

Farmer Rancher Grant Program

Heron Lake Watershed District Cover Crop Demonstration Project Final Report

I. PROJECT IDENTIFICATION

- Name: Jan Voit, District Administrator
- Address: PO Box 345
- City, State, Zip Code: Heron Lake, MN 56137
- Phone: 507-793-2462
- Project Title: Heron Lake Watershed District Cover Crop Demonstration Project
- Project Number: FNC 12-894
- Project Duration: March 16, 2012 to April 30, 2014
- Date of Report: September 18, 2013

II. PROJECT BACKGROUND

1. Briefly describe your operation (i.e. how many acres, what crops, types of cropping systems, type of livestock or dairy production, grazing systems, family operation, etc.)

Cooperators Jerry and Nancy Ackermann farm 1,050 acres in a crop rotation of corn, soybeans, and alfalfa. Jerry and Nancy have been farming for 35 years and both are extremely active in on-the-farm research and test plots. Nancy Ackermann attended the University of Minnesota (UM) and has a background in nursery/landscape. She is active in the community, serving on both the Jackson County Farm Service Agency and Prairie Ecology Bus Center boards.

2. Before receiving this grant, did you carry out any sustainable practices? If so, briefly describe what they were and how long you had been practicing them.

For the past nine years, the landowners have incorporated 350 acres of no-till soybeans and 350 acres of strip-till corn in the crop rotation. The alfalfa crop is a cash crop and is used in nutrient management for alfalfa-corn rotations.

In 2010, the Ackermann's partnered with the UM on a test plot and hosted a field day focused on planting corn after an alfalfa crop to increase nitrogen amounts. They also partnered with the UM during the 2011 growing season on another test plot. This plot examined yield rates of alfalfa using different seeding mechanisms.

The Ackermann's have pioneered conservation tillage methods such as strip till and no-till in southwest Minnesota. They remain on the cutting edge of new agricultural practices that allow conservation and profitability to progress hand-in-hand. The Ackermann's were awarded an Innovative Nutrient Management Grant to improve water quality through the Minnesota Nutrient Efficiency Grant Program in the fall of 2010.

III. PROJECT DESCRIPTION

The Heron Lake watershed encompasses approximately 472 square miles and is located in

portions of Nobles, Jackson, Murray, and Cottonwood Counties in southwestern Minnesota. Heron Lake and its watershed face many of the same problems seen in other rural, agricultural areas in Minnesota. Point and nonpoint source pollution, intensive tillage, non-compliant septic systems, feedlots, and urban stormwater runoff are all problems that must be addressed in order to reduce phosphorus loading in North Heron Lake and South Heron Lake. Problems associated with these lakes include severe algae blooms, loss of rooted aquatic vegetation, loss of migratory waterfowl, rough fish impacts, reduced water clarity, and flooding.

The Heron Lake Watershed District (HLWD) continually looks for avenues to provide educational opportunities that could lead to landowners and operators incorporating new techniques in their farming operations. Independent surveys conducted by HLWD and the UM have found environmental issues and new environmental technologies to be of high value to watershed residents. In addition, landowners rarely can independently afford to implement new conservation practices. This problem permeates the entire watershed and affects any HLWD resident who is interested in improving and protecting the environment and wildlife habitat through responsible farming practices.

Cover crops are a means that could be implemented to provide erosion control in the watershed. They can also be used on a continuous basis throughout the growing season to provide crop nutrients and pest control.

Through the project, Jerry and Nancy Ackerman, local landowners and operators, established a cover crop demonstration site as a means to distribute new conservation technology to other agriculture producers and the community. Cover crops have been shown to be effective in reducing sediment and nutrient runoff by providing vegetative cover during erosion-prone time between fall harvest and spring planting. Studies have also shown an economic advantage for the landowner by scavenging up to 45 pounds of nitrogen that has leached below the accessible root depth of corn and soybeans and increasing organic matter.

The cover crop demonstration site was located directly adjacent to Jackson County Judicial Ditch 3 located in Section 33 of West Heron Lake Township in Jackson County. The cover crop project was implemented to address water quality problems in an effort to increase nutrient uptake, reduce erosion, and minimize nutrient leaching. Cover crops have the potential to directly benefit the community and watershed by slowing water and reducing sediment and nutrient runoff.

This project location drains to South Heron Lake. The West Fork Des Moines River and Heron Lake Total Maximum Daily Load Report found South Heron Lake to be impaired for phosphorus. This project was implemented to decrease phosphorus levels by using vegetation to reduce erosion and nutrient runoff. Vegetation has been shown to reduce sediment, nutrients, and pesticide movement in surface water. As vegetation absorbs the energy of raindrops it reduces surface sealing and runoff, impedes erosion by decreasing surface velocity, physically restrains soil movement, improves the aggregation and porosity of the soil, and increases biological activity in the soil.

The root systems of the cover crop break up compaction to allow for better water infiltration and are used to draw nitrogen from deep below the surface back to the root zone for the next year's crop. The seed mix was chosen to provide the opportunity to scavenge nitrogen to increase soil fertility, add additional organic matter to improve soil composition, infiltration, and protection and reduce weed competition. All of these are ways to naturally improve the overall yield of the

following year's crop while reducing nitrogen application costs.

GOALS

Goal 1: To establish 37 acres of cereal rye, purple top turnips, and tillage radish cover crop to reduce erosion, increase water infiltration to prevent runoff, bring leached nitrogen back to the root zone for the next year's crop, increase organic matter, and provide wildlife habitat cover.

Objective 1a: Within the grant period, a cover crop will be incorporated into the crop rotation, seeded in the fall of 2012, and destroyed in the spring of 2013 before the 2013 crop is planted.

Goal 2: To provide farmers and service providers with information about innovative cover crop practices to benefit water quality and nutrient management

Objective 2a: A field day would be hosted in the fall of 2012, following harvest, and would be open to the public.

Objective 2b: The Cover Crop Demonstration Project will be featured in one HLWD newsletter that will be distributed to 3,400 residents, conservationists, and legislators.

Objective 2c: A press release will be distributed to local media outlets highlighting project progress and the upcoming field day before the Cover Crop Demonstration Field Day.

PROCESS

Describe the steps involved in conducting the project and the logic behind the choices you made. Please be specific so that other farmers and ranchers can consider what would apply to their operations and gain from your experience.

Jerry and Nancy Ackermann contacted HLWD staff regarding the possibility of working together on a cover crop demonstration project. HLWD staff, in cooperation with Extended Ag Services, Inc. and the Ackermanns, drafted and submitted a grant application. Funding was awarded through the Farmer Rancher Grant program administered by North Central Sustainable Agriculture Research and Education (NCR-SARE).

The Cover Crop Demonstration Plot was located 5.5 miles west of Lakefield, Minnesota. The farm is a 1,050 acre crop rotation of corn, soybeans, and alfalfa. For the past nine years, the landowners have incorporated 350 acres of no-till soybeans and 350 acres of strip-till corn in the crop rotation. The alfalfa crop is a cash crop and is used in nutrient management for alfalfa-corn rotations.

Through the Cover Crop Demonstration Project, Extended Ag Services, Inc. worked with Jerry and Nancy Ackermann to establish a cover crop of forage rape, tillage radish, and purple top turnip that would be aerially seeded into a standing soybean crop in the fall of 2011. An adjacent control field of similar soil type, elevation, and slope was seeded to soybeans. The demonstration plot and control field were each approximately 40 acres.

Tillage transects, infiltration measurements, plant tissue tests, and soil samples were taken at the cover crop field in the spring of 2012 and the same measurements will be taken in the spring of 2013 to gauge cover crop success.

Tillage transects were completed by Andy Nesseth on May 23, 2012. Residue levels were 64 percent. To measure the percent residue a fifty-foot transect line with markers every six inches was placed at a forty-five degree angle across the field following planting. Each marker that fell

on top of the previous year's crop was counted. This was performed at six random locations for each plot and averaged to get the percent residue cover for the two separate fields. See **Appendix 1** for tillage transect results.

A 4.4 acre geo-referenced grid sampling was conducted on May 23, 2012. All cores were taken at a depth of 0-6" and 6-24". The core samples were analyzed for organic matter, phosphorus, potassium, zinc, pH, buffer index, and nitrate. Cores taken at 6-24" were only analyzed for nitrate. All soil tests were mapped and surfaced using inverse distance weighting algorithm. See **Appendix 2** for soil sampling results.

In the summer of 2013, the farm was grid sampled following University of Minnesota guidelines. A sampling location was generated every 4.4 acres with over 10 cores pulled in a 30-ft radius at each location. The results were analyzed at Minnesota Valley Testing Laboratories, in New Ulm. Those results showed a typical range of soil pHs characteristic of the calcareous soils of the region – ranging from 5.7 – 7.6. The spatial distribution of soil pH was relatively consistent with the sampling from the previous year. Organic matter measurements were also consistent with previous samples – any changes in measured percent Organic Matter is only due to inherent sampling variability. The measured soil test phosphorus was similar to previous sampling as well and spatial distribution was very similar. Soil test potassium exhibited the greatest difference in year over year analysis. A few of the sampling locations on the east-northeast side of the farm showed dramatic differences in soil test potassium, despite the locations being extremely close to each other in the subsequent sampling. There is no consistent trend in the differences, some are lower and some are higher.

Due to an excessively wet spring-early summer in 2013, the timing of the sampling was about 30 days later. As such differences in measure nitrate should be evaluated with caution. Soil measured nitrogen is highly weather dependent and will change spatially and temporally year to year. The later sampling timing in 2013 likely contributed more to the changes (increases) in measured soil nitrate more than the actual cover crop. As the growing season progresses, soil bacteria convert nitrogen to nitrate. This process increases as soils warm, provided there is sufficient aeration and moisture. There was a similar measured gradient on the each side of the farm, despite actual measured nitrogen being higher in 2013 versus 2012.

Infiltration measurements were taken on May 23, 2012. This was done to establish water absorption rates before and after the cover crop was seeded. Infiltration rates were not significantly different. To see the infiltration rates refer to **Table 1**.

To conduct infiltration measurements, a tube was driven halfway into the ground. The other half was filled with water. The amount of water that disappeared over a set period of time was measured and recorded by HLWD staff. This was repeated several times in the cover crop and control field to analyze each soil type before and after the cover crop was seeded. See **Appendix 3** for infiltration test results.

Table 1. 2012 Infiltration measurements taken before and after cover crop treatment.

Infiltration Rates (inches/hr)		
	Treatment	Control
Pre-Seeding	0.9	0.87
Post-Harvest	1.1	1.05
Spring 2012	n/a	n/a

Figure 1. 2013 Infiltration and residue sampling results

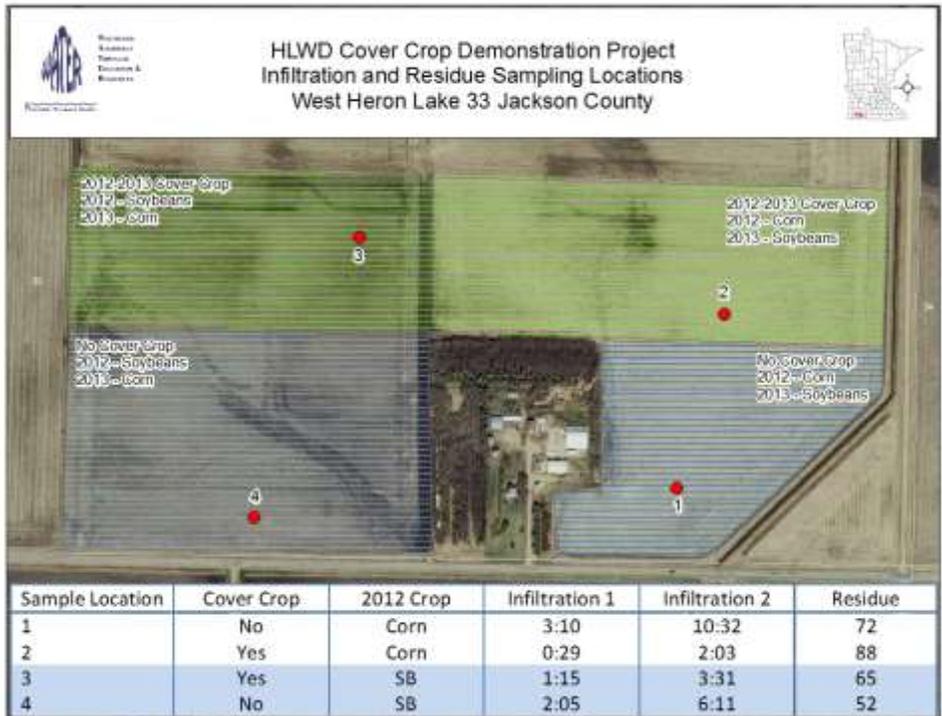


Figure 1 compares residue and infiltration measurements between the control and the area planted to cover crops. Corn acres that had a cover crop had an 84 percent higher infiltration rate compared to acres without a cover crop. Soybean acres with cover crop had a 40 percent higher infiltration than those acres with no cover crop. Residue measurement taken after planting was 18 percent higher on corn acres with cover crop and 20 percent higher on soybean acres with cover crop. Based on the significant increase in infiltration rates and surface cover residue where cover crops were established, it is easy to illustrate the water quality benefits of establishing cover crops.

Plant tissue samples were taken by Extended Ag Services, Inc. on June 6, 2012 and sent to Minnesota Valley Testing Laboratories for analysis. Results indicated that the nutrients for Nitrogen and Phosphorus were in the sufficiency range. Potassium was slightly below the sufficiency range according to UM standards. See plant tissue test results in **Appendix 4**.

