2016
Center For Excellence
Agriculture Field Plot Research

Center for Excellence

Conservation Districts

Corn Marketing Program of Michigan

MSPC

Michigan Wheat Program

Great Lakes Restoration

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INTRODUCTION
A BRIEF HISTORY

Center for Excellence – Who would have thought

When Bakerlads Farm and Raymond and Stutzman Farms were approached in 1997 with a request to be host farms for demonstrating applied research they never considered that twenty years later the Center for Excellence would eventually take on a life of its own. Twenty years of crops days and field days with countless strip trials, demonstration projects, and numerous guest speakers from around the country brought focus to the two host farms.

A notable change was when the Center of Excellence title changed to the Center for Excellence, including the site for the tillage trials located at the Bakerlads Farm. This all came about when Monsanto Chemical stepped down after five seasons with The Center for Excellence and a great arrangement as a large financial supporter. There are currently six primary partners and twenty-four sponsors with additional support coming from nine other agri-businesses and universities.

Over the years at the Raymond and Stutzman Farms we were trying to push the envelope with the "what if concept" implemented by Dr. Gordon Wuethrich, Lenawee County Agricultural Agent (retired) and later a private consultant. What if we could raise 100 bushels/acre soybeans? What would it take? What if a premium was paid to growers for higher alcohol yield based on variety? What if we only planted soybeans at 1/2 the recommended seed drop rate? If we reduce row spacing on corn could we increase yields? What if we were to adjust our seed drop to line up with CEC and past years yield maps for corn and soybeans? What if we inter-seeded soybeans into a live wheat crop in late May? What if we put fungicide on corn as a preventative practice? What happens to the soil biology when small grains are introduced into the rotation? Is a drainage water management demonstration possible? Results are sometimes successful and sometimes not. Many of the strip trials done at the Raymond and Stutzman Farms were ahead of their time. Variable rate fertilizer application OptRx for nitrogen application based on crop health was another.

The Bakerlads Farm was set up to be highlighted by conservation tillage and No-till replicated plots. In Michigan there is no other site with this many years of tillage data with replicated comparisons. Over the years there have been additional strip trials of seeding rates by CEC, seed treatments, Foliar feed, Planting Depths, Gypsum, use of biologicals and LCO promoters for soybeans and corn. Conservation projects demonstrated include: (LRWSIS) a closed loop sub-irrigation system that recycles dairy waste water and runoff through a wetland then sub-irrigated to a corn crop., (WASCOB) Water and Sediment Control Basins, two-stage ditch installation, blind inlets, and for 2017, a saturated buffer.

The annual field day typically draws over 400 people and offers high-quality, agriculture-oriented continuing education sessions and demonstrations for farmers and industry participants. The morning progam is in Clayton, Michigan and the afternoon program in Morenci, Michigan.

In addition to the annual field day held on the third Wednesday in August, a results meeting is hosted in January to present data collected from the projects. The winter meeting provides further education opportunities for the agricultural community along with yield results from the Bakerlads Farm, the Raymond and Stutzman Farms, and satellite Center for Excellence On The Road plots.

HOST FARMERS

Bakerlads Farm

Blaine Baker, host farmer from Bakerlads Farm, along with his brother Kim is part of the 5th generation in his family to run the nearly 140-year old farm. The Baker's home farm is located in Clayton, Michigan on Cadmus Road east of Morey Highway.

Bakerlads Farm owns and operates 2,000 acres of cropland with corn, soybeans, and alfalfa as part of their 480 cow dairy operation.

Blaine has been a no-till farmer for over twenty years and continues to "tweak" the system. They have installed a number of conservation projects on the farm which Include WASCOBS, grass waterways, erosion control structures, filter strips and most recently a two stage ditch, saturated buffer and blind inlets.

Raymond & Stutzman Farms, LLC

Tim Stutzman of Raymond and Stutzman Farms has been with the Center For Excellence for 20 years. Tim is the owner/operator and manager of the 6,000 acres of cropland and feeds 2,000 steers annually. Custom applying manure, variable rate fertilizer, and chopping several thousand acres annually for producers in Michigan and Ohio is a big part of the business.

Tim is constantly pushing the envelope with new technology and is a leader in the Ag community. Tim's signature technology is with his twin row planter system for corn and recently went to a 15 Inch row width for soybeans.

In addition, he is applying inputs for crop production on the go and by the foot. In other words, all his fertilizer, seed and pesticides are applied geo-spatially based on the crop need. Recently added was Ydrops for applying N at V-10 stage.

Pictured from left to right: Daniel, Tim, Dave and Dave (grandpa)

2016 FARM PARTNERS & SPONSORS

Center for Excellence

Partners

Lenawee Conservation District
Corn Marketing Program of Michigan
Michigan Soybean Promotion Committee
Michigan Wheat Program
Great Lakes Restoration Initiative

