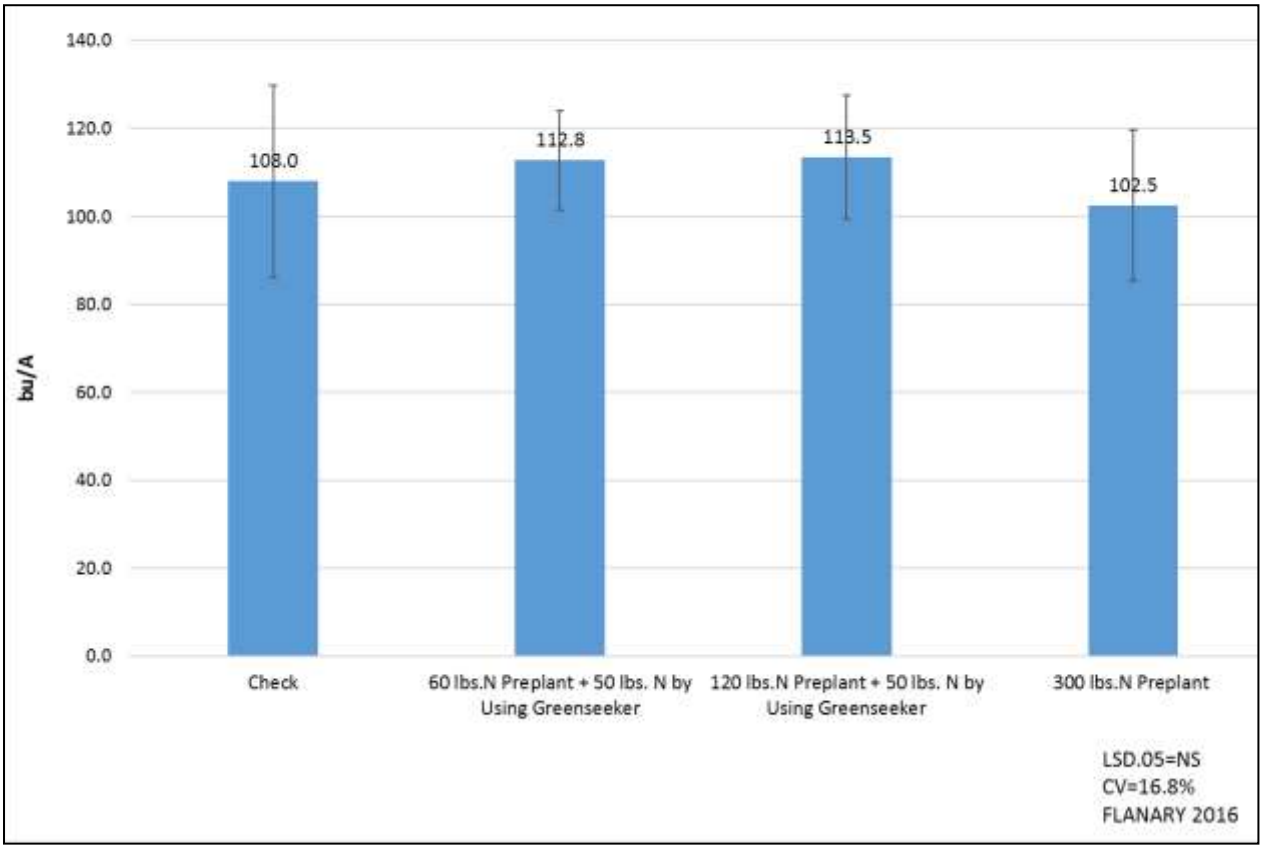

Figure 1 - Corn yields when using a handheld GreenSeeker® to apply nitrogen after emergence and as the corn is actively growing.

Yields for Soybeans Planted into Different Heights of Cereal Rye Cover Crop

Introduction

One of the practices discussed with cover crops is planting shorter maturity corn so that the cover crops will have more time to grow. However, as the results on page 20 show , shorter maturity corn has a tremendous yield drag in NW Missouri and is not a recommended practice.

