2018

Center For Excellence
Agriculture Field Plot Research

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Blaine Baker of Bakerlads Farm

GENERAL INFORMATION
CONDUCTING ON-FARM RESEARCH

The Center for Excellence was started 23 years ago. The Lenawee Conservation District has been hosting the Center along with two host farms, Bakerlads Farm and Raymond and Stutzman Farms. Major supporters of the Center are Michigan Corn Marketing Program, Michigan Soybean Promotion Committee, and thirty-one other local and regional sponsors enabling the Conservation District to make the Center happen. The Conservation District is grateful for all the support.

The on-farm research and demonstration efforts allow the Conservation District to address issues relevant to county needs as identified by local partners and stakeholders contributing to these efforts. Please visit the Lenawee Conservation District website at www.lenaweeconservationdistrict.org for more information on the Center for Excellence for current and past reports.

WHY ON-FARM RESEARCH

Over 20 years ago a group of farmers from the Hudson, Michigan area met with local United States Department of Agriculture (USDA) and Michigan State University (MSU) Extension service staff, driving home the need for on-farm research for residue management systems. No-till systems were being required on highly erodible land in the Western Lake Erie Basin (WLEB) and farmers were struggling to make these systems work on a consistent basis.

Since then, the Center has evolved into on-farm research plots in other areas of crop management. Additional demonstration type projects for local and regional producers were established for evaluation and use on local farms.

Areas of Interest: Crop residue management systems, nutrient management (phosphorus, late season N on corn, GPS application of N), crop rotations, soil health, new conservation practice technology (sub-irrigation, drainage water management, two-stage ditch, blind inlets, saturated buffers, and phosphorus filters.

STATISTICS 101

Replication: In statistics, replication is repetition of a treatment or observation under the same or similar conditions. Replication is important because it adds information about the reliability of the conclusion drawn from the data collected. The statistical methods that assess that reliability rely on replication. If possible, multi-year data is considered some of the most important replications for a trial and is considered more valuable than one-year data.

Randomization: A method of selecting a sample from a population in which all the items in the population have an equal chance of being chosen in the sample. This reduces the introduction of bias into the analysis. In on-farm research, this same randomization accounts for spatial and soil variation.

P-value: The calculated probability that the differences found in the study are due to chance. As the P-Value number gets smaller, the probability increases that there are real differences. For these studies we use the P-Value of 0.05 as the cutoff to determine whether the treatment differences are greater than random variation (sometimes called experimental error). When these differences are thought to be real we call them significant. In most research trials the P-values are 0.05, 0.1 or 0.2. As the P value approaches 0.2 there is less confidence in the treatments that cause significant difference.

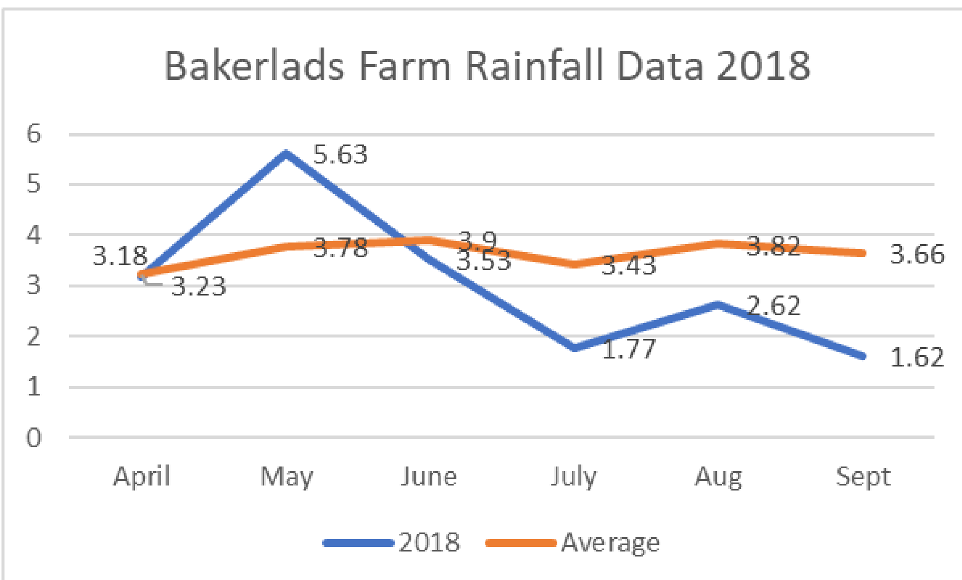
Least Significant Difference (LSD): The amount of difference that is required within a data point to be called significant due to the treatment. In the replicated trials in this report, data that is not significantly different is listed with the same letter.

Coefficient of Variation (CV): The amount of variation in the data that is analyzed in ANOVA. The higher the CV, the more variance there is in the data. The lower the CV, the cleaner the data is.

2018 WEATHER DATA

The data was acquired from the Michigan Agriculture Weather Network (MAWN) site that is located at the Hudson, Michigan site and located in Clayton, Michigan at the Bakerlads Farm.

(Latitude: 41.8729 Longitude: -84.2559)



The growing season was characterized by a wet early April-May followed by a dryer hot June-July. Most of the corn and soybean crops were not planted until Memorial day or later. The wheat crop report for northwest Ohio and southeast Michigan was quoted: “potentially wheat could be some of the best wheat ever grown”. That slipped away from most of the growers to the tune of about 20% yield reduction due to an extremely dry and hot June through early July. Soybeans became stressed while corn hung in there with cooler temperatures and timely rains through the rest of the summer.

The mean high and low temperatures from June 1st through September 1st were 82.5 degrees F and 59.4 degrees F. Lots of sunshine and cooler daily temperatures helped the crops in the late summer become more efficient in utilizing soil moisture.

2018 HOST FARMS FIELD FEATURES

Soils information provided from the Lenawee County Soil Survey, available in hard copy at the Lenawee County Conservation District or by visiting the National Resource Conservation Service (NRCS) Web Soil Survey site: http://.soils.usda.gov/survey.

Bakerlads Farm

Map Unit: BfB Blount loam, 2-6 percent slopes

The Blount component makes up 85 percent of the map unit. Slopes are two to six percent. This component is on ground moraines on till plains, till plains, and end moraines on till plains. The parent material consists of Wisconsin till derived from limestone and shale. Depth to a root restrictive layer, densic material, is 26 to 45 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 9 inches during January, February, March, April, May, November and December. Organic matter content in the surface horizon is about two percent. Non-irrigated land capability classification is 2e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 24 percent.

Map Unit: MhB2—Glynwood loam, 2 to 6 percent slopes, eroded

Component: Glynwood (85%)

The Glynwood component makes up 85 percent of the map unit. Slopes are two to six percent. This component is on till plains, end moraines on till plains. The parent material consists of Wisconsin till derived from limestone and shale. Depth to a root restrictive layer, densic material, is 25 to 37 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 18 inches during January, February, March, April, May, and December. Organic matter content in the surface horizon is about two percent. Non-irrigated land capability classification is 2e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 26 percent.

Raymond and Stutzman Farms

Map Unit: BfB Blount loam, 2-6 percent slopes

The Blount component makes up 85 percent of the map unit. Slopes are two to six percent. This component is on ground moraines on till plains, till plains, and end moraines on till plains. The parent material consists of Wisconsin till derived from limestone and shale. Depth to a root restrictive layer, densic material, is 26 to 45 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at nine inches during January, February, March, April, May, November and December. Organic matter content in the surface horizon is about two percent. Non-irrigated land capability classification is 2e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 24 percent.