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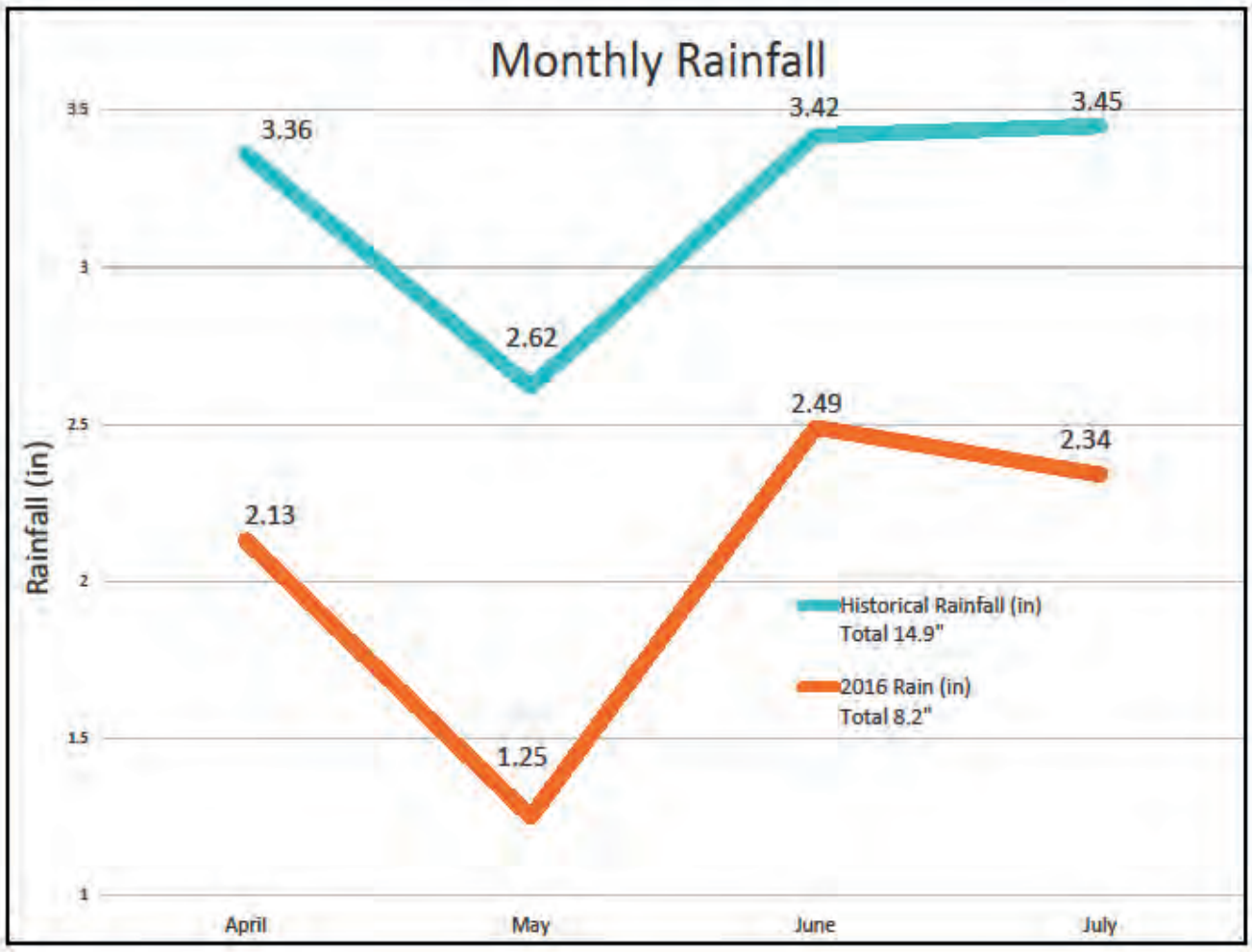
2016 RAINFALL



Rainfall is measured with a recording rain gauge at the Bakerlads Farm and reflects real time rainfall for both of the host farms. Monthly rainfall for April through July was below normal. There was a 4.64 inch total rainfall deficit. There was a period of time in which there was only 0.2 inches of rain from late May through most of June. Corn yields for 2016 were average and the soybean yields were above average due to good rainfall in the month of August.

2016 CENTER ON THE ROAD STRIP TILLAGE

Strip tilling in mid-November 2016 into tillage radishes planted in early August. The cover crop winter kills and the strips will be ready to plant in May of 2017.

We have collected data from eight replicated strip-till trials completed with producers from northwest Ohio and southeast Lenawee County. Two soybean plots and six corn plots.

In cooperation with Fulton County Ohio State University Extension, Center for Excellence strip tillage plots were completed in the fall of 2015 for spring planting. Three of the plots had fertilizer applied in the strip.

With the GPS auto-steer the strips were planted in the spring of 2016. The design of having replicated strips across an entire field should provide for some excellent data.

Shane Meyer, owner of Country side Land Management, installed all of the strip till trials in Fulton and Lenawee County.

Yield Response to Strip Tillage

Eric A. Richer, Ohio State University Extension Educator, Fulton County

Thomas Van Wagner, Michigan Center For Excellence, Lenawee County

Objective

To compare the yield response and economics for strip till, no till, conventional tillage and minimum tillage.

Methods

This study was designed to evaluate the impact of strip tillage against no tillage and other tillage systems. All treatments were replicated a minimum of 4 times in alternating strips (2 treatment trials) or in randomized strips (trials with more than 2 treatments). All strip tillage work was conducted in the fall of 2015 using an Orthman 1TRPR. Where noted fertilizer was applied in the band and then matched equally in the spring. Fertilizer was applied on the surface in the spring to minimize nutrient loss associated with fall applied surface fertilizer. Within each trial location all planting, fertilizing, pesticide application and harvesting was consistent.

Measureable data points included yield, economics, soil temp at planting, and average growth stage at a particular date. Stated soil temperatures and growth stages are the mean of 10 measurements per treatment. Data was analyzed using a simple Analysis of Variance (ANOVA) and considered to be significant at $P<.05$. Economics were calculated using relevant crop prices and custom tillage/fertilizer application rates from the 2016 Ohio Farm Custom Rates Survey.

Results

For easier readability, see results chart on the next page.

Discussion

Much discussion and analysis of this data can be made. In the Ohio trials, three out of four trials showed no statistical difference in yield for strip tillage and the highest yielding treatment. In one trial, strip till showed a statistically significant yield difference over a no tillage system. In Michigan, the disk ripper followed by spring cultivator showed a statistically significant yield difference in the corn crop. However, the soybean strip till trials showed one trial where strip tillage was significant over the disk ripper system and one trial where strip tillage was not significant. It is important to remember that these trials represent one year's worth of data from one region of the country. Multi-year data will increase the validity and confidence of research results.

Acknowledgements

Support for this project was provided by Michigan Center For Excellence, OSU Conservation Technology Conference and OSU Extension Fulton County. Thanks to Countryside Land Management for assisting with these strip tillage plots. Thanks to OSUE Fulton intern Ben Eggers for assistance with data collection and processing.