However, there are cases when corn is harvested early; chopped for silage, damaged, early planted or corn being harvested to open fields or meet contracts. Cereal rye could be drilled into these areas as soon as the crop is removed giving the cover crop a longer growth window.

Methods and Materials

This trial immediately followed the 2015 corn maturity trial where four maturity dates of corn were planted in plots and replicated three times in a randomized block design.

Each maturity of corn was harvested when the grain moisture for that treatment was approximately 18% and cereal rye drilled into the residue at that time.

Results and Discussion

Cereal rye planting dates and the observed height of the cereal rye on April 11, 2016 are shown in Table 1. The three early plantings showed significant growth.

The cereal rye was sprayed out on April 11 with an application of glyphosate. The soybeans were planted on May 24 at 160,000 seeds per acre and harvested on November 3.

The yields are shown in Figure 1. While the trend was for higher yields with the taller cereal rye, the differences between the plots was not statistically significant.

Maturity days	Cereal rye planted	Ave height on April 11,2016 inches
86	9/11/2015	15.8
90	9/17/2015	17.5
96	9/24/2015	14.0
118	10/13/2015	8.0

Table 1 - Cereal rye planting date and average height on April 11, 2016.

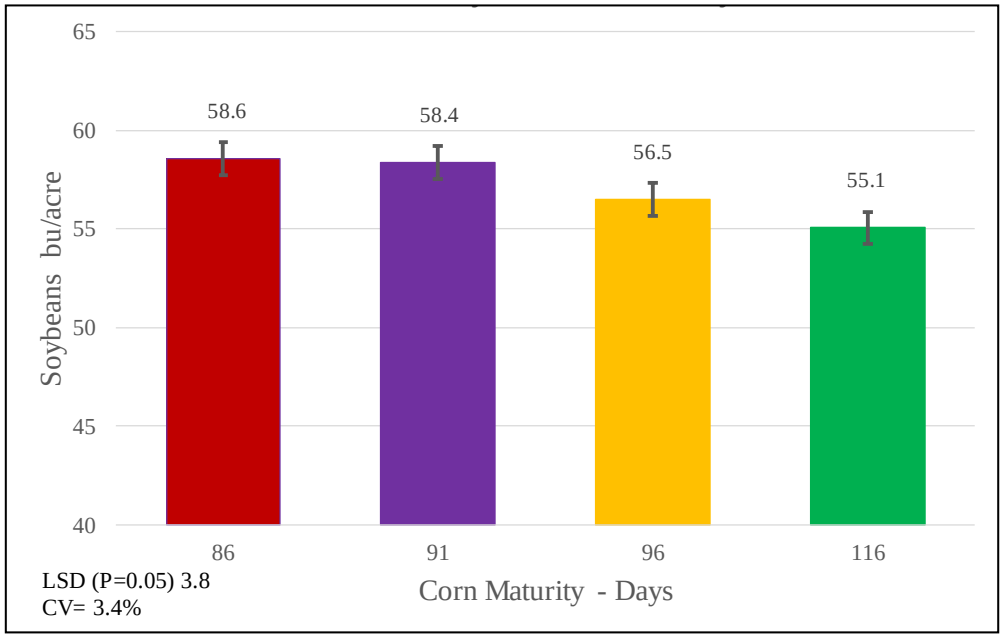

Figure 1 - Soybean yields following different maturities of corn followed by cereal rye cover crop.