Bids for the aerial seeding were obtained. Teryjon Aviation, Inc. of St. Peter, Minnesota was contracted to seed the cover crops. Total cost for aerial seeding was \$1,008.00. Seed was purchased from LaCrosse Forage & Turf Seed, LLC in Sioux Falls, South Dakota for \$1,411.92. The cover crop was seeded on August 26, 2012.

In the spring of 2012, roundup will be used to destroy the cover crop before the corn crop is planted. It is assumed that this herbicide treatment will not be needed due to lack of germination in the cover crop. If the seed should germinate during the spring of 2012, it will be destroyed by the farmer during his first roundup application following planting.

PEOPLE

List farmers, ranchers, or business people who assisted with the project and explain how they were involved. List any personnel from a public agency, such as the Extension Service, Natural Resources Conservation Services or Soil and Water Conservation Districts who assisted with this project. List people from non-profit organizations who helped you.

Andy Nesselth, Extended Ag Services, Inc. worked with Jerry and Nancy Ackermann to establish the cover crop demonstration plot. He was responsible for tillage transects, infiltration measurements, plant tissue tests, and soil samples in the plot. He also spoke at the field day and gave a summary of the efforts undertaken.

Jan Voit, HLWD Administrator was responsible for drafting the newsletter and press release, field day organization, grant administration, and reporting.

Ross Behrends, HLWD Watershed Technician provided assistance to the Ackermann's in establishing the plot, helped with cover crop seeding, field day organization, and documentation.

Jill Sackett, Local Extension Educator, Conservation Agronomist for the UM Extension – Rural Advantage spoke about the importance of cover crops at the field day.

RESULTS

What results did you achieve and how were they measured? For production projects, include yields, field analysis, and related data. How do these compare with conventional systems used previously? For education projects, include outcomes achieved and how you measured them through surveys, attendance, or other methods. Were these results what you expected? If not, why not? What would you do differently next time?

The overall success of this project was evaluated by the establishment of a cover crop, amount of nutrients saved, reduction in sediment transport, and an increased awareness throughout the HLWD on the effectiveness of cover crops.

As a result of an extreme dry period, there was little emergence of the cover crop during the fall of 2012. The lack of precipitation along with above average temperatures left poor conditions for germination.

Despite low fall emergence of the seeded cover crop, there was a significant amount of coverage from the cereal rye grass in the spring of 2013. Although there wasn't a statistical difference in nitrogen scavenging and yields, the water quality benefits were quantified by a 62 percent average increase in infiltration rates and 19 percent higher residues.

Securing an aerial seeding contractor proved to be difficult. To help with the price, the Ackermans were able to get a few of their neighbors to try out their own test acres which lowered to overall cost of the project. If future funding opportunities become available it is our goal to have the area seeded by August 15 to capitalize on moisture and the number of days before the first frost.

DISCUSSION

What did you learn from this grant? How has this affected your farm or ranch operation? Did you overcome your identified barrier, and if so, how? What are the advantages and disadvantages of implementing a project such as yours? If asked for more information or a recommendation concerning what you examined in this project, what would you tell other farmers or ranchers?

Despite the dry conditions, there was excellent cover crop emergence before termination in the spring of 2013. The importance of using a winter crop to benefit from spring emergence is well documented by this project. Beyond a successful spring germination, having 37 participants at the field day was deemed successful. Following the field day, there has been a considerable interest in cover crops from other residents in and around the HLWD. Four watershed residents requested assistance in developing a cover crop project in 2013.

The HLWD submitted an application and was awarded funding through the National Wildlife Federation (NWF) *Roadmap for Increased Cover Crop Adoption*. Through this grant endeavor, the HLWD will be providing first-hand information about the effectiveness of cover crops, agronomic and water quality benefits, and technology and equipment availability in southern Minnesota by focusing on the experiences of local experts and watershed landowners. This project will work with Jerry and Nancy Ackermann and Jerry and Terry Perkins, HLWD landowners and operators, to promote their involvement with cover crops as a means to distribute conservation technology to other agriculture producers and the community. The ultimate goal is to engage farmers that will implement cover crops for water quality improvement as well as their own farm's sustainability.

The HLWD also applied and received funding through the Environmental Protection Agency 319 grant program for the Heron Lake Third Crop Phosphorus Reduction Effort. Through this project, the HLWD proposes to provide incentives to establish 200 acres of cover crops on an annual basis during the three-year grant period. This will be done by aerially seeding a third crop, or cover crop, of cereal rye, purple top turnip, and tillage radish. Cover crops reduce erosion, decrease soil compaction, increase water infiltration to prevent runoff, bring leached nitrogen back to the root zone for the following year's crop, increase organic matter, and provide habitat cover. The HLWD also proposes to conduct civic engagement through the development of a steering committee. Processes taught at the Southwest Civic Engagement Cohort will be employed with the committee to brainstorm about the needs, wants, and perceptions of watershed landowners as they relate to water quality improvement, focusing on cover crops. They will also be asked to assist in identifying barriers to making changes and develop strategies for behavior change.

IV. PROJECT IMPACTS

Evaluate the economic, environmental and social impacts of this sustainable practice by completing the Benefits and Impacts form. Also, if possible, provide hard economic data.

See Benefits and Impact of Your Farmer Rancher Grant Project in **Appendix 5**.

V. OUTREACH

What methods did you use for telling others about: 1. Your project, 2. Project events or activities, 3. Project results? How and to whom did you communicate this information? Be sure to include details on how many people attended field days or demonstrations, and how information was further disseminated by media covering any events. What plans do you have for further communicating your results? Include press releases, news clippings, flyers, brochures, or publications developed during this project. Also include photos which might be helpful in telling your story to others. (Mail items separately if you cannot send them electronically.)

A field day was planned for November 7, 2012, following harvest. Advertising was done through the HLWD newsletter, press releases to local media, and the HLWD website. The HLWD newsletter provided information about the Cover Crop Demonstration Pilot project and the field day. The newsletter and press release can be found in **Appendix 6**.

At the field day, Jill Sackett, UM Extension Rural Advantage, spoke about the importance of cover crops. Jerry Ackermann and Andy Nesseth, Extended Ag Services, Inc. provided a project overview. Attendees had the opportunity to walk through the fields and see the vegetation that grew. Refreshments were provided. There were 37 people in attendance.

Following the field day, the speakers' handouts and photos from the event were uploaded to the HLWD website. Handouts are included in **Appendix 7**. Mike Jordan, Lakefield Standard, was present at the field day. He took photos and wrote an article that was published on November 14, 2012. The article can be found in **Appendix 8**.

VI. PROGRAM EVALUATION

This was the nineteenth year the North Central Region SARE Program sponsored a farmer rancher grant program. As a participant, do you have any recommendations to the regional Administrative Council about this program? Is there anything you would like to see changed? Please fill out the Evaluation form.

See Farmer/Rancher Grant Evaluation in **Appendix 9**.

VII. BUDGET SUMMARY

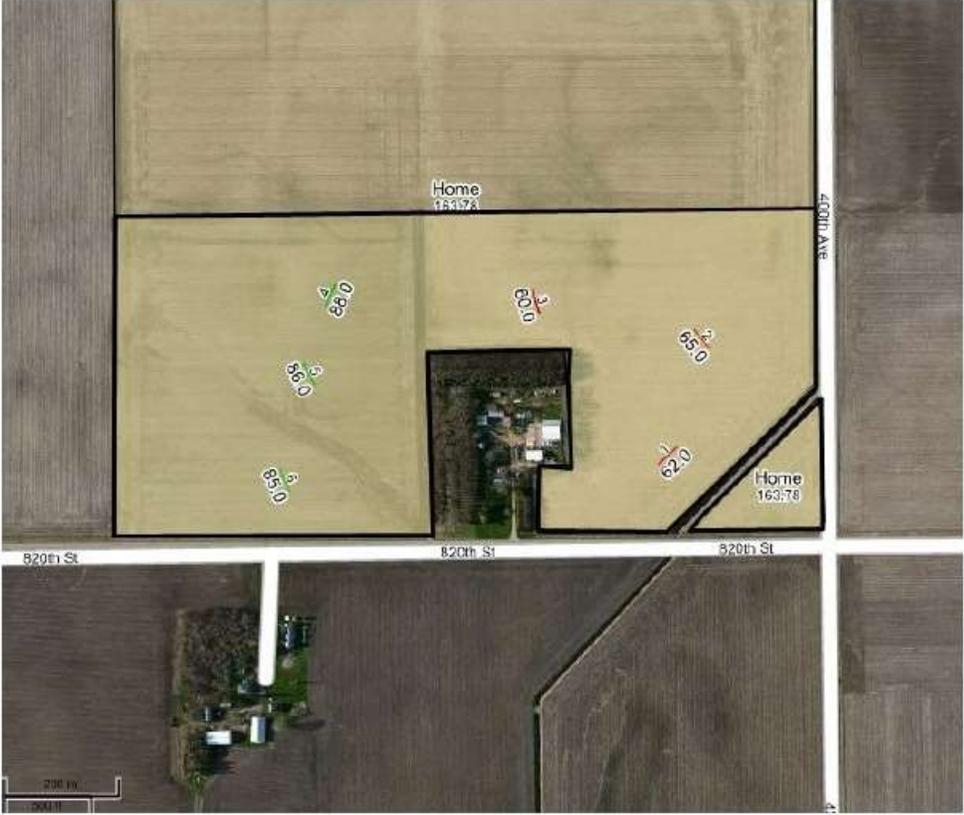
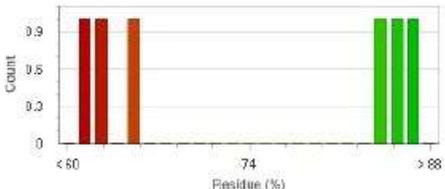
Complete the final budget form and return it with your report. You will only be reimbursed for expenses incurred and items purchased for conducting your project. If you made significant changes (more than 10% of your grant total) to final expenses listed by budget category, please include an explanation for the changes. Call Joan Benjamin with questions at: 573-681-5545.

Submit your final report to:

E-mail: BenjaminJ@lincolnu.edu or mail to:

Joan Benjamin
NCR-SARE Associate Regional Coordinator
Lincoln University
South Campus Bldg
900 Leslie Blvd, Room 101
Jefferson City, MO 65101

Appendix 1. Residue Counts

 <p>507 Milwaukee St. Lakefield, MN 56160</p>	<p>Current View</p> <p>Ackermann, Jerry & Nancy Acres: 80.00</p> <p>Farm: WHL 33, SE1/4 Lab Name: ""</p> <p>Field: Home-Grant Sampled:</p>
	
<p>Location: County: Jackson, MN Twp Rng Sec:</p> <p>Summary Statistics Layer Name: 12_MAWRC_Residue Count: 6 Minimum: 60.0 Maximum: 88.0 Average: 74.3 Weighted Average: 74.0</p>	<p>Residue (%)</p> 

Appendix 2. Soil Sample Results

**Jerry & Nancy Ackermann
4.4 ac Grid Soil Sampling Results
May 2012
MAWRC Grant Project**



"An Unbiased and Independent Ag Services Business"

Serving SW Minnesota

Jim, Matt and Andy Nesseth
507 Milwaukee Street
Lakefield, MN 56150-1177
507-662-5005 – office
507-662-5105 – fax
info@extendedag.com

Serving NW Iowa

Tim Baker
108 Clinton Street
Lester, IA 51242-0134
712-478-4582 – office
712-478-4584 – fax
extag@alliancecom.net

Visit us online at: www.extendedag.com

"Offering Complete Services in Agronomy, Feedlot Consulting and Risk Management."



How to Read Your Soil Tests:

- **Sample ID:** This is the approximate location of where the soil sample was taken.
- **OM:** This is the measured percent Organic Matter in the soil sample. Properties influenced by organic matter include: soil structure; moisture holding capacity; diversity and activity of soil organisms, both those that are beneficial and harmful to crop production; and nutrient availability. It also influences the effects of chemical amendments, fertilizers, pesticides and herbicides. The organic matter level is one of the factors used to determine the nitrogen fertilizer recommendation for some crops. Soils with higher organic matter have lower nitrogen recommendations. This is because decomposition of organic matter and the associated release of plant-available nitrogen is a significant source of this nutrient for crops. Soil organic matter is not used in nitrogen recommendations for corn.
- **Buffer Index:** This is a soil test measurement that is used to determine the amount of *lime* required to raise soil pH to the desired level; the buffer index is measured only when the pH of a mineral soil is less than 6.0.
- **pH:** This is a soil test measurement of the acidity or alkalinity of the soil solution. Optimum soil pH improves the availability of nutrients for crop production: 6.0 – 7.3.
- **Bray1 P:** This is a soil testing procedure that is used to determine the level of *plant available* phosphorus in soils with a pH of 7.4 or less.
- **Olsen P:** This is a soil testing procedure that is used to determine the level of *plant available* phosphorus in soils with a pH greater than 7.4.
- **Potassium:** This is a soil testing procedure (ammonium acetate) that is used to determine the level of *plant available* potassium in soils for crop production.
- **Zinc:** This is a soil testing procedure (DTPA procedure) that is used to determine the level of *plant available* zinc in soils for crop production.
- **Soil Types-Crop Productivity Index:** Crop productivity index ratings from the Natural Resources Conservation Service provide a relative ranking of soils based on their potential for intensive crop production. An index can be used to rate the potential yield of one soil against that of another over a period of time. Ratings range from 0 to 100. The higher numbers indicate higher production potential. CPI ratings do not take into account climatic factors, such as the differences in precipitation or growing degree days across Minnesota. The ratings are based on physical and chemical properties of the soils and on such hazards as flooding or ponding. Available water capacity, reaction (pH), slope, soil moisture status, cation-exchange capacity (CEC), organic matter content, salinity, and surface fragments are the major properties evaluated when CPI ratings are generated.
- **CEC (Cation Exchange Capacity):** This is a calculated value that is an estimate of the soils ability to attract, retain, and exchange cation elements. It is reported in millequivalents per 100 grams of soil (meq/100g). Lower readings (1-10) indicate higher sand content, a higher likelihood of nitrogen or potassium leaching, lower water-holding capacity and less lime required to correct a given pH. Higher readings (11-50) indicate more clay/organic matter, higher water holding capacity, more lime required to correct a given pH and a greater capacity to hold nutrients.

