



Agriculture Field Plot Research

2023 Center For Excellence



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Foreword

The 2023 season was the 27th birthday of the Center for Excellence for providing plot work, data, keynote speakers, great meals and many memories for local and regional growers and agribusinesses.

This report summarizes the plot work completed for the 2023 Center for Excellence field season and hopefully will provide growers information that can be used on your farms.

Spring started off with dry conditions so most of the crops were planted on time. July gave the area 6.2 inches of rainfall which delayed wheat harvest but provided much needed moisture in the soil. The month of August was more normal with a dryer September and nice weather to get crops in in a timely manner.

Corn harvest was average or above and soybean harvest was above average for the Clayton area.

Because of cooler temperatures in the summer months, many of the crops had high moisture in the grain which delayed corn harvest later in the season. There were many corn fields harvested in December and Early January.

There was a change this year in programming in 2023. We decided to explore to change it up a little bit by exploring have the morning, lunch program at the Bakerlads Farm.

We thank all the sponsors for the 2023 field day. The Center for Excellence would not be able to put on such a good program for farmers and agri-businesses in Southeast Michigan, Northwest Ohio and surrounding counties that have been attending for years. Help support the Center with your continued participation at our 28th season at the Field Day on Wednesday August 14, 2024.

Last Word

With the publication of the field study results from the Center, the 23 season is now history. As I sat here writing this at the end of February with the temperature of 55°, I feel as though we are already behind on getting equipment ready.

The corn got off to an early start then dry weather set in and some soybean seed was in the ground close to a month before germinating. Crop yields were still very respectable amongst the challenges faced.

As you look at the results you will see that no-till will work if you are set up properly to do that. I'm very intrigued by the soybean population studies we did this year, introducing variable rate seeding of soybeans. As seed continues to increase in price I believe variable rate seating will become more common.

Most of us farm within the Western Lake Erie Basin. Keep this in mind as you look through the booklet and think about what you can do to help mitigate the situation there. My concern is that if we as farmers and conservation districts don't figure out how to improve the situation the government, through rules and regulations will figure it out for us.

Blaine Baker



**Lenawee Conservation District
Thanks
All 2023 Sponsors and Supporters**

**Special Thank You!
Michigan Soybean Promotion Committee for 27 years
of Support**

2023 Sponsors

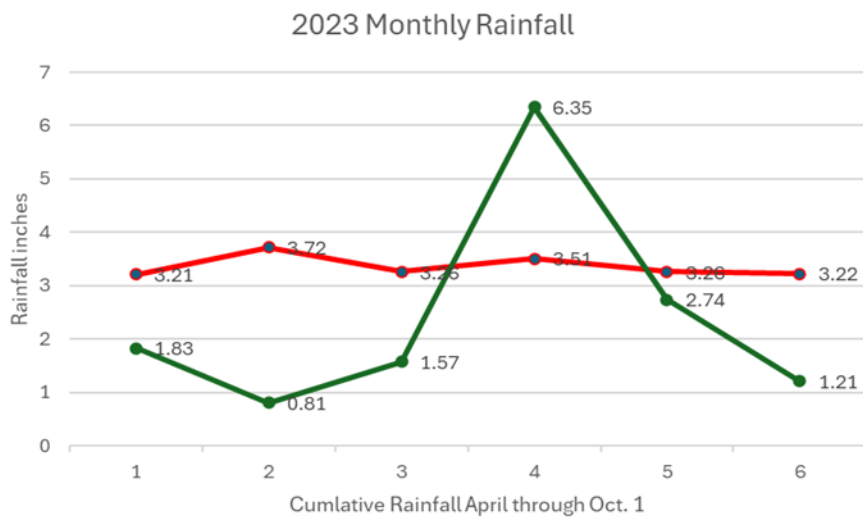
*Andre Land Forming
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Lenawee County Farm Bureau
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Precision Ag Services
Washtenaw Conservation District
Hart's Local
Local FFA Chapters*

*Prattville Elevator
University of Michigan
NRCS-Adrian, MI*

2023 Rainfall Information



April-October 1, 2023 rainfall data went from a dry spring to double the normal rainfall in July. This rainfall coupled with August average rainfall help carry the crops to a much better yield outcome than expected.