Yellow Corn Variety	Moisture %	Adjusted Yield bu/acre
Agrigold A6652STX	14.9	222.6
Producers Hybrids 7358STXRIB	15.2	213.0
LG 5643STX	15.6	206.7
Hoegemeyer HPT8408 AM	15.5	205.5
Rob-See-CO RC6435-GTA	16.4	204.2
MORCORN MCXP1608	15.1	201.9
MORCORN MC4377	14.7	198.4
Hoegemeyer HPT8363 AM	16.0	198.3
Producers Hybrids 7068STXRIB	15.1	197.9
Taylor EXP C-115-13	15.2	197.6
Hoegemeyer HPT8652 AM	15.7	195.0
Taylor 8812	15.7	194.6
MORCORN MCXP1614	16.1	194.5
Rob-See-CO RC6401-3000GT	14.8	191.7
Rob-See-CO RC6829-3000GT	16.2	191.4
MORCORN MCXP1613	15.4	190.9
Hoegemeyer HPT 8469 AM	15.9	190.8
MORCORN MCXP1609	15.8	189.5
MORCORN MCXP1611	14.2	189.4
Green Valley GV8452	15.8	189.0
Power Plus 5K33AM	15.0	188.7
Green Valley GV7962	16.0	188.6
LG 5650STX	16.8	187.0
Catalyst 5009 3220	14.6	186.8
Taylor EXP A-113-13	15.9	185.9
Power Plus 6C41S	14.7	184.5

Yellow Corn Variety	Moisture %	Adjusted Yield bu/acre
Agrigold A6517VT3PRIB	13.5	184.0
Producers Hybrids 7493VT2PRIB	15.8	183.1
Power Plus 4J93AM	15.9	182.9
Taylor 8808	15.8	182.6
Power Plus 6P73AM	15.5	182.3
Producers Hybrids 7268STXRIB	15.5	181.7
Green Valley GV8362	14.3	181.3
Producers Hybrids 7428STXRIB	15.7	181.2
Agrigold A6499STXRIB	15.6	181.1
Innotech IC6125-3111A	14.6	181.0
LG 5663VT2	16.6	179.6
Weber WS12GT316	16.1	179.3
Taylor 8070	15.7	179.0
Burrus 6T54 3000GT	16.1	178.2
Agrigold A6441STXRIB	14.3	177.1
MORCORN MC4354	15.9	176.5
Catalyst 7577 3010	14.4	173.1
MORCORN MC4319	14.9	171.8
Hoegemeyer HPT7946 YHR	15.0	171.6
Taylor 8835	14.6	168.9
Agrigold A6572STX	16.0	162.4
LG 5618STX	16.1	157.3
Ave	**15.4**	**187.1**
Std dev	**0.7**	**12.3**
Median	**15.6**	**186.4**

Planted - May 19, 2016
Planted rate - 32,000 seeds/acre
Row spacing - 30 inches
Soil type - Dockery
Previous crop - Soybeans
Tillage - no-till
Fertilizer - 225 lbs. Nirogen per acre
100 lbs. Phosphorus per acre

Pre-herbicide - Lumax + Atrazine
+ Glyphosate + 2,4-D
Post-herbicide - Glyphosate + Atrazine
Harvested - October 20, 2016
Check variety - Hoegemeyer HPT 8294 AM
Check average - 165.3 bu/acre
Total growing season rainfall - 21.99 in

RR® Soybean Variety Demonstrations

Soybean Variety	Moisture %	Adjusted Yield bu/acre
Power Plus 39R5	11.1	74.7
Producers 4104NR2	10.9	73.7
MorSoy 33X14	10.9	69.5
Power Plus 38K6 PS SDS	10.9	69.1
Hoegemeyer 3919NR	11.2	67.2
Innotech 3990	10.9	67.0
LG C3989R2	10.9	64.1
Innotech 3115	11.4	63.5
Producers 3801NR2	10.9	63.4
Power Plus 35C7	11.0	62.3
Hoegemeyer 3422NR	11.1	62.3
Power Plus 37S7 PS SDS	11.6	61.4
MorSoy 37X41	11.0	61.3
Hoegemeyer 3731NR	12.2	60.6
Power Plus 36J3	11.3	60.3
MorSoy 39X14	11.2	59.6
Innotech 3783	12.1	59.3
Power Plus 41M4 PS SDS	11.4	58.6
Power Plus 42V6 PS SDS	11.5	57.8
Innotech 3423	11.1	57.6
Hoegemeyer 4170NR	11.1	54.1
LG C3647R2	11.0	52.8
Average	**11.2**	**62.7**
Standard Deviation	**0.4**	**5.6**
Median	**11.1**	**61.8**

