



LCCMR Project Report:
Southeast Minnesota Cover Crop and Soil Health Initiatives
LCCMR: December 4, 2018

Matt Drewitz, BWSR Measures and Outcomes Coordinator
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Why did BWSR pursue this project?

- **Soil health and cover crop buzz** was growing and a lot of interest from our partners.
- **2012 Crop Year:** Snow in May and wet conditions resulted in numerous **"preventative plant"** situations throughout SE MN:
 - Local SWCD staff expressed that they and the farmers they work with were not prepared for this emergency.
- **Leverage Existing Staff:** Dean Thomas, local Soil Health Technician, was critical in the success of this project.
- This region had a **strong partnership** in place and a landscape suitable for cover crops that could make this project work,
- Need at BWSR to develop a **strategy** for Soil Health and Cover Crops.


How do cover crops benefit soil health?

<ul style="list-style-type: none"> • Decrease nutrient loss and impacts to surface and ground water quality, • Reduce soil erosion, • Reduce soil compaction and improve soil structure, • Increase water infiltration, • Increase organic matter, 	<ul style="list-style-type: none"> • Increase biodiversity on the landscape, • Attract beneficial insects, • Legumes can add nitrogen to the system, • Suppress weeds, • Suppress nematodes, • Enhance mycorrhizal numbers.
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11/30/2018 Sources: Sustainable Agriculture Research and Education (SARE) and the Soil Health Institute 3

Initial Development in 2014

- **Development:** Megan Lennon and Matt Drewitz worked with Tim Koehler and Al Kean to develop the application to LCCMR at BWSR.
- **Support:**
 - Consulted partners beforehand in southeast Minnesota, and
 - Discussed application with U of M, USDA-NRCS, and MDA



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Project Goal and Objectives

Goal: This project aims to accelerate the adoption of cover crops in agricultural cropping systems in Southeastern Minnesota to reduce pollution runoff and sedimentation, improve water quality, and improve soil health

Objective 1: Technical Education, Training, and Outreach	Objective 2: Cover Crop Economic Study	Objective 3: Cover Crop Demonstration Sites
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Objective 1: Technical Education, Training, and Outreach

- **Objective 1:** Technical Education, Training, and Outreach
 - Workshops,
 - Field days,
 - Rainfall simulator, and
 - Soil health sampling.



Field Day at the Brian Hazel Farm, Lanesboro, MN

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Objective 2: Cover Crop Economic Study for Southeastern Minnesota

- **Objective 2:** Cover Crop Economic Study for SE MN
 - Survey of producers (in-person and written surveys),
 - Development of cover crop economic report, and
 - Update of economic spreadsheet tools.



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Objective 3: Cover Crop Demonstration Sites

- **Objective 3:** Cover Crop Demonstration Sites
 - Financial Assistance to landowners, and
 - Landowners assisted with field days, workshops and economic analysis.



Demonstration Site by Clarks Grove, MN

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Who was involved?

- **Advisory Team Membership**
 - BWSR
 - USDA-NRCS
 - U of M: Extension
 - U of M: Applied Economics
 - U of M: Forever Green Initiative
 - SWCDs (individual and Joint Powers Board)
 - MDA
 - Southeast Minnesota Water Resources Board



Landowner Participants
(field days, demos, economic study)




Tom Pyfferoen landowner participant

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Core Team: Project Management




Matt Drewitz
(BWSR)

Jake Overgaard
(U of M Extension)*

Dr. Bill Lazarus
(U of M Applied Economics)

Dean Thomas
(TSA 7 Soil Health Tech)



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Jill Sackett Eberhart was initial U of M Extension Lead


Objective 1 Project Outcomes: Technical Training, Education, and Outreach

- Field Days: Goal was 9 and completed 9
 - Weather impacted completing more field days
- Workshops: Goal was 6 and completed 11
 - 7 winter workshops
 - 4 Ray Archuleta events
- Approximately 1,400 people attended the events
- Leveraging other groups and projects: Coordinated with other groups saved \$ for this project (Ray Archuleta workshop and Plowville field days are good examples)
- Summary: This project helped propel more outreach in SE MN on this topic, which appears to be sustaining itself on its own.

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Sample of Workshop Topics

- Soil, nutrient, and water quality benefit of cover crops,
- How to interpret soil health testing results,
- Cover crop economics,
- Lessons learned farmer panel,
- Inter-seeding cover crops,
- Residual herbicide management, and
- Cover crops and manure management.



Owatonna workshop. March 8, 2016.

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Winter Workshop: Owatonna – March 6, 2018



Participants continuing discussions after workshop



Farmer panel discusses lessons learned

Ray Archuleta Workshops: March 27, 28, and 29, 2018



Ray Archuleta interacting with workshop participants on the benefits of soil health



Ray Archuleta speaking to benefits of cover crops

Field Day: April 12, 2017 Tom Pyfferoen near Pine Island



Dan Nath, USDA-NRCS, talk about soil health and the positive impacts of cover crops/no till. A soil pit was used to directly show soil properties to the field day participants.



Metric: Portable Rainfall Simulator

- Visual
- Relatively easy to use versus research grade simulators
- Qualitative, not quantitative



11/30/2018 Dean Thomas, SE MN Technical Service Area, and Dan Nath demonstrate the rainfall simulator. 16

Field Day - Plowville Event: September 19, 2017 Location: Dodge Center, MN



Participants listening to cover crop speakers before going into the field.