The recording rainfall gauge at the Bakerlads farm records daily information on rainfall, relative humidity, potential evapo-transpiration, air/soil temperatures, total wind speed, total solar

Access to the information is through the Enviro-weather at:
<https://mawn.geo.msu.edu/>

MICHIGAN STATE UNIVERSITY


Weather Station Network home


Enviro-weather


MSU Agricultural Weather Office

Michigan State Climatologist's Office

MSU Department of Geography







Enviro-weather

formerly Michigan Automated Weather Network (MAWN)

<p>Station: hudson</p> <p>Station ID: hdn</p> <p>Location: Baker Dairy Farm</p> <p>City: Clayton</p> <p>Latitude: 41.8729 deg.</p> <p>Longitude: -84.2259 deg.</p> <p>Elevation: 265 m</p>	
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Pregenerated Data Reports:

- [▶ Daily Data](#)
- [▶ Hourly Data](#)

Station Information:

- [▶ Maintenance Reports](#)

Custom Reports (Data-on-Demand):

Note: Change has been made to date/time labels. Please refer to note at the bottom of generated reports.

Select Data Type: Hourly Data (wait for page to reload after selecting)

Planted May 18, 2023

Variety: P31A73E

Tillage

- No-till with cover
- Fall Strip-Till
- Fall Disk Ripping
- Fall High Speed Disk

2023 Soybean Tillage Trials



2023 Soybean Tillage Trials

Objective

Continue the long-term tillage trials that have been part of the Center for Excellence from the beginning. The type of equipment we use for conventional tillage has changed over the years to more of a residue management system. This year's tillage systems were No-till, Fall Strip-Till, Fall Disk Rip-ping, and Fall High Speed Disking .

Harvest Information and Economics

The data, as indicated in the chart below, were replicated a minimum of three strips randomly selected and are sixteen rows wide. The plot sizes are about 0.35 acres in size. The harvest data is taken from the inside twelve rows of each plot.

The yield data was collected using calibrated yield monitors, and the cost was real costs by the land-owner supplemented with custom rates from the Michigan State University custom rate information for equipment use.

The yield data is listed below for each of the individual strips. There was no significant yield difference in the mean yield. The big take away is the cost savings of all practices that include planting, Primary and Secondary tillage, Herbicide differences(burndown) and planting. No-till had an \$8.86-\$30.10 per acre savings on input costs, resulting in a higher net income.

Tillage Systems Individual Samples	No-till Bu/ac	Fall Strip-Till Bu/ac	Fall Disk Rip- ping Bu/ac	Fall High Speed Disk Bu/ac
1	64.21	67.25	68.19	63.68
2	58.43	65.42	58.60	53.26
3	69.71	64.42	61.63	58.78
Mean Average	61.5	65.7	62.8	62.2
Gross Income @ \$12.50/ bu	\$768.75	\$821.25	\$785	\$777.5
Cost Tillage, Planting, Burn- down \$/ac	\$57.7 Planting with burn- down	\$87.77 Fall strip-till with burn- down	\$78.23 1 pass in fall and spring	\$ 72.53 1 pass in the fall and spring
Net Income After Tillage , Burndown, and Planting	\$711.05	\$733.48	\$706.77	\$704.97
*28.17/ac for planter, auto steer and labor \$ 28.56/ac 1 pass with high- speed disk \$22.86/ac Strip-Tiller with fertilizer \$30.10/ac. \$29.50/acre burndown spray(product and application) Soil Finisher \$ 21.50/ac			Disk Ripper	CV 3.32 LSD 6.69 no significant yield difference No-till saves \$8.86-\$30.10 input costs

2023 Dalero Fungicide Trials —Soybeans

Objective

Compare the value of the application of a fungicide applied at early flowering or before disease development as compared no fungicide applied at all.

Harvest and Economic Information and Economics Chart

Soybean Diseases

- Alternaria Leaf Spot
- Anthracnose
- Asian Soybean Rust
- Brown Spot
- Cercospora Blight
- Frogeye Leaf Spot
- Pod And Stem Blight
- Powdery Mildew
- Rhizoctonia Aerial Blight

Soybeans	
Use Rate per Application	8.0 to 11.0 fl oz/A
Use Rate per Season	33 fl oz/A Do not apply more than 3 applications per year
Timing	Apply as a broadcast foliar spray at early flowering or prior to disease development, whichever is earlier. Repeat applications on a 10 to 21 day spray interval if disease monitoring or environmental factors indicate favorable conditions for continued disease development. Use of the higher rates and shorter spray intervals are recommended when disease pressure is severe.
PHI	21 days

The soybean strip trials with Dalero had no significant yield difference with a mean average difference of 1.9 bushel/acre. The fungicide strip trial cost \$ 27.50/acre more of input costs and would take a minimum of a 2.2-bushel of significant yield difference. It should be noted that this year may have been a good weather yield for little or no diseases in soybeans due to other weather conditions. There have been many years where the yield difference when using a fungicide has been well worth the treatment.

