2017

Center For Excellence
Agriculture Field Plot Research

Center for Excellence

LENAWEE CONSERVATION DISTRICT

Corn Marketing Program of Michigan

MICHIGAN WHEAT PROGRAM

MSPC

DEQ

Great Lakes Commission des Grands Lacs

Michigan Department of Agriculture & Rural Development

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GENERAL INFORMATION
CONDUCTING ON-FARM RESEARCH

The Center for Excellence is starting its 22nd year. 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, Michigan Wheat Program, 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 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 in 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: Using random sampling as 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, LSD or CV: The P value for each trial is 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 .05, .1 or .2. As the P value approaches .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.

2017 FARM PARTNERS & SPONSORS

Partners

Lenawee Conservation District

Michigan Wheat Program

Great Lakes Restoration Initiative

Corn Marketing Program of Michigan

Michigan Soybean Promotion Committee

Sponsors

Andre Land Forming   Blissfield State Bank   Channel   Crop Production Services - Blissfield & Morenci Plants

Dairy Farmers of America   Farmer-Led Watershed Conservation/Erb Family Foundation

Fulton County Soil & Water Conservation District   Gleaner Life Insurance Society   Great Lakes Hybrids

GreenStone Farm Credit Services   Haviland Drainage Products   Kemner Iott Benz   Kenn-Feld Group

Lenawee Community Foundation   Lenawee County Farm Bureau   Michigan Ag Commodities, Inc. (MAC)

Milk Source LLC   Monsanto BioAg   Plant Tuff, Inc.   Prattville Fertilizer & Grain Inc.   Precision Ag Services, Inc.

Quality Liquid Feeds   RCO Law   Redline Equipment   River Raisin Watershed Council   Soil Health Partnership

The Andersons Inc.   The Nature Conservancy   Triple K Irrigation Inc.   USDA-NRCS Michigan   Wilbur-Ellis Company

Additional Support

Ag Leader   Case IH   J.A. Scott Farm Inc.   Great lakes Commission

Greenfield Ag   John Deere   Lenawee County Drain Commission

MI Dept. of Agriculture & Rural Development

MI Department of Environmental Quality

The Ohio State University Extension

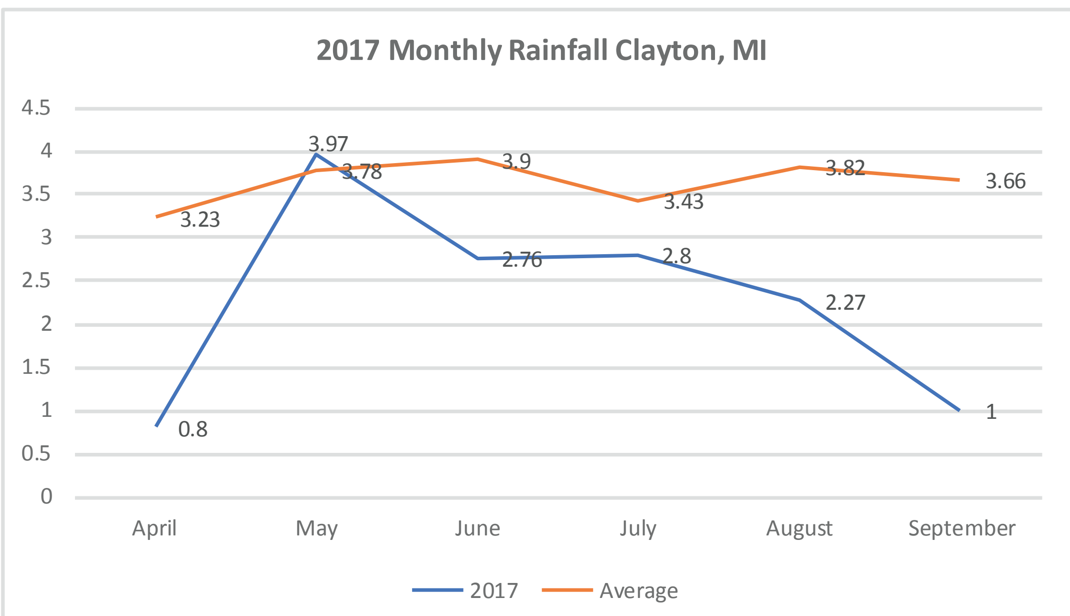
Special Thanks to the Host Research Farmers

Bakerlads Farms

Raymond and Stutzman Farms

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 below average rainfall. April was extremely dry followed by a normal May, then below average rainfall with dry weather in August through September. Because of cooler temperatures throughout the growing season loss of moisture from fields reduced. In general, the corn crop was above average for most growers in Lenawee County and soybeans were average to below average.