2016 CENTER ON THE ROAD
STRIP TILLAGE

OHIO STATE UNIVERSITY EXTENSION

Ohio-Michigan Strip Till Data

Location	Soil	Crop	Tillage Treatment	Fertilizer Applied	Soil Temp at Plant	Stage on 7/1	Mean Yield (bu/ac)	Significant Difference (p<.05)	Net Return over Cost*
Lenawee Co-1	Hoytville	Soybeans	Strip till	Broadcast VRT over both treatments			58.1 a	LSD 7.10; CV 4.9	$500.15
			Disk ripper/S. Cultivate				63.6 a	Not significant	$540.55
Lenawee Co-2	Hoytville	Soybeans	Strip till	Broadcast VRT over both treatments			53.4 a	LSD 3.23; CV 2.63	$457.85
			Disk ripper/S. Cultivate				49.5 b	Significant	$413.65
Lenawee Co-3	Hoytville	Corn	Strip till	Broadcast VRT over both treatments			165.8 b	LSD 2.54; CV .088	$557.55
			Disk ripper/S. Cultivate				181.8 a	Significant	$604.45
Lenawee Co-4	Hoytville	Corn	Strip till	Broadcast VRT over both treatments			219.5 a	LSD 3.23; CV 1.07	$745.50
			Disk ripper/S Cultivate				229.8 a	Significant	$772.45

Location	Soil	Crop	Tillage Treatment	Fertilizer Applied	Soil Temp at Plant	Avg Growth Stage on 7/13	Mean Yield (bu/ac)	Significant Difference (p<.05)	Net Return over Cost*
Fulton Co-5	Hoytville-Mermill	Corn	Strip till	200# Potash fall	60.7	11.6	189.7 a	LSD 2.07; CV .74	$641.20
			No till	200# Potash spring broadcast	58.1	11.3	190 a	Not significant	$658.75
Fulton Co-6	Hoytville-Nappanee	Corn	Strip till	50# MAP, 50# Potash fall	67.2	12.4	205.6 a	LSC 3.01; CV 1.15	$696.85
			No till	50# MAP, 50# Potash spring broadcast	61	11.9	196 b	Significant	$679.75
						6/23			
Fulton Co-7	Haskins-Nappanee	Corn	Strip till	50# MAP, 50# Potash fall	67.6	6.0	219.5 ab		$745.50
			No till	50# MAP, 50# Potash spring broadcast	61.4	5.9	211.2 b	LSD 10.8; CV 3.08	$732.95
			F.chisel/S.cultivate	50# MAP, 50# Potash spring broadcast	66.7	6.4	218 ab		$724.90
			Spring cultivate	50# MAP, 50# Potash spring broadcast	65.9	6.0	224.6 a	Significant	$765.85
Fulton Co-8	Haskins-Nappanee	Corn	Strip till	50# MAP, 50# Potash fall	67.6	5.7	208.9 a		$708.40
			No till	50# MAP, 50# Potash spring broadcast	61.4	6.0	201.6 b	LSD 6.23; CV 1.90	$699.35
			F.chisel/S.cultivate	50# MAP, 50# Potash spring broadcast	66.7	6.3	205.2 ab		$680.10
			Spring cultivate	50# MAP, 50# Potash spring broadcast	65.9	6.0	205.3 ab	Significant	$698.30

*Equipment costs based on 2016 Ohio Farm Custom Rates

Soybean Price	$9.00
Corn Price	$3.50
Strip till with fertilizer	$22.75
Dry bulk fertilizer	$6.25
Disk Rip/Disk Chisel	$17.85
Spring Cultivate/Finish	$14.00

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THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

LONG TERM RESIDUE MANAGEMENT CORN

RESIDUE MANAGEMENT SYSTEMS

It all started with tillage. Farmers were struggling with no-till corn on highly erodible land in the western region of Lenawee County. The Center of Excellence was organized as a result of farmers wanting more information on tillage systems.

Over the past 19 years of doing tillage plots at the Center of and for Excellence, there was never a trend established of increased yield due to different tillage operations. The first seven years of plots were at the Skinner Highway farm and the past 13 years at the Lidster farm. Over the years, the tillage operations have changed based on the equipment that farmers are using. Examples of this are switching from a chisel plow to a disk-ripper or from the disk to a vertical tillage tool (turbo-till). During this time period no-till and chisel plowing (disk ripping) have been two of the operations that are always included in the strip trials.

CENTER FOR EXCELLENCE
BAKERLADS FARMS
8 YEARS of TILLAGE DATA 2007-2016
SHELLED CORN DRY BU/AC

Tillage	2007	2008	2010	2011	2012	2014	2015	2016
In-Line Ripper	133.2	115.9	163.5	149.1	ND	ND	ND	ND
Disk Ripper	120.2	102.8	167.6	145.4	30.6	119.4	155.3	162.1
No-till	133.7	115.6	166.5	146.6	51.8	121.1	157.8	157.4
No-till w/gypsum	130.6	103.2	ND	ND	ND	ND	ND	ND
Strip Till	ND	ND	ND	148.9	57	134.2	153.8	163.8
Turbo Till	ND	ND	ND	140.3	61.6	139.3	147.0	165.1

Eight years of tillage data in a corn and soybean rotation. Once again the data indicates that yield differences were not a function of a tillage system but of plot variability; soil type, drainage, and CEC differences.

Note: In 2012, the lack of rainfall had a huge impact on soil moisture loss. All the tillage was done in the spring.