CONTACT EXTENDED AG SERVICES FOR COMPLETE FERTILIZER RECOMMENDATIONS.

Soil Test Sampling Map

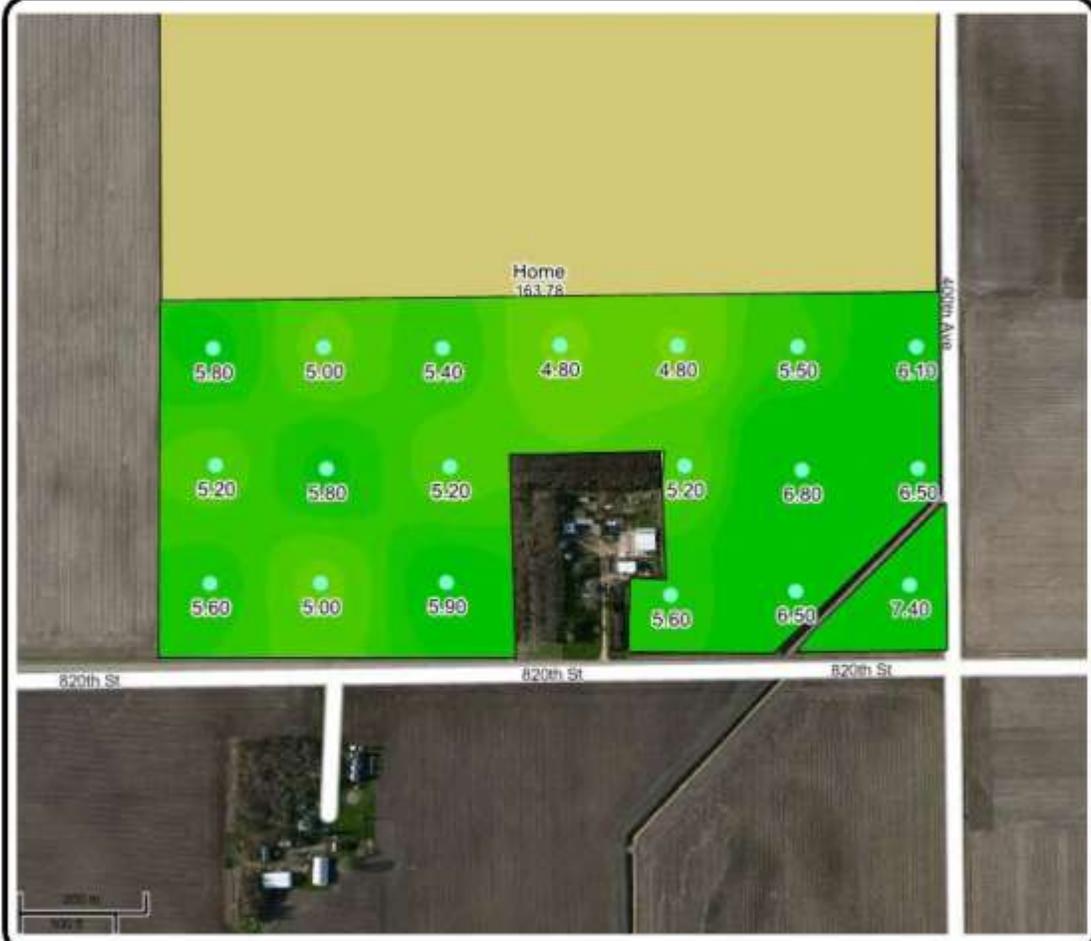
 <p style="font-size: small;">907 Milwaukee St. Lakefield, MN 56190</p>	<p>Grower: Ackemann, Jerry & Nancy</p> <p>Farm: WHL 33, SE1/4</p> <p>Field: Home-Grant</p>	<p>Area: 78.43</p> <p>Lab Name: MVTL</p> <p>Sample Date: May 22, 2012</p>
--	---	--



<p>Location: County: Jackson, MN Twp Rng Sec:</p> <p>Summary Statistics Layer Name: 12_MAWRC_4.4ac Sample Count: 19</p>	<p style="text-align: center;">SampleID</p>
---	--

OM

 <p>Extended Ag Services, Inc. 907 Milwaukee St. Lakefield, MN 56150</p>	<p>Grower: Ackemann, Jerry & Nancy</p>	<p>Area: 78.43</p>
	<p>Farm: WHL 33, SE1/4</p>	<p>Lab Name: MVTL</p>
	<p>Field: Home-Grant</p>	<p>Sample Date: May 22, 2012</p>



<p>Location: County: Jackson, MN Twp Rng Sec:</p> <p>Summary Statistics Layer Name: 12_MAWRC_4.4ac Sample Count: 19 Minimum: 4.8 Maximum: 7.4 Average: 5.65 Weighted Average: 5.69</p>	<p>OM percent</p>
--	--------------------------

CEC

 <p style="font-size: small;">007 Milwaukee St. Lakefield, MN 56150</p>	Grower: Ackemann, Jerry & Nancy	Area: 78.43
	Farm: WHL 33, SE1/4	Lab Name: MVTL
	Field: Home-Grant	Sample Date: May 22, 2012

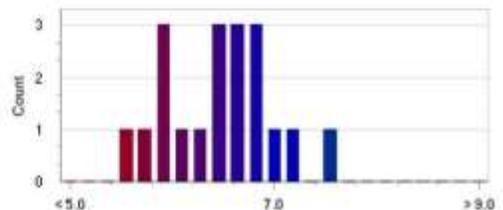


<p>Location: County: Jackson, MN Twp Rng Sec:</p> <p>Summary Statistics Layer Name: 12_MAWRC_4.4ac Sample Count: 19 Minimum: 23.2 Maximum: 42.7 Average: 28.94 Weighted Average: 29.15</p>	<p>CEC meq/100g</p>
--	----------------------------

pH

 507 Milwaukee St. Lakefield, MN 56130	Grower: Ackemann, Jerry & Nancy	Area: 78.43
	Farm: WHL 33, SE1/4	Lab Name: MVTL
	Field: Home-Grant	Sample Date: May 22, 2012



Location: County: Jackson, MN Twp Rng Sec:	pH none
Summary Statistics Layer Name: 12_MAWRC_4.4ac Sample Count: 19 Minimum: 5.4 Maximum: 7.5 Average: 6.44 Weighted Average: 6.45	

Buffer_Index

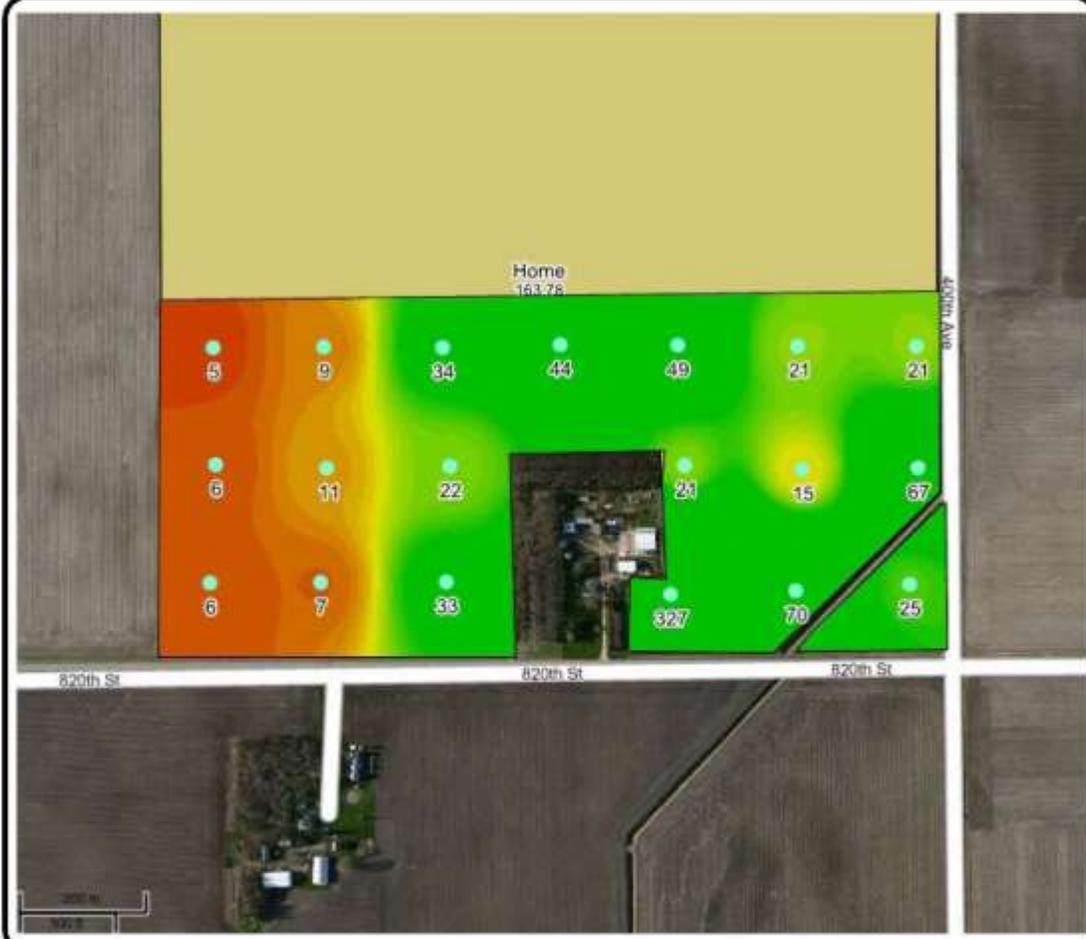
<p style="font-size: small;">907 Milwaukee St. Lansford, MN 55130</p>	Grower: Ackemann, Jerry & Nancy	Area: 78.43
	Farm: WHL 33, SE1/4	Lab Name: MVTL
	Field: Home-Grant	Sample Date: May 22, 2012



Location: County: Jackson, MN Twp Rng Sec: Summary Statistics Layer Name: 12_MAWRC_4.4ac Sample Count: 19 Minimum: 6.4 Maximum: 7.4 Average: 6.91 Weighted Average: 6.92	Buffer_Index none
---	------------------------------

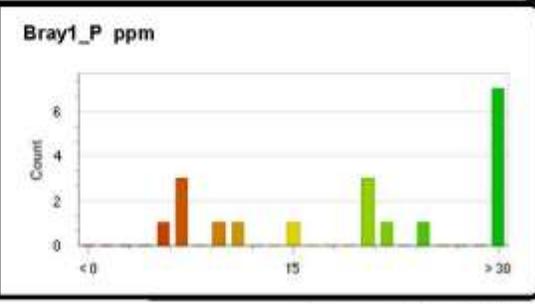
Bray1_P

 <p style="font-size: small;">907 Milwaukee St. Lansford, MN 55130</p>	Grower: Ackemann, Jerry & Nancy	Area: 78.43
	Farm: WHL 33, SE1/4	Lab Name: MVTL
	Field: Home-Grant	Sample Date: May 22, 2012



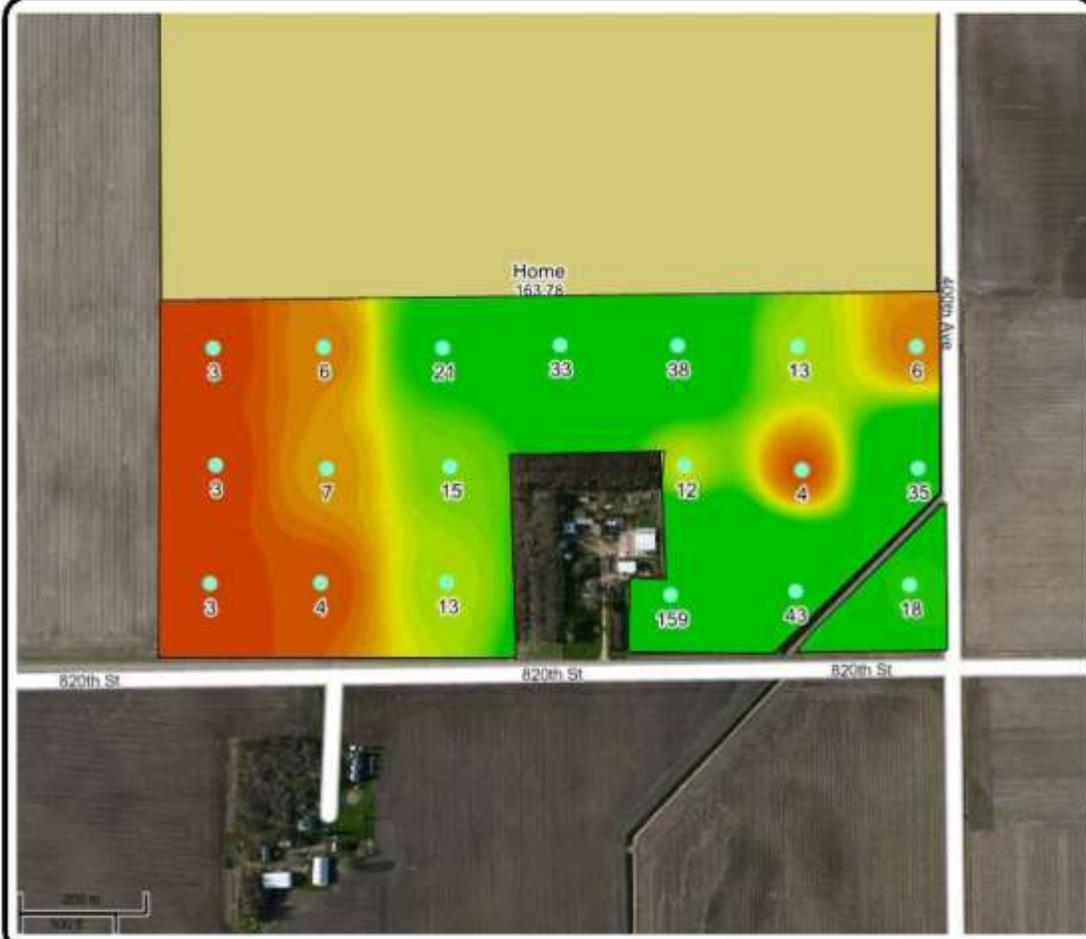
Location:
 County: Jackson, MN
 Twp Rng Sec:

