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?

- 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,
- Increase biodiversity on the landscape,
- Attract beneficial insects,
- Legumes can add nitrogen to the system,
- Suppress weeds,
- Suppress nematodes,
- Enhance mycorrhizal numbers.

Sources: Sustainable Agriculture Research and Education (SARE) and the Soil Health Institute
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

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

- Workshops,
- Field days,
- Rainfall simulator, and
- Soil health sampling.

**Objective 2**: Cover Crop Economic Study

**Objective 3**: Cover Crop Demonstration Sites
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.

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.

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)

Demonstration Site by Clarks Grove, MN
Core Team: Project Management

<table>
<thead>
<tr>
<th>Core Team Member</th>
<th>Role and Institution</th>
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<tbody>
<tr>
<td>Matt Drewitz</td>
<td>BWSR</td>
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<tr>
<td>Jake Overgaard</td>
<td>U of M Extension</td>
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<tr>
<td>Dr. Bill Lazarus</td>
<td>U of M Applied Economics</td>
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<tr>
<td>Dean Thomas</td>
<td>TSA 7 Soil Health Tech</td>
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</tbody>
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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.

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.
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-ARS, 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

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

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.
Metric: Cover Crop Economics

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

Study Results

- Approximate Costs Per Acre
  - $35 seeding and planting,
  - Between $5 to $16 per acre for termination,
  - 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)

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”

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)

Metric: Soil Testing for Biological Indicators

- BWSR Staff Adam Beilke collecting soil samples.
- BWSR Staff Dave Copeland collecting soil samples.
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.

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.

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.

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)

Questions?

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

Agenda Item: 07