RESIDUE MANAGEMENT
2016 BAKERLADS FARM CORN

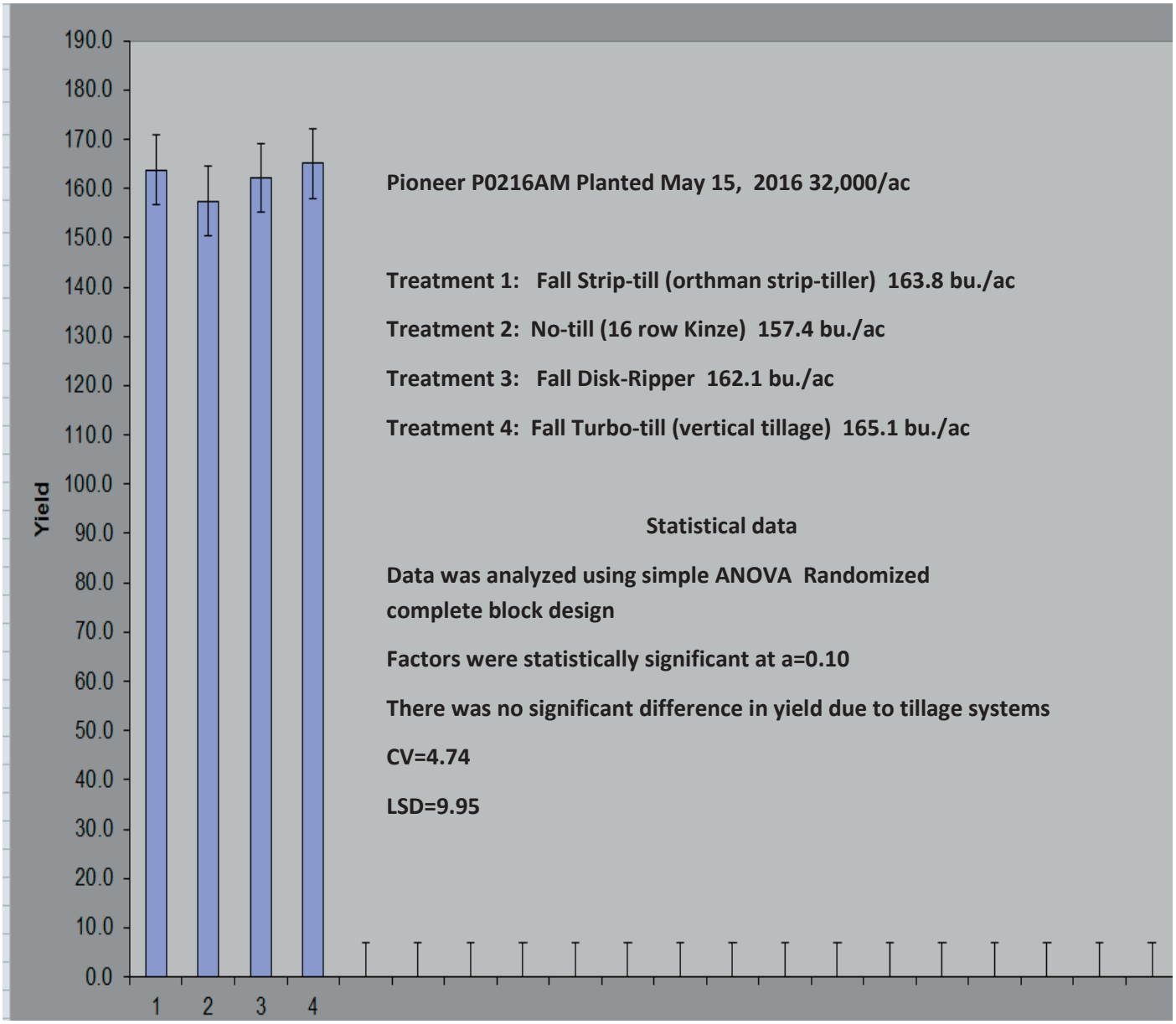
2016 Bakerlads Farm

Soil tests are done every four years on 2.5 acre grids.

Yield goal for the corn tillage plots is 160 bushels per acre. The soil test results and as-applied fertilizer are listed in the chart below. The fertilizer application is designed for crop removal for a two-year period.

Organic matter	PH	Avg. P1 ppm	Avg. K ppm	Lime /ac	14-52-0/ac	0-0-60/ac	other
3.167	7.3	36.3	123.2	0	70	283	0

Corn was planted on 05-15-2016 with Pioneer P0216 AM at 32,000 seeds/acre. Three gallons of Pop-up in furrow of 6-22-15 and 15 gallons of 28% (50 lbs. N) beside the row at planting time on all the plots. Four tillage treatments replicated 3-4 times: Strip-till, No-till, Disk-ripper, and Turbo-till (vertical tillage).