Component: Bronson (95%)

The Bronson component makes up 95 percent of the map unit. Slopes are zero to three percent. This component is on knolls. The parent material consists of loamy glaciofluvial deposits over sandy and gravelly glaciofluvial deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 33 inches during January, February, March, April, May, November and December. Organic matter content in the surface horizon is about two percent. Non-irrigated land capability classification is 2s. Irrigated land capability classification is 2s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 15 percent.

Map Unit: CgA—Conover loam, 0 to 3 percent slopes

Component: Conover (95%)

The Conover component makes up 95 percent of the map unit. Slopes are zero to three percent. This component is on knolls. The parent material consists of loamy till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 18 inches during January, February, March, April, May, November, and December. Organic matter content in the surface horizon is about three percent. Non-irrigated land capability classification is 2w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 15 percent.

Map Unit: BhA—Brady sandy loam, 0 to 3 percent slopes

Component: Brady (95%)

The Brady component makes up 95 percent of the map unit. Slopes are zero to three percent. This component is on low knolls. The parent material consists of loamy over sandy and gravelly glaciofluvial deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during January, February, March, April, May, November and December. Organic matter content in the surface horizon is about three percent. Non-irrigated land capability classification is 2w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 18 percent.

TILLAGE STRIP TRIALS IN CORN BAKERLADS FARM 2018

OBJECTIVE

As requested by producers every year, continue evaluation of different tillage systems and their effects on long term yields. Possibly keep the longest running tillage test plot going.

METHODS

This is the 22nd season for the replicated strip trials of different tillage systems. There are at least three replications of each of the tillage systems. Over the years, some of the tillage systems have been dropped from the trials. These include in-line ripping and strip-till with fertilizer in the strip. Chisel plowing was replaced by a disk ripper and a field cultivator was replaced with Turbo-Till.

The replicated strip trials for tillage are done in the fall. The tillage equipment used in the strip-trials are: strip-till completed with an 8-Row Orthman One-Tripper, No-till planting with Kinze 3600 16-row, Vertical Tillage with Case IH 330 Turbo-Till and IH 875 Disk Ripper.

RESULTS

Tillage System	Soil	Crop	Fertilizer	Mean Yield/ac	Statistical Significance *(P<0.05) C.V.-2.02 LSD 10.57*	Net Return / acre After Tillage & Planting Based on mean average of field
Strip-Till System (auto-steer, planting and strip-tilling)	Morley and Blount Loam	Corn	3 gal. starter 50 lbs. of N at planting	178.1 a	Not Significant	$605.91
No-Till System (no-till planting w/auto steer)	Morley and Blount Loam	Corn	3 gal. starter 50 lbs. of N at planting	188.9 a	Not Significant	$630.21
Disk-Ripping System (disk-ripping, spring turbo-till, planting w/auto steer)	Morley and Blount Loam	Corn	3 gal. starter 50 lbs. of N at planting	189.3 a	Not Significant	$593.88
Turbo-till system (one pass in the fall, one pass in spring, planting w/ auto steer)	Morley and Blount Loam	Corn	3 gal. starter 50 lbs. of N at planting	189.7 a	Not Significant	$601.66

Equipment costs based on 2018 Michigan State University Custom Rates which includes: machine, operator and power unit

Disk-Ripper: $20.28/acre; No-till Planting with fertilizer: $19.75/acre; Conventional Planter with fertilizer: $19.30/acre.

Vertical Tillage (42'-Turbo-Till): $14.50/acre; Orthman Strip-Tiller: $24.75/acre; Soil finisher: $16.50/acre; Auto-Steer: $2.79/acre.

Corn Price: $3.50/bushel * Mean Average of the field 186.5 bushel/acre

TILLAGE STRIP TRIALS IN CORN
BAKERLADS FARM 2018

DISCUSSION

Corn yields were very good considering the month of May was wet; corn planting started Memorial day and ended in early June which produced hot, dry conditions through the middle of July.

There was no significant difference in yield between the different tillage systems. After 22 years of no-till and improved soil health it has become difficult to demonstrate the economic value of soil health. Variability in the field may be providing enough yield variance to overshadow the benefits that good soil health may provide. In drought years the no-till system out yields the conventional tillage systems by 20 percent as has been demonstrated a couple of times in the past couple of decades.

Yield differences over the 22 years of corn tillage plots have proven not to be statistically different from year to year but there definitely is an economic difference in these systems when compared.

NEMASTRIKE SEED TREATMENT ON CORN 2018

OBJECTIVE

To test the seed treatment product Acceleron NemaStrike ST and its effects on crop yield in fields, known to have high populations of nematodes. This is the second year of testing this product at the Raymond and Stutzman Farms.

BACKGROUND

NemaStrike is not available in all areas of the country. It currently has an experimental license for use but can only be used as a pre-seed treatment. It has current handling restrictions by producers and the material is toxic to birds and animals.

METHODS

NemaStrike treated seeds were put in one side of the split central fill corn planter with the check seed in the other. Sixty-foot strips of treated seed as compared to the check were planted across the field. Yield checks were made side by side on a minimum of four sample strips in the field will be harvested for the treatment and the check.

RESULTS

Dry Bushel/Acre		
Replications	**NemaStrike Seed Treatment**	**Check**
1	171	173
2	167	142
3	129	134
4	131	145
Mean	149.5	148.5
LSD (P<.05) 34.58	CV 13.41	No significant difference

DISCUSSION

Average harvest populations for the Nemastrike seed treatment and the check were almost identical. Several harvest populations were taken with NemaStrike population at 30,407 and the check at 30,335. Evidently, nematodes were not an issue in this field this year.

NITROGEN MANAGEMENT IN CORN WITH OPTRX™ (V4 & V9) 2018

OBJECTIVE

The strip trials were to further evaluate the effectiveness of using the GPS OptRx™ which applies nitrogen based on crop health and need as compared to timing of plant growth stage (V4 and V9). This is the 2nd year of data for these nitrogen management trials at the Bakerlads Farm

BACKGROUND

The Center for Excellence has been working on nitrogen management trials for many years. There have been many N strip trials in the past evaluating pre-plant verses side-dress, N-Serve, Anhydrous verses 28% and most recently using the OptRx™ GPS application for side-dress application of nitrogen. Most of the strip-trials have resulted in no significant difference except when we varied the amounts and the use of the OptRx™.

- It has been very evident that high nitrogen application in corn doesn't always produce extra yields.
- The OptRx™ side-dressed in five years of replicated strip trials has increased crop production efficiency by reducing the amount of nitrogen applied at the V3-V5 stages of side-dress and no yield decline.

METHODS

A ten-acre field was setup with alternating 60-foot wide strips in the field of side-dress with anhydrous ammonia at the V4 stage as compared to applying nitrogen at the V9-V10 with 28% and drop nozzles. All the plots were using the OptRx GPS applicator. There were four samples taken from each test strip running the length of the field. The entire field had 50 lbs. of 28% nitrogen applied at planting time followed by the treatments described.

