

National Fish and Wildlife Foundation Final Programmatic Report

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Project Name and Number: Transitioning to No-Till Cover Crops (IN, OH)

Recipient Organization/Agency: Conservation Technology Information Center

1) Summary

In 2008, CTIC began a three-year project, "Using Cover Crops to Facilitate the Transition to Continuous No-Till," to provide technical and social support to producers in Indiana and Ohio wanting to expand their use of cover crops and continuous no-till, two proven conservation practices. With consultant services, workshops and opportunities to learn from peers, this project provided the assistance needed to get conservation on the ground.

Project participants-four producers in Indiana and two producers in Ohio-have transitioned field(s) within their operation to continuous no-till, while incorporating cover crops into the rotation. Crop consultants provided producers with technical and social support as they made the transition. Consultants met regularly with their partner-farmers, assisting with equipment, planting time, seed selection and other decisions, as they relate to cover crops and no-till planting.

CTIC and the Midwest Cover Crops Council developed a unique Cover Crop Selection Tool for Indiana, Ohio, Michigan, Minnesota and Wisconsin, which is available online at <http://mcccdev.anr.msu.edu/> Producers enter details about their location, operation and desired outcomes, and the tool responds by showing cover crops that will work well in their operation.

2) Introduction

Using a continuous no-till (CNT) system, producers build healthy soil, grow productive crops and efficiently manage nutrients. Without disturbing the fragile sub-layers of soil, CNT allows surface organisms to thrive and encourages increased nutrient cycling and availability while improving soil structure and infiltration and increasing organic matter. Residue-covered ground is highly resistant to extreme weather conditions, such as drought, and holds the soil in place, ensuring that nutrients and sediment remain on the land and not in nearby water ways. With reduced fuel use, reduced nutrient inputs and yields comparable to conventional systems, CNT greatly increases profit margins.

Despite the proven economic and environmental benefits of CNT, some farmers remain hesitant to fully adopt the system. In 2004, the National Crop Residue Management survey indicated that only 22.6 percent of farmers were no-tilling. This does not indicate the number of CNT farmers; that number is likely much less. One of the major reasons farmers resist switching to CNT is that the transition years pose many challenges. Attempting CNT without proper technical knowledge may cause a disastrous first year and taint opinions toward the practice. Potential economic risks and yield losses during the first five years also can cause farmers to resist CNT. However, if farmers can maintain a CNT system for three consecutive years, the risks begin to fade. The farmers' confidence increases and benefits from the lack of tillage start to take effect on the land and in the wallet.

Incorporating cover crops into a CNT rotation can multiply the environmental and economic benefits. In fact, by keeping something growing on a field for as many days as possible, soil erosion becomes almost nonexistent, even during a six-inch rain. These are the same benefits of a CNT system, but by pairing the two practices, the benefits are seen more quickly and the transition years are more productive and less stressful for the transitioning farmer. CTIC proposed addressing the challenges that farmers face during the transition to CNT by educating them about the environmental and economic advantages of pairing no-till and cover crop systems.

Objectives

- Eight farmers in Indiana and Ohio transition to CNT with the personalized technical support provided by a Crop Consultant.
- Eight participating farmers integrate cover crops into their CNT system.
- At least 20 farmers in both Indiana and Ohio form social support networks for CNT.
- A Cover Crop Matrix (CCM) for the Midwest aids farmers in choosing the correct cover crop for their location and operation.
- Soil quality tests showing the benefits of cover crops paired with no-till.

3) Methods

Demonstration Plots

CTIC worked with four farmers in Indiana and two farmers in Ohio to transition to CNT while incorporating cover crops into the rotation. Each participating producer was paired with a no-till/cover crop consultant who was knowledgeable and experienced in no-till farming and the use of cover crops. The producer and no-till/cover crop consultant met on a regular basis to plan activities. These meetings included discussions about alterations to equipment, inputs and management that were necessary to successfully adopt a profitable continuous no-till system utilizing cover crops.

CTIC paid each farmer and each consultant \$625 per year for their participation in this project. Starting in spring 2009 (2010 for the Mercer County, OH farm), each farmer planted three 10-acre plots in the same field with the following:

Plot 1- No-till soybeans but at least one tillage pass in soybean stubble ahead of planting com.
(some tillage)

Plot 2- No-till soybeans and no-till com (continuous no-till)

Plot 3 -No-till soybeans and no-till com with one or more cover crops planted.