LONG TERM RESIDUE MANAGEMENT SOYBEANS

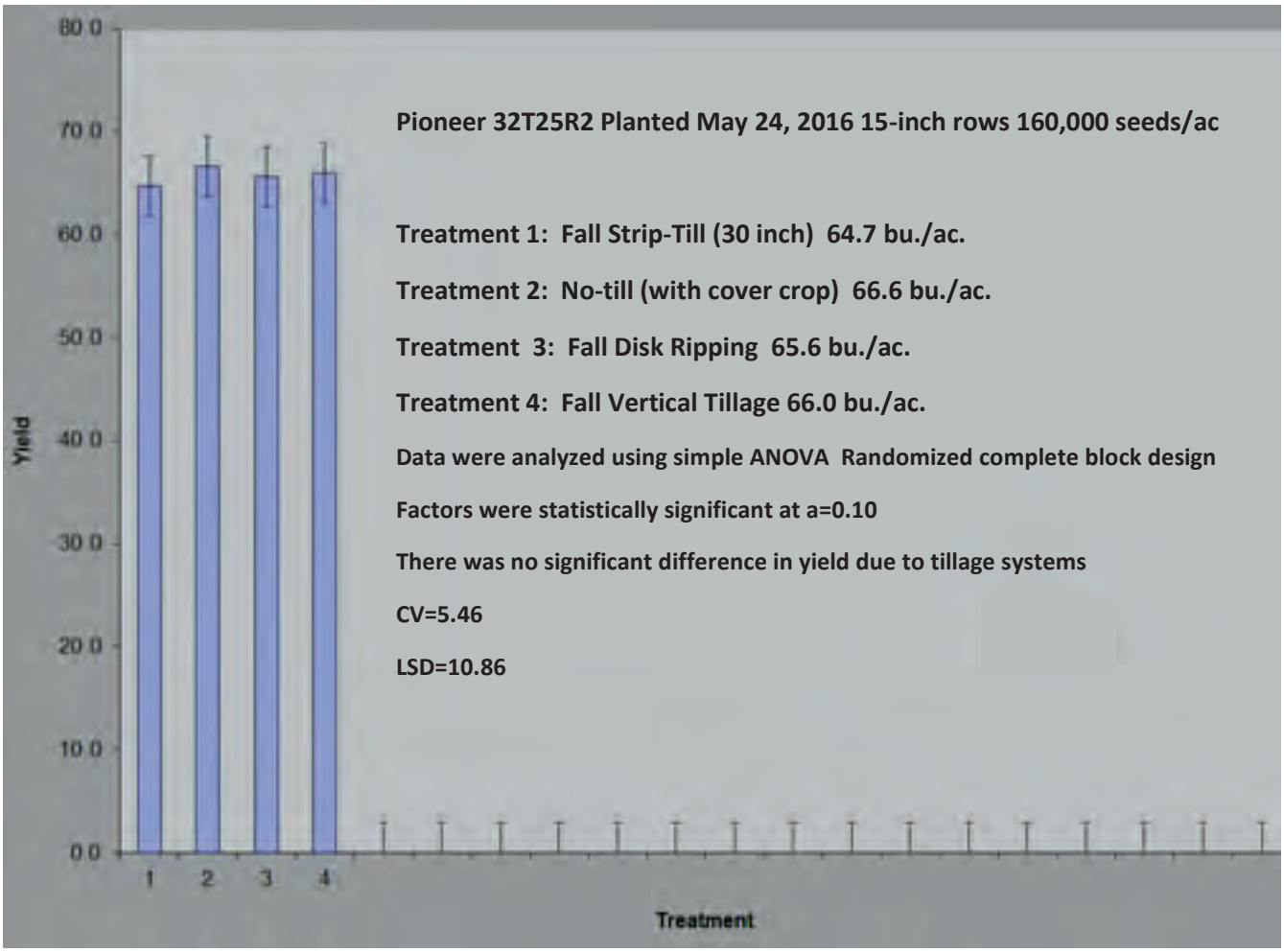
BAKERLADS FARM 2016 SOYBEANS

After 20 years of replicated strip trials a trend of more often than not showed a 2-4 bushel increase in yield most of the time from doing some type of tillage for soybeans following corn in rotation.

Center for Excellence
Soybean Long Term Tillage & Yield Data (dry bu/ac)
2006-2016 Bakerlads Farms

Tillage	2006	2008	2009	2010	2011	2012	2013	2014	2015	2016
No-till	53.3	45.4	57.4	58.6	51.01	42.8	61.7	**39.7**	33.9	66.6
No-till w/gypsum	54.4	45.7	56.2	57.3	**	**	**	**	**	**
Chisel (disk ripping)	**58.8**	**46.7**	**61.5**	**62.7**	50.4	39.1	61.2	38.31	**36.3**	**65.6**
In-line ripper	51.9	44.5	56.8	58	50.94	**	**	**	**	**
Turbo till	**	**	**	**	**51.48**	39.8	**65.2**	38.42	33.7	66.0
Strip-Till	**	**	**	**	51.11	**45.6**	59.1	35.2	35.7	64.7
Strip-till Potash	**	**	**	**	**	**	58.8	31.7	**	**