Plowville Field Day: Field Plots



Example of a tillage radish in the field plot.



Seed mixes were provided at each field plot.

Plowville Field Day: Equipment demos



Photo above shows equipment used to seed in cover crops



Photo above shows zone tillage equipment for high residue systems

Current and Next Steps

- Soil Health Teams: USDA NRCS, SWCD, and local partners working with farmers
 - Farmer led and organized with assistance from local staff,
 - Fillmore and Houston County Soil Health Team formed during the project,
 - Freeborn Soil Health Team active in the region and leading field days.
- Minnesota Office for Soil Health (partnership between U of M and BWSR)
 - Dr. Ann Cates starting in January 2019 (70% Extension, 30 % research)
- Incorporate Soil Health Concepts and Cover Crops into water planning
- Continue to use rainfall simulator at events across Minnesota

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Objective 2: Project Outcomes on Cover Crop Economics

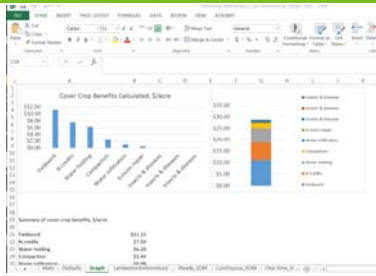
- Dr. Bill Lazarus and his graduate student interviewed and collected information from all of the financial assistance recipients.
- Data was used to create an economics report that is now posted on the BWSR website:
 - Breakdown of costs
 - Risks involved
 - Farmer perspectives and methods
- Updated spreadsheet calculators on cover crop economics.
- Next Steps: Research and technological needs identified.

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Metric: Cover Crop Economics

- Updated spreadsheet tool on Cover Crop Economics, and
- Planting Risk Tool also developed.



Example output of the Cover Crop Economics Tool

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Study Results

- Approximate Costs Per Acre
 - \$35 seeding and planting,
 - Between 0\$ to \$16 per acre for termination, and
 - Approximately \$50 per acre cost to landowner.
- Benefits:
 - Yield increase or no yield difference on all farms except one farm with issues with termination,
 - Two producers reported less white mold on soybeans,
 - Less erosion reported by nine of the farmer participants,
 - Two farmers utilized the biomass for forage, which improved their bottom line (\$40 to \$112 acre benefit)

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Winter Workshop: Rochester, MN (February 28, 2018)



Dr. Bill Lazarus, U of M Applied Economics, talks about Economic Impacts of Cover Crops

Current and Next Steps

- Minnesota Nutrient Reduction Strategy and update on cover crop costs.
- Research needs identified (a few examples):
 - Long term effects on crop yields,
 - Long term benefits of increases to soil organic matter levels,
 - Economic impacts of soil erosion,
 - Impacts on weed suppression and reduction in herbicide use,
- Future: Automate the Economic Spreadsheets into an "App"


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Project Outcomes: Soil Sampling


- Collected Samples in Fall of 2016 and 2017,
 - Utilized Ward labs out of Nebraska.
 - Looked at biological indicators for soil health along with other traditional soil metrics.
- Data collected and disseminated to landowners:
 - Developed soil sampling protocol which was an important part of the project.
- Some of the farmers interested in continuing work (see Next Steps)

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Metric: Soil Testing for Biological Indicators



BWSR Staff Adam Beilke
collecting soil samples.



BWSR Staff Dave Copeland
collecting soil samples.

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Current and Next Steps

- 2018 Conservation Innovation Grant (CIG) from USDA-NRCS Awarded to the U of M Water Resource Center
 - BWSR is a partner in this project and assisted in developing the application,
 - Landowners from this LCCMR project have potential to be participants and continue the soil sampling work,
 - Economic study will also inform this project,
 - Project just started in October 2018.
- Project focus:
 - Develop better soil health metrics for soils in colder, wetter climates like Minnesota,
 - Develop an on-line network for farmers to share information,
 - Provide outreach to farmers through U of M Extension.

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Objective 3 Project Outcomes: Cover Crop Demonstrations sites

- 13 landowners, 16 fields, and 2,098 acres of cover crops over two years,
- General estimation of pollution reduction: 40 lbs of P and 170 tons of sediment per year,
- Provided incentive funds so landowners would try multiple species planting,
- Landowners were also involved in workshops, field days, and survey work in addition to the financial assistance for seeding cover crops,
- Planning was important and realized the need of about 6 months lead time before cover crops established,
 - Dean Thomas worked with each farmer and developed an agreed upon plan.

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Cover Crops: Anderson Farm (May 10, 2018)



Cover crops emerging in Spring 2018.



Close up view of cover crop.

Current and Next Steps

- This project informed BWSR on how to utilize General Fund and Clean Water Funds for cover crops,
 - Helped establish policy for BWSR funds used for cover crops, and
 - Helped provide guidance on landowner contracts and technical sign off.
- Technical Training and Certification Program
 - Provide technical assistance to local government staff so they can better help landowners, and
 - Lessons learned from this project will help inform this training.

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Future BWSR Work on Cover Crops and Soil Health


- Minnesota Office for Soil Health,
- Soil health and cover crops being incorporated into 1W1P,
- Included in BWSR Technical Training Program,
- Included in BWSR Grant Programs, and
- Partnering on the USDA NRCS Conservation Innovation Grant (CIG)



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Questions?

- Matt Drewitz, BWSR Measures and Outcomes coordinator
 - matt.drewitz@state.mn.us
 - Phone: 507-344-2821



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