Dan Towery, our project partner, personally managed each of the farmer-consultant relationships as well as the soil testing and final results report.

Each farmer successfully planted and managed his plots throughout the project period. The weather during fall 2009 was so wet that most of our producers did not harvest until very late in the year. In fall 2010, our farmers experienced an early harvest and planted their cover crops in plenty of time. Unfortunately, fall 2010 was so dry that the cover crops had very little growth. Despite challenges with weather, these farmers successfully transitioned their no-till/cover crop plots. Each farmer now plants more cover crops than originally required by our plots. In 2011 the Mercer County, OH farmer intends to keep his plots and to monitor the change for the next 10 years. Each producer has planted more than the required 15 acres of cover crops in 2011. The Mercer County, OH farmer planted 2650 acres, Williams County, OH farmer planted 200 acres, Decatur County, IN farmer planted 30 acres, Orange County, IN planted 2,970 acres, Owen County, IN planted 60 acres,

Clinton County, IN planted 325 acres. They all intend to continue using cover crops and reduced tillage or continuous no-till after the project ends. More information on our farmers and their experiences can be found at <http://ctic.org/Cover Crops/>

Cropping Decisions Survey 2010

As this project progressed, we realized that asking a producer to change his operation to both continuous no-till and using cover crops was a lot to ask. In general, farmers willing to try cover crops already understand the benefits and advantages of no-till. To better understand what influences farmer decisions about cover crops, CTIC surveyed more 800 farmers in summer 2010. In December 2010, CTIC invited nine farmers from Michigan, Indiana and Illinois to participate in a focus group to share their views on cover crop adoption. These farmers had varying levels of experience with cover crops. One farmer used them a lot, one farmer had never tried them and the rest of the farmers fell somewhere between. After a full day of conversation about challenges and preferences, the group discussed how to most effectively influence farmer decisions to change their operation. The group concluded that farmers like to see other farmers succeeding. Farmers sharing their success stories will have greater influence than advisors, research or printed material. For a complete report on the survey and focus group results, see the references at the end of this report.

Soil Tests

The overall soil quality scores on plots in no-till or seeded to cover crops improved from 2009 to 2011. For example, the Decatur County, IN farm improved from an overall quality score of 46 for conventional tilled fields to 64 on no-till and/or cover crops fields. The soil property which changed the most consistently on all fields was Potentially Mineralizable Nitrogen. Soil test results have been distributed to the participating farmers. Considering that two of the three project years were very difficult cover crop seasons, much larger improvements would likely been seen in more favorable years.

CTIC sampled soil from the demonstration plots in 2009 and 2011. The short time frame of this project allowed a small window to show differences in measured soil properties. In addition, changes active organic matter, aggregate stability, available water capacity, active carbon, and potential mineralizable Nitrogen take place in the top two inches of the soil. Taking soil samples to a depth of seven inches dilutes these changes yet provides more stable results.

Soil samples taken for biological soils tests can be affected by temperature and moisture and provide a "snapshot" of what is happening at the time taken. Cornell University recommends soil sampling occur between April 1 and May 31 and at moisture levels that are dry enough to plant corn. In 2011 soil samples were taken on or around May 25 on soils more wet than the optimal condition. It is not known how this may have affected results. The dry conditions of fall 2010 resulted in almost no fall growth, regardless if seeded aerially or with a drill. However, the wet spring of 2011 resulted in very good growth. It is unknown how this affected the soil test results. A final report of the soil test results is included in the references at the end of this report.

Field Days

CTIC hosted four field days (two more than proposed) promoting continuous no-till and cover crops. Toward the end of this project, we found that producers were more open to messages about improving soil health than being told they must be continuous no-tillers. All field days focused on same message - "Using continuous no-till and cover crops in a system will improve your soil quality and provide both economic and environmental benefits."

2009

On August 25, 2009, CTIC conducted the Indiana Cover Crop workshop and field day in Elwood, Ind., with 49 participants. Following indoor morning sessions, participants traveled by bus to a nearby farm and met with long-time no-tillers and cover crop users. Participants received the book "Managing Cover Crops Profitably" (\$20 value) and many presentations with practical information they could use to plant cover crops during fall 2009.