RESIDUE MANAGEMENT
2016 BAKERLADS FARM SOYBEANS

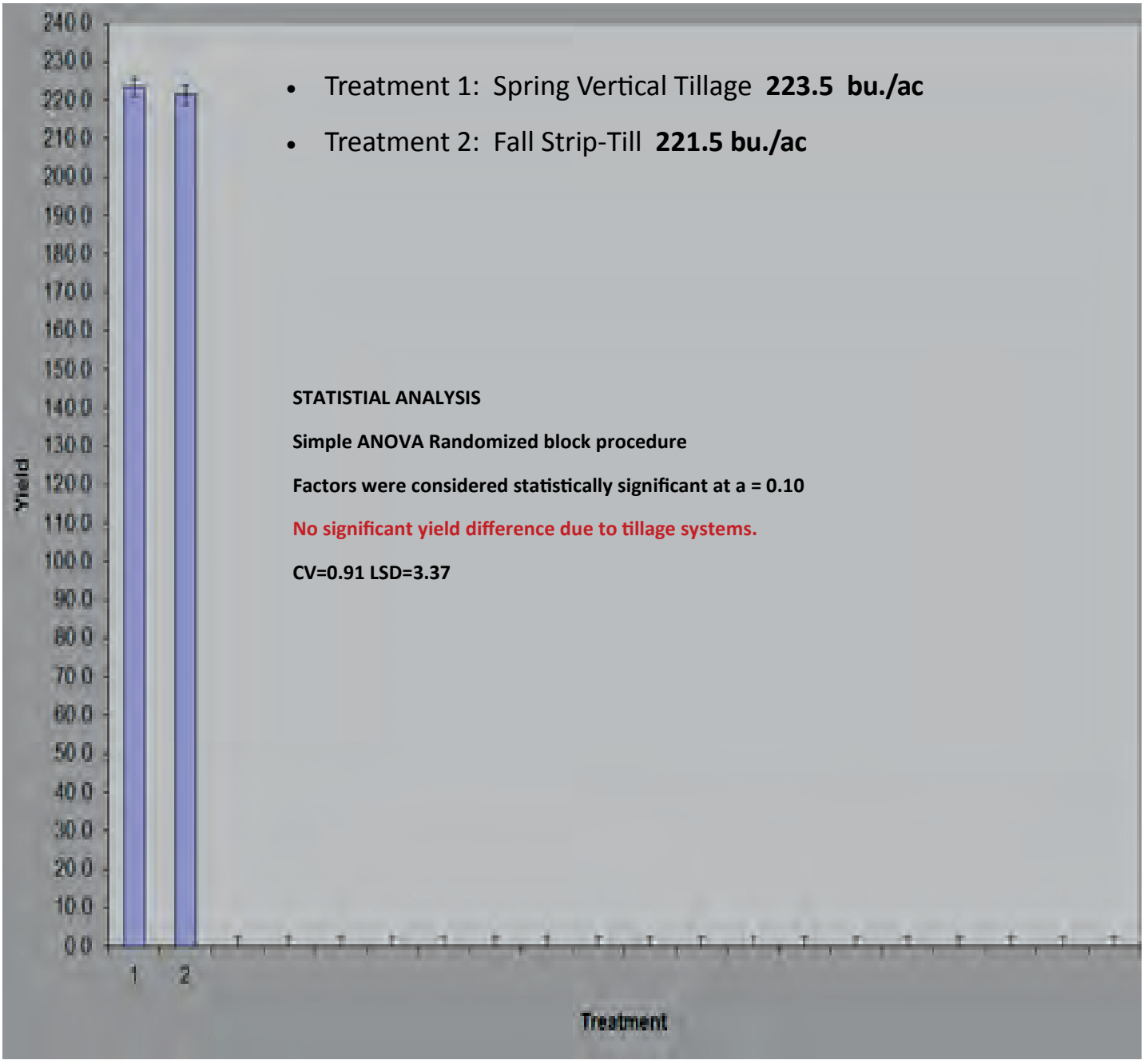


- All tillage was done in the fall of 2015
- Cover crop of annual ryegrass was aerial seeded in fall of 2015
- P and K if needed were variable rate applied based on 2.5 acre grids with a 50 bu/ac yield goal

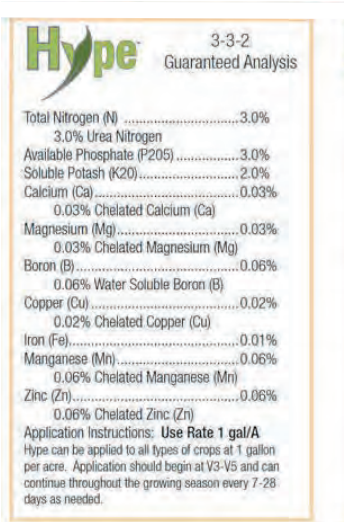
RESIDUE MANAGEMENT
2016 RAYMOND AND STUTZMAN FARMS

A 100-acre field was fall strip-tilled every other 48 rows into soybean residue. P & K fertilizers were variable rate spread prior to planting.

Corn was twin-row planted May 1, 2016 using Channel 207-27 double pro variety @ 38,000 seed drop. Five gallons of Pop-up fertilizer was used at planting time. Nitrogen was applied at V-10 stage with Y drops and variable rate with OptRx .



FOLIAR APPLICATIONS OF SECONDARY AND MICRO-NURIENTS IN CORN



Spraying at V5 vegetative stage in corn when deficiencies occur is a good way to assist in maintaining good corn yields. Raymond and Stutzman Farms participated in strip trials in 2016.

Raymond and Stutzman Farms

Corn planted May 1, 2016 Channel 207-27 Double Pro. 36,000 seed drop/ acre. Fertilizer needs were variable rate spread prior to planting. Pop-up fertilizer five gallons per acre of 16-22-15. Xanthion applied in furrow. 70 lbs of actual N pre-plant with Anhydrous Ammonia. 28% applied with Y drops at V-10 using OptRx variable rate applicator. One application of Micros and secondary nutrients were applied at 1 gallon/acre at the V5 growth stage.

Table 1. 2016 Foliar feed yield data

Treatments	Mean Dry bu/ac
Check	224.7a
Hype	225.2a
C.V.	1.98
L.S.D. (.10)	6.02
Significance	none

FOLIAR APPLICATIONS OF SECONDARY AND MICRO-NURIENTS IN SOYBEANS

Soybeans were planted late may. P & K were applied the year prior in corn. The soybeans were no-tilled. Herbicides were applied as a burndown with some residual broadleaf and grass killer tank mixed. Round-up is applied over top the soybeans if necessary. Foliar application of nutrients were applied at one gallon/acre at the V4 stage. An additional foliar application (Trifecta) was applied at the R3 stage (pod formation) of the soybeans at one gallon per acre.

- Hype is a product that contains N-P-K with Ca, Mg, B, Cu, Mn, Fe, Zn
- Trifecta is a 10-10-10 product of N-P-K with S, Cu, Fe, Mn and Zn

Table 1. Effect on yield of spraying soybeans at the V3-V5 (4th trifoliate) with Hype at 1 gal/acre and Trifecta at 1 gal/acre at R3 stage

Treatment	Mean Yield dry bu/ac	Significant Difference
Check	72.5a	None
Hype	72.6a	None
CV	2.14	
LSD(0.10)	2.10	

The foliar applications of the Product Hype at the V4 stage followed by an application of Trifecta at the R3 stage showed no difference in yields. The strips were replicated across the field with alternate strips of treatment and check to get a good field level yield sample of the treatments. The soybeans had an excellent yield primarily due to the late summer timely rainfalls needed for the crop.

It appears that foliar applications of micro nutrients have mixed results when applied at the field level for any significant yield response.

