

Cover Crops:

Who, What, When, Where and Why

2015 Farm Bill Assistance Partnership Winter Meeting
January 30, 2015 - St. Cloud, MN



UNIVERSITY OF MINNESOTA
EXTENSION

Driven to DiscoverSM

Jill L. Sackett

- University of Minnesota Extension
 - Local Extension Educator, Crop Production Systems
 - Programming around sustainable agriculture and conservation
- USDA Sustainable Agriculture Research and Education (SARE)
 - Co-coordinator, Minnesota SARE
 - Grants, educational materials, outreach activities



WHY ME?



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



WHAT is a Cover Crop?

- A non-cash crop grown between two cash crops (Practical Farmers of Iowa)
- Grasses, legumes and forbs used for season cover and conservation (NRCS)
- A crop planted to prevent soil erosion and to provide humus (Merriam-Websters Online Dictionary)



Examples



WHY Cover Crops?

- Soils
 - Erosion
 - SOM
 - Compaction
 - Nitrogen +/-
 - Nutrient cycling
 - Aggregation
 - Water +/-
 - Microbes
- Pests
 - Weeds
 - Insects
 - Microbes
- Forage / Grazing
- Prevent Plant

Add Value
Increase Resiliency



WHY NOT Cover Crops? (challenges)

- Added Management
 - Planning
 - Establishment
 - Termination (some)
 - Herbicide system
 - Tillage system
 - Fertilizer system
 - Moisture
- Corn/Soybean system + climate = few GDD
- Crop insurance
- Lack of specific research
- Cost



Back to WHAT: Grasses

- Winter cereal rye
- Winter triticale
- Winter wheat
- Annual ryegrass (!)
- Oats
- Spring Wheat
- Barley
- Millet
- Sorghum
- Sudangrass
- Sorghum-Sudangrass
- *Teff*



Winter cereal rye



Winter cereal rye



Winter cereal rye



WHAT?

Legumes

- Forage pea
- Field pea
- Austrian winter pea
- Red clover
- Crimson clover
- Berseem clover
- Sweetclover
- Hairy vetch
- Alfalfa
- *Sunn hemp*
- *Cow pea*
- *Common vetch*



Legumes



WHAT?

Forbs

- Brassicas
 - Radishes
 - Turnips
 - Rapeseed
 - Canola
 - Mustards
- Buckwheat
- *Sunflower*
- *Phacelia*
- *Kale*
- *Camelina*



Forbs



Forbs – Brassica – Oil Seed Radish



Single versus

- Single species
 - Generally makes
- Multiple species
 - Generally belie
- Think diversity
 - Grass vs Broad
 - Warm vs. Cool
 - Root system



Seed Cost Example (01/29/15)

Cover Crop	Suggested Drilling Rates (MN CCDT)	Seed Cost (Green Cover Seed)	Total Cost [\$ per acre]
Berseem Clover	8-15 lb/A PLS	\$2.15/lb (conventional, 50# bag)	\$17.20-\$32.25
Oats	30-50 lb/A PLS (1-2 bu/A)	\$0.29/lb (conventional, 50# bag, added \$0.02 for mono)	\$8.70-\$14.50
Nitro Radish	8-15 lb/A PLS	\$2.25/lb (conventional, 50# bag)	\$18.00-\$33.75
Winter Cereal Rye (Elbon Southern)	55-100 lb/A PLS	\$0.32/lb (conventional, 50# bag, added \$0.02 for mono)	\$17.60-\$32.00
Oats (60%) and Nitro Radish (40%)	18-30 lb/A PLS 3-6 lb/A PLS	~	\$11.97-\$22.20



HOW?

- Grain Drill
- Planter
- Broadcaster (bucket, fertilizer wagon)
- Interseeding
 - Planter
 - Drop-seeder
 - High-clearance Vehicle
- Aerial
 - Airplane
 - Helicopter

Slurry
seeding with
liquid
manure
spreader?



Establishment Cost Example

Cover Crop Establishment Method	Closest Method (ISU 2014 Iowa Farm Survey Custom Rate)	Total Cost [\$ per acre]
Drilling	Drilling Small Grain	\$10.00-\$20.00 Average \$15.30
Broadcast (no incorporation)	Broadcast Seeding Grass with Tractor	\$8.00-\$18.00 Average \$12.45
High Clearance Vehicle (before canopy closure)	Fertilizer Application Liquid, side-dress	\$8.00-\$20.00 Average \$12.90
Aerial (helicopter or airplane)	Aerial Spraying	\$7.50-\$13.00 Average \$10.10



WHEN?