2011

One of our consultants hosted a field day at his farm in Greensburg, Ind., on July 14, 2011. He and the Decatur County farmer shared their experiences with our project. Ray Archuleta, NRCS, talked about soil biology and soil health. The 71 attendees provided positive feedback on evaluation forms.

The Mercer County farmer hosted 147 participants at an ECO (Eternal No till-Continuous Living Cover- Other Best Management Practices) field day on his farm of in Celina, Ohio, on July 14, 2011. He has had great success with his conversion to cover crops and no-till. Participants rotated through several talks and then took a trolley tour of our demonstration plot as well as other cover crop fields. *Farm Journal* featured his farm and participation in our project in its Fall 2011 Stewardship edition. 2,650 acres in cover crops were planted in 2011, and he plans to continue the plots for 10 more years.

2011

Ohio No-Till Council worked with CTIC to host a cover crop and continuous no-till field day on August 31, 2011, in Minster, Ohio. The 135 participants learned about cover crops, continuous no-till and soil health. A soil pit and cover crop plots demonstrated the benefits of cover crops and experts and experienced farmers answered questions about cover crop management.

Farmer Networks

This project helped to build and expand farmer networks in Ohio and Indiana that discuss, exchange information about and provide support for adoption of cover crops and CNT.

The Ohio No-Till Council provided a foundation for our Ohio farmer network to grow. As our project grew and more farmers gained interest, Ohio No-Till Council membership also increased. All Ohio project partners are associated with this group and will continue to receive support from this network.

In addition to the 2011 workshop, Ohio No-Till Council hosted winter meetings in 2009 and 2010 and hosted additional summer field days in 2009 and 2010. The Ohio No-Till Council participated in all project field days and networking sessions. These regular meetings and events provided a network of farmers and experts that have supported this project and helped ensure our success.

Indiana's Conservation Cropping Systems Initiative (CCSI) also helped build farmer networks in Indiana. While not a producer-led organization, CCSI reaches hundreds of Indiana producers by hosting events and providing training and information about cover crops and no-till. Our farmers and consultants regularly communicate with CCSI and will continue to serve their regions as leaders in adoption of cover crops and CNT.

CTIC compiled an email list of project and field day participants as well as people who have expressed interest. We sent 10 informational emails to this group as well as notices about upcoming events or timely topics. All project farmers also are connected to a larger network of cover crop

people through the Midwest Cover Crop Council's email list serve. This list serve provides the platform for many questions and discussions about cover crop topics.

Networking Sessions

CTIC held two networking sessions to connect farmers and facilitate discussion about cover crops and CNT. Participating farmers appreciated opportunity to network with peers and discuss daily challenges and successes when using cover crops and no-till. At each networking session, farmers discussed these topics long after the event's end time. We clearly achieved our goal of fostering productive conversations between farmers about these conservation practices.

2010

CTIC hosted a winter farmer networking meeting in February 2010 in Fort Wayne, Ind. An audience of 96 people listened to Dr. Jill Clapperton, owner of EarthSpirit Resource Consulting, speak about the importance of soil quality and Rodney Rulon, an experienced no-till and cover crop farmer, talk about his experiences. The participants ate lunch and listened to a farmer panel answer questions during the meal. Participants talked and networked for two hours after lunch.

2011

CTIC hosted the second farmer networking meeting at the Conservation Tillage and Technology Conference (CTC) in Ada, Ohio, on February 24, 2011, which attracted more than 800 people. The conference agenda featured several cover crop presentations in a large sanctuary filled nearly to capacity of 400 people. The networking meeting took place after the conference at the Northern Ohio University Inn across the road from the CTC. After the day of presentations, participants and speakers were invited to meet at the Inn and enjoy food and good conversation.

Eighty-two people attended the networking session. Farmers and speakers mingled and discussed the information from the CTC presentations. CTIC plans to build on this success and continue to host a farmer networking event at this conference in Ada after the project ends.

Conservation Tillage and Technology Conference

The Ohio No-Till Council incorporated a full day of cover crops sessions into this very successful conference. CTIC participated in different ways each year.

2009

At the CTC conference, CTIC met with participating farmers and consultants. Farmers met the other participants and discussed the project and expectations. We handed out information about cover crops to conference participants and attended many great sessions along with our project partners.