Summary Statistics
 Layer Name: 12_MAWRC_4.4ac
 Sample Count: 19
 Minimum: 5
 Maximum: 326.99
 Average: 38.66
 Weighted Average: 41.74



Olsen_P

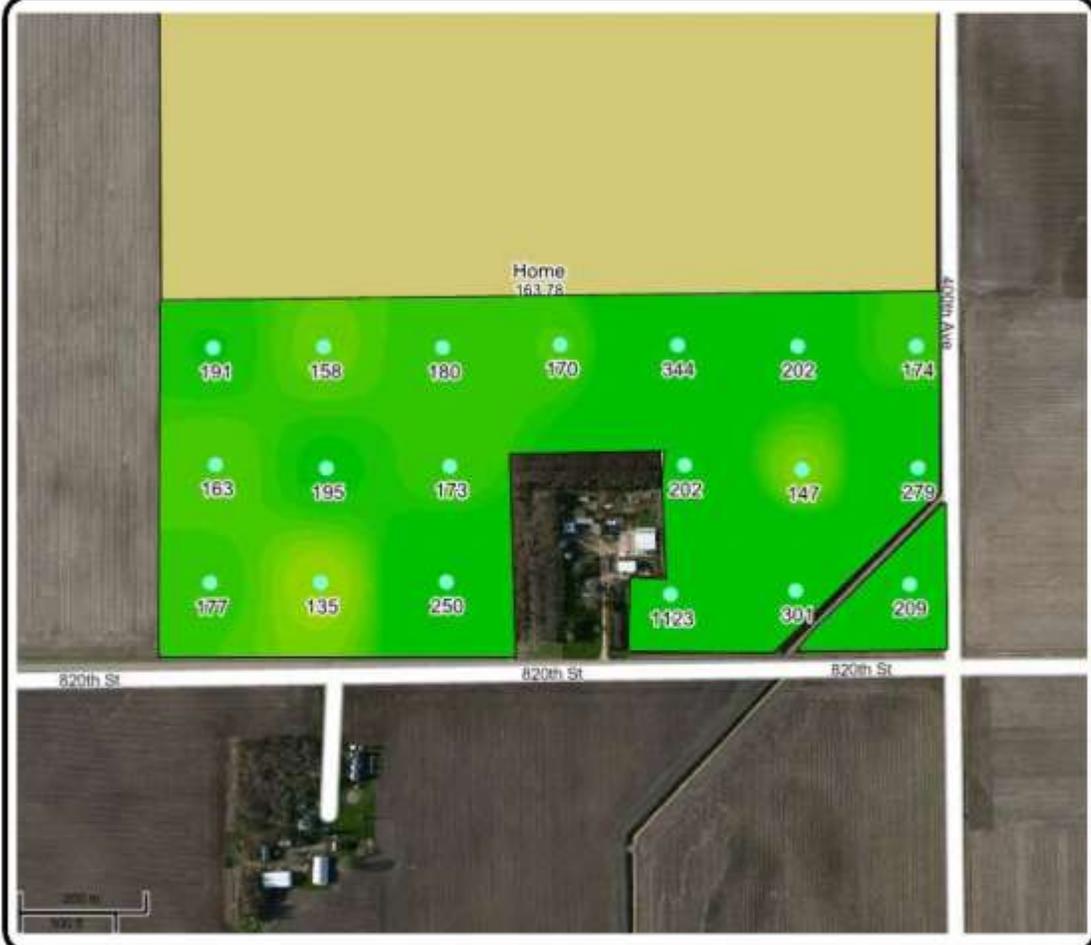
 <p style="font-size: small;">907 Minnesota Dr. Lansford, MN 55130</p>	Grower: Ackemann, Jerry & Nancy	Area: 78.43
	Farm: WHL 33, SE1/4	Lab Name: MVTL
	Field: Home-Grant	Sample Date: May 22, 2012



<p>Location: County: Jackson, MN Twp Rng Sec:</p> <p>Summary Statistics Layer Name: 12_MAWRC_4.4ac Sample Count: 19 Minimum: 3 Maximum: 159 Average: 21.54 Weighted Average: 22.95</p>	<p>Olsen_P ppm</p>  <table border="1" style="font-size: x-small; margin-top: 5px;"> <caption>Histogram Data</caption> <thead> <tr> <th>ppm Range</th> <th>Count</th> </tr> </thead> <tbody> <tr><td>< 0.0</td><td>0</td></tr> <tr><td>0.0 - 2.5</td><td>3</td></tr> <tr><td>2.5 - 5.0</td><td>2</td></tr> <tr><td>5.0 - 7.5</td><td>2</td></tr> <tr><td>7.5 - 10.0</td><td>1</td></tr> <tr><td>10.0 - 12.5</td><td>1</td></tr> <tr><td>12.5 - 15.0</td><td>2</td></tr> <tr><td>15.0 - 17.5</td><td>1</td></tr> <tr><td>17.5 - 20.0</td><td>1</td></tr> <tr><td>> 20.0</td><td>6</td></tr> </tbody> </table>	ppm Range	Count	< 0.0	0	0.0 - 2.5	3	2.5 - 5.0	2	5.0 - 7.5	2	7.5 - 10.0	1	10.0 - 12.5	1	12.5 - 15.0	2	15.0 - 17.5	1	17.5 - 20.0	1	> 20.0	6
ppm Range	Count																						
< 0.0	0																						
0.0 - 2.5	3																						
2.5 - 5.0	2																						
5.0 - 7.5	2																						
7.5 - 10.0	1																						
10.0 - 12.5	1																						
12.5 - 15.0	2																						
15.0 - 17.5	1																						
17.5 - 20.0	1																						
> 20.0	6																						

Potassium

<p style="font-size: small;">907 Milwaukee St. Lanesboro, MN 56150</p>	Grower: Ackemann, Jerry & Nancy	Area: 78.43
	Farm: WHL 33, SE1/4	Lab Name: MVTL
	Field: Home-Grant	Sample Date: May 22, 2012



<p>Location: County: Jackson, MN Twp Rng Sec:</p> <p>Summary Statistics Layer Name: 12_MAWRC_4.4ac Sample Count: 19 Minimum: 135.01 Maximum: 1,122.97 Average: 242.05 Weighted Average: 251.21</p>	<p>Potassium ppm</p>
--	-----------------------------

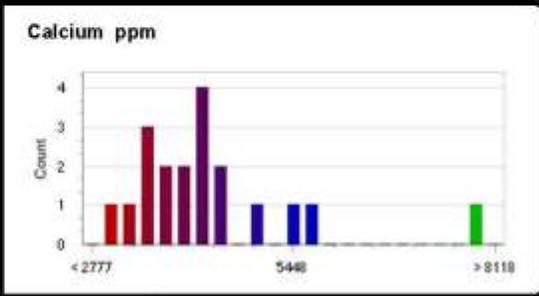
Calcium

<p style="font-size: small;">907 Milwaukee St. Lafayette, MN 55110</p>	Grower: Ackemann, Jerry & Nancy	Area: 78.43
	Farm: WHL 33, SE1/4	Lab Name: MVTL
	Field: Home-Grant	Sample Date: May 22, 2012



Location:
 County: Jackson, MN
 Twp Rng Sec:

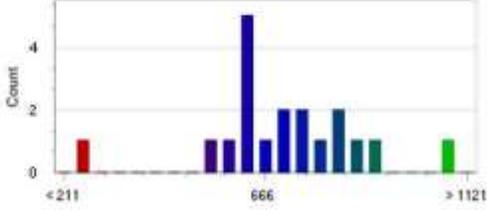
Summary Statistics
 Layer Name: 12_MAWRC_4.4ac
 Sample Count: 19
 Minimum: 2,777.05
 Maximum: 8,117.46
 Average: 4,201.94
 Weighted Average: 4,242.26



Magnesium

 <p style="font-size: small;">507 Milwaukee St. Lambert, MN 56110</p>	Grower: Ackemann, Jerry & Nancy	Area: 78.43
	Farm: WHL 33, SE1/4	Lab Name: MVTL
	Field: Home-Grant	Sample Date: May 22, 2012

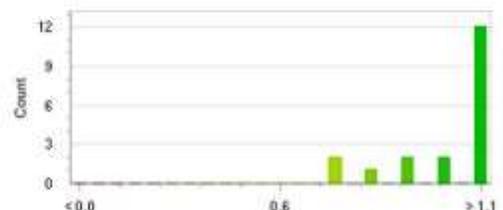


<p>Location: County: Jackson, MN Twp Rng Sec:</p> <p>Summary Statistics Layer Name: 12_MAWRC_4.4ac Sample Count: 19 Minimum: 211.07 Maximum: 1,120.98 Average: 708.56 Weighted Average: 709.79</p>	<p>Magnesium ppm</p> 
--	--

Zinc

	Grower: Ackemann, Jerry & Nancy	Area: 78.43
	Farm: WHL 33, SE1/4	Lab Name: MVTL
	Field: Home-Grant	Sample Date: May 22, 2012



<p>Location: County: Jackson, MN Twp Rng Sec:</p> <p>Summary Statistics Layer Name: 12_MAWRC_4.4ac Sample Count: 19 Minimum: 0.7 Maximum: 9 Average: 1.84 Weighted Average: 1.93</p>	<p>Zinc ppm</p> 
--	---

Nitrate_0_6_

 <p style="font-size: small;">507 Milwaukee St. Lambert, MN 56150</p>	Grower: Ackemann, Jerry & Nancy	Area: 78.43
	Farm: WHL 33, SE1/4	Lab Name: MVTL
	Field: Home-Grant	Sample Date: May 22, 2012



<p>Location: County: Jackson, MN Twp Rng Sec:</p> <p>Summary Statistics Layer Name: 12_MAWRC_4.4ac Sample Count: 19 Minimum: 8.4 Maximum: 71.6 Average: 27.24 Weighted Average: 28.61</p>	<p>Nitrate_0_6_ lbs per acre (st)</p>
---	--

Nitrate__0_24__

 <p style="font-size: small;">307 Milwaukee St. Layfayette, MN 56150</p>	Grower: Ackemann, Jerry & Nancy	Area: 78.43
	Farm: WHL 33, SE1/4	Lab Name: MVTL
	Field: Home-Grant	Sample Date: May 22, 2012

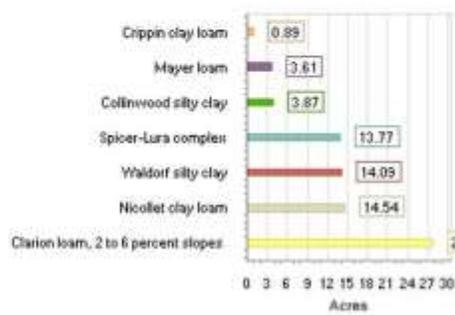


<p>Location: County: Jackson, MN Twp Rng Sec:</p> <p>Summary Statistics Layer Name: 12_MAWRC_4.4ac Sample Count: 19 Minimum: 30 Maximum: 153 Average: 75.83 Weighted Average: 77.74</p>	<p>Nitrate__0_24__ lbs per acre (st)</p> <table border="1" style="font-size: x-small; margin-top: 5px;"> <caption>Histogram Data</caption> <thead> <tr> <th>Nitrate Range (lbs/acre)</th> <th>Count</th> </tr> </thead> <tbody> <tr><td>< 30</td><td>3</td></tr> <tr><td>30 - 40</td><td>1</td></tr> <tr><td>40 - 50</td><td>3</td></tr> <tr><td>50 - 60</td><td>1</td></tr> <tr><td>60 - 70</td><td>2</td></tr> <tr><td>70 - 80</td><td>1</td></tr> <tr><td>80 - 90</td><td>1</td></tr> <tr><td>90 - 100</td><td>1</td></tr> <tr><td>100 - 110</td><td>1</td></tr> <tr><td>110 - 120</td><td>1</td></tr> <tr><td>120 - 130</td><td>1</td></tr> <tr><td>130 - 140</td><td>1</td></tr> <tr><td>140 - 150</td><td>1</td></tr> <tr><td>> 150</td><td>1</td></tr> </tbody> </table>	Nitrate Range (lbs/acre)	Count	< 30	3	30 - 40	1	40 - 50	3	50 - 60	1	60 - 70	2	70 - 80	1	80 - 90	1	90 - 100	1	100 - 110	1	110 - 120	1	120 - 130	1	130 - 140	1	140 - 150	1	> 150	1
Nitrate Range (lbs/acre)	Count																														
< 30	3																														
30 - 40	1																														
40 - 50	3																														
50 - 60	1																														
60 - 70	2																														
70 - 80	1																														
80 - 90	1																														
90 - 100	1																														
100 - 110	1																														
110 - 120	1																														
120 - 130	1																														
130 - 140	1																														
140 - 150	1																														
> 150	1																														