Individual Strips	Fungicide Dalero dry bu/ac	No Fungicide dry bu/ac
1	57.96	58.22
2	63.01	60.51
3	58.61	61.88
4	56.79	58.36
Mean Average	61.6	59.7
Gross Income/acre		
\$12.50/acre	\$770	\$746.25
Net Income/acre		
Fungicide cost \$27.50	\$742.5	\$746.25
CV 6.62 LSD 5.52 No significant yield difference	95% confidence level	** +\$ 3.25/acre

2023 Soybean Population Studies

Objective

Evaluate different population studies on the farm to determine the bottom rate and high rate of soybeans used in a cropland field to evaluate how to design a field level variable rate seed prescription.

- Most variable rate soybean prescriptions have been designed on a combination of soil types, organic matter, CEC, and yield data.
- The normal seeding rate for 15-inch row soybeans on the farm was 150,000 seeds per acre
- Seeding rates at the farm have been reduced to 120,000 based on data from past years' strip-trials.
- Evaluate economics of reduced seed drop in relationship to yield and net return.

Goal

Compare a variable rate seeding rate to two straight rate populations .

- 120,000 seed drop/acre
- 95,000 seed drop/acre

Prescription Design

- Used multi-year soybean yield data
- Six yield zones from yield map
- Lower yields receive a higher seeding rate and higher yields receive less soybean drop

Red strips: 120,000

Green strips: 95,000

Blue, yellow orange, and green strips: variable rate prescription 80,000 -120,000



Soybean Population Study

Home Farm



The replicated strip trials demonstrate the seeding rates dropped at planting time.

The red strips on the map are 120,000 seeds/acre. The green strips are 95,000 seeds/acre and the blue, green, orange strips are variable rate strips ranging from 80,000 to 120,000 seeds per acre.

Yield and Economic Information

Yield from the different strips of populations— from straight rates to variable rate seed application. The four different strips for each population had a mean average that was 60.6-61.8 bu./acre. There was no significant yield difference between the treatments, but there was a difference in cost of seed used in each population. There was an \$11.21 savings per acre in seed cost between current seeding practices (120,000/ac) to variable rate (95,165/ac).

Different Seeding Rates	96,400	119,333	95,165
Seed Drop/ac			Variable Rate
1	60.53	66.34	64.25
2	60.43	59.77	62.43
3	55.73	57.46	57.33
4	61.91	63.56	60.93
Mean bu/ac	60.6	61.8	61.2
Gross Return/ac @ \$12.50 /bu soybeans	\$757.5	\$772.5	\$765
Cost of Seed/acre \$65/140,000 sd/unit	\$44.76	\$55.40	\$44.19
Net Return/ac	\$712.74	\$717.10	**\$720.81

Soybean Population Study Creger Farm



The replicated strip trials demonstrate the seeding rates dropped at planting time.

The red strips on the map are 120,000 seeds/acre. The green strips are 95,000 seeds/acre and the blue, green, orange strips are variable rate strips ranging from 80,000 to 120,000 seeds per acre.

Yield and Economic Information

The yield information for the seeding population strip trials once again showed no yield difference. Yields were excellent in all strips. The variable rate seeding rate of 85,265 per acre had a seed cost per acre of \$39.59. compared to the 120,000 seeds per acre of \$55.71. That is a \$16.00 dollar difference in seed cost. On a 1,000 acres of soybeans that is a savings of \$16,000 dollars.