Planted - June 2, 2016
Planted rate - 160,000 seeds/acre
Row spacing - 30 inches
Soil type - Dockery
Previous crop - Corn
Tillage - no-till
Fertilizer - 100 lbs. Phosphorus per acre

Pre-herbicide - Boundry
+ Sharpen
+ Glyphosate
Post-herbicide - Glyphosate
+ Cleanse
Harvested - October 8, 2016
Check variety - Weber GV405
Check average - 57.0 bu/acre
Total Growing season rainfall - 21.99 in

Soybean Variety	Moisture %	Adjusted Yield bu/acre
Hoblit 384LL	10.8	67.1
Credenz 2810LL	11.5	66.6
MoSoy LL3973	10.9	65.6
Credenz 3601LL	12.1	65.4
Credenz 3841LL	11.2	65.4
Hoegemeyer HPTLL3813N	10.9	65.0
Hoblit 355LL PS SDS	11.4	63.9
Credenz 2915LL	11.0	63.5
Hoegemeyer HPTLL3455NS	12.0	63.5
Stine 38LE02	11.1	63.4
Stine 36LE32	10.8	62.3
Credenz 3233LL	13.2	61.9
Stine 41LF32	11.2	61.3
LG C3753LL	11.3	61.3
LG C3904LL	10.6	61.1
Hoblit 405LL PS SDS	10.8	60.9
Hoblit 426LL	11.1	60.7
Hoegemeyer HPTLL4117N	11.0	60.1
Stine 37LF23	11.3	59.2
Credenz 3443LL	10.8	57.5
MoSoy LL3704	11.2	55.9
Credenz 3737LL	11.1	55.3
Hoegemeyer HPTLL4500NS	11.0	54.0
Average	**11.2**	**61.8**
Standard Deviation	**0.6**	**3.6**
Median	**11.1**	**61.9**

Planted - June 2, 2016
Planted rate - 160,000 seeds/acre
Row spacing - 30 inches
Soil type - Dockery
Previous crop - Corn
Tillage - no-till
Fertilizer - 100 lbs. Phosphorus per acre

Pre-herbicide - Boundry
+ Sharpen
+ Glyphosate
Post-herbicide - Liberty
+ Cleanse
Harvested - October 9, 2016
Check variety - Hoblit 384 LL
Check average - 63.7 bu/acre
Total Growing season rainfall - 21.99 in

Missouri Corn Growers Association and Missouri Soybean Association Fish Fry

The sixth annual fish fry was held on the evening of August 22 at the Graves-Chapple Research Center. This event is co-sponsored by the Missouri Corn Growers Association and the Missouri Soybean Association. It is great to have the two major farmer owned and operated commodity groups in Missouri involved with the event. Held each year prior to the annual field day, the fish fry helps promote the work the Missouri Corn Growers Association, Missouri Soybean Association and the Graves-Chapple Research Center do to help promote agriculture in northwest Missouri.

Greg Razer, field representative for Senator Claire McCaskill, discuses current issues with other attendees at the fish fry.

Missouri State Representatives Allen Andrews discusses issues with center Superintendent Jim Crawford during the fish fry.

The event provides a casual atmosphere for local producers, elected officials as well as faculty, researchers and administrators from the University of Missouri to discuss agriculture and share their concerns. Over 125 people attended the event in 2016. The fish fry has become an anticipated annual event providing an opportunity for all three organizations to showcase their activities.

Fresh catfish and fried potatoes are enjoyed by those attending the fish fry.

The 28th annual Graves-Chapple Research Center Field Day was held on August 23, 2016. A pre-field day breakfast was held to thank the many individuals, organizations and agribusinesses that make the work at the center possible. We want to thank Hoegemeyer Seed for sponsoring our breakfast. One hundred and twenty nine attendees enjoyed breakfast and fellowship before the 2016 Friends of Graves-Chapple Research Center were recognized.