Soil Types

	Grower: Ackemann, Jerry & Nancy	Area: 78.43
	Farm: WHL 33, SE1/4	Crop Zone:
	Field: Home-Grant	Crop Year:



<p>Location: County: Jackson, MN Twp Rng Sec: Directions:</p>	<p>MuName</p>  <table border="1" style="margin-top: 10px;"> <thead> <tr> <th>Soil Type</th> <th>Area (Acres)</th> </tr> </thead> <tbody> <tr> <td>Crippin clay loam</td> <td>0.89</td> </tr> <tr> <td>Mayer loam</td> <td>3.61</td> </tr> <tr> <td>Collinwood silty clay</td> <td>3.87</td> </tr> <tr> <td>Spicer-Lura complex</td> <td>13.77</td> </tr> <tr> <td>Waldorf silty clay</td> <td>14.09</td> </tr> <tr> <td>Nicollet clay loam</td> <td>14.54</td> </tr> <tr> <td>Clarion loam, 2 to 6 percent slopes</td> <td>27.67</td> </tr> </tbody> </table>	Soil Type	Area (Acres)	Crippin clay loam	0.89	Mayer loam	3.61	Collinwood silty clay	3.87	Spicer-Lura complex	13.77	Waldorf silty clay	14.09	Nicollet clay loam	14.54	Clarion loam, 2 to 6 percent slopes	27.67
Soil Type	Area (Acres)																
Crippin clay loam	0.89																
Mayer loam	3.61																
Collinwood silty clay	3.87																
Spicer-Lura complex	13.77																
Waldorf silty clay	14.09																
Nicollet clay loam	14.54																
Clarion loam, 2 to 6 percent slopes	27.67																

Soil Types

 <p style="font-size: small;">907 Milwaukee St. Lakeville, MN 56190</p>	<p>Grower: Ackemann, Jerry & Nancy</p> <p>Farm: WHL 33, SE1/4</p> <p>Field: Home-Grant</p>	<p>Area: 78.43</p> <p>Crop Zone:</p> <p>Crop Year:</p>
--	---	---



<p>Location: County: Jackson, MN Twp Rng Sec: Directions:</p> <p>Summary Statistics Minimum: 72.00 Maximum: 100.00 Average: 89.58 Weighted Average: 91.10</p>	<p>CropProductivityIndex</p> <table border="1" style="font-size: small; margin-top: 10px;"> <caption>Crop Productivity Index Distribution</caption> <thead> <tr> <th>Index Range</th> <th>Acres</th> </tr> </thead> <tbody> <tr> <td>< 72</td> <td>~3</td> </tr> <tr> <td>86</td> <td>~14</td> </tr> <tr> <td>> 100</td> <td>~28</td> </tr> </tbody> </table>	Index Range	Acres	< 72	~3	86	~14	> 100	~28
Index Range	Acres								
< 72	~3								
86	~14								
> 100	~28								



EXT
ended Ag Services, Inc.

507 Milwaukee St.
Lakefield, MN 56150

Soil Test Summary

Ackermann, Jerry & Nancy

Farm: WHL 33, SE1/4

Lab Name: MVTL

Field: Home-Grant

Sample Date: May 22, 2012

SampleID	OM	CEC	pH	Buffer_ Index	Bray1_ P	Olsen_ P	Potassi um	Calciu m	Magne sium	Zinc	Nitrate_ 0_6	Nitrate_ 0_24	Comme nts
none	percent	meq/100g	none	none	ppm	ppm	ppm	ppm	ppm	ppm	lbs per acre (0)	lbs per acre (24)	none
1	6.10	32.9	7.2	7.3	21	6	174	5,631	529	1.4	39.0	130.0	
2	5.50	27.4	5.9	6.9	21	13	202	4,125	638	1.3	61.8	153.0	
3	4.80	23.2	5.7	6.8	49	38	344	3,067	612	1.3	71.6	141.0	
4	4.80	27.6	6.6	7.2	44	33	170	4,009	871	2.4	27.0	96.0	
5	5.40	25.3	5.4	6.4	34	21	180	2,777	608	2.2	12.6	51.0	
6	5.00	27.2	6.4	7.0	9	6	158	4,201	705	0.8	10.8	49.0	
7	5.80	30.3	6.3	6.9	5	3	191	4,370	847	0.7	13.0	51.0	
8	5.20	26.7	6.0	6.9	6	3	163	3,731	804	0.9	9.0	30.0	
9	5.80	27.6	6.6	6.8	11	7	195	3,803	738	1.0	10.8	32.0	
10	5.20	24.6	6.5	6.8	22	15	173	3,442	600	1.6	8.6	30.0	
11	5.20	28.3	5.9	6.4	21	12	202	3,312	638	1.2	42.0	102.0	
12	6.80	42.7	7.5	7.4	15	4	147	8,118	211	0.9	23.6	64.0	
13	6.50	32.5	6.6	6.9	67	35	279	4,912	759	2.6	65.4	125.0	
14	6.50	31.9	5.9	6.5	70	43	301	4,104	667	3.5	8.4	37.0	
15	5.60	26.5	7.0	7.2	327	159	1,123	3,693	623	9.0	64.0	93.0	
16	5.90	29.6	6.8	7.0	33	13	250	4,381	857	1.5	13.4	57.0	
17	5.00	23.2	6.7	7.0	7	4	135	3,391	720	1.0	23.0	69.0	
18	5.60	29.8	6.5	6.9	6	3	177	4,170	918	0.7	11.8	79.0	
19	7.40	36.6	6.9	7.1	25	18	209	5,366	1,121	2.7	27.8	68.0	
Average:	5.69	29.2	6.5	6.9	42	23	251	4,242	710	1.9	28.6	77.7	0



507 Milwaukee St.
Lakefield, MN 56150

Field Boundary Map

Ackemann, Jerry & Nancy Crop Year: 2013

Farm: WHL 33, SE1/4

Area: 78.51

Field: Home-Grant



Powered by MapShots AgStudio™

Page 1 of 11
Sep 11, 2013 10:59 PM





Extended Ag Services, Inc.

907 Milwaukee St.
Lakefield, MN 56150

Soil Types

Ackermann, Jerry & Nancy

Farm: WHL 33, SE1/4

Area: 78.51

Field: Home-Grant



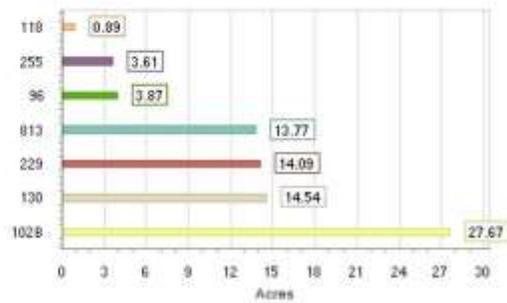
Location:

County: Jackson, MN

Twp Rng Sec:

Directions:

MuSym by Acres



Powered by MapShots AgStudio™

Page 2 of 11
Sep 11, 2013 10:59 PM





507 Milwaukee St.
Lakefield, MN 56150

Soil Test Sampling Map

Ackermann, Jerry & Nancy Area: 78.51

Farm: WHL 33, SE1/4

Lab Name: Minnesota Valley T

Field: Home-Grant

Sample Date: Jun 22, 2013



Location:

County: Jackson, MN

Twp Rng Sec:

Summary Statistics

Layer Name: 13_ST_4.4ac

Sample Count: 18

LayerID: 20306H6285

Notes:



Extended Ag Services, Inc.

607 Milwaukee St.
Lakefield, MN 56150

Soil Test Summary

Ackermann, Jerry & Nancy Area: 80.00

Farm: WHL 33, SE1/4

Sample Date: Jun 22, 2013

Field: Home-Grant

Lab Name: Minnesota Valley T

SampleID	OM	Bray1_P	Olson_P	Potassium	Zinc	Buffer_Index	pH
none	percent	ppm	ppm	ppm	ppm	none	none
1	7.2	19	12	121	1.5	7.3	7.6
2	4.3	18	9	83	1.8	6.7	5.9
3	5.3	64	42	119	2.9	6.9	6.4
4	4.8	45	30	104	2.5	7.0	6.6
5	5.0	52	31	124	1.6	6.7	6.2
6	5.3	22	18	141	1.0	6.8	6.4
7	5.7	31	24	179	0.7	6.9	6.6
8	4.7	18	11	150	1.4	7.1	6.6
9	4.4	30	21	143	0.7	7.2	7.2
10	4.7	158	54	188	2.2	6.5	5.7
11	4.4	13	9	85	1.4	7.1	6.6
12	6.9	23	17	112	2.9	6.5	5.8
13	7.4	104	62	239	5.5	7.1	7.0
14							0.0
16	5.8	41	19	156	1.3	7.1	7.2
17	4.7	43	26	170	1.0	6.5	6.0
18	6.3	12	9	186	0.8	6.7	6.1
19	7.4	23	14	175	2.0	7.1	7.4
Average:	5.5	42	24	146	1.8	6.9	6.2



507 Milwaukee St.
Lakefield, MN 56150

Soil Test Map Report - OM

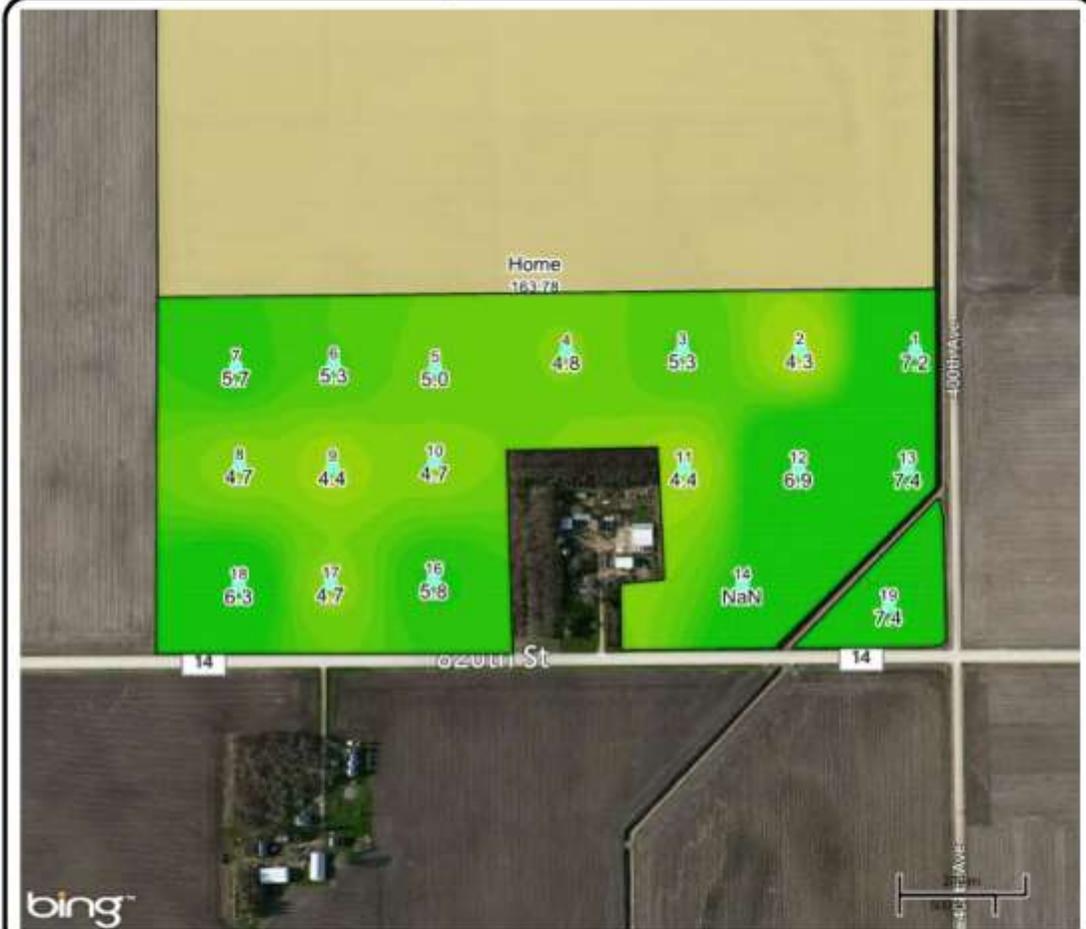
Ackermann, Jerry & Nancy Area: 78.51

Farm: WHL 33, SE1/4

Sample Date Jun 22, 2013

Field Home-Grant

Lab Name Minnesota Valley T



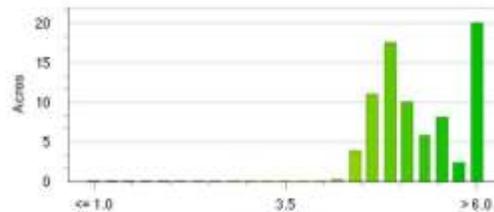
Location:

County: Jackson, MN
Twp Rng Sec: T103N R37W S33

Summary Statistics

Layer Name 13_ST_4.4ac
Sample Count 18
Minimum 4.3
Maximum 7.4
Average Rate 5.54
Weighted Average: 5.53