It should also be recognized that there were spotty showers in locations throughout the county that provided excellence corn yields and average to above average soybean yields.

Growing Season Temperature and growing degree units from May 1, to September 15, 2017

- Average daily temperatures were 77.9 degrees
- Average daily minimum temperatures were 52.4 degrees

2017 HOST FARMS SOIL DATA

Center for Excellence

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:

Bakerlads Farms

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

The Blount component makes up 85 percent of the map unit. Slopes are 2 to 6 percent. This component is on ground moraines on till plains, 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 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, December. Organic matter content in the surface horizon is about 2 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 2 to 6 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 2 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 2 to 6 percent. This component is on ground moraines on till plains, 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 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, December. Organic matter content in the surface horizon is about 2 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 0 to 3 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, December. Organic matter content in the surface horizon is about 2 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 0 to 3 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 3 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 0 to 3 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, December. Organic matter content in the surface horizon is about 3 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.

Corn Yield Response to Different P Application Methods

OBJECTIVE

To determine the effects of spreading Phosphorus differently through strip injection, broadcast or starter fertilizer. Test trials were designed to evaluate if the placement of P (DAP) in the soil compared to a Pop-up fertilizer having any negative or effects on corn yields.

BACKGROUND

Lake Erie annually has issues with harmful algae blooms (HAB) caused by excessive nutrient loading of dissolved reactive P in relationship to Nitrate Nitrogen. It is reported that up to 75% of the dissolved reactive P is directly linked to farmers and intensive production systems of corn, soybeans and wheat.

METHODS

A field with a low soil test level for Bray P1 was selected to conduct the test. A randomized strip system was established of three treatments replicated four times. Just prior to planting strips were variable rate applied according to a two-year prescription map injected in a narrow strip and surface broadcast in a strip. Two-year variable rate prescription of MAP with ranges of spread from 155 to 252 lbs./acre of MAP was incorporated. Corn was no-till planted with a 16-row Kinze.

RESULTS

Dry Bushels Per Acre			
Replications	Starter Fertilizer only	MAP variable rate injected	MAP variable rate surface applied
1	184.97	198.09	177.62
2	183.72	186.07	183.71
3	187.10	187.37	187.36
4	197.49	189.39	188.17
Mean	188.30 a	190.20 a	184.20 a
LSD (P<.05) 7.82	CV 3.04	No significant difference	

DISCUSSION

The replicated strip trials are not statistically significant even though the mean difference of MAP variable rate injected had a 6-bushel higher yield difference then surface applied and 2-bushel higher yield difference then starter only. The LSD data variation of the yields at a <.05% is 7.82 bushel which is higher than the mean difference between the treatments making the differences insignificant. What is interesting to note the starter only had no yield difference. Is it possible we are over fertilizing for P on corn and soybean ground? We will continue to do this study with new soil tests and keep the same testing parameters, so we can get a good data set before making conclusions.

INTERSEEDING COVER CROPS IN CORN
2017 ON-FARM RESEARCH

By Aaron Brooker; Drs. Karen Renner, Christy Sprague, Lisa Tiemann, and Bruno Basso

Why?

-Late corn harvest limits cover crop options in the fall.
-Provide more options for cover crop species and seeding times.
-Benefit from cover crops throughout the season.