Dr. Tom Payne was recognized for his many years of support for the center. As Vice Chancellor and Dean of the college the past 18 years, Dr. Payne has been instrumental in the growth of the center. He announced he will be retiring the end of December 2016.

Dean and Vice Chancellor Tom Payne receives his Friend of the Graves-Chapple Research Center plaque during the appreciation breakfast.

Dr. C. John Poehlmann retired in January as the Director of Field Operations for the University of Missouri Agricultural Experiment Stations. His assistance through the years has allowed the center to grow to meet the area producers' needs.

A mainstay at every field day, Marilyn Graves has served as a wonderful ambassador for the center which was named after her husband upon his passing. Always one of the first ones to arrive for the day, Marilyn is a friend to everyone which made it only fitting to present her with a Friends of the Center plaque.

Advisory Board Chairman Steve Klute presents Dr. C. John Poehlmann with his Friend of the Graves-Chapple Research Center plaque.

Advisory Board Chairman Steve Klute presents Marilyn Graves with her Friend of the Graves-Chapple Research Center plaque.

Following breakfast, attendees were invited to take three tours of the center to view some of the research taking place. More than 200 people registered at the event and participated in the tours.

The field day tours and lunch were made possible through the assistance of many local organizations. Atchison-Holt Electric Cooperative provided doughnuts and coffee to the attendees in the morning. The Missouri River Valley Tractor Club brought five of their restored, antique tractors to the center to be used for pulling the tour wagons. A deli style lunch was sponsored by Kent Fisher Insurance with ice cream bars and sandwiches provided by MO Valley Ag.

Attendees had the opportunity to participate in three field tours that highlighted some of the work being conducted both on the Graves-Chapple research Center as well as at other MU research centers.

The three tours were:

Red Tour – Pest Management

Stop 1 - *Preparing for Future Soybean Technologies and Management of Resistant Weeds*
Dr. Kevin Bradley
MU Assoc. Professor of Plant Sciences

Stop 2 - *Management Considerations for SDS and the Cost Effectiveness of Seed Treatments*
Kurt Nagel
MU Extension Regional Agronomist

Stop 3 - *Current and Future Corn and Soybean Insect Issues*
Greg Luce
Director of Research
Missouri Soybean Merchandising Council

White Tour – Crop Management

Stop 1 - *Managing 2017 Production Costs*
Dr Raymond Massey
Professor MU Extension

Stop 2 - *Breeding Conventional Soybeans at the University of Missouri*
Dr. Andrew Scaboo
MU Assistant Professor of Plant Sciences

Stop 3 - *Building Soil Health & Cost Share Programs*
Chris Rader
NRCS District Conservationist

Blue Tour – Nutrient Management

Stop 1 - *Planting Cover Crops on a Budget*
Wayne Flanary
MU Extension Regional Agronomist

Stop 2 - *Using the Missouri Strip Trial Program to Evaluate Management Decisions*
Dr. John Lory
MU Extension Associate Professor

Stop 3 - *Response to Nitrogen of Corn Damaged by Water*
Larry Mueller
Research Specialist II
MU Plant Sciences

MU Assistant Professor of Plant Sciences Dr. Andrew Scaboo discusses the conventional soybean variety breeding taking place at the University of Missouri.

Dr. Ray Massey, MU extension professor, discusses how to manage the 2017 production costs in a down marketing year.

Wayne Flanary, MU Extension regional agronomist, explains to producers different strategies for planting cover crops on a limited budget.

Dr. Kevin Bradley, MU associate professor of plant sciences, discusses management of herbicide resistant weeds with a group of producers.

Youth Ag Education Day

Two hundred fifty-six high school students and 29 teachers/chaperones from seven area schools attended the annual Student Ag Day at the Graves-Chapple Research Center on September 16. A rainy morning resulted in an additional five schools not attending. The goal for the event is to show some of the various aspects of agriculture to demonstrate to our youth there are many career opportunities in agriculture and that agriculture is more than just raising crops and livestock.