- AFTER early harvested crops (sweet corn, sweet peas, small grain, dried beans, some silage, some potatoes, earlier maturing soybean varieties)
 - July planting = warm season covers
 - August planting = cool season covers
 - September planting = cool season grasses
- INTO standing corn and soybeans
 - Physiological maturity
 - Aerial OR high-clearance (OR RowBot??)
 - V4-V8 (?!?!?!?)



HOW



Resources

- Midwest Cover Crop Council (mccc.msu.edu)
 - Midwest Cover Crops Field Guide
 - Minnesota Cover Crop Decision Tool
- Sustainable Agriculture Research and Education (sare.org)
 - *Managing Cover Crops Profitably*
 - *Building Soils for Better Crops*
 - Cover Crops Survey
 - Cover Crop Learning Center
- Seed Companies



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





- Illinois
- Indiana
- Iowa
- Michigan
- Minnesota
- North Dakota
- Ohio
- Wisconsin
- Ontario



- Home
- About Us
- History
- Mission and vision
- Supporters
- MCCC meetings
- Cover Crop Resources
 - Cover crop species
 - Cover crop selector tools
 - Innovator profiles
 - Extension material
 - Publications
 - Multimedia
 - Links
 - Slurry seeding
 - Survey...coming soon

Midwest Cover Crops Council Cover Crop Decision Tools

The Midwest Cover Crop Council (MCCC) Cover Crop Decision Tools are web-based systems to assist farmers in selecting cover crops to include in field crop and vegetable rotations.

Instructions for Using the Cover Crop Decision Tool-Field Crops

Go to the Cover Crop Decision Tool-Field Crops

(If your browser is Internet Explorer (IE), please close the Favorites Pane for proper display)

Vegetables (Michigan)

Instructions for Using the Cover Crop Decision Tool-Vegetables

Go to the Cover Crop Decision Tool-Vegetables

Other states/provinces in the MCCC are currently developing their information. They will be added to the tools when complete. We welcome your input and comments on the Cover Crop Decision Tools. Send them to Dean Baas at baasdean@msu.edu.

About the Cover Crop Decision Tools

The Cover Crop Decision Tools are an initiative by the MCCC to consolidate cover crop



Location Information Minnesota Stearns

Cash Crop None or Prevented Planting Plant Date: Harvest Date:

Drainage Information Select a Drainage Class Flooding No

Goal #1 Select an attribute Goal #2 Select an attribute Goal #3 Select an attribute

Select cover crop to create information sheet 50% HV/50% WC Rye Submit

Reliable Establishment Freeze Risk to Establishment Frost Seeding
Cash Crop Growing Period: Requires Aerial Seeding or Interseeding of Cover Crop

Table with columns for dates (Mar 15 to Feb 15) and rows for crop categories: Nonlegumes, Brassicas, Legumes, and Mixes. Each cell contains a color-coded bar representing the growing period for a specific crop.





Midwest Cover Crops Council - Cover Crops

Minnesota: Stearns County Se

- Location Information
- Cash Crop Information
- Soil Information
- Attribute Information

Location Information Minnesota Stearns

Cash Crop Corn - Silage Plant Date: 05/15/2013 Harvest Date: 09/10/2013

Drainage Information Well Drained Flooding No

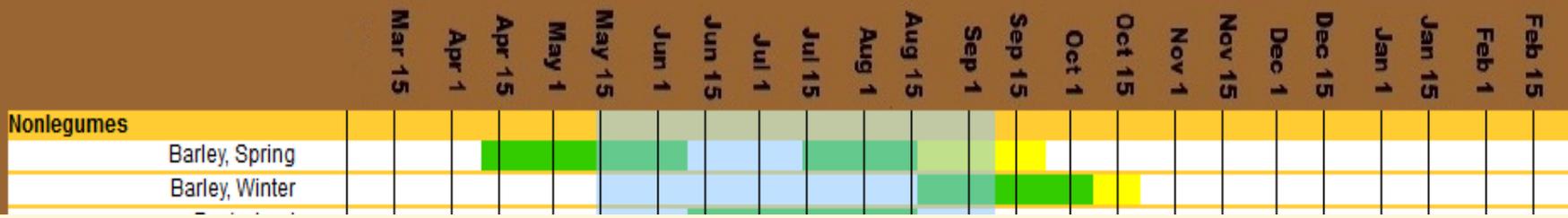
Goal #1 Select an attribute Goal #2 Select an attribute