Bakerlads Farms Soybean Field Roller Trial Protocol for 2016 (Three Treatments)

1	2	3	2	3	1	3	1	2	1	3	2
Pre-emerge	First Trifoliate	Control	First Trifoliate	Control	Pre-emerge	Control	Pre-emerge	First Trifoliate	Pre-emerge	Control	First Trifoliate
Replication 1			Replication 2			Replication 3			Replication 4		

Purpose: Field rolling is a common practice on many farms in Michigan. It significantly reduces stone damage to combines and operator fatigue during harvest operations. Most producers roll soybeans after planting and prior to emergence. This is a very narrow window in some years and producers are wondering if they can safely roll soybeans during the early vegetative stages. There is also growing speculation that rolling soybeans between V1 (first trifoliate) and V3 (third trifoliate) may stress the plants and actually increase yield. The purpose of the 2016 field roller trial was to determine the effect of field rolling at various growth stages on soybean yields.

Procedure: One of the seven SMaRT field rolling trials was conducted by Blaine Baker in 2016. Three treatments were compared in the trial 1) an unrolled control, 2) a pre-emerge rolling and 3) rolling at V1. Stand counts were taken in all treatments to determine if rolling affected final stand.

Results: Both of the rolling treatments increased yields compared to the unrolled control in this trial. The pre-emerge rolling and the V1 rolling increased soybean yields by 3.6 and 2.8 bushels per acre respectively. However, field rolling did not affect final plant stands. Because the cost of field rolling is around $8.00 per acre, field rolling was profitable at this location in 2016.

Table 1. Effect of field rolling on soybean yield, income and final stand in Lenawee County.

Treatment means followed by different letters are statistically significant

Treatment	Yield (bu/ac)	Income ($/ac)	Final stand (plants/ac)
Unrolled	60.0 b	$552	103,300 a
Pre-emerge	63.6 a	$577	103,000 a
First trifoliate	62.8 a	$570	98,100 a
$LSD_{0.10}$	2.4		

LCO PROMOTER AND BIOLOGICALS BAKERLADS FARM AND RAYMOND & STUTZMAN FARMS

Use of biologicals for nitrogen and phosphate fertility at the Center for Excellence Host farms has been part of the Bakerlads and Raymond and Stutzman farms for the past three seasons. This year for corn and soybeans strip trials were done at the Raymond and Stutzman Farms and Bakerlads Farm.

The replicated Strip Trials included seed treatments for both Corn and Soybeans.

- The corn seed treatment was with the product Quickroots. This product is a microbial seed inoculant for improving availability of nitrogen, phosphorus and potassium.
- Soybean seed treatments were made up of two products Quickroots and Optimize. This seed treatment provides both a microbial seed inoculant for improving N, P, and K availability and a multi-action inoculant that combines the performance of the LCO molecule and selected rhizobia inoculant which enhances natural growth process in root and shoot development by providing nitrogen from the air.
- In every strip trial in both corn and soybeans there was a plus yield increase.
- In corn one of the three field trials had a significant yield increase.
- Soybeans two of the three years had yield increases that were significant.

Table 1. Yield data from replicated strips of Quickroots Seed Treatment (Corn) and Quickroots & Optimize Seed Treatment (soybeans)

Farms	Crop	Check Mean Yield	Quickroots Seed Treatment Mean Yield	Yield Increase Bu/acre	Statistics
Raymond and Stutzman Farms					
McMunn	Corn	224.5	232.01	+7.51	Significant LSD 6.22 CV 1.64
Green	Corn	245.8	245.3	-0.5	Not Significant LSD 1.78 CV 0.44
Bakerlads Farm					
Beagle South	Corn	171.9	174.4	+2.5	Not Significant LSD 8.5 CV 2.95
FARMS	**Crop**	**Check Mean Yield**	**Quickroots and Optimize Seed Treatment Mean Yield**	**Yield Increase Bu/acre**	**Statistics**
Raymond and Stutzman Farms					
Bruggeman	Soybeans	67.5	68.6	+1.1	Not Significant LSD 2.67 CV 2.35
Bakerlads Farm					
Baldwin Farm	Soybeans	69.02	71.76	+2.74	Significant LSD 1.0 CV 1.05
Creger Farm	Soybeans	71.3	73.7	+2.4	Significant LSD 1.53 CV 1.27

BIOLOGICALS & MICRO-NUTRIENTS IN CORN - BAKERLADS FARMS

- Strip Trials using Quickroots seed treatment and a micro-nutrient package added in furrow with and without Quickroots.
- Quickroots seed treatment provides microbial activity to activate N,P,K
- Micro-nutrients were applied 2 x2 in furrow. The product used was TJ Micro-mix Liquid at 2 quarts per acre. This is a mix of seven essential secondary and micro-nutrients Ca, Mg, B, FE. Mn, Zn, Cu.
- The strip-trials were done on a field basis and the particular field used for the trial had a lot of variability based on soil types, CEC and organic matter. The corn was planted in late May when it became extremely dry. Some of the stand counts were well below agronomic recommendations.
- There were three trials in the field: Micromix and Quickroots , Micromix with no Quickroot, and only Quickroots. These three treatments were all compared in side by side checks.

Table 1. 2016 Yield data for corn checks compared to three treatments

Treatments	Check Yield	Treatment Yields	Yield Increase bu/acre	Statistics
Micros with Quickroots Seed Treatment	163.7	169.7	+6 **	Significant LSD 6.22 CV 1.64
Micro-nutrients	164.1	164.5	0.4 **	Not Significant LSD 2.67 CV 2.35
Quickroots Seed Treatment	171.9	174.4	+2.5 **	Not Significant LSD 8.5 CV 2.95

**** The data cannot be used to compare each of the treatments against each other only the check for each treatment.**

Planting corn with Quickroots seed treater and micro-mix in furrow placement of micronutrients strip-trials at Bakerlads Farm

IN-FURROW APPLICATION OF BIOLOGICALS AND NUTRIENTS

NutriSmart is made up of lignite/leonardite humate, starch, beneficial microbes, microbial activators

- Humates have a very large surface area for positive and negative charges
- The starches act as a food source for the beneficial microbes
- The microbial activators are the last part of the product and increase food source for all microbes applied and native populations in the soil.