RESULTS

Dry Bushel/Acre		
Data	**OptRx™ at V4 Anhydrous ammonia**	**OptRx™ at V9 28% with Drops**
Mean Yield dry bu./ac.	185.1	187.2
Lbs of Actual N Applied at Planting	50	50
Lbs of Actual N Post applied with OptRx	90.1	77.9
Total N Used	140.1	127.9
Nitrogen Efficiency	0.76	0.68
Total N cost*$.40/lb.	$56.04*	$51.16*
LSD (P < .05) 7.2	CV 2.35	No Significant Difference

DISCUSSION

The data shows a 2.1-bushel difference in the early side-dress application of nitrogen verses late vegetative application at the V9 stage but this yield difference was not significant. Nitrogen uptake charts in corn show that about 15% of the total nitrogen needed through yield is used in the first 40 days or up to about V-9. The corn crop from this stage starts to utilize the largest amount of nitrogen through flowering, up to 65% of the total use. Can we improve the efficiency in yield by late application of nitrogen based on crop need? The late application of nitrogen with the OptRx used 12.2 pounds/acre less Nitrogen which equates to $4.88 per acre.

The data suggests no significant difference but the other piece to the puzzle is how much nitrogen did we use? The average N use based on the crop needs was different based on the crop stage. We know the crop is getting the nitrogen from somewhere, such as mineralization, or atmosphere. How does soil health effect the available nutrients in the soil?

NITROGEN MANAGEMENT IN CORN STRAIGHT RATES TO OPTRX™ 2018

Center for Excellence

Objective

The replicated trials were designed to compare different straight nitrogen rates with OptRx GPS application of nitrogen based on crop health.

Background

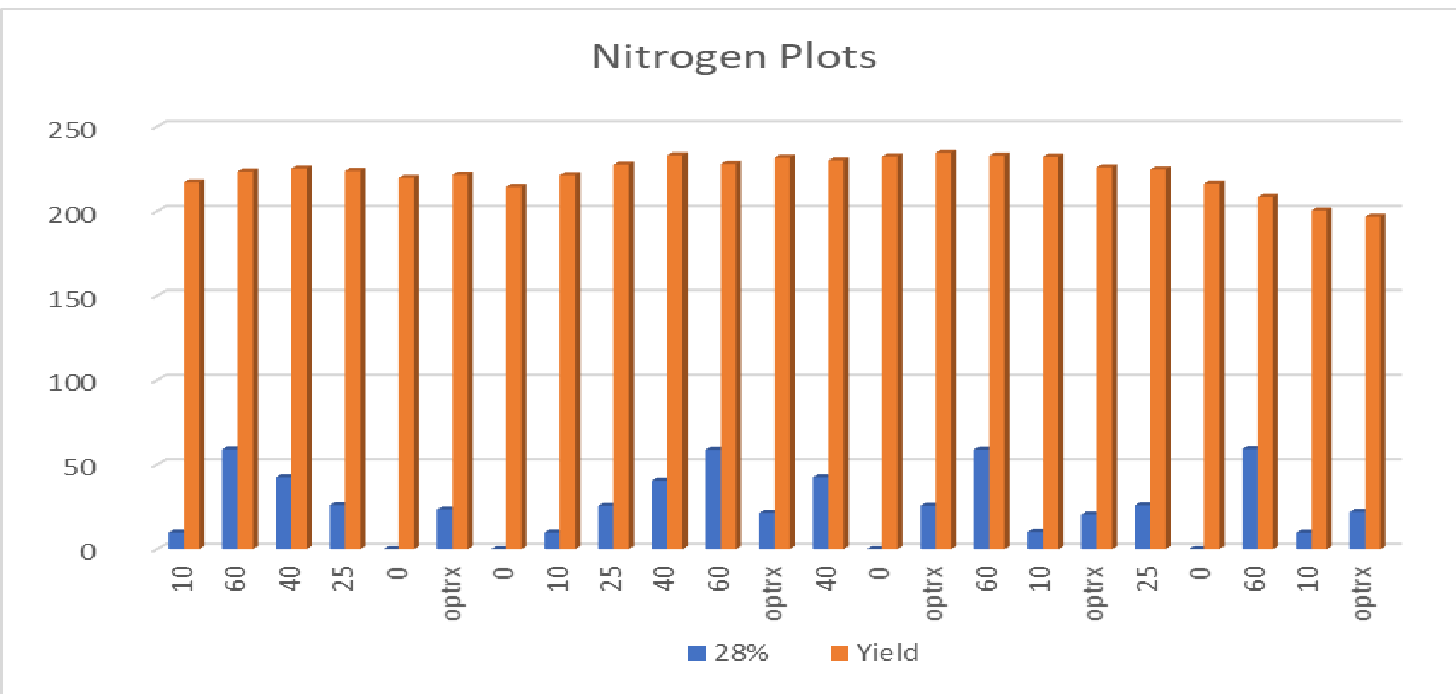
The use of nitrogen fertilizer in corn has drastically changed over the past decade. New corn varieties, price of nitrogen fertilizer, timing, water quality issues and the current price of corn all effect how much nitrogen fertilizer is being used. It is not uncommon for most producers to apply 1-1.2 pounds of N per bushel produced. At the Center for Excellence, the search to improve the efficiency of how much nitrogen gets applied as compared to resulting yields has been a top priority.

Methods

Random strips of different applications of Nitrogen were applied on a 100-acre field that is very similar in soil type and fertility levels. The field had 70 pounds of actual N applied pre-plant with Anhydrous Ammonia. The balance of the Nitrogen was applied at V-9 with Y-drops using 28% Nitrogen in 60- foot wide random strips across the field.

Results

Raymond and Stutzman Farms



*Preplant Nitrogen: 70 pounds of actual N applied May 15, 2018

**Based on $3.50 corn/bu. & Nitrogen cost at $0.40/pound of actual N ($225/ton)

NITROGEN MANAGEMENT IN CORN STRAIGHT RATES TO OPTRX™ 2018

RESULTS

Raymond and Stutzman Farms

Gallons of 28% N Applied at V-9	**0 Gal**	**10 Gal**	**25 Gal**	**40 Gal**	**60 Gal**	**OptRx**
Total Lbs. N Used including Pre-plant*	70.0	99.0	145.0	192.0	242.0	136.0
Mean Yield Dry Bushel/Ac	**221.1 a**	**223.5 a**	**225.3 a**	**229.3 a**	**228.1 a**	**229.2 a**
Efficiency of N (lbs. used per bu. Yield)	0.32	0.45	0.64	0.84	1.08	0.60
Net Return After Nitrogen Cost **	$744.17	$722.32	$730.69	$726.10	$684.12	$744.93
Yield Statistical Data a Not-Significant (p<0.5)	**LSD 11.11**	**CV 2.76**				

DISCUSSION

The 2018 crop year was wet early with most of the corn crop planted the last week in May through Early June. The weather followed with a 4-5-week hot dry spell and sunshine, moderate temperatures and timely moisture for the rest of the summer. Early pre-plant application of nitrogen could have been lost into the system.

Additional 28% nitrogen was applied at the V-9 stage of the corn with Y drops to distribute nitrogen evenly between the rows. Straight rate nitrogen is applied at the desired amounts as programmed into the display screen in the tractor which communicates with a spray module to apply accordingly. Research shows that corn uses 65% of the nitrogen from this stage through the ear and kernel development.

When using the OptRx, the operator uses the same display screen, with additional field information. The OptRx sets parameters for algorithms to function properly while applying nitrogen geo-spatially. The field data entry includes past crop, nitrogen credits, and age of crop to be side-dressed. The OptRx sensor reads the near infra-red light reflected off the plant displaying crop health geospatially. Nitrogen is then applied based on the crop health in the field. Typically, areas of the field that have high organic matter where mineralization occurs at a higher rate needs less nitrogen to grow an economic crop.