2010

CTIC handed out informational fliers about our project, including description of the online cover crop decision tool, to 500 conference participants.

2011

CTIC's Angie Williams gave a presentation about the cropping decisions survey during the cover crop portion of the conference. In this presentation, the audience used turning point technology to answer the survey questions. The immediately tallied results were compared to the original survey. The opinions of both groups were similar. They all agreed that time and money posed significant challenges when incorporating cover crops into their rotations. They also agreed that farmers like to hear information from other farmers.

Midwest Cover Crop Council (MCCC) Cover Crop Decision Tool (CCDT) and Web Site

The MCCC launched a website dedicated entirely to cover crop information (www.mccc.msu.edu); created the MCCC email list serve that our farmers have used for discussions, information and social support; and created an online cover crop decision tool that helps farmers make informed decisions about what cover crops will work best for their operation. The online tool was originally planned to provide information for farmers in Indiana and Ohio, however the MCCC expanded the tool to include Minnesota, Wisconsin and Michigan. MCCC plans to add Illinois soon.

The web version of the Midwest Cover Crops Council (MCCC) Cover Crop Decision Tool (CCDT) was launched on the MCCC website (www.mccc.msu.edu) for use by Indiana and Ohio farmers on February 17, 2011. The web-based CCDT (Figure 1) includes: 1) a database to store state frost/freeze data (by county) and state cover crop data for 103 categories including attributes, comments and references for each state's list of cover crops and mixes and 2) web pages for inputting cover crop criteria and outputting cover crop recommendations and information sheets.