OM percent



Powered by MapShots AgStudio™

Page 5 of 11
Sep 11, 2013 10:59 PM





507 Milwaukee St.
Lakefield, MN 56150

Soil Test Map Report - pH

Ackermann, Jerry & Nancy Area: 78.51

Farm: WHL 33, SE1/4

Sample Date Jun 22, 2013

Field Home-Grant

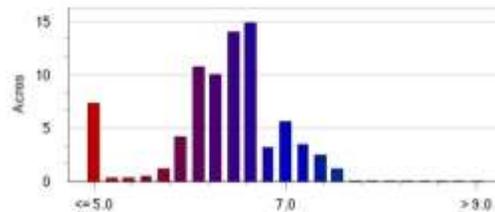
Lab Name Minnesota Valley T



Location:
County: Jackson, MN
Twp Rng Sec: T103N R37W S33

Summary Statistics
Layer Name 13_ST_4.4ac
Sample Count 18
Minimum 5.0
Maximum 7.6
Average Rate 6.02
Weighted Average: 6.02

pH none



Powered by MapShots AgStudio™

Page 6 of 11
Sep 11, 2013 10:59 PM





507 Milwaukee St.
Lakefield, MN 56150

Soil Test Map Report - Buffer_Index

Ackermann, Jerry & Nancy Area: 78.51

Farm: WHL 33, SE1/4

Sample Date Jun 22, 2013

Field Home-Grant

Lab Name Minnesota Valley T



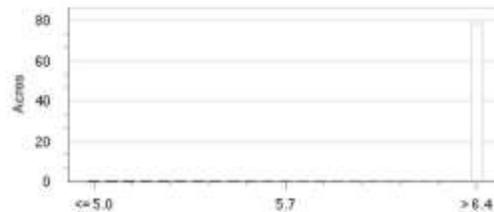
Location:

County: Jackson, MN
Twp Rng Sec: T103N R37W S33

Summary Statistics

Layer Name 13_ST_4.4ac
Sample Count 18
Minimum 6.5
Maximum 7.3
Average Rate 6.89
Weighted Average: 6.88

Buffer_Index none



Powered by MapShots AgStudio™

Page 7 of 11
Sep 11, 2013 10:59 PM





507 Milwaukee St.
Lakefield, MN 56150

Soil Test Map Report - Bray1_P

Ackermann, Jerry & Nancy Area: 78.51

Farm: WHL 33, SE1/4

Sample Date Jun 22, 2013

Field Home-Grant

Lab Name Minnesota Valley T



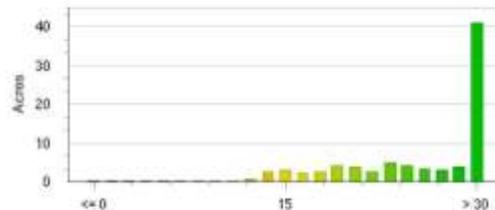
Location:

County: Jackson, MN
Twp Rng Sec: T103N R37W S33

Summary Statistics

Layer Name 13_ST_4.4ac
Sample Count 18
Minimum 12
Maximum 157.99
Average Rate 40.32
Weighted Average: 40.37

Bray1_P ppm



Powered by MapShots AgStudio™

Page 8 of 11
Sep 11, 2013 10:59 PM





507 Milwaukee St.
Lakefield, MN 56150

Soil Test Map Report - Olsen_P

Ackermann, Jerry & Nancy Area: 78.51

Farm: WHL 33, SE1/4

Sample Date Jun 22, 2013

Field Home-Grant

Lab Name Minnesota Valley T



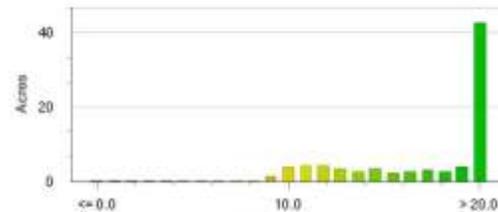
Location:

County: Jackson, MN
Twp Rng Sec: T103N R37W S33

Summary Statistics

Layer Name 13_ST_4.4ac
Sample Count 18
Minimum 9
Maximum 61.99
Average Rate 23.06
Weighted Average: 23.06

Olsen_P ppm



Powered by MapShots AgStudio™

Page 9 of 11
Sep 11, 2013 10:59 PM





507 Milwaukee St.
Lakefield, MN 56150

Soil Test Map Report - Potassium

Ackermann, Jerry & Nancy Area: 78.51

Farm: WHL 33, SE1/4

Sample Date Jun 22, 2013

Field Home-Grant

Lab Name Minnesota Valley T



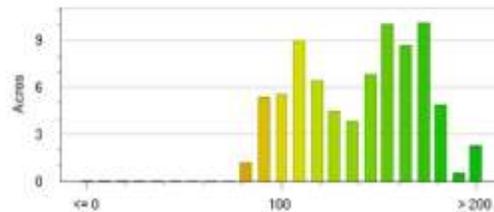
Location:

County: Jackson, MN
Twp Rng Sec: T103N R37W S33

Summary Statistics

Layer Name 13_ST_4.4ac
Sample Count 18
Minimum 83.01
Maximum 239.99
Average Rate 143.01
Weighted Average: 142.83

Potassium ppm



Powered by MapShots AgStudio™

Page 10 of 11
Sep 11, 2013 10:59 PM





507 Milwaukee St.
Lakefield, MN 56150

Soil Test Map Report - Zinc

Ackermann, Jerry & Nancy Area: 78.51

Farm: WHL 33, SE1/4

Sample Date Jun 22, 2013

Field Home-Grant

Lab Name Minnesota Valley T



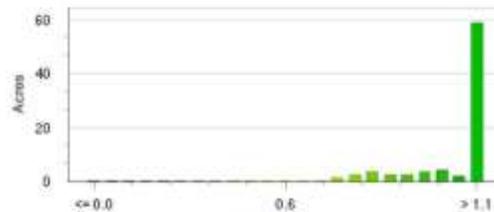
Location:

County: Jackson, MN
Twp Rng Sec: T103N R37W S33

Summary Statistics

Layer Name 13_ST_4.4ac
Sample Count 18
Minimum 0.7
Maximum 5.5
Average Rate 1.83
Weighted Average: 1.82

Zinc ppm

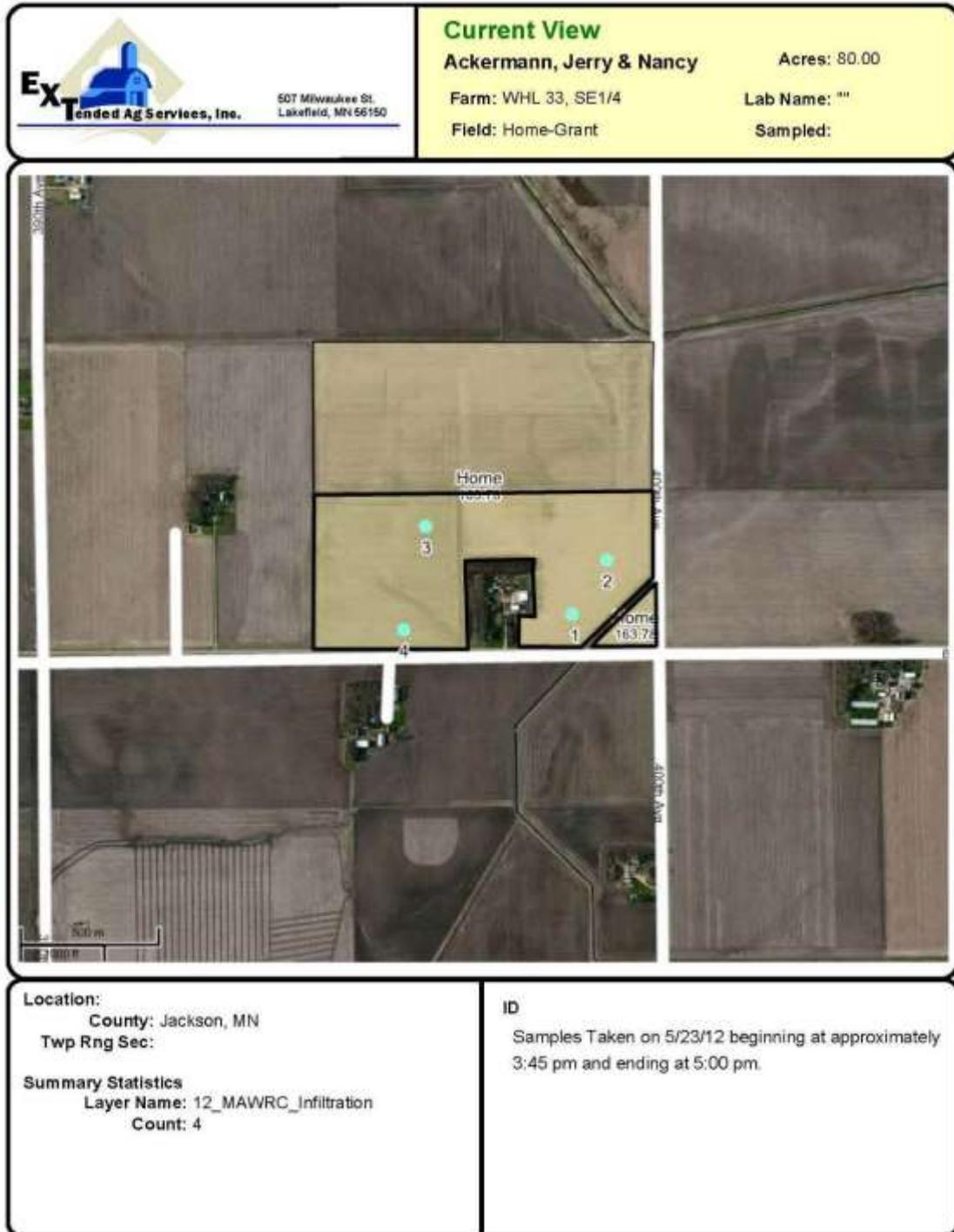


Powered by MapShots AgStudio™

Page 11 of 11
Sep 11, 2013 10:59 PM



Appendix 3. Infiltration test results





Extended Ag Services, Inc.
507 Milwaukee St.
Lakefield, MN 56150

Current View
Ackermann, Jerry & Nancy Acres: 80.00
 Farm: WHL 33, SE1/4 Lab Name: ""
 Field: Home-Grant Sampled:



Location:
 County: Jackson, MN
 Twp Rng Sec:
Summary Statistics
 Layer Name: 12_MAWRC_Infiltration
 Count: 4

Infiltration_1



Extended Ag Services, Inc.
507 Milwaukee St.
Lakefield, MN 56150

Current View
Ackermann, Jerry & Nancy Acres: 80.00
 Farm: WHL 33, SE1/4 Lab Name: ""
 Field: Home-Grant Sampled:



Location:
 County: Jackson, MN
 Twp Rng Sec:
Summary Statistics
 Layer Name: 12_MAWRC_Infiltration
 Count: 4

Infiltration_2

Appendix 4. Plant tissue test results

<p>507 Milwaukee St. Lakefield, MN 56190</p>	<p>Current View Ackermann, Jerry & Nancy Acres: 163.78 Farm: WHL 33, SE1/4 Lab Name: Minnesota Vail Field: Home Sampled: Nov 2011</p>
<p>Location: County: Jackson, MN Twp Rng Sec: T103N R37W S33</p> <p>Summary Statistics Layer Name: 12_TT_40ac Count: 2</p>	<p>SampleID</p>

MVTL**MINNESOTA VALLEY TESTING LABORATORIES, INC.**

1126 N. Front St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890

2616 E. Broadway Ave. ~ Bismarck, ND 58501 ~ 800-279-6885 ~ Fax 701-258-9724

51 W. Lincoln Way ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885

**MEMBER
ACIL**

MVTL guarantees the accuracy of the analysis done on the sample submitted for testing. It is not possible for MVTL to guarantee that a test result obtained on a particular sample will be the same on any other sample under all conditions affecting the sample or the assay, including sampling by MVTL. As a matter of protection to clients, for public and consumer safety, all reports are submitted as the confidential property of clients, and will not be used for publication of statements, conclusions or results from or regarding our reports or services pending our written approval.

AN EQUAL OPPORTUNITY EMPLOYER**PLANT ANALYSIS REPORT**

Submitted by: 040017

Submitted For: JERRY ACKERMAN

JIM NESSETH
EXTENDED AG SERVICES INC
507 MILWAUKEE ST PO BOX 1177
LAKEFIELD MN 56150

Date Received: Jun 8 2012
Report Date: Jun 12 2012
Work Order No: 201211-01214

Laboratory No: 12-P806
Sample Description: 1
Field ID: JACKSON 33 HOME
Farmer Name: JERRY ACKERMAN

Plant: CORN
Plant Part: WHOLE PLANT
Crop Stage: V4

ANALYTE	RESULT		SUFFICIENCY RANGE
Nitrogen	3.63	%	3.5-5.0
Phosphorus	0.42	%	0.4-0.8
Potassium	2.88	%	3.0-5.0
Calcium	0.66	%	0.9-1.6
Magnesium	0.27	%	0.3-0.8
Sulfur	0.24	%	0.2-0.3
Manganese	83.0	ppm	50-160
Iron	324	ppm	50-300
Zinc	21.0	ppm	20-50
Copper	9.5	ppm	7-20
Boron	8.1	ppm	7-25

Appendix 5. Benefits and Impact of Your Farmer Rancher Grant Project

Benefits and Impact of Your Farmer Rancher Grant Project

We like to learn about the contributions farmers or ranchers like you are making toward creating a more sustainable agriculture and society. In the following questions, you will be asked to determine the environmental, social, and economic benefits and impact resulting from the research and /or demonstration activities carried out with the help of your Farmer Rancher Grant.

Please indicate whether the following environmental benefits and impacts have increased or decreased as a result of your research/demonstration project.
(Please check one box only for each item.)