When analyzing the data there was no significant yield difference from all the different nitrogen applications used in the field. Keep in mind, the growing season from the V-9 stage on was perfect with plenty of moisture for a good growing crop. The corn crop was getting its nitrogen from somewhere: mineralization of organic matter, last year's soybean crop and/or past applications of manure. The important take away is that every year the available nitrogen in the soil varies with weather and past cropping history. The algorithms incorporated in the OptRx are designed to use past field history coupled with current crop health to provide adequate nitrogen to the plant for an optimum or economic crop.

Using the flat rate strip trials in conjunction with the OptRx verifies that using book value nitrogen rates is at best a professional guess.

TILLAGE STRIP TRIALS IN SOYBEANS
BAKERLADS FARM

Center for Excellence

OBJECTIVE

As requested by producers every year, continue evaluation of different tillage systems and their effects on long term yields.

BACKGROUND

For 22 seasons we have been testing replicated strip trials of different tillage systems. We have dropped some of the systems, for example, in-line ripping. Currently we have been evaluating four systems which include No-till, vertical tillage (turbo-till), disk-ripping and strip tillage. There are at least three replications of each of the tillage systems annually. There has never been a trend establishing that a specific type of tillage significantly raises yields. The yield differences sometimes have been significant but not more than one season in a row. Most of the data reflects yield differences due to other variations in the field which could be drainage, compaction, or poor weed control.

In past years there was a trend of increased yield (+2-4 bu.) by using tillage systems in soybeans. That trend has disappeared. No longer is there a yield difference due to different tillage systems. Perhaps the improvement of soil structure and health has been the main factor.

METHODS

Replicated fall tillage strip trials are done each fall on designated strips. The featured tillage is Strip-Till completed with an 8-Row Orthman One-Tripper, No-till planting with Kinze 16-row with splitter, Vertical Tillage with Case IH 330 Turbo-Till and primary tillage with 875 Disk Ripper.

RESULTS

Tillage System	Soil	Crop	Mean Yield/ac	*Statistical Significance (P<0.05) C.V. 4.92 LSD 8.16*	Net Return After Tillage & Planting Based on mean average of field
Strip-Till System (auto-steer, planting and strip-tilling)	Morley and Blount Loam	Soybean	59.3	Not Significant	$498.4
No-Till System (no-till planting w/auto steer)	Morley and Blount Loam	Soybean	61.2	Not Significant	$523.15
Disk-Ripping System (disk-ripping, spring turbo-till x2 , planting w/auto steer)	Morley and Blount Loam	Soybean	58.6	Not Significant	$475.17
Turbo-Till System (one pass in the fall, one pass in spring, planting w/auto steer)	Morley and Blount Loam	Soybean	62.8	Not Significant	$495.45

Equipment costs based on 2018 Michigan State University Custom Rates which includes: machine, operator and power unit

Disk-Ripper: $20.28/acre; No-till with splitter & fertilizer: $18.56/acre; Conventional planter with 15-inch rows: $17.26/acre

Vertical Tillage (42'-Turbo-Till): $14.50/acre; Orthman Strip-Tiller: $24.75/acre; Soil finisher: $16.50/acre; Auto-Steer: $2.79/acre. Soybean Price: $9.00/bushel * Mean Average of the field 60.5 bushel/acre

TILLAGE STRIP TRIALS IN SOYBEANS
BAKERLADS FARM

DISCUSSION

The soybeans were planted in late May due to wetness in the fields. Weed control was good with no major weed outbreaks. All the tillage plots were sprayed with the same chemical program and fertilized with potash using variable rate technology. The mean average yields, regardless of tillage system, were not significant.

When determining crop budgets, the difference in return to management did not include seed, fertilizer, chemical spray, land rents, etc. It should be noted the same chemical charge was used for all tillage systems based on talking to farmers. Many producers use a burndown chemical regardless of tillage systems to deal with perennial weeds that have developed due to long term use of Glyphosate chemistry used in post applications of weed control.

2016-2018 LENAWEE COUNTY SMARTT FIELD ROLLING TRIAL

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. Producers are wondering if they can safely roll soybeans during the early vegetative stages and induce a stress-related yield response. The purpose of the field roller trials was to determine the effect of field rolling at various growth stages on soybean yields.

PROCEDURE Blaine Baker conducted rolling trials in 2016, 2017 and 2018. Three treatments were compared in the 2016 trial 1) an unrolled control, 2) a pre-emerge rolling and 3) rolling at V1. Rolling at V3 was added as a fourth treatment in 2017 and 2018. Stand counts were taken in all treatments to determine how rolling affected final plant stand.

Table 1. Effect of field rolling on soybean yield and final stand in Lenawee County in 2016.

Treatment	Yield (bu/ac)	Final stand (plants/ac)
Unrolled	60.0 b	103,300 a
Pre-emerge	63.6 a	103,000 a
First trifoliate	62.8 a	98,100 a
LSD $_{0.10}$	2.4	17,500

Treatment means followed by different letters are statistically different.

Table 2. Effect of field rolling on soybean yield and final stand in Lenawee County in 2017.

Treatment	Yield (bu/ac)	Final stand (plants/ac)
Unrolled	57.5 a	116,700 a
Pre-emerge	57.9 a	111,900 ab
First trifoliate	60.6 a	105,900 bc
Third trifoliate	60.7 a	95,700 c
LSD $_{0.10}$	4.6	10,200

Treatment means followed by different letters are statistically different

Table 3. Effect of field rolling on soybean yield and final stand in Lenawee County in 2018.

Treatment	Yield (bu/ac)	Final stand (plants/ac)
Unrolled	69.5 a	105,700
Pre-emerge	63.9 a	99,600
First trifoliate	66.1 a	100,800
Third trifoliate	67.4 a	105,300
LSD $_{0.10}$	4.9	7,657

Treatment means followed by different letters are statistically different

RESULTS In 2016, both rolling treatments increased yields compared to the unrolled control. 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. In 2017 and 2018, rolling did not affect soybean yields but did significantly affect final stands in 2017. Rolling after the plants emerged reduced final stands by 10,800 plants per acre at V1 and by 21,000 plants per acre at V3 compared to not rolling.

2017-2018 IN-FURROW CALCIUM FERTILIZER TRIAL

Center for Excellence

PURPOSE

Some Michigan soybean producers have the capability of applying in-furrow products at planting. These producers are looking for products that will increase soybean yields and profits when applied in-furrow. The purpose of this trial was to evaluate how an in-furrow application of LiberateCa™, a liquid calcium fertilizer from AgroLiquid will affect soybean yield and income in 2017 and 2018.

PROCEDURE

Tim Stutzman conducted one of the three in-furrow calcium fertilizer trials in 2017 and one of two trials conducted in 2018. In these trials, an in-furrow application of LiberateCa was compared to an untreated control. The LiberateCa was applied at 1 quart per acre.

RESULTS

The LiberateCa in-furrow application did not significantly increase soybean yields in Lenawee County in 2017 or 2018. The lack of a positive yield response to the calcium fertilizer was probably due to the fact that the soil calcium levels were medium to high in both years.