Research Questions:

1. Can cover crops establish when interseeded from V1-V7?
2. Are interseeded cover crops competitive with corn?

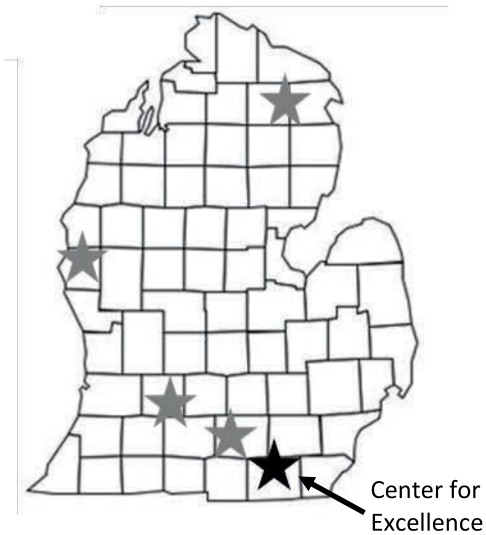
Methods

-Annual ryegrass, crimson clover, and Tillage Radish® (Table 1.)
-Cover crop and weed density measured 30 days after Interseeding and prior to corn harvest.
-Cover crop and weed biomass measured prior to corn harvest.
-Corn grain yield data collected.

Results

-All species emerged at both interseeding timings. (Figure 2)
-Tillage Radish® had the highest final stand as a percentage of the seeding rate.
-Annual ryegrass emergence was greatest at V3.
-Harvested biomass was variable across sites, but Tillage Radish® produced the highest biomass and crimson clover the lowest.
-Corn yield was not reduced when cover crops were interseeded at V3 and V6.
(Table 1).

Figure 1. Experiment locations



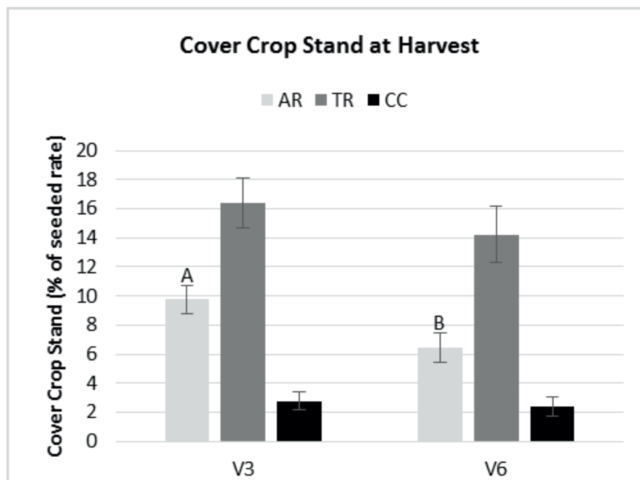


Figure 2. Annual ryegrass (AR), Tillage Radish® (TR), and crimson clover (CC) stand at harvest.

Table 1. Site information, cover crop seeding rate, and yield for each location.

Location	Corn Planting Date	Corn Population	Soil Type	Cover crop seeding rate (lb/ac)	No cover yield (bu/ac)	Corn Grain Yield (bu/ac)					
						V2/V3			V5/V6		
						AR	TR	CC	AR	TR	CC
Center of Excellence (Clayton)	13 May	32,000	Loam	AR (25) CC (20) TR (15)	189	192	203	196	181	190	190
KBS (Hickory Corners)	28 April	28,000	Loam	AR (30) CC (30) TR (20)	139	138	135	139	139	141	147
Hart	13 May	28,500	Loamy Sand	AR (15)	187	197	187	196	182	177	181
Hillman	14 May	32,000	Silt Loam	CC (20)	122	123	127	145	122	123	132
Springport	31 May	34,000	Sandy Loam	TR (10)	161	160	164	157	159	160	166

TILLAGE STRIP TRIALS IN CORN
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. Over the years we have dropped some of the systems such as 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 that establishes a specific type of tillage that 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.

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 3600 16-row, Vertical Tillage with Case IH 330 Turbo-Till and TH 875 Disk Ripper.