Different Seeding Rates/Seed Drop	96,304	120,000	Variable Rate 85,265
1	63.84	64.45	61.24
2	61.23	61.15	59.99
3	65.01	65.57	63.74
4	65.69	66.87	67.65
Mean	63.9	64.5	63.2
Gross Return/ac @ 12.50/bu Soybeans	798.75	806.25	790.0
Cost of Seed/acre \$65/140,000 sd/unit	\$44.71	\$55.71	\$39.59
Net Return/ac	754.04	750.54	750.41
LSD 4.26 CV 4.17 No Significant Difference			

Soybean Population Study Summary Home and Creger Farm

Seed Drop Per Acre	96,563 Flat Rate	119,777 Flat Rate	Variable Rate 91,365	Average Cost Savings /ac Variable Rate compared to Flat Rate	
Farm	Dry bu./ac	Dry bu./ac	Dry bu./ac	119.8 ksd./ac	96.56 ksd./ac
Home Farm Yield	60.6	61.8	61.2	\$13.20	\$.50
Creger Bu/ac	63.9	64.5	63.2	\$16.12	\$5.12
\$65.00/unit 140,000 seeds			Mean Savings/ ac Variable rate	\$12.96	\$2.81

The above chart is a summary of the three seeding rates ranging from an average of 91,365 seeds per acre with the variable rate seeding, compared to the two flat rate seedings at 120,000 and 95,000 prescription seeding rates. The mean savings of the variable rate from the two farms was \$12.96 per acre for the higher seeding rate of 120,000 seeds per acre and only a \$2.81 seeding savings on the lower seeding rate.

The goal was to demonstrate no yield lag from the lower seeding rates and how much input cost/acre can be realized by doing this. It appears there would be very little savings between the flat rate of 95,000 seeds per are and the variable rate.

Next year, additional strip trials will be done with a wider range of variable rate seeding populations compared to the 2023 prescription.

2023 Corn Tillage Trials



Objective

Continue the long-term tillage trials that have been part of the Center for Excellence from the beginning.

The type of equipment we use for conventional tillage has changed over the years to more of a residue management system. This year's tillage systems were No-till, Fall Strip-Till, Fall Disk Ripping and Fall High Speed Disking.



Corn Tillage Trials

Corn no-till and strip till acres in Southeast Michigan have not increased in the last decade or so. Farmers tend to want to do fall tillage before the next corn crop. Planting corn early due to having many acres to plant, can sometimes cause issues with no-till corn such as: side wall compaction, closing the trench, and wheel compaction all of which lead to poor soil quality and an undesirable root growth environment.

Over the years at the Center for Excellence, there has been very little significant yield difference between the tillage systems for corn in a corn-soybean rotation. Have the correct starter fertilizer with a minimum of 50 lbs. of N at planting time. Row cleaners, hydraulic down force, and electric drives all contribute to the picket fence corn stand that corn growers strive for. No-till crops will not give up yield if the system—from planting to weed control and good fertility—are followed and the soil health of the field is in good shape.

The data, as indicated in the chart below, were replicated with a minimum of three strips randomly selected and are sixteen rows wide. The plot sizes are about 0.35 acres in size. The harvest data is taken from the inside twelve rows of each plot.

The yield data was collected using calibrated yield monitors, and the cost was real costs by the land-owner supplemented with custom rates from the Michigan State University custom rate information for equipment use.

Tillage Systems	No-till	Fall Strip-Till	Fall Disk Ripping	Fall High Speed Disk
1	162.03	163.6	148.4	149.4
2	159.7	145.29	169.69	167.31
3	172.34	172.88	177.57	177.98
Mean Average	164.7	160.6	165.2	164.9
Gross Income @ \$4.50/bu	\$741.15	\$722.7	\$743.40	\$742.05
Cost of Tillage, planting, burndown \$/ac	\$63.67	\$93.77 Fall strip-till	\$78.23 1 pass in fall and spring	\$ 72.53 1 pass in the fall and spring
Net Income After tillage , burn-	\$677.48	\$628.93	\$665.17	\$669.52
*28.17/ac for planter, auto steer, and labor Disk Ripper \$ 28.56/ac 1 pass with high- speed disk \$22.86/ac Strip-Tiller with fertilizer \$30.10/ac. \$35.50/acre burndown spray(product and application) Soil Finisher \$ 21.50/ac				CV 7.95 LSD 24.52 no significant yield differ- ence No-till saves \$8.86- \$30.10 input costs

Phosphorus Reduction Program

This program is based on science and a fundamentally simple concept. If less phosphorus is used in the system, could it be one part of the puzzle to reduce soluble P from leaving farmland fields. The program essentially incentivizes the application of P205 in cropland fields except zones or areas of the field that are 10 ppm or less.

Plants are using less phosphorus but get P from the soil in an environment which has a lot of microbial activity with an aerobic environment for improved root soil nutrient exchange.