Table 1. Soil test levels at the 2017 and 2018 in-furrow calcium fertilizer trials

Year	P	K	Mg	Ca	Soil pH	Mg base saturation	Ca base saturation
	------- Parts per million --------				1:1	--------- Percent -------	
2017	144	122	149	899	6.2	23	58
2018	22	75	158	1107	6.4	18	65

Table 2. The effect of an in-furrow application of calcium fertilizer on soybean yield in Lenawee County in 2018

Year	Untreated control	LiberateCA	$LSD_{0.10}$	Yield Difference
	------------- Yield (bushels per acre) --------------			
2017	48.1	49.8	3.1	1.7
2018	53.1	52.9	1.1	-0.2

SMaRT

Soybean Management and Research Technology

2018 PRE-PLANT, BROADCAST AMMONIUM SULFATE TRIAL

Center for Excellence

PURPOSE

There is growing interest in applying sulfur fertilizers to soybeans. Much of this is due to recent research conducted by Dr. Shawn Casteel at Purdue University. Dr. Casteel has shown some profitable yield increases when ammonium sulfate is broadcast prior to planting soybeans. The purpose of this trial was to evaluate how a pre-plant, broadcast application of ammonium sulfate will affect soybean yield and income in Michigan in 2018.

PROCEDURE

A pre-plant, broadcast application of ammonium sulfate (21-0-0-24) was compared to an unfertilized control at four locations in 2018. One of these trials was conducted by Tim Stutzman in Lenawee County. The ammonium sulfate was applied at 100 pounds per acre. Soil tests were collected from each site to determine the baseline sulfur levels in the soil.

RESULTS

The ammonium sulfate did not increase soybean yields at any of the 2018 trials (including the Lenawee site) or when all four locations were combined and analyzed. Due to the lack of a positive yield response and the associated fertilizer and application costs with this treatment, the ammonium sulfate treatment reduced income by $18 per acre in 2018.

Table 1. Soil test levels at the pre-plant, broadcast ammonium sulfate trial in Lenawee County in 2018

Organic Matter	P	K	Mg	Ca	Sulfur	CEC	Soil pH
percent	------- Parts per million --------					meq/100g	1:1
3.9	31	154	495	2500	7	17	7.0

Table 2. The effect of a pre-plant, broadcast application of ammonium sulfate on soybean yield in Lenawee County in 2018

Untreated control	Ammonium sulfate	$LSD_{0.10}$	Yield Difference
------------- Yield (bushels per acre) --------------			
53.9 a	53.1 a	2.6	-0.8

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YIELD RESPONSE TO STRIP TILLAGE

THE OHIO STATE UNIVERSITY EXTENSION

By Eric A. Richer, Ohio State University Extension Educator, Fulton County and
Thomas Van Wagner, Michigan Center For Excellence, Lenawee County

OBJECTIVE

To compare the yield response and economics for strip tillage, no-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 four 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 2016 using an Orthman 1TRPR. While one of the advantages of strip tillage is applying the fertilizer in the strip, time and field limitations did not allow it for this trial. As such, all fertilizer was variable-rate applied across all treatments in the spring. Within each trial location, all planting, fertilizing, pesticide application, and harvesting was consistent.

Measurable data points included yield and moisture. Yield 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

Ohio Michigan Strip Till Data

Location	Soil	Crop	Tillage Treatment	Fertilizer Applied	Moisture %	Mean Yield	Significant Difference (p<.05)
Lenawee Co 1	Hoytville	Corn	Vertical Tillage	Broadcast VRT over	28.2	225.9 a	LSD 14.3; CV 4.3
			Strip Till	both Treatmenst	28.1	217.8 a	
Fulton Co 2	Haskins-Nappanee	Corn	No Till	Broadcast VRT over	16.9	156.5 a	LSD 17.6; CV 4.94
			Strip Till	both Treatmenst	16.5	159.4 a	
Fulton Co 3	Haskins-Nappanee	Corn	No Till	Broadcast VRT over	18.8	159.4 a	LSD 13.2; CV 3.66
			Strip Till	both Treatmenst	17.8	161.4 a	

Mean Yields with the same letter are not significantly different

DISCUSSION

In all of the sites, there was no significant difference in yield among the treatment systems. Additional university data suggests that placing the nutrients with strip tillage equipment would have positive impact on yield in similar trials. As such, it is important to remember that strip tillage equipment brings both the zone tillage and nutrient placement benefits to the system. Broadcasting the fertilizer in the comparison of these two trials could have had an impact on results. Each producer's cost for equipment operations can vary. It is best to calculate and compare your equipment costs to determine economic differences for this trial.

YIELD RESPONSE TO STRIP TILLAGE

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THE OHIO STATE UNIVERSITY EXTENSION

Location	Soil	Crop	Tillage Treatment	Fertilizer Applied	Mean Yield (bu/ac)	Significant Difference (p<.05)	Net Return over Cost*
Fulton Co-1	Haskins-Nappanee	Corn	Strip till	100# Potash fall	192.18 a	LSD 6.4; CV 2.46% Not significant	$630
			Strip till	200# Potash fall	195.28 a		$626
			No till	200# Potash spring broadcast	194.98 a		$645
			F.chisel/ S.cultivate	200# Potash fall broadcast	192.56 a		$603
			Spring cultivate	200# Potash spring broadcast	195.56 a		$631
Fulton Co-2	Haskins-Nappanee	Corn	Strip till	100# Potash fall	207.5 bc	LSD 6.18; CV 2.21	$684
			Strip till	200# Potash fall	208.9 ab		$673
			No till	200# Potash spring broadcast	202.6 c		$671
			F.chisel/ S.cultivate	200# Potash fall broadcast	214.3 a		$679
			Spring cultivate	200# Potash spring broadcast	214.3 a		$697

Economics Calculations based on:

Corn price/bu	$3.50
Strip Till with fertilizer	$27.80
Dry bulk VRT broadcast	$7.90
Disk Chisel/Rip	$18.00
Spring Cultivate/Finish	$ 15.50
Potash (0-0-60)/ton	$300.00

Source: 2018 Ohio Farm Custom Rates

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

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DISCUSSION

There is no significant yield difference in site #1 between the different tillage systems. From and economic standpoint , net return over cost is higher in the no-till system. Site #2 with 4 different tillage systems did show significant yield difference for fall and spring tillage. Strip-till showed a slight significant yield difference than the no-till. The placement of 100-200 lbs. of potash in the strip is not clear on any yield advantage and would need additional years of testing. Economically the spring field cultivate and the strip-till provided the greatest net return over cost.

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 and Kaitlin Ruetz for assistance with data collection and processing.

CENTER ON THE ROAD
YIELD RESPONSE TO NITROGEN TIMING

THE OHIO STATE UNIVERSITY EXTENSION

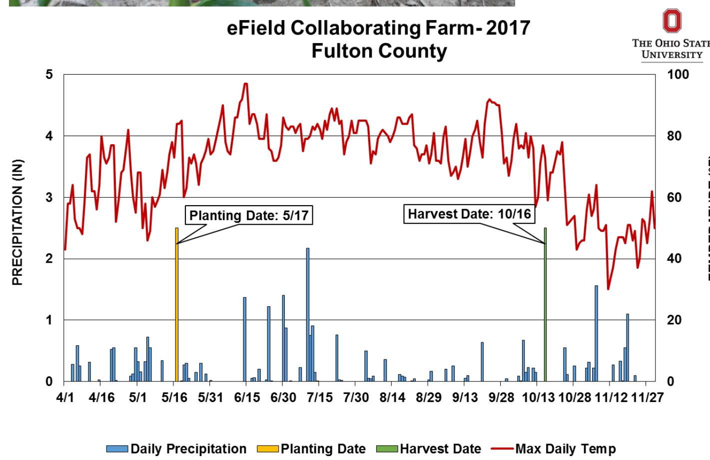
By: Eric Richer (OSUE); Bill Copeland and Tom Van Wagner (MCFE); Ricardo Costas (MSUE)

OBJECTIVE

To determine the effects of nitrogen timing and rate on corn yield and profitability.