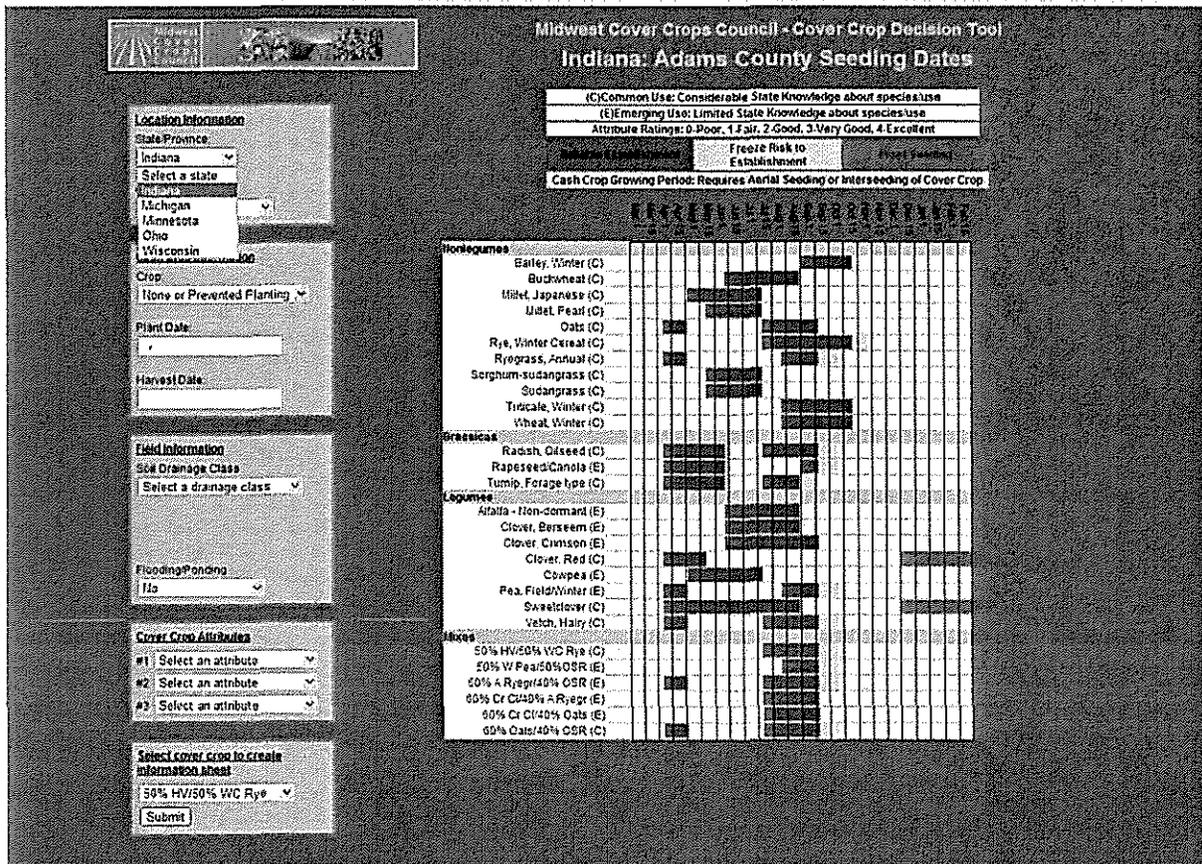


Figure 1: Screen shot of the web-based CCDT

Since the CCDT launch on February 17, 2011 through January 20, 2012, visitors accessed the site 4,944 times, with 885 visits from Indiana and 660 visits from Ohio. During the same time period, the MCCC website was visited 18,499 times from 108 countries, led by the U.S and Canada. The website consists of roughly 40 general and state information pages and 330 documents on cover crops and their use. The MCCC listserv has grown to 297 members. In 2011, 76 communications were sent to the listserv, and since its inception, 275 communications have been sent. The MCCC has been "liked" by 71 people on Facebook. See full report in references.

CTIC cover crop web site

CTIC created a cover crop subsite, <http://ctic.org/Cover Crops/>. on the organization's main website. We added more than 100 cover crop references to a searchable database in this site. The site contains information about our project, including soil tests, profiles, and details about what the farmers did each year. CTIC interviewed participating farmers by phone for feedback about their participation and the project. Interview summaries can be accessed on the cover crop site. As of October 30, 2011, 4,377 visitors accessed this website. This website will continue to provide cover crop information to visitors long after the project period.

4) Results

| Expected Results/Outputs | Project Results/Outputs | Measure | Comments |
|--|--|---|--|
| Eight farmers successfully transition to CNT using cover crops and realize economic and environmental advantages of the system | Six farmers successfully transitioned to CNT using cover crops and realize economic and environmental advantages of the system | Six farmers maintain CNT/cover crop system. The farmers intend to continue this practice and expand their no-till and cover crop acres | Finding farmers who were not already no-tilling their land and were willing to try BOTH continuous no-till and cover crops was a challenge. Some of our farmers were already using no-till on some acres. All the demonstration plots occurred on land that was not previously notilled. |
| Demonstrated results of environmental and economic benefits of CNT/cover crop system | Demonstrated results of environmental and economic benefits of CNT/cover crop system | First and third spring soil tests; 5,235 acres of cover crops planted on demonstration farms in fall 2011 | All soil tests that were taken in first and third year showed soil quality improvement in CNT/Cover crop plots |
| Cover Crop matrix for IN, OH | Online selector tool for IN, OH, MI, WI, MN | Completed selector tool is online | Tool developed for five states, three more than proposed |
| CNT Network in IN and OH sharing information about CNT/cover crops | Farmers networked through MCCC list serve, Indiana Conservation Cropping Systems Initiative and Ohio No-Till Council | All project farmers participate in MCCC list serve, which includes 271 others interested in cover crops. Ohio Farmers connected with Ohio NoTill Council. Indiana farmers work with Indiana conservation Cropping Systems Initiative. | Information exchange through CTIC web site, <i>Partners</i> articles, news releases, workshops and field days, CNT network, MCCC list serve and conference exhibits, Ohio NoTill Council mailing list |
| CNT/cover crop workshops in IN and OH | CNT/cover crop and Soil Health workshops in IN and OH | Evaluations from workshops showed increased knowledge and positive feedback | CTIC hosted one workshop in 2009 and three (instead of one) in 2011. |

ii) Discrepancies

- (1) Six farmers participated in our demonstration plots instead of eight. Finding farmers who were not already no-tilling but were willing to use no-till and cover crops proved to be a challenge.
- (2) Soil tests conducted when weather conditions allowed. The wet springs in 2009 and 2011 posed significant challenges. Not being able to find a window within the correct dates with the right moisture for soil tests prevented some of the farms from being tested.
- (3) The weather, as always, played a large factor in cover crop successes. A wet late harvest in 2009 and a fall drought in 2010 made growing conditions very unfavorable for cover crops. With these poor circumstances, our soil tests still showed improvement in soil quality for all the no-till cover crop plots that were tested.