The purpose of the product is for the biology to form a relationship to with the plant. When the plant needs N it will signal the microbes to activate and fix NH4. Research has shown increase yields while lowering the amount of N, P, K

Table 1. 2016 Yield data (three replications) for corn checks compared to NutriSmart at the Bakerlads Farm.

Treatments	NutriSmart	Check	Yield Increase bu/acre	Statistics
Mean Yield bu/ac	177.7	171.8	+ 5.9	LSD 8.06 a=0.10 CV 2.77 Not significant

**** The data cannot be used to compare each of the treatments against each other only the check for each treatment.**

Planting corn with Quickroots seed treater and micro-mix in furrow placement of micronutrients strip-trials at Bakerlads Farm.

UNDERCOVER APPLICATION OF FUNGICIDES RAYMOND AND STUTUZMAN FARMS 2016

Overview

When plants aren't healthy, nitrogen utilization can be limited and yields can suffer. With 360 UNDERCOVER, you can target your fungicide, insecticide and nutrient application where it's needed most — under the crop canopy. In these strip trials Headline fungicide was applied according to label at tassel.

Target Problems at the Source

Protect your crops from late-season disease and insect infestations by applying protection where it's most effective. 360 UNDERCOVER completely surrounds the ear leaf and upper canopy, attacking your target from the top, sides and bottom.

Table 1 Raymond and Stutzman Farms 2016 -360 undercover Fungicide Data

Farms	Headline Mean Yield	Check Mean Yield	Yield Increase	Statistics
Betz	223.05 a	221.73 a	+1.32	LSD 67.13 0.10 CV 12.66
Dave's South	221.66 a	210.73 b	+10.93	LSD 9.47 0.10 CV 2.52
McMunn	244.205 a	245.33 a	-1.125	LSD 8.81 0.10 CV 1.53
Sutton	265.46 a	257.83 b	+7.63	LSD 13.74 0.10 CV 3.02
Les Allen	267.38 a	250.08 b	+17.3	LSD 12.46 0.10 CV 2.76
Total Average	246.10	238.54	+7.56	

On six farms totaling approximately 750 acres, all corn had Xanthium fungicide in furrow at planting. The average yield increase was 7.56 bushels per acre. There were yield increases on all farms except one field. Although the same variety was used in each field there were several varieties used on the 750 acres. Varieties play a big part on using fungicides and could well determine if late application of fungicide at tassel will pay.

20-15-2106

Wheat High Input Trial

Center for Excellence

Tim Stutzman, 2016

Objective

To quantify the impact of increasing inputs on wheat yield and profitability

Protocol

Plot layout was a randomized complete block design with 4 replications and 4 treatments. SMS Advanced was used to create prescription application maps for 28% UAN, fungicide and plant growth regulator. Yerks 2438 wheat was planted October 6, 2015 at 1.1 million seeds per acre on 15-inch row spacing. Yield data was collected with CaseIH 8010 combine with 40-foot head. Yield data was summarized in SMS Advanced, then statistical analysis conducted using SAS proc glymmix procedure.

Figure 1. Research plot layout including field boundary and application prescription map for Prosaro.

Table 1. Yield and Net Return of four treatments of increasing inputs conducted at the Center for Excellence in 2016.

	Treatments	Avg Yield (bu/a)		Bu above control	Additional Cost ($/a)	Net Return ($/a)*	Return ($/a)
1	Base	91.8	B	0.0	$0	$367	$0.00
2	**Base + Prosaro**	**109.9**	**A**	**18.1**	**$23**	**$416**	**$49.21**
3	Base + Prosaro + 35 lb N	100.9	AB	9.1	$46	$358	-$9.07
4	Base + Prosaro + 35 lb N + Palisade	104.5	A	12.8	$62	$357	-$10.61

**Treatment yield x $4/bu minus additional cost of extra inputs.*

Results and Discussion

This trial was one of six high input trials conducted in MI in 2016. This site was the only one with statistical differences between treatments. The base program was designed to be what most wheat growers do now. Each successive treatment adds inputs in attempt to increase yields. The base treatment yielded 91.8 bu/a. When a fungicide at anthesis timing was added, the yield jumped 18.1 bushels to 109.9 bu/a. The third treatment added an additional 35 lb nitrogen to treatment 2, which yielded 100.9 bu/a. The fourth treatment added a plant growth regulator (Palisade), produced a yield of 104.5 bu/a. Partial budget analysis is a tool that allows you to calculate the economic impact of treatments on net returns. It does not account for all costs, but it does give us a comparison between treatments taking into account the cost of each input and resulting yields. The additional cost above the control as well as the Net Return is listed in the table. The treatment with the highest return was 2 with a $49.21 return above the additional cost of the fungicide.

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OVERSEEDING CORN WITH COVER CROPS

In 2014 we did a demonstration plot looking at the establishment of cover crops using annual ryegrass and crimson clover over seeded at the V4-V5 stage of corn. Spreading cover crops at such an early stage can be tricky. Herbicide programs must be suited to provide adequate weed control but allow the establishment of the cover crops but not taking any yield opportunities away from the corn crop. Summary: No yield drag, great cover crop establishment but weed control on fall grasses could cause some future issues . Research on chemical use and this practice is needed before used on a whole farm situation.

There was do demonstration in 2015 but in the 2016 crop season we did the practice again. Three cover crop demonstrations were evaluated. Alternated strips of Annual ryegrass and red/crimson clover mix and red clover and crimson clover mix were over seeded on June 21 , 2016, V5-V6 stage 25 lbs/acre. The rest of the field was seeded with annual rye grass mix at the normal cover crop seeding time in late August. (check)

Overseeding annual ryegrass and red/crimson clover at V5-v6 stage on June 21, 2016

Treatment	Mean Yield 3 replications
Check	174.7 b
Annual Rye grass/clover mix	184.4 a
Crimson and red clover mix	173.1 b
Statistics Treatment means followed by different letters are statistically significant	LSD 0.10 4.57 CV 1.61