	Fulton Co 1	Fulton Co 2	Fulton Co 3
Planting Date	5/17/2017	5/16/2017	5/26/2018
Harvest Date	10/16/2017	10/19/2017	10/29/2018
Variety	DK 5520	Pio 0843 AM	Pio 0825 AM
Population	34,000	33,000	33,000
Acres	13	55	40
Treatments	4	4	5
Reps	3	4	3
Treatment Width	30-60 ft	60 ft	60 ft
Tillage	Fall Chisel	Stale Seed Bed	No Till
Herbicide	Triple Flex, Atrazine, Roundup	Triple Flex, Atrazine, Sharpen	Bicep II Magnum, Roundup
Nitrogen at Plant	90 lbs	70 lbs	70 lbs
Previous Crop	Soybeans	Soybeans	Soybeans
Row Width	30”	30”	30”
Soil Type	Lenawee SCL, Fulton SCL	Mermill Loam, Haskins Loam	Hoytville Loam Mermill Loam

Liquid nitrogen placed near the stalk.



Weather Summary

Total	APR	MAY	JUN	JUL	AUG	Total
Precip (in)	3.30	3.63	4.34	5.91	1.56	18.74
Cumulative GDDs	145.0	420.0	1020.0	1714.0	2292.0	2292.0

STUDY DESIGN

High-clearance equipment has allowed producers to stretch the nitrogen application window in corn. Since 2016, three on-farm collaborators have committed to multi-year late season nitrogen trials in Fulton County. All sites had a pre-season yield goal of 210 bushels per acre. In each trial, the check treatment is the farmer’s normal practice of applying all remaining nitrogen at sidedress or approximately 5-leaf (V5) corn. As fewer source and equipment options are available for late season applications, the check treatments in these studies may have different source or placement characteristics than the late season treatments. In 2017, ‘reduced rate’ treatments were added; in 2018, a pre-plant anhydrous treatment was added.

Late season N application on ten-leaf (V10) corn.

CENTER ON THE ROAD
YIELD RESPONSE TO NITROGEN TIMING

Center for Excellence

THE OHIO STATE UNIVERSITY EXTENSION

Results—Fulton #1

				2017 Data				*2016 Data*
Treatments	**Placement**	**Rate (total N/ac)**	**Source**	**CSNT (ppm)**	**Yield (bu/ac)**	**NUE (lbs N/bu)**	**Return to N ($/ac)**	**Yield (bu/ac)**
Check @ V5	Coulter/Knife	210	28% UAN	58	232.7 a	.90	$750	219.0 a
Late N @ V12	Y-Drops ®	210	28% UAN	449	234.7 a	.89	$757	218.8 a
Split @ V5 & V12	Both	210	28% UAN	1,375	239.0 a	.88	$772	222.0 a
Late N @ V12 (reduced)	Y-Drops ®	168	28% UAN	173	219.7 b	.76	$718	N/A

Results—Fulton #2

				2017 Data				*2016 Data*
Treatments	**Placement**	**Rate (total N/ac)**	**Source**	**CSNT (ppm)**	**Yield (bu/ac)**	**NUE (lbs N/bu)**	**Return to N ($/ac)**	**Yield (bu/ac)**
Check @ V5	Y-Drops ®	210	28% UAN	831	223.2 a	.94	$717	173.9 a
Late N @ V10	Y-Drops ®	210	28% UAN	1,048	218.0 a	.96	$699	176.2 a
Late N @ V10 (reduced)	Y-Drops ®	168	28% UAN	57	218.0 a	.77	$712	175.6 a
Late N @ V10 (reduced)	Y-Drops ®	126	28% UAN	20	206.5 b	.61	$684	N/A

Results—Fulton #3

				2018 Data				*2017 Data*	*2016 Data*
Treatments	**Placement**	**Rate (total N/ac)**	**Source**	**CSNT (ppm)**	**Yield (bu/ac)**	**NUE (lbs N/bu)**	**Return to N ($/ac)**	**Yield (bu/ac)**	**Yield (bu/ac)**
Check @ V5	Gas Injection	210	Anhydrous	2,048	205.1 a	1.02	$654	209.2 a	212.8 a
Late N @ V12	Y-Drops ®	210	28% UAN	1,050	199.1 b	1.05	$633	211.9 a	211.2 a
Split @ V5 & V12	Both	210	Both	1,308	200.3 ab	1.05	$637	214.4 a	214.4 a
Late N @ V12 (reduced)	Y-Drops ®	168	28% UAN	388	197.2 b	0.85	$639	211.2 a	N/A
Pre Plant	Gas Injection	210	Anhydrous	818	201.7 ab	1.04	$642	N/A	N/A
				LSD (CV)	5.04(1.99%)			4.79(1.43%)	6.68(1.8%)

Results—Michigan #1

2018 Data

Treatments	**Rate (total N/ac)**	**Source**	**Yield (bu/ac)**	**NUE (lbs N/bu)**	**Return to N ($/ac)**
70 lbs N at plant	70	28% UAN	222 a	0.32	$756
70 lbs at plant fb 10 gal/ac V9	99	28% UAN	224 a	0.44	$754
70 lbs at plant fb 25 gal/ac V9	145	28% UAN	225 a	0.64	$743
70 lbs at plant fb 40 gal/ac V9	192	28% UAN	229 a	0.84	$743
70 lbs at plant fb 60 gal/ac V9	242	28% UAN	228 a	1.06	$724
70 lbs at plant fb 22 gal/ac Optrx	136	28% UAN	226 a	0.60	$750
		LSD(CV)	7.26(2.17%)		

Treatments with the same letter are not significantly different according to Fisher's Protected Least Significant Differences (LSD) test at alpha = 0.1.

SUMMARY

Ohio Data: Results from these seven site years suggest that when equal amounts of nitrogen are applied either at sidedress or late season, there is no significant difference in yield 86% of the time (6 out of 7 years). When comparing one sidedress application to split applications, there was no statistical yield difference 100% of the time (5 out of 5 years) when equal total N-rates are compared. When a reduced rate of 168 lbs N/acre was analyzed against the sidedress check, there was a statistical difference in yield 40% of the time (2 of 5 years).

Michigan Data: No significant yield difference was observed across all late season nitrogen rates. The 70lbs N at plant had the greatest return to nitrogen and lowest nitrogen use efficiency (NUE).