RESULTS

Dry Bushel/Acre				
Replications	**Orthman Strip Tiller**	**No-Till**	**Disk Ripper**	**Vertical Tillage (Turbo Till)**
1	128.08	132.92	124.99	123.62
2	127.5	130.32	133.67	126.27
3	126.85	134.64	138.56	127.72
Mean	127.5 a	132.6 a	132.4 a	125.9 a
LSD (<0.05 %) 7.09	CV 2.9		Yield not significant	

DISCUSSION

Plot yields were below average this year. Blaine Baker isn't sure why these yields were below the farm average of 170 bu./acre. We suspect that a dry April followed by a normal rainfall in May but poor drying conditions existed and corn may have been planted a bit on the wet side.

Regardless of this issue, the yields were not significantly different based on tillage type. It appears that there was quite a bit of variation within each of the tillage systems due to other factors in the field.

NEMASTRIKE SEED TREATMENT ON CORN SEED

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.

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 five strips in the field.

RESULTS

Dry Bushel/Acre		
Replications	NemaStrike Seed Treatment	Check
1	222	227
2	235	210
3	227	229
4	234	230
5	236	235
Mean	230.8 a	226.2 a
LSD (P<.05) 14.76	CV 3.68	No significant difference

DISCUSSION

It appears there was a 4.6-bushel yield increase from using the treated seed. The data from the field showed a higher mean yield of 4.6 dry bushel/acre but there was yield variation in the field and among the samples which led to a higher LSD. Technically the difference in yield is not significant. It was the intention of Raymond and Stutzman Farms to try to use the treated seed on the sandy gravel sites in the field that are known to have higher nematode populations. Their vision is to be able to apply product "on the go" to seed in areas that are higher in nematodes. This would allow using less of the product in the field and treat only those areas that would get a response.

This trial will be run for another two years if the product is available for use.

USE OF BIOLOGICAL SEED TREATMENT IN CORN

OBJECTIVE

Use a biological seed treatment product (QuickRoots®) and compare its effectiveness on increasing yield potential in high production corn systems.

BACKGROUND

QuickRoots® technology has microbial seed innoculants that can improve nutrient availability. The Bacillus amyloliquefaciens-and Trichoderma virens-based treatment helps increase availability and uptake of nitrogen, phosphate, and potassium. The improved phosphate availability can lead to expanded root volume which enhances nitrogen and potassium uptake.

METHODS

Seed was treated prior to planting at the rate of 7.2 g/80,000 seeds of wettable powder. The planter has a central fill two-chamber unit. Treated seed was put in one side of the central fill and the other side was filled with untreated seed. The 24-row planter was used to plant corn and strips of treated verses non-treated 60-foot-wide were planted across the field. A twelve-row head (30 ft.) is used to harvest the crop. Harvest samples were done the full 30-foot width of the field.

RESULTS

Dry Bushel/Acre		
Replications	**QuickRoots® Seed Treatment**	**Check**
1	210.79	205.28
2	209.21	207.5
3	215.04	203.17
4	209.85	193.58
5	207.66	201.416
6	213.99	212.43
Mean	211.10 a	203.9 b
LSD (P<.05) 6.12	CV 1.99	Significant Difference

DISCUSSION

The yields were good in the entire field but there was a 7.2-bushel difference in the mean average of the harvested samples. The data was consistent throughout the field and therefore there was a yield response to using the QuickRoots® seed treatment this year. We have tested this product in the past and there has been an inconsistency on significant yield increases from using this product in previous years.

STRIP TILLAGE IN CORN
STALE SEEDBED

OBJECTIVE

Evaluate if there is any advantage to spring secondary tillage compared to a fall strip tillage system.

BACKGROUND

The field selection was specifically targeted at following wheat harvest. Manure was spread following wheat harvest and worked into the soil using primary and secondary tools. A cover crop was established seeding radish and volunteer wheat in mid to late August. In October, 48 rows of strip till in the standing cover crop were done alternated with no fall tillage. In the spring of the following year vertical tillage with the 330 Turbo Till was done in alternating strips across the field between the fall strip tillage. Harvest data was 24 rows the length the field.

METHODS

Using a whole field with alternating strips of spring vertical tillage and fall strip tillage were evaluated. The strips were 48 rows or 120 feet wide. The harvest samples were 2.75 acres and 5 samples from each data set were used to evaluate statistically.