b) Post-project Outcomes

- o Project farmers will share the project information and results with their family and neighbors to generate greater community interest in using these systems.
- o The CTIC website and MCCC website will remain available to provide information about cover crops and continuous no-till and the effects on soil health.
- o The MCCC list serve will continue to provide an online cover crop community for farmers, and other organizations and groups who are interested in cover crops.
- o The online Cover Crop Decision Tool serves five states (Indiana, Michigan, Minnesota, Ohio, and Wisconsin) and provides reliable information for producers and others interested in cover crops and assistance in selecting appropriate varieties for optimal performance.
- o Networks of continuous no-tillers established during this project will continue to provide support to producers with an interest in CNT systems and cover crops.
- o As each of our project farmers continues to expand their cover crop acreage and improve their management system, they will serve as leaders and innovators to landowners in their area. Leading by example, these farmers will encourage others to adopt these systems and improve land and water quality in their areas.
- o Soil erosion will decrease as continuous no-till and cover crop acres increase. Less sediment and nutrients will leave land under no-till and cover crops, adding greater protection to watersheds.
- o Soil quality will continue to improve on each farm. The Mercer County farmer intends to keep his plots and to monitor the change for the next 10 years. Each producer has planted more than the required 15 acres of cover crops in 2011. The Mercer County, OH farmer planted 2650 acres, Williams County, OH farmer planted 200 acres, Decatur County, IN farmer planted 30 acres, Orange County, IN planted 2,970 acres, Owen County, IN planted 60 acres, Clinton County, IN planted 325 acres.

5) Discussion & Adaptive Management

a) Lessons Learned and Transferability

- i) Modifying a fanning operation to continuous no-till and cover crops requires significant and specific change to overall farm management. What works for one producer may not work for his/her neighbor. Therefore, specific, reliable information and technical support must be provided to help farmers make the best decision for their operation.
- ii) Some farmers can use cover crops while transitioning to continuous no-till (it will accelerate the process), and some farmers need to take things more slowly. Although the cover crops do compliment a no-till system, smaller steps over a longer period of time may work better for some farmers.
- iii) Access to technical, financial and social support when changing farm management substantially improves likelihood of success. Producers who had solid forms of all three were the most successful.
- iv) At every outreach event, the farmer panel was the most well received part of the program. Farmers like to learn about a new practice or management from farmers who successfully use that same practice or management.
- v) The soil tests confirmed that even under less than ideal circumstances, soil quality will improve in a continuous no-till/cover crop rotation in two years.
- vi) The monitoring and evaluating activities of this project helped to:
 - (1) See that the soil is improving even though it is a slow process
 - (2) Learn that farmers place a high value on farmer-to-farmer interactions when learning about new practices.
 - (3) Confirm that the information at our field days was relevant and useful for our producers.

vii) CTIC plans to continue to promote a system of continuous no-till and cover crops. We will use innovative farmers to set examples and share their experiences whenever possible.

b) Dissemination

| Outreach | Audience | Numbers |
|---|---|--|
| 4 Field Days | Producers, CCAs, SWCDs, NRCS | 402 attendees |
| 2 Farmer Networking Meetings | Producers | 178 attendees |
| 3 Partners Articles | CTIC's mailing list | 27,000 |
| 7 News Releases | CTIC's mailing list, MCCC mailing lists, SWCD mailing lists | 27,000 |
| Farm Journal Stewardship Edition Article | Farm Journal Subscribers | 370,000 |
| CTIC cover crop email messages (10) to list | Cover Crop producers and experts | 150 subscribers |
| MCCC list serve | Large network of cover crop producers and experts | 275 communications sent to 297 members |
| MCCC website | Producers, CCAs, universities, local, state and federal partners | 18,499 hits |
| CTIC cover crop website | Producers, CCAs, ag businesses, universities, local, state and federal agencies | 4,377 hits |

c) NFWF Adaptive Management

i) NFWF provided excellent project administration. Questions were answered in a timely manner and adaptations to our original work plan were well received.

6) References

1. Farmers names and contact information
2. Field Day Evaluation Results
 - a. Elwood, IN Field Day
 - b. Greensburg, IN Field Day
3. Cropping Decisions Survey Report
4. Focus Group Report
5. Soil Results Report
6. Cover Crop Decision Tool Report
7. Project Pictures