CENTER ON THE ROAD
NITROGEN MANAGEMENT IN CORN

OBJECTIVE

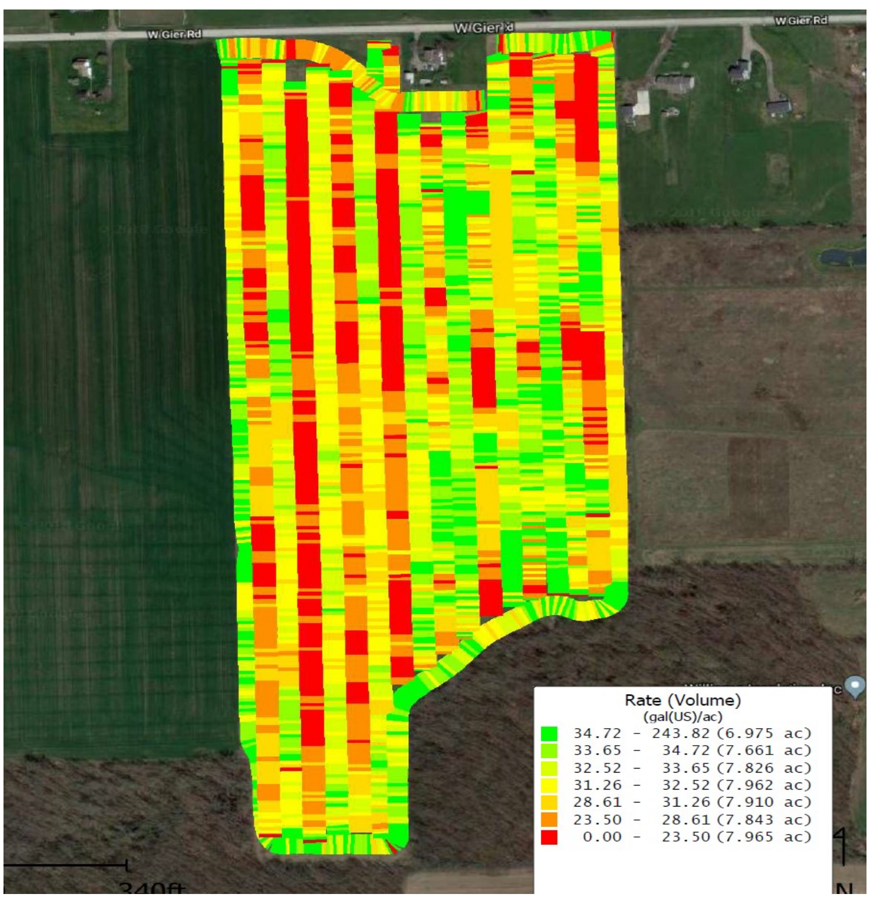
Take Center On The Road strip trials to see if similar results can be obtained with different soils, management, and a custom applicator.

BACKGROUND

In past years at Bakerlads and Raymond and Stutzman Farms, several nitrogen management studies have been conducted from forms of nitrogen used, straight rates, and using the GPS OptRx sensor on N applicators for corn at various stages of corn growth. Corn was no-tilled into wheat and cover crop residue on June 2 with 31,000 seeds/acre. A starter fertilizer of 11-7-4 with 2% sulfur was applied at planting.

METHODS

Plots were alternating 60-foot wide strips of flat rate as compared to Optrx GPS application of nitrogen. Corn was planted in 30 wide 12 row strips and harvested with a 12 row head or 30 to match the planter. Samples were taken with a weigh wagon 730 feet long by 30 feet wide. The average harvest sample was 0.51 acres. There were 6 replicated strips in the field but the south east part of the field was wet and had fall grass breakthroughs from the herbicide program. Twenty-four pounds of Nitrogen were applied at planting time and additional 28% nitrogen was applied at V-10 with Y drops just prior to tasseling of corn.



As applied map for nitrogen application at V-9 stage of corn with alternating strips of OptRx sensor and straight rates.

The flat rate was 35 gallons or 105 lbs of additional N/ac as compared to the OptRx using 24.3 gallons or 72.9 additional lbs. of N/ac.

CENTER ON THE ROAD
NITROGEN MANAGEMENT IN CORN

Center for Excellence

RESULTS

There was no significant difference in yield based on the nitrogen management differences all applied at the same time. The OptRx saved 32.1 lbs of actual nitrogen or $13.16/acre of savings. Yield data wasn't significant but the nitrogen use efficiency improved by 27%.

Data	OptRx™ at V10 28% N	Straight Rate at V-10 28% N
Mean Yield dry bu./ac.	168.3 a	163.4 a
Lbs of Actual N Applied at Planting	24	24
Lbs of Actual N Post Applied	72.9	105
Total N Used Actual Lbs.	96.9	129
Nitrogen Efficiency lbs./bu	0.58	0.79
*Total N cost/acre	$39.73*	$52.89*
Return to management from N savings/ac	$13.16/ac	0
LSD (P < .05) 7.69	CV 2..05	No Significant Difference

* 28% N 225/ton or $0.41/lb.

DISCUSSION

Both treatments had a good efficiency well below the 1.0 lbs N per bushel of crop as demonstrated with the yield data. The OptRx sensor came in at 0.58 lbs of N used per bushel and saved $13.16 /acre using this practice.

Approximately 65% of the nitrogen used by the corn plant is from the V-9 stage through the reproduction stage. Using the Y drop system at V-10 provides a way to place the nitrogen when the crop uses it the most. It also provides a larger window of nitrogen application as compared to a regular V-3 to V-5 side-dress program. Pre-plant nitrogen creates a risk for nitrogen loss in the spring if there is increased rainfall prior to planting through subsurface drainage systems and different soil profiles.

This system provides an economic incentive while mitigating nitrogen loss into surface waters and possibly Lake Erie.

CENTER ON THE ROAD
WHEAT NITROGEN MANAGEMENT TRIALS

PURPOSE

Quantify the benefits of using OptRx optical sensors to determine application rate of nitrogen on wheat. Sensors and imagery are becoming more important in agriculture to provide adequate nutrients to the growing crop while at the same time reducing potential unwanted loss of nitrogen through leaching or volatilization. Wheat could potentially benefit from split applications of nitrogen.

Data collected on similar studies in corn has shown a statistically significant difference in efficiency of nitrogen used in a similar design.

TREATMENTS

Control – solid rate (not controlled by sensor) using MSU nitrogen recommendations formula

Nitrogen rate = -13 + (1.33 x yield potential)

Example with yield potential of 95: -13 + (1.33 x 95) = 113.35 pounds N per acre

Variable Rate Nitrogen (VRN) – variable rate as determined by the OptRx system

Treatments should be applied in a field large enough for at least three replications (four is preferred).

Apply no more than 15-20 pounds of nitrogen in fall at planting. This trial will be a split application. Due to perceived risk of allowing OptRx to apply a rate too low, 40 pounds per acre of nitrogen should be applied at green-up. The balance should be applied at Feekes 5-6 according to the treatments.

METHODS

The study was designed to evaluate the impact of flat rate application of nitrogen as compared to using a sensor that applies nitrogen based on crop need through algorithms that rely on calibration and initial data entered in the display such as yield goal, maximum and minimum N application and nitrogen credits. The sensors can only work with proper calibration and data entry prior.

Measurable data points included nitrogen used in each trial, yield, and economics. Data was analyzed using a simple Analysis of Variance (ANOVA) and considered significant at $P<.05$. Economics were calculated using relevant crop prices comparing total nitrogen used with the cost of the nitrogen product. The price of wheat used was $4.78/bushel and 28% nitrogen at $250/ton or $.44 per pound of actual Nitrogen.