RESULTS

Dry Bushel/Acre		
Replications	**Vertical Tillage (Check)**	**Strip-Tillage**
1	225.38	230.8
2	227.82	243.87
3	228.53	239.27
4	221.55	206.76
5	203.21	208.83
6	200.05	206.56
Mean	217.8 a	222.7 a
LSD (P<.05) 11.0	CV 3.37	No Significant Difference

DISCUSSION

The mean difference appears to have a significant difference but when analyzing the data, it is considered not significant. This is because the strip till data had a 37-bushel difference. It appears the yield in the field reduces gradually from west to east. The strip-till had higher yields side by side of each vertical tillage except in one strip (in red). If this strip was thrown out the difference would be significant.

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

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).

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 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 strip trials 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. There were four samples taken from each test strips running the length of the field. The entire field had 50 lbs. of 28% Nitrogen applied at planting time followed by the treatments described.

Dry Bushel/Acre		
Replications	**OptRx™ at V3 Anhydrous ammonia**	**OptrRx™ at V9 28% with Drops**
1	137.5	133.67
2	140.53	131.41
3	134.5	132.0
4	137.67	139.53
Mean	137.6 a	134.2 a
LSD (P < .05) 7.2	CV 2.35	No Significant Difference

Treatment	Average lbs. of Nitrogen Applied Per Acre (post)	Total N Used Lbs./acre (+50Lbs)	Efficiency of N Lbs./ bu.
OptRx™ at V3 Anhydrous ammonia	86.3 lbs.	136.3 lbs.	0.99 lbs.
OptrRx™ at V9 28% with Drops	59.8 lbs.	109.8 lbs.	.81 lbs.

DISCUSSION

The data shows a 3.4-bushel difference in the early side-dress applied of nitrogen verses late vegetative application at the V9 stage. 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 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, mineralization, atmosphere. How does soil health effect the available nutrients in the soil?

YIELD RESPONSE TO STRIP TILLAGE

Center for Excellence

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.

Measureable 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 both Treatmenst	28.2	225.9 a	LSD 14.3; CV 4.3
			Strip Till		28.1	217.8 a	
Fulton Co 2	Haskins-Nappanee	Corn	No Till	Broadcast VRT over both Treatmenst	16.9	156.5 a	LSD 17.6; CV 4.94
			Strip Till		16.5	159.4 a	
Fulton Co 3	Haskins-Nappanee	Corn	No Till	Broadcast VRT over both Treatmenst	18.8	159.4 a	LSD 13.2; CV 3.66
			Strip Till		17.8	161.4 a	
Mean Yields with the same letter are not significantly different							

Discussion

The results show that there was no significant difference in yield between the two treatments in any of the three trials. 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.

While this trial shows there is no difference in yield between strip tillage and other tillage systems, the data does suggest a slight grain dry down (moisture) advantage for strip tillage.

Finally, 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 these 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 and Kaitlin Ruetz for assistance with data collection and processing.

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

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, Vertical Tillage with Case IH 330 Turbo-Till and primary tillage with 875 Disk Ripper.

RESULTS

Dry Bushel/Acre				
Replications	**Orthman Strip Tiller**	**No-Till**	**Disk Ripper**	**Vertical Tillage (Turbo Till)**
1	54.22	55.43	56.43	51.99
2	55.43	56.69	53.8	49.88
3	50.97	51.15	52.94	58.72
4	52.5	53.1	53.0	55.2
Mean	53.3 a	54.1 a	54.0 a	53.9 a
LSD 0.05 3.9		CV 4.69	No Significant difference	

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 soybeans on this plot were a good average for this soil type and lack of rainfall in the area in 2017. The mean average yields, regardless of tillage system, were not significant.

2016 AND 2017 LENAWEE COUNTY SMART 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. 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 field roller trials in 2016 and 2017 was to determine the effect of field rolling at various growth stages on soybean yields.

Procedure: Blaine Baker conducted rolling trials in 2016 and 2017. 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. Stand counts were taken in all treatments to determine how rolling affected final plant stand.

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, rolling did not affect soybean yields but did significantly affect final stands. 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.

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

2017 Lenawee County SMaRT in-furrow calcium fertilizer trial

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.