MU Extension Regional Livestock Specialist Shawn Deering how proper management of a cow herd can increase the quality of the product.

Each learning station was designed to provide hands-on learning opportunities for the students on some of the cutting-edge technology and practices used in today's agriculture and how it affects their everyday lives.

The learning stations were:

- Demonstrating the digestive tract of cattle using a cannulated cow
- Beef quality assurance
- Energy efficient lighting
- Agricultural entrepreneurship
- Representative from MU with opportunities in ag at MU
- Composting products we use every day
- The benefits of cover crops
- Importance of monarch butterflies and their habitat restoration
- Field tour highlighting some of research at the center

A lunch of hotdogs and hamburgers was provided by the research center and local area businesses and prepared by the Rock Port Rotary club. Volunteers from the Atchison County MU Extension council helped serve the meal.

All the participants were asked to complete a questionnaire after the event to gauge their understanding of the topics both before and after the event using the following scale: 1 - No knowledge, 2 - Some knowledge, 3 - Average knowledge, 4 - Above average knowledge, 5 - Excellent knowledge. The average score before the field day was a 3.1 and after was a 3.9, which is a 25% increase in knowledge of the topics after the event. This indicates a good transfer of knowledge occurred during the workshop.

Director of Field Operations for the MU Agricultural Experiment Stations Tim Reinbott discusses the many things in our everyday life that can be composted.

Using a cow with a ruminal cannula (a door implanted into the digestive tract), MU Extension Regional Livestock Specialist Amie Schleicher is able to demonstrate the workings of a ruminant's digestive system.

MU Extension Regional Livestock Specialist Jim Humphrey explains the indicators a producer should use when culling their cattle herd to make it the most profitable.

MU Extension Regional Agronomy Specialist Wayne Flanary uses live plants to teach participants about the benefits cover crops provide to the soil.

What's in Our Big Back Yard?

Over the past several years, agriculture has been portrayed more negatively in the press. Often times the press reports only tell part of the story, twist some of the facts or just outright do not report the truth. Most people in the United States are at least two or three generations removed from any direct contact with agriculture thus what they read and hear on the news is the only information they have on the subject. Even in rural Northwest Missouri where ag is the main economic driver, most people have a very limited understanding of modern agriculture.

To address this education shortfall, the MU Graves-Chapple Research Center in conjunction with the faculty at the Atchison County MU Extension Center held the second annual event titled "What's in Our Big Back Yard". The event was designed to use hands on, visual displays to provide education to the general public on a variety of agriculture related topics. Learning stations were manned by MU Extension regional specialists and MU State specialists, as well as partners from Missouri Department of Conservation, Missouri Department of Natural Resources and several local experts.

Attendees to the event enjoy the pumpkin painting section of the Kids Corral.

Some of the learning stations included:

- What is MU Extension and What Can it Do For You?
- What's the Deal With Cover Crops?
- Demonstrating the Digestive Tract of Cattle Using a Cannulated Cow
- All You Ever Wanted to Know About the Meaning of GMO and Organic
- Insect Pests of the Lawn and Garden
- Loess Hills Restoration Using Native Plants and Grasses
- Rainfall Simulator to Demonstrate How Farmers Protect the Soil and Environment
- Energy Conservation for the Home
- Procurement Technical Assistance Center – How to Get Government Contracts
- The 4H – It is Not What You Grew Up With
- Golden Triangle Energy – Producing Pharmaceutical Quality Ethanol and Co-Products

The local FFA chapters organized and ran a "Kids Corral' featuring a petting zoo, pumpkin painting and a trolley ride. This allowed parents to drop off their kids while they walked around the learning stations.

The center also raised pink pumpkins that were available for sale with all the proceeds going to cancer research. Also available for purchase were a variety of ornamental gourds and 12 varieties of ornamental corn.