Good Soil Health leads to soil profiles that come to life with macro-invertebrates.

Improved soil health works in more of an aerobic environment verses an anerobic one

The aerobic environment unleashes nutrients that are tightly bound to the soil.

Phosphorus becomes more available to plants in an aerobic environment.

2.5-acre grid soil samples that provide good science to reduce nutrient application compared to straight rate applications.

MAP and DAP fertilizer are expensive products to supply P205 to a growing crop.

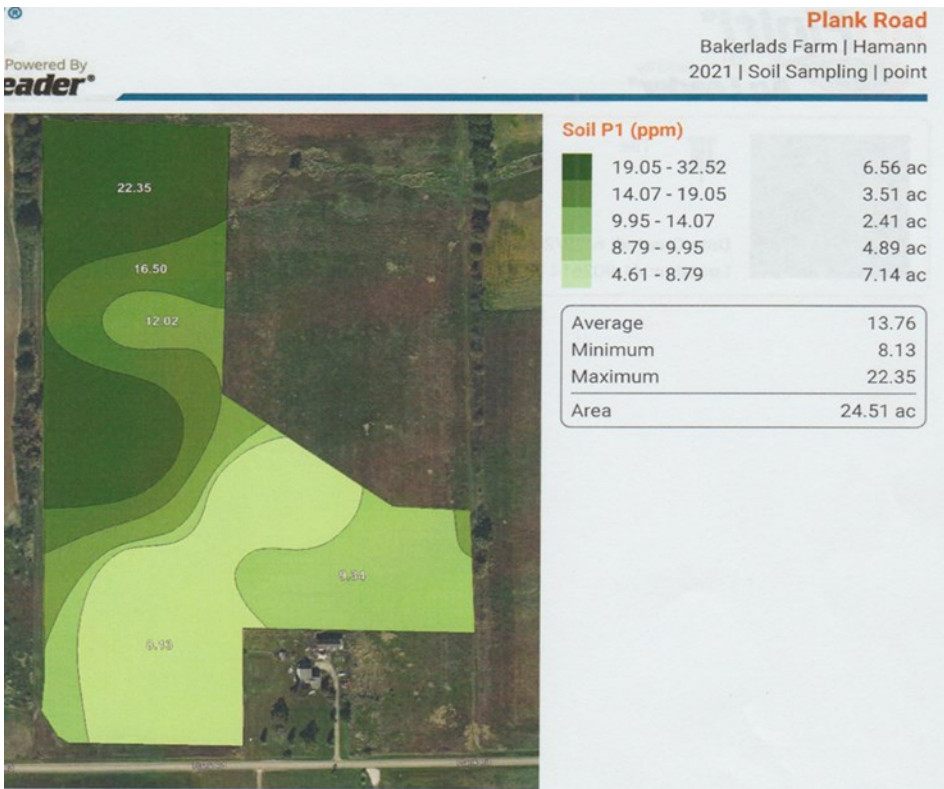
Cost Of MAP/Ton: \$700-\$800/Ton
110 lbs. P205 for crop removal is > \$40.00/acre.