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

Results: Although the yield was 1.7 bushels per acre higher in the in-furrow LiberateCa™ treatment, the yield difference was not statistically significant. Therefore, we cannot conclude that the higher yield was due to the calcium fertilizer application and not some other factor. The lack of a positive yield response to the calcium fertilizer is probably due to the fact that the soil calcium levels were medium to high at all three sites.

Table 1. Soil test levels at the 2017 in-furrow calcium fertilizer trial

P	K	Mg	Ca	Soil pH	Mg base saturation	Ca base saturation
------- Parts per million --------				1:1	--------- Percent -------	
144	122	149	899	6.2	23	58

Table 2. The effect of an in-furrow application of calcium fertilizer on soybean yield in Lenawee County in 2017

Untreated control	LiberateCA	$LSD_{0.10}$	Yield Difference
------------- Yield (bushels per acre) --------------			
48.1	49.8	3.1	1.7

FUNGICIDE APPLICATION TO WHEAT

Center for Excellence

Fungicide Application to Wheat at Flag Leaf or T2 Timing Shows Benefits in Some Years

Disease control is one of the most important yield protection management practices for wheat growers. The flag leaf (leaf 1), penultimate (leaf 2) and leaf 3 contribute nearly 90% of the photosynthates to grain yield. Keeping them free of disease is critical in maintaining high yield potential. There are three stages in wheat development where application of fungicide may be warranted: Timing 1 is Feekes 5-6 (tillering to first joint), Timing 2 is Feekes 9 (flag) and Timing 3 is Feekes 10.5.1 (anthesis).

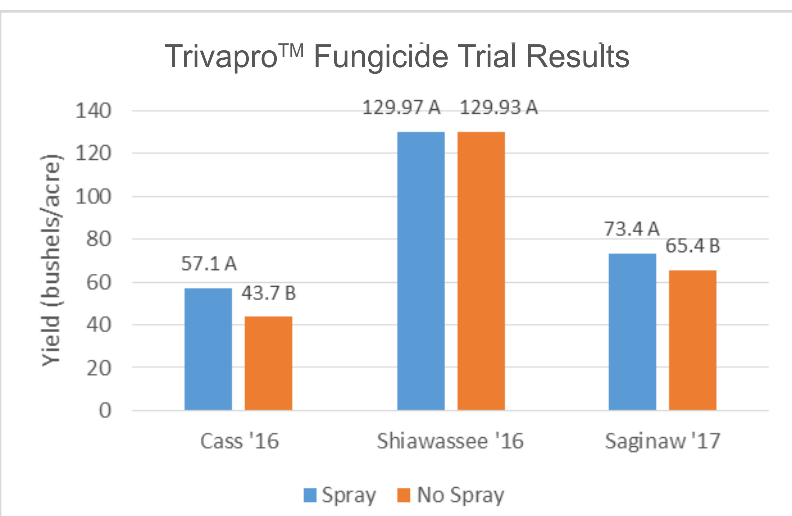
Table 1. Fungicide application timing for wheat and key target diseases at each timing.

Timing	Key target diseases
T1 – Feekes 5-6	Powdery mildew, septoria, tan spot
T2 – Feekes 9	Leaf, stem and stripe rusts; powdery mildew, staganospora
T3 – Feekes 10.5.1	Fusarium head blight; leaf, stem and stripe rusts;

A new fungicide mix containing benzovindiflupyr, propiconazole and azoxystrobin (Trivapro™, Syngenta®) has been out on the market for nearly two years now. This study was established to quantify its effects on wheat grain yield when applied at the T2 or flag leaf timing. Plots were established on commercial farms and their equipment was used to apply replicated strips of spray/no spray in the field. Yield monitors and a weigh wagon was used to obtain grain yield in each strip. Two farms had plots in 2016 and one in 2017.

Table 2. T2 fungicide application trial results from three farms over two years.