Fertilizing (Liquid) 2018 -(28% UAN)

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CENTER ON THE ROAD
WHEAT NITROGEN MANAGEMENT TRIALS

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SUMMARY

Location	Treatment	Starter N lbs./ ac	Green-Up Application lbs./ac	Feekes 6-N Rate Gal/ac	Total lbs. N used/ac	Total Cost N Used $	Mean Yield Bu/ac	Significant Diff. (p<.05)	Net Return Over Cost of N $
1	Straight rate	20	40	28.05	144.15	63.42	84.20	LSD 4.77, CV 1.67	339.06
1	OptRx	20	40	14.83	104.49	45.97	78.18	Significant	327.73
2	Straight rate	20	40	25.22	135.66	59.69	78.24	LSD 1.93, CV 1.08	314.30
2	OptRx	20	40	21.79	125.37	55.16	80.12	Non-Significant	327.81
3	Straight rate	0	40	30.33	130.99	57.64	75.26	LSD 3.61, CV 2.21	302.10
3	OptRx	0	40	26.8	120.4	52.98	69.8	Significant	280.66
4	Straight rate	20	0	32.74	118.22	52.10	76.56	LSD 0.65, CV 0.24	313.86
4	OptRx	20	0	22.42	87.26	38.39	73.38	Significant	312.37

Every gallon of 28% is 3 lbs. of actual Nitrogen • 28% nitrogen at $250/ton is $.44/lb. • $4.78/bushel price n

- Three of the four wheat plots had a significant higher yield difference of straight rate verses OptRx sensors
- The average yield on the plots for straight rate was 78.56 bushel/acre applying 29.08 gallons of 28% (87.24 pounds N applied at Feekes 5-6).
- The average yield for the OptRx sensor was 75.37 bushel/acre applying 21.46 gallons of 28% (64.38 pounds of N applied at Feekes 5-6).
- The average yield difference between the treatments is 3.19 bushel/acre difference and using 7.62 gallons/acre more of 28% nitrogen in the straight rate with a $5.19 income advantage over the OptRx.
- For all the trials, the straight rate application of Nitrogen made $12.45 more per acre than the OptRx GPS application of nitrogen

DISCUSSION

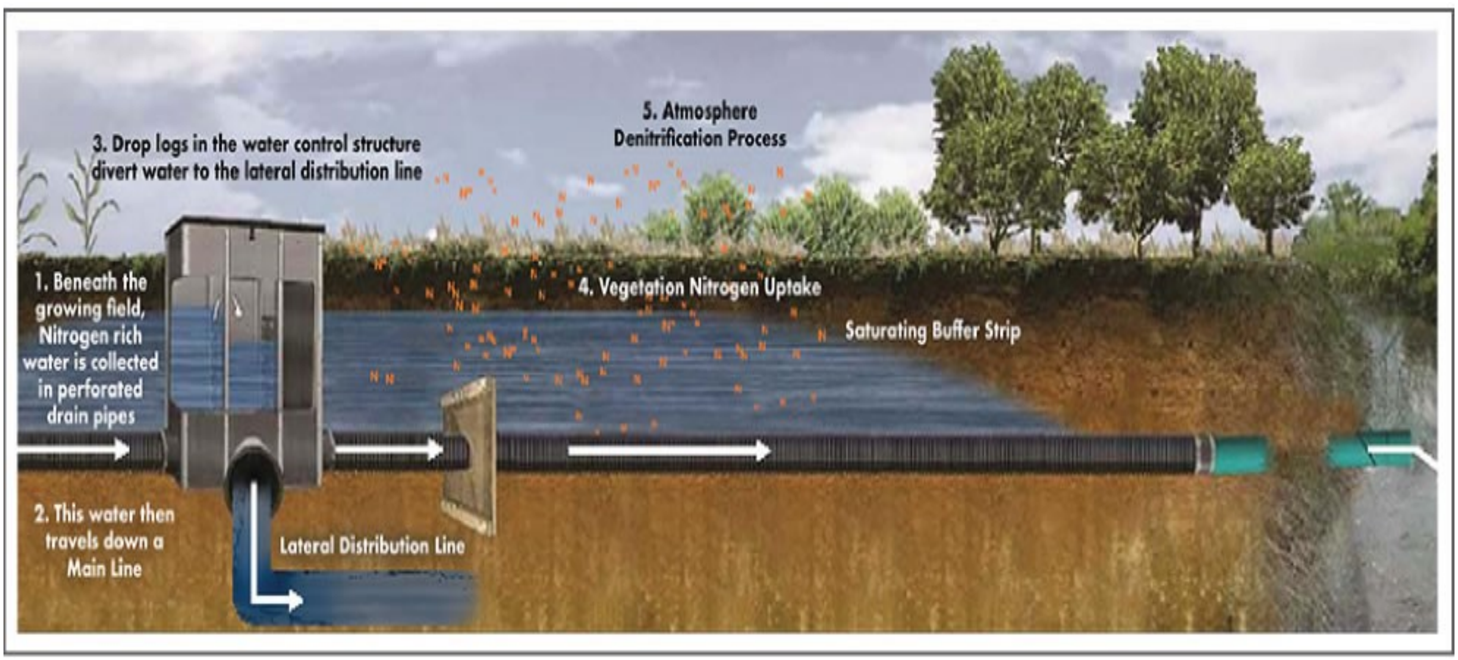
The spring of 2018 turned out to be one of the most difficult springs to carry out farming practices. Higher rainfall in April and early May prohibited and limited the cultural practices to be carried out when managing high production crops. Initially the wheat crop in southeast Michigan and northwest Ohio was on track for a tremendous crop. High intense rainfall caused drainage issues in some fields, limited early application of early fungicides, and promoted the loss of early nitrogen applications. Head scab and dry weather in June and early July put a final damper on a great crop and the farmers ended with an average to below average crop.

Not all the OptRx wheat trials had the same cultural practices, although the treatments were the same on the individual trials as indicated in the data chart. Not all the plots used starter fertilizer. Three green-up applications were done, but application time was late (Feekes 3-4). Follow-up with the final application of Nitrogen at Feekes 6 was 7-10 days after the first application of nitrogen. The yields in all the plots were damaged by water early and later by dry weather. Two of the trials were on Ziegenfuss clay loam soils with sub-surface drainage systems on 50 to 66 feet spacing. Typically, these fields would have drainage systems with 25 to 30 feet spacing. Excess spring rainfall followed by extreme temperatures created most of the yield variability.

SATURATED BUFFER

Saturated buffers store water within the soil of field buffers, by diverting tile water into shallow laterals that raise the water table within the buffer and slow outflow. Early results for saturated buffers indicate that they can be very effective for removing nitrate from tile drain water before it is discharged into surface waters by diverting a fraction of the tile flow through riparian buffers as shallow groundwater. As a consequence of the diversion, saturated buffers could also help reduce the peak flow in streams, acting as detention structures that delay discharge and flatten the stream hydrograph, although little research has occurred on their potential ability to temporarily store water.

The Bakerlads saturated buffer is about 1000 feet long and 40 feet wide with four-inch transmission line 10 feet from the edge of the cropland and into the grass filter strip. The buffer will treat subsurface drainage the seven acre field just south of the grass buffer area and 27-acre field across the road which is pattern tiled every 40-50 feet.



FIELD EDGE WATER QUALITY SAMPLING SATURATED BUFFER

The Center for Excellence is a featured site of field edge water quality sampling as part of a partnership with the Michigan Department of Agriculture, Michigan Department of Environmental Quality, Michigan State University and Bakerlads Farm. The automated sampler was installed this year to evaluate the benefits of a saturated buffer for mitigating nitrogen loss in a upstream subsurface drainage systems as compared to a drainage system that drains directly into surface waters.

The automated samplers will collect weekly data from the compared systems. The samplers are being calibrated for the first year and the data will be presented and discussed at next years field day

Blaine Baker of Bakerlads Farm discussing the automated sampler at the Saturated Buffer Site. The automated samplers will be in the calibration mode from fall 2018 through fall of 2019. The two automated samplers will be collecting data from a drainage system that is diverted through a saturated buffer site as compared to a direct subsurface drainage system.

SAVE THE DATE!

2019 FIELD DAY

Center for Excellence

WEDNESDAY, AUGUST 14TH, 2019

NOTES