	Does not apply	Decreased a lot	Decreased somewhat	Unchanged	Increased somewhat	Increased a lot
a. Soil organic matter.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b. Soil biological activity.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c. Soil Structure.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d. Soil water infiltration.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Soil erosion.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
f. Stream water quality.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
g. Well water quality.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
h. Wildlife and bird habitat.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
i. Wildlife and bird species diversity.....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. Crop diseases.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k. Insect pests.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
l. Nitrogen fertilizer use.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
m. Herbicide use.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
n. Use of other pesticides.....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
o. Manure use.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
p. Compost use.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
q. Green manure use.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
r. Use of bio-fertilizers.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
s. Use of cover crops.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
t. Weed pressure.....	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

don't know

not sure

" "

We would like to find out about the social benefits resulting from the research, demonstration, and educational activities carried out with your Farmer Rancher Grant. Please indicate how the following activities and quality of life issues have been affected as a result of your research/demonstration project. (Please check one box only for each item.)

	Does not apply	Decreased a lot	Decreased somewhat	Unchanged	Increased somewhat	Increased a lot
a. Management requirements of farm operations.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b. Total labor requirements for farm operations.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c. Number of work hours/day of principal farm operator...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Use of family labor.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Use of non-family labor.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f. Involvement of family members in decision-making on farm operations.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Time for community activities.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Involvement in local civic organizations.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Purchase of farm supplies from local businesses.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
j. Purchase of farm machinery from local businesses.....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k. Purchase of clothing and other necessities from local businesses.....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
l. Marketing of farm produce within my county.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
m. On-farm and direct consumer marketing of farm produce	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
n. On-farm processing of farm produce.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
o. Personal and family health.....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
p. Personal and family stress.....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
q. Enjoyment of farming.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
r. Farm safety.....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
s. Family quality of life.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
t. Community quality of life.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
u. Overall family well-being.....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

We would like to learn about the economic benefits of your Farmer Rancher Grant activities. As you may not have kept detailed economic records on your project, we are asking you to indicate whether various costs, yields, and net income associated with the sustainable practice you tested have increased or decreased as compared to conventional practices. *(Please check one box only for each item.)*

	Does not apply	Decreased a lot	Decreased somewhat	Unchanged	Increased somewhat	Increased a lot
Cash Costs						
a. Fertilizer costs.....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Fuel costs.....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Pesticide costs.....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Weed control costs.....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Feed costs.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Veterinary care costs.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Seed costs.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Labor Costs						
h. Hired labor costs.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
i. Management costs.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Fixed Costs						
j. Machinery and equipment.....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k. Fencing.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
l. Buildings.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
m. Building equipment.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Marketing Costs						
n. Costs for on-farm processing.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
o. Costs associated with on-farm sales.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
p. Costs of direct to consumer sales (e.g. through community supported agriculture).....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
q. Costs of selling at farmers' market.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Yields and Income						
r. Yield per acre.....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
s. Weight gain or production per animal.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
t. Overall gross sales.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
u. Overall net income.....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Are you satisfied with the overall economic performance of your project?..... Yes No Don't know

considering the drought year

Based on the yield difference and the perceived economic benefits, would you recommend the treatment for adoption? Yes No Don't know

Comments: We are still learning about the cover crops and establishment of covers even under drought conditions.
More research needs to continue for this area and see how the cover crops work under normal growing conditions.
There were a lot of interested farmers at the field day but would like to see more research in the area.

If you did keep economic records of your project, please provide the cost savings of the practice you tested over conventional practice. The examples below show different ways that the cost savings can be calculated. Please use a minus sign (-) before the amount to indicate that the practice you tested was more costly than conventional practice.

Cost savings per acre..... \$ _____
Cost savings per head..... \$ does not apply
Cost savings per cwt..... \$ " " "

The idea would be less herbicide and fertilizer cost. And increase more soil organic matter. Need a good growing season.



HERON LAKE WATERSHED DISTRICT Water Watch

October 2012

Cover Crop Demonstration Project

In an effort to protect southwest Minnesota's essential water resources the Heron Lake Watershed District (HLWD), in partnership with Jerry and Nancy Ackermann and Extended Ag Services, Inc., applied for a grant from the North Central Region - Sustainable Agriculture Research and Education (NCR-SARE) Farmer Rancher program. Through this program, a 37-acre cover crop demonstration site was established.

PURPLE TOP TURNIP



The cover crop demonstration site is directly adjacent to Jackson County Judicial Ditch 3 located in Section 33 of West Heron Lake Township in Jackson County. Cereal rye, tillage radish, and purple top turnip were seeded to address water quality problems by increasing nutrient uptake, reducing erosion, and minimizing nutrient leaching. The cover crop will directly benefit the community and watershed by slowing water and reducing sediment and nutrient runoff before it enters the ditch.

TILLAGE RADISH



The root systems of the cover crop will break up compaction to allow for better water infiltration and be used to draw nitrogen from deep below the surface back to the root zone for next year's crop. This seed mix will scavenge nitrogen to enhance soil fertility, add additional organic matter to improve soil composition, increase infiltration, diminish soil movement, and reduce weed competition. All of these are ways to naturally improve the overall yield of the following year's crop

CEREAL RYE



The root systems of the cover crop will break up compaction to allow for better water infiltration and be used to draw nitrogen from deep below the surface back to the root zone for next year's crop. This seed mix will scavenge nitrogen to enhance soil fertility, add additional organic matter to improve soil composition, increase infiltration, diminish soil movement, and reduce weed competition. All of these are ways to naturally improve the overall yield of the following year's crop



while reducing nitrogen application costs.

The HLWD was awarded \$6,642.26 from NCR-SARE to establish the demonstration site and seed for the 2012 growing season. The plot was aerially seeded by helicopter into standing soybeans and corn on August 26, 2012.

This demonstration project will build upon previous work done through different grant foundations including NCR-SARE. Our project results will allow farmers within the HLWD and southwest Minnesota to gain knowledge and understanding of cover



crops and their ability to be used locally. Data will show farmers that cover crops are a useful management tool for their own farm's sustainability.



Field Day

A field day will be hosted by the HLWD to provide an opportunity for interested farmers and agricultural professionals to learn about this cover crop demonstration project. The event will take place Wednesday, November 7, 1:00 p.m., at the Jerry and Nancy Ackermann Farm Site (SE $\frac{1}{4}$ of Section 33, West Heron Lake Township, Jackson County); five miles west of Lakefield on County Road 14.

If you are interested in attending, please register with the HLWD office by Thursday, November 1 at 507-793-2462 or contact Jan Voit at jan.voit@mysmbs.com.



Jill Sackett

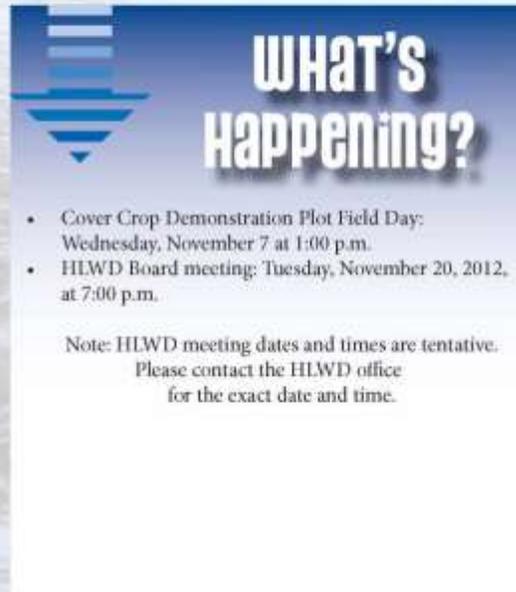
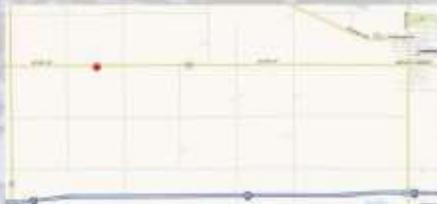
Guest speaker Jill Sackett is a local extension educator and conservation agronomist for the Uni-
continued on other side



Field Day continued

versity of Minnesota Extension-Rural Advantage. This position is grant funded by the non-profit Rural Advantage and the watershed organization the Greater Blue Earth River Basin Alliance (GBERBA). Sackett has been working on a cover crop grant funded by NCR-SARE since 2009. This three-year grant was received by Practical Farmers of Iowa and Rural Advantage in the fall of that year and will run through fall 2012. Sackett's programming is driven by water quality and the conservation agronomy mindset. Programming includes third crops, cover crops, and bioenergy feedstocks. Major program events include the Third Crop Producer Meetings, Third Crop Walk-n-Talks, and cover crop workshops and field days.

ACKERMANN FARM SITE



WHAT'S HAPPENING?

- Cover Crop Demonstration Plot Field Day: Wednesday, November 7 at 1:00 p.m.
- HLWD Board meeting: Tuesday, November 20, 2012, at 7:00 p.m.

Note: HLWD meeting dates and times are tentative. Please contact the HLWD office for the exact date and time.

Contact us with your questions or concerns; call 507-793-2462 or email jan.voit@mysmbs.com.

Funding for this newsletter was provided by NCR-SARE through the Farmer Rancher Grant Program.

News Release

Heron Lake Watershed District
Jan Voit, District Administrator
PO Box 345
Heron Lake, MN 56137
507-793-2462
Email: jan.voit@mysmbs.com
Website: www.hlwdonline.org

Cover Crop Demonstration Project Field Day

In an effort to protect southwest Minnesota's essential water resources the Heron Lake Watershed District (HLWD), in partnership with Jerry and Nancy Ackermann and Extended Ag Services, Inc., applied for a grant from the North Central Region – Sustainable Agriculture Research and Education (NCR-SARE) Farmer Rancher program. The HLWD was awarded \$6,642.26 from NCR-SARE to establish the demonstration site and purchase seed for the 2012 growing season.

Through this program, a 37-acre cover crop demonstration site was established. The cover crop demonstration site is directly adjacent to Jackson County Judicial Ditch 3 located in Section 33 of West Heron Lake Township in Jackson County. The plot was aerielly seeded by helicopter into standing soybeans and corn on August 26, 2012.

A field day will be hosted by the HLWD to provide an opportunity for interested farmers and agricultural professionals to learn about this cover crop demonstration project. Jill Sackett, Local Extension Education, Conservation Agronomist for the University of Minnesota Extension-Rural Advantage, will be the guest speaker.

When: Wednesday, November 7
Jerry and Nancy Ackermann Farm Site
SE ¼ of Section 33, West Heron Lake Township, Jackson County
Five miles west of Lakefield on County Road 14
Time: 1:00 p.m.

If you are interested in attending, please register with the HLWD office by Thursday, November 1 at 507-793-2462 or contact Jan Voit at jan.voit@mysmbs.com.

Cover Crop Walk-n-Talk, November 7

LAKEFIELD, Minn. (10/15/2012) –Join event partners on November 7, 2012, from 1:00 pm to 3:00 pm for a cover crop discussion at the Ackermann farm near Lakefield, Minnesota. Heron Lake Watershed District (HLWD) and Jerry and Nancy Ackermann were awarded a North Central Region Sustainable Agriculture Research and Education (NCR-SARE) Farmer/Rancher grant to continue their work with cover crops.

A cover crop mixture of winter cereal rye, tillage radish, and purple top turnip was planted into standing corn and soybeans by helicopter in late August 2012 just north of the Ackermann farmstead. This aerial application allows for a longer cover crop growing season in the corn-soybean system. The Ackermanns chose the cover crop species for their ability to scavenge nitrogen, add organic matter to the soil, increase water infiltration, decrease soil erosion, and reduce weed competition.

Attendees will be able to discuss the benefits of cover crops, hear about the NCR-SARE project being conducted by the Ackermanns and HLWD, and view the cover crops in the field. This is an outdoor event; please dress accordingly.

NCR-SARE has arranged for a van from the University of Minnesota, St. Paul campus. If interested in this carpooling opportunity, contact Kate Seager to sign-up (612-625-8235, kseager@umn.edu).

Event Partners:

- Jerry and Nancy Ackermann
- Extended Ag
- Heron Lake Watershed District
- Rural Advantage
- University of Minnesota Extension

DIRECTIONS:

Jerry and Nancy Ackermann – 39750 820th Street - Lakefield, MN

From Lakefield: Travel west on Mill Rd. W. / 820th Street / County Road 14 for about 5.5 miles. The Ackermann farmstead will be on the north side of the road.

Contacts for this event:

Jill Sackett – University of Minnesota Extension/Rural Advantage, 507-238-5449 or sacke032@umn.edu.

Jan Voit – Heron Lake Watershed District, 507-793-2462 or jan.voit@mysmb.com.

Source: Jill Sackett - Extension Educator, Conservation Agronomist - University of Minnesota Extension and Rural Advantage, Fairmont, Minn. – 507-238-5449 – sacke032@umn.edu

Appendix 7. Cover Crop Demonstration Project Field Day Handouts

Jill Sackett, UM/Rural Advantage, Handout

Cover Crops in Your Future

Cover Crop Walk-n-Talk
Lakefield, MN



UNIVERSITY OF MINNESOTA
EXTENSION
Driven to Discover™

Local Extension Educator, Conservation Agronomist

- UMN Extension – State, Regional, Local
- Rural Advantage and the Greater Blue Earth River Basin Alliance (GBERBA)
 - Blue Earth – Cottonwood – Faribault – Freeborn
 - Jackson – Le Sueur – Martin – Waseca – Watonwan
- Programming around Water Quality and Conservation Agriculture
 - 3rd Crops – Cover Crops



WHY ME?