Wheat Yield (bu/a)						
	Cass-16		Shiawassee-16		Saginaw-17	
spray	57.1	A	129.97	A	73.4	A
no spray	43.7	B	129.93	A	65.4	B
ROI	$30.10		-$23.34		$8.57	
stdev	11.78		7.18		6.85	
cv	23.6		5.13		9.87	
Pr > F	0.0209		0.9951		0.0048	



Data from these trials show that fungicide application for disease control can in fact protect yield. However, this benefit was only observed in two of the three fields. The Shiawassee County field in 2016 had very low disease pressure throughout the tillering and grain fill periods, therefore no yield response was observed. Carefully scouting fields on a regular basis is the best way to determine if application of T2 fungicide will be cost effective. Cool, moist conditions during these growth periods favor disease development, increasing the need for fungicides.

The cost of application for Trivapro™ at a rate of 13.8 oz/acre is $16.50 plus $7.00 per acre for application for a total of $23.50 per acre. Based on this, at $4.00 wheat price, you would need 5.9 bushel increase to pay for the fungicide. Here there was a positive ROI at the Cass '16 and Saginaw '17 sites, but not Shiawassee '16.

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MICHIGAN STATE UNIVERSITY Extension

FEATURED CONSERVATION DEMONSTRATION PROJECT OF THE YEAR

PHOSPHORUS REMOVAL STRUCTURE

The Center for Excellence is dedicated to demonstrating science based projects in soil and water conservation. Installation of these projects is evaluated for the applicability of using on a landscape basis and verifying the benefits of the practice as claimed.

A P removal structure is a large, landscape scale filter for dissolved P (DP), intended to intercept and trap P from “hot spots” before reaching a surface water body. The P removal structure has four basic principles:

1. Contains solid media with high affinity for P, commonly known as a “P sorption material”, or PSM.
2. PSM is contained and placed in a hydrologically active area with high dissolved P concentrations.
3. High DP water is able to flow through the contained PSM at a sufficient rate.
4. The PSM is able to be removed and replaced after it is no longer effective.

Choosing an ideal location for a P filter should possess:

- Flow convergence to a point where water can be directed into a structure.
- At least 0.2 ppm of dissolved P (DP) in the water
- Hydraulic head required to push water through the structure: allows treatment through the PSM and due to elevation change to allow structure to drain.
- Sufficient space to accommodate PSM

P removal structures can appear in many different forms. They can be located on the surface, subsurface, in ditches, tile drains, drop inlets and blind/surface inlets. Any unit that possesses the four basic components is essentially a P removal structure. Basically the water from the source enters the PSM median and becomes baffled to spread over a larger surface area. It can then drain vertically through the PSM material and then to a free flowing outlet. The larger the elevation change the more PSM material the water can drain through allowing the size of the structure to be reduced in size. The design is targeted at total load to filter through a calculated cubic feet of median to treat the high P water.

The site that was selected for demonstration was on a 4-inch tile outlet that has tested high in dissolved P. The P sorption material used at the Bakerlads Farm site is steel slag.

FARMERS HELPING FARMERS TO PROTECT WATER QUALITY

Center for Excellence

Farmer-Led Watershed Conservation
Western Lake Erie Basin (WLEB)
"Water Quality Farming"

Some conservation changes are easy to do; here's a few things some of your peers are saying:

"Cover crops have always been incorporated into our farming operation, but with the financial support from Farmer-Led Watershed Conservation, it has encouraged us to use them on more acres which will further improve our soil health for the long term." Dan Gust Riga Township Farmer

"Although limitations on funding are a challenge for expensive erosion control projects, we have found working with the Farmer-Led group is a much easier and more effective process." Chad Hart, Hudson Township Farmer

2017 ERB Grant

*Funded $7,750.00 for conservation
*Conservation practices implemented included cover crops, filter strips, grid soil sampling, and grade stabilization
*Impacting over 550+ acres

2018 ERB Grant

*$12,000.00 for conservation
*Conservation practices intended for implementation in 2018 include grassed waterways and grad stabilization structure, water and sediment control basin (WASCOB), filter strips, and grid soil sampling
*Impacting ~375 acres

River Raisin
WATERSHED COUNCIL
Partner · Protect · Preserve

Fred A. and Barbara M.
Erb Family Foundation

SAVE THE DATE!

2018 FIELD DAY

Center for Excellence

WEDNESDAY, AUGUST 8TH, 2018