Approximately 140 people attended the inaugural event held on a beautiful Saturday in October. A free lunch was served that was sponsored by the research center. Participants indicated that they "learned a lot" and that "I will know the whole story next time I hear about that topic". Feedback was overwhelming positive so we hope the event in 2017 will attract more people.

One of the activities at the event was selling pink pumpkins with all proceeds going to fund cancer awareness programs. Guests were allowed to roam the plot and pick the pumpkins of their choice. Over $250 was raised from the activity with a donation made to the American Cancer Society.

Various types of ornamental and yellow field corn were grown at the center to help foster the discussion about hybrids and genetically modified plants.

Youth as well as adults lined up to learn about the rumen of a cow from Regional MU Extension Livestock Specialist Amie Schleicher.

The Bob Chapple Endowment

For the support of the Graves-Chapple Research Center

The Bob Chapple Endowment

Graves Farm was established in 1988 in southwest Atchison County as a collaborative effort between Atchison County Extension, Holt County Extension, University of Missouri Extension Commercial Agriculture Program, MU Agricultural Experiment Station, local agribusinesses and local producers. The farm was renamed in August 2003 to add the name of Robert Chapple, who helped found the farm. Partially through his hard work and diligence the farm has become a center of excellence in the northwest region. With Bob's passing in 2013, the endowment fund was renamed in his honor to help provide long term support for the center he helped establish.

The goal of the work on the collective 98-acre leased farms is to implement applied research, demonstrate management practices for crop production, and evaluate new and sustainable crop production practices. The farm strives to perfect practices to maintain or increase profitability for area crop producers. Your support will help ensure the prominence of this research center in the community for today and tomorrow. We encourage you to consider one of two options for giving – operational needs or long -term endowment. Thank you for your support of MU's Graves-Chapple Research Center!

Direct my support to: ☐ Immediate needs of the farm. ☐ Graves-Chapple Endowment for long-term investment.

☐ I wish to show my commitment to the Graves-Chapple Endowment Fund with a gift of:

☐ $100 ☐ $500 ☐ $1,000 ☐ Other _____

I wish to pledge $_____ payable over _____ year(s).

PAYMENT INFORMATION

☐ My check, *payable to U of MO – Graves-Chapple Endowment Fund*, is enclosed.

☐ Please charge my credit card.

☐ VISA ☐ MasterCard ☐ DISCOVER

Card # _____ Expiration Date _____

Name _____ Phone _____

Address _____

Signature _____

If your gift is securities or other property, please call Heidi Griswold at 866-400-4483 (toll free) or 573-882-9003. All gifts to the Graves-Chapple Fund are tax-deductible in accordance with state and federal income tax provisions.

Please return this form to:

Office of Advancement
2-4 Agriculture Building
Columbia, MO 65211

Research and Education Impact

One of the primary purposes of the center is to show that no-till farming is viable for northwest Missouri. When the farm was started in 1988 it was estimated that less than 10 percent of the farmland in Atchison and Holt counties was in no-till. By 2009 that number is estimated to have risen to 80 percent.

• Demonstrations at the center have shown that no-till reduces soil loss by 93 percent over conventionally tilled plots. This is a reduction of more than 59 tons per acre of topsoil. This amounts to approximately 16 million tons of topsoil protected from erosion and kept out of area rivers and streams each year. Erosion of farm fields has been identified as one of the contributors to hypoxia in the Gulf of Mexico.

• Research and demonstrations show producers can reduce fertilizer inputs with no loss on yield, saving costs and the environment. With approximately 400,000 acres in Atchison and Holt counties in row crops, a 10 percent reduction in nitrogen on 20 percent of these acres results in an $800,000/year savings.

• Over 600 people visit the center each year through field days, a youth education day, workshops and other events. Graves-Chapple Research Center is vital to the northwest region in sharing education and research not only with producers, but with the community and youth. Each year, 250-300 students attend the youth education day – even more have to be turned away due to capacity issues – including students from urban communities who have never before visited a farm and do not understand the impact agriculture has on their daily lives.