- Worked on NCR-SARE cover crop grant 2009-2012
 - Demonstration acres (cost-share)
 - Educational events (field days, workshops)
 - Including info on CCDT



Cover Crops

- A non-cash crop grown between two cash crops (Practical Farmers of Iowa)
- Close-growing crop that temporarily protects soil when crop residues aren't present – established for seasonal cover and conservation (NRCS)
- A crop planted to prevent soil erosion and to provide humus (Websters Dictionary)



Cover Crop Examples



Benefits of Cover Crops

- Addition of organic matter
- Provide Nitrogen
- Improve soil structure
- Reduce soil erosion
- Reduce soil compaction
- Manage nutrients
- Provide weed control matter
- Reduce soil salinity
- Provide livestock forage/grazing
- Increase crop and soil diversity
- Water management



Potential Problems

- Water management
- Termination
- Persistence
- Nutrient management
- Cost
- Timeliness
- Crop insurance

Seed Cost Example

Cover Crop	Suggested Drilling Rates	Seed Cost (09/17/12 Albert Lea Seed)	Total Cost (\$ per acre)
Crimson Clover	10-15 lb/A PLS	\$1.95/lb	\$24.00-\$36.00
Field Pea	30-90 lb/A PLS	\$0.40/lb	\$12.00-\$36.00
Austrian Winter Pea		\$0.48/lb	\$14.40-\$42.30
Oats	30-50 lb/A PLS (1-2 bu/A)	\$0.33/lb (\$10.50/bu)	\$8.40-\$14.00
Tillage Radish	8-15 lb/A PLS	\$2.90/lb	\$26.40-\$49.50
Winter Rye	55-100 lb/A PLS	\$0.31/lb	\$17.05-\$31.00
Winter Triticale	50-90 lb/A PLS	\$0.38/lb	\$19.00-\$34.20
Oats (60%) and Tillage Radish (40%)	18-30 lb/A PLS 3-6 lb/A PLS	-	\$14.64-\$27.30

Establishment Cost Example

Cover Crop Establishment Method	Closest Method (ISU 2012 Iowa Farm Survey Custom Rate)	Total Cost (\$ per acre)
Drilling	Drilling Small Grain	\$10.00-\$20.00 Average \$14.50
Broadcast (no incorporation)	Broadcast Seeding Grass with Tractor	\$9.80-\$15.00 Average \$11.15
High Clearance Vehicle	Fertilizer Application Liquid, side-dress	\$5.50-\$20.00 Average \$11.25
Aerial (helicopter or airplane)	Aerial Spraying	\$7.00-\$14.00 Average \$9.80

Before Utilizing Cover Crops

- Identify a purpose
- Do your homework
- Start small, try a few
- Keep careful records
- Take best species/mixes and increase "plot" size
- Be creative and willing to change
- Live in reality

Cover Crop Decision Tool

- A web-based tool for selecting species of cover crops to use in **your** rotation, for **your** specific purpose or need
- **Midwest Cover Crops Council**
 – <http://www.mccc.msu.edu/>
- Grant funded
- Based on charts found in SARE's "Managing Cover Crops Profitably"

MN Cover Crop Decision Tool

- Organizational committee formed (Jan. 2011)
 – MN Extension Educators, researchers, students, farmers, agency personnel, etc. that have worked with cover crops species
- One face-to-face with decision tool leaders
- Conference calls until finished with data collection/input (June 2011)
- Live on the WEB – October 2011

<http://www.mccc.msu.edu/>



Cover Crop Information Sheet	
Guidance for using the Minnesota CCR Worksheet	
How to use the worksheet	
Location Information Location Address: [Blank] County: [Blank] Map Sheet: [Blank] Section: [Blank] Township: [Blank] Range: [Blank] Section: [Blank] Section: [Blank]	Crop Information Crops: [Blank] Planting Date: [Blank] Harvest Date: [Blank] Planting Method: [Blank] Harvest Method: [Blank] Planting Date: [Blank] Harvest Date: [Blank]
Soil & Site Information Soil Type: [Blank] Soil Color: [Blank] Soil Texture: [Blank] Soil pH: [Blank] Soil Fertility: [Blank] Soil Fertility: [Blank]	Production Information Production Method: [Blank] Production Method: [Blank] Production Method: [Blank] Production Method: [Blank] Production Method: [Blank] Production Method: [Blank]
Planting Information Planting Date: [Blank] Planting Date: [Blank] Planting Date: [Blank] Planting Date: [Blank] Planting Date: [Blank] Planting Date: [Blank]	Harvest Information Harvest Date: [Blank] Harvest Date: [Blank] Harvest Date: [Blank] Harvest Date: [Blank] Harvest Date: [Blank] Harvest Date: [Blank]
Additional Information Additional Information: [Blank] Additional Information: [Blank] Additional Information: [Blank] Additional Information: [Blank] Additional Information: [Blank] Additional Information: [Blank]	Additional Information Additional Information: [Blank] Additional Information: [Blank] Additional Information: [Blank] Additional Information: [Blank] Additional Information: [Blank] Additional Information: [Blank]

Questions?

Jill Sackett, Extension Educator
UMN Extension / Rural Advantage
Fairmont, MN
507-238-5449
sacke032@umn.edu



Join the Minnesota Cover Crop Listserv!

UMN Extension – Conservation Agronomy is on Facebook!

Extended Ag Services, Inc. Handout

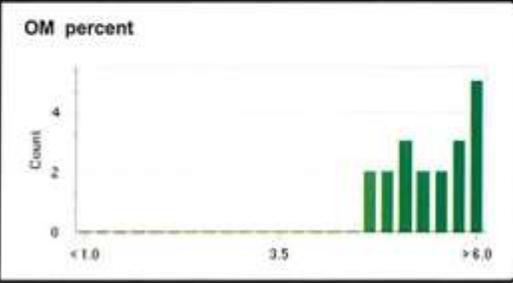
OM

 <p>227 Milwaukee St. Lakeford, MN 56119</p>	<p>Grower: Ackermann, Jerry & Nancy</p>	<p>Area: 78.43</p>
	<p>Farm: WHL 33, SE1/4</p>	<p>Lab Name: MVTL</p>
	<p>Field: Home-Grant</p>	<p>Sample Date: May 22, 2012</p>



Location:
 County: Jackson, MN
 Twp Rng Sec:

Summary Statistics
 Layer Name: 12_MAWRC_4.4ac
 Sample Count: 19
 Minimum: 4.8
 Maximum: 7.4
 Average: 5.65
 Weighted Average: 5.69



Nitrate_0_6_

 <p>507 Milwaukee St. Lakefield, MN 56150</p>	Grower: Ackermann, Jerry & Nancy	Area: 78.43
	Farm: WHL 33, SE1/4	Lab Name: MVTL
	Field: Home-Grant	Sample Date: May 22, 2012



Location: County: Jackson, MN Twp Rng Sec:	Nitrate_0_6_ lbs per acre (st) 
Summary Statistics Layer Name: 12_MAWRC_4.4ac Sample Count: 19 Minimum: 8.4 Maximum: 71.6 Average: 27.24 Weighted Average: 28.61	



Cover Crop Field Day
Wednesday, November 7, 2012
1:00 p.m.



**Cover Crop Demonstration Plot funded through the
North Central Sustainable Agriculture Research & Education (NCR-SARE) Farmer-Rancher
Grant Program**

Timeframe – April 16, 2012 to April 30, 2014

Program Grant funds \$6,642.26

Demonstration Plot: The Cover Crop Demonstration Plot was aerially seeded with purple top turnip, tillage radish, and cereal rye into standing soybeans and corn using a helicopter on August 26, 2012. The cover crop demonstration plot, directly adjacent to Jackson County Judicial Ditch 3, will address water quality problems by increasing nutrient uptake, reducing erosion, and minimizing nutrient leaching. The cover crop will directly benefit the community and watershed by slowing water and reducing sediment and nutrient runoff before it enters the ditch.





Benefits of cover crops:

The deep root systems of the cover crop will break up compaction to allow for better water infiltration and be used to draw nitrogen from deep below the surface back to the root zone for next year's crop. This seed mix will bring scavenged nitrogen to enhance soil fertility, add additional organic matter to improve soil composition, increase infiltration, diminish soil movement, and reduce weed competition. All of these ways to naturally improve the overall yield of the following year's crop while reducing nitrogen application costs.



Appendix 8. Lakefield Standard newspaper article

GROWING INTEREST

Local interest in cover crops continues to grow

by MARG JORDAN
Staff Writer

Local interest in cover crop continues to grow. More than 30 people — area farmers among them — attended a field day on the use of cover crops at the Jerry and Nancy Ackermann farm west of Lakefield last week. These in attendance were able to inspect first-hand the Ackermanns' 21-acre cover crop demonstration site and learn of the benefits cover crops can deliver to both the producer, but also to the watershed.

Proven benefits

A helicopter aerial view of purple top, rye, and alfalfa cover crops on the Ackermann farm in Westfield, Wis., on Aug. 26. The field was located in the area of north 36th by the North Central Region, Sustainable Agriculture Research and Education (NSARE) Project through the Illinois Lake Watershed District. In partnership with the Ackermanns and Lakefield-based Extended Ag Services.

Law Buchanan, DNR District Conservation Administrator, announced with the University of Minnesota Extension-Rural Advantages, explained to those gathered the benefits of cover crops.

"Why cover crops?" Buchanan asked. "Science research shows that cover crops are very good at helping with soil erosion and have additional benefits for farmers, as well as the watershed they are located within."

"The overall benefit is, for example, Buchanan said, a cover crop that acts as a chemical that keeps weeds, weeds, but does not affect row crops or other plants. It does not create problems with corn or soybeans in particular, she added.

Beyond weed control, cover crops also contribute to soil fertility reduction, Buchanan said, as well as reduced sediment and, in the case of blueberries, reduction in soil compaction.

In the Ackermann situation, they demonstrate a plot of a local farm adjacent to Lake County's Indian Ditch. It directly to the north and east of their farm and area. "The use of cover crops in that area will help with water quality by increasing water infiltration and reducing runoff into the ditch which can cause nutrient loading," Buchanan said.

Interest growing

Local farmers who attended last Wednesday's field day were very impressed.

Norman Natural Resources Conservation Service District Conservationist Sam Poppo, who farms north of Lakefield, said cover crops have a bright future in Jackson County.

"I think the concept is good," he said. "I think Jerry and his neighbors can learn a lot from something new, doing something with those cover crops and learning how to do it. It is a concept that will work. Well it will in every situation. Probably not — just like in any other farming management situation. Not every farm can make it work."

Lakefield area farmer John Nantema II agreed. "I want to give the Ackermanns a farm when amount of credit for trying something new, and making mistakes," he said. "I think anybody involved with this deserves a tip of the hat on the way. I don't know if the cover crops will work for everybody, but what are the benefits of proper and the decisions they put into it, how are you going to know? Maybe a guy could use those 14 days of information that are composed on that data."

Tom Van, executive director of the ILWSD, said she is always looking for ways to provide resources with information about resources and techniques that will help with water quality reduction.

"The field day was a great chance to gain firsthand knowledge about the benefits of cover crops," she said. "Jerry and Nancy are great cooperators. The working relationship with them and with Extended Ag has been wonderful."



Al Langeneth, Nobles County Soilist officer, and Nancy Ackermann talk it over as those attending the cover crop field day at the Ackermann farm west of Lakefield take a look at the emerging cover crops of cereal rye, Illinois raddish and purple top tarps among the corn visible last Wednesday.



Jill Sockell, extension education conservation agronomist with the University of Minnesota Extension's Rural Advantages, presents information on cover crops, drawing on her experience over the past three years helping area farmers plant a variety of the crops, including cereal rye, Illinois raddish and purple top tarps.



Lakefield area farmers Sam Poppo (left) and Brian Post talk about the cover crops on the Jerry and Nancy Ackermann farm west of Lakefield.

Appendix 9. Farmer/Rancher Grant Evaluation



NCR-SARE Minnesota Office
120 BAE | University of Minnesota | 1390 Eckles Ave | St Paul, MN 55108 | ph: 612-626-3113
www.sare.org | www.ncrsare.blogspot.com

NCR-SARE Missouri Office
Lincoln University | South Campus Bldg | 900 Leslie Blvd | Rm 101 | Jefferson City, MO 65101
ph: 573-681-5545 or 800-529-1342 | fax: 573-681-5534 | benjaminj@lincolnu.edu

Farmer/Rancher Grant Evaluation

Thank you for participating in the North Central Region SARE Farmer Rancher Grant program. Now that you've completed your project and final report, please take a few minutes to evaluate the program. Your comments will be read carefully and reviewed when the Administrative Council considers possible changes in the program.

1. What benefits did you gain from this project?

We have gained knowledge on how to seed cover crops in the northern growing areas of the U.S.

2. What benefits do you think others in your community derived from this project?

We have had several growers in the area indicate they are interested in trying cover crops but haven't known anyone that had tried them. They have a fear of trying them without more knowledge.

3. Have you adopted any sustainable agricultural practices because of what you learned through this program, and if so, what were they?

We will continue to use cover crops learning more about timing for seeding and what varieties to use.

4. What suggestions would you have for improving the program?

It is an excellent program. The field days are a great time for other farmers to explore what works and what doesn't work.

5. What kinds of research should be funded by SARE?

6. What are the best methods for notifying sustainable agriculture farmers and ranchers in your community about the SARE program? (Please be specific).

Extension news letters

7. Please rate the following items related to the Farmer Rancher Grant program on a scale of 1 to 5 with 1 being Excellent and 5 being Poor.

	Excellent		Average		Poor
The application process	1	2	3	4	5
The reporting requirement	1	2	3	4	5
Contact with the regional office	1	2	3	4	5
Payment procedure	1	2	3	4	5

8. Additional Comments

Heron Lake Watershed District actually wrote the grant. Most farmers would have a fear of trying it themselves.

Please return this form to: benjaminj@lincolnu.edu

Or mail to:

NCR-SARE

Lincoln University

South Campus Bldg

900 Leslie Blvd, Rm 101

Jefferson City, MO 65101


(Signature)