Soil P Reduction Program Example

Soil P1 Level ppm

2.5-acre Grid Soil Samples

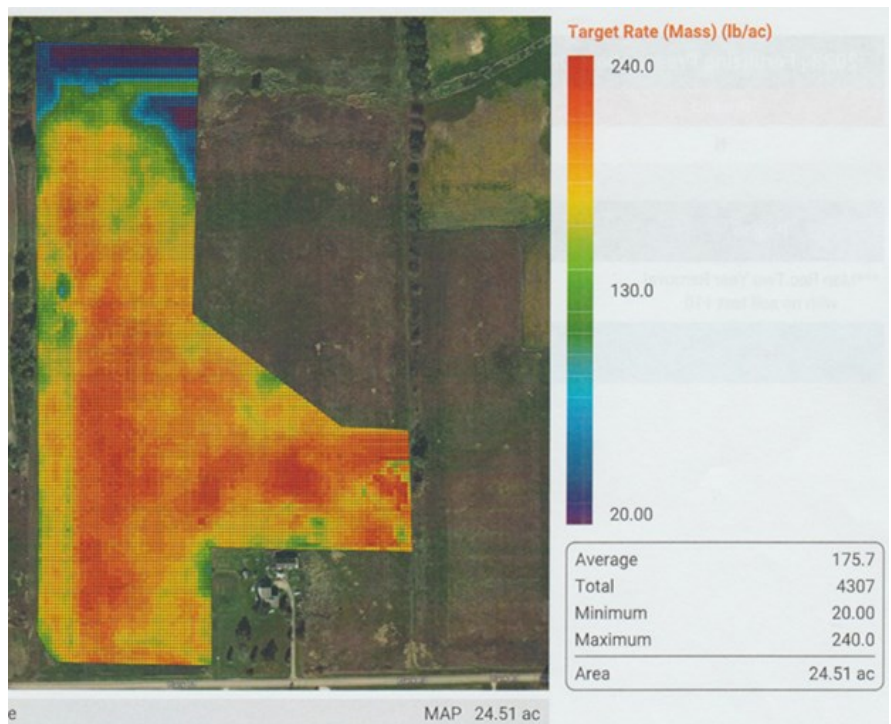


The soil P1 map has soil test zones ranging from 22.35-8.13 ppm. About 12.03 acres of the field are at or below the 10-ppm critical level and will have crop removal spread based yield mapping from previous years.

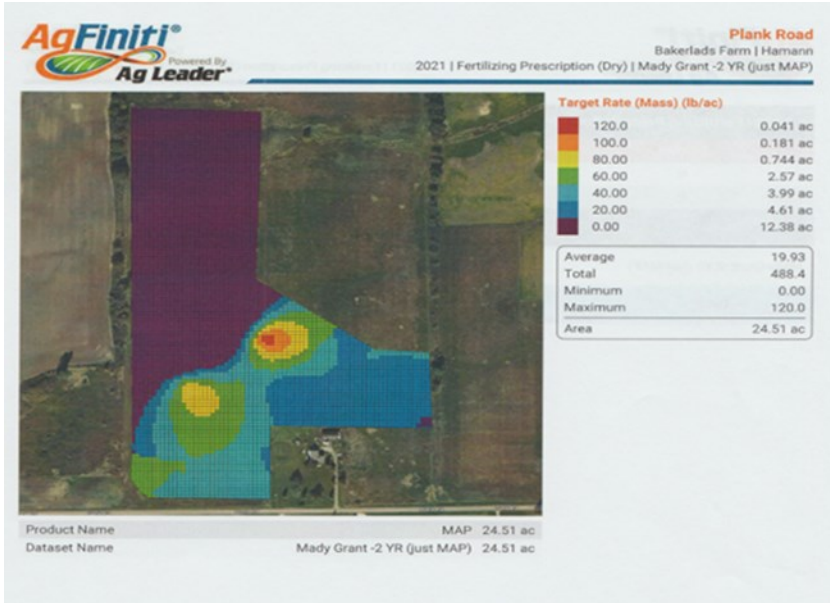
The prescription as pictured, is a variable rate prescription based on the soil P1 map and the tri-state fertilizer recommendations which use a critical level of 20-30 ppm P.

The 2- year variable rate prescription tri-state recommendation using crop uptake is 175.7 lbs of MAP per acre. This costs \$70.80 for product only or 35.40/acre year. At \$4.00/bu. For corn it takes 8.85 bushels of corn to pay for the P205 product alone and over 3 bushels of soybeans.

The total P205 prescribed on this field is 4307 lbs. of MAP fertilizer or 2.2 tons @ \$800/ton and total cost of \$1760.00.



Phosphorus Reduction Program



The prescription under the P reduction program for this field is spreading a total of 488 lbs. of MAP fertilizer with an average for the field of 19.93 lbs./acre.

The tri-state two year spread on the field was 4307 lbs. and 175.7 lbs./acre.

The P reduction program implements test strips in the field of crop removal compared to the balance of the field that has 0 or very little P fertilizer applied. Yield mapping is overlaid the fertilizer application to determine if there was a cost and water quality benefit from using less P in the field.

Map Application	No Map Application
2 year spread 198 lbs./ac	0 lbs./ac
161.5 bu./ac	168.3 bu./ac
161.3 bu./ac	172.1 bu./ac
No significant difference	

Phosphorus use reduction : 179.67 lbs. per acre or total lbs. of 4,401 lbs. @800/ton

\$1768.80 cost savings for the field.



SAVE THE DATE!

2024 FIELD DAY



WEDNESDAY AUGUST 14, 2024