Graves-Chapple Research Center Mission Statement

Research centers are an integral part of the Missouri Agricultural Experiment Station and unique contributors to MU's comprehensive land-grant responsibility.

We work with University of Missouri Extension, state and federal agencies and Missouri agribusinesses to implement applied research, demonstrate management practices for crop production, and evaluate new and sustainable crop production practices to help keep Missouri producers competitive. We will accomplish this by responding to the needs of Missouri's citizens, and evaluate efficient, profitable crop production techniques while emphasizing soil conservation, water quality and energy efficiency.

2016 Graves - Chapple Research Center
Daily Precipitation Data, April-September 2016

Daily Precipitation in Inches

Day	April	May	June	July	August	September
1	0.02	0.05				
2				0.61	0.01	
3			0.04	0.04		
4						
5	0.16				0.22	
6						
7				0.81	0.06	0.12
8		0.02				
9		1.80				0.54
10						
11		0.27			1.31	
12				2.33	0.53	
13				0.05		0.25
14						0.12
15						
16		0.41				0.15
17	0.05					
18	0.34			0.75		
19					1.00	
20	1.28	0.01			0.05	
21			0.03			
22				0.06		
23				0.02	0.35	
24	0.29	0.03		0.03	0.60	1.41
25		0.23	0.57		0.43	0.31
26	1.44	0.95	0.07		0.35	
27	1.13	0.30	0.40		0.02	
28		0.04			0.01	
29	0.16		0.01		0.46	
30	0.84	0.09	0.16		0.65	
31	--	0.01	--		0.04	--
TOTAL	**5.71**	**4.21**	**1.28**	**4.70**	**6.09**	**2.90**

Daily Temperature in °Fahrenheit

Day	April Max/Min	May Max/Min	June Max/Min	July Max/Min	August Max/Min	September Max/Min
1	48/31	54/46	82/57	81/59	85/72	81/57
2	62/28	65/45	87/55	71/60	89/72	78/60
3	85/42	72/43	87/63	67/60	90/71	80/59
4	64/42	70/49	84/60	82/64	96/72	83/64
5	75/42	77/44	87/57	96/72	83/66	90/71
6	63/44	87/52	88/60	90/74	82/64	92/75
7	63/36	83/62	82/51	90/65	79/66	86/75
8	60/31	71/59	90/58	90/68	84/69	86/74
9	59/24	75/54	94/72	89/68	92/70	88/62
10	69/49	78/53	95/74	91/75	93/77	76/54
11	58/34	71/55	96/75	92/75	97/69	80/56
12	66/26	72/50	95/74	86/63	83/67	88/63
13	76/43	82/47	92/71	88/70	88/62	76/61
14	76/47	61/39	94/72	86/65	88/64	73/60
15	77/45	69/38	102/68	77/64	86/62	87/66
16	77/56	54/50	97/70	87/63	87/67	76/62
17	77/61	67/48	97/76	88/74	93/70	84/60
18	65/56	73/47	90/72	87/67	92/71	86/62
19	67/52	71/54	94/70	90/74	89/66	94/68
20	66/51	68/54	96/72	94/77	75/59	94/66
21	67/50	77/50	97/69	96/77	82/55	93/76
22	68/52	84/53	100/77	94/79	83/62	93/74
23	80/47	78/66	89/64	91/77	87/67	91/68
24	83/58	87/64	91/66	90/67	82/65	90/68
25	80/58	82/64	94/72	88/65	79/62	75/51
26	77/54	81/61	87/68	89/64	77/62	78/45
27	69/45	79/61	92/64	91/66	87/67	81/50
28	55/47	78/60	87/67	87/68	91/67	68/47
29	53/46	89/57	84/66	83/64	90/69	74/44
30	65/48	89/66	89/66	82/59	85/69	77/45
31	---	79/61	--	84/70	83/64	---

Graves-Chapple
Research Center
University of Missouri

http://graveschapple.cafnr.org/

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