- No
- Brief - up to 7 days
- Long - 7 days +

Select cover crop to create information sheet 50% HV/50% WC Rye Submit

Reliable Establishment Freeze Risk to Establishment Frost Seeding

Cash Crop Growing Period: Requires Aerial Seeding or Interseeding of Cover Crop



Goal #1 Nitrogen Scavenger

Goal #2 Erosion Fighter

Goal #3 Weed Fighter

Select cover crop to create information sheet 50% HV/50% WC Rye

Attribute Ratings: 0-Poor, 1-Fair 2-Good, 3-Very Good, 4-Excellent	Reliable Establishment		Freeze Risk to Establishment		Frost Seeding																		
	Cash Crop Growing Period: Requires Aerial Seeding or Interseeding of Cover Crop																						
Weed Fighter Erosion Fighter Nitrogen Scavenger	Mar 15	Apr 1	Apr 15	May 1	May 15	Jun 1	Jun 15	Jul 1	Jul 15	Aug 1	Aug 15	Sep 1	Sep 15	Oct 1	Oct 15	Nov 1	Nov 15	Dec 1	Dec 15	Jan 1	Jan 15	Feb 1	Feb 15
Nonlegumes																							
Barley, Spring 3 3 3																							
Barley, Winter 4 4 3																							
Buckwheat 3 2 3																							
Flax 2 1 0																							
Millet, Foxtail 3 3 3																							
Millet, Japanese 3 3 3																							
Millet, Pearl 3 3 3																							
Millet, Proso 3 3 3																							
Oats 3 3 2																							
Rye, Winter Cereal 4 4 4																							
Ryegrass, Annual 3 3 2																							
Sorghum-sudangrass 4 3 4																							
Sudangrass 4 3 4																							
Triticale, Winter 4 4 3																							
Wheat, Spring 3 3 2																							
Wheat, Winter 4 4 3																							
Brassic																							
Mustard, Yellow 3 2 3																							
Radish, Oilseed 3 2 3																							
Rapeseed/Canola 3 2 2																							
Turnip, Forage type 3 2 2																							
Legumes																							
Alfalfa - Dormant 4 4 2																							
Alfalfa - Non-dormant 3 2 2																							
Clover, Berseem 2 3 2																							
Clover, Crimson 2 2 2																							
Clover, Red 3 4 3																							
Clover, White 2 3 2																							
Cowpea 1 2 2																							
Pea, Field/Winter 2 2 1																							
Soybeans 2 0 2																							
Sweetclover 2 3 2																							
Vetch, Hairy 2 2 2																							
Mixes																							
50% HV/50% WC Rye 3 4 3																							
50% W.Pea/50%OSR 2 2 2																							
60% A Ryegr/40% OSR 3 2 2																							
60% Cr Cl/40% A Ryegr 2 2 2																							
60% Cr Cl/40% Oats 2 2 2																							
60% Oats/40% OSR 3 2 2																							



Equipment from University of Minnesota (corn silage). Non host for root knot nematode, soybean cyst nematode and sugarbeet cyst nematode.

Termination Information

Termination Methods: Tillage, Mow, Chemical, Roller Crimper
 If terminating with only tillage, multiple passes often required/Crimp during reproductive stage (milk or dough stage).
Comments: Roller crimping is the most difficult/variable termination method.

Performance and Roles

Legume Nitrogen Source: Poor
Total Nitrogen: 0 (lb./A)
Dry Matter: 2500-6000 (lb./A/yr.)
Nitrogen Scavenger: Excellent
Soil Builder: Excellent
Erosion Fighter: Excellent
Weed Fighter: Excellent
Good Grazing: Excellent
Quick Growth: Excellent
Lasting Residue: Excellent
Forage Harvest: Very Good
Grain Seed Harvest: Excellent
Cash Crop Interseed: Poor
Comments: Tolerates triazine herbicides; one of the latest seeded cover crops.

Potential Disadvantages

Delayed Emergence: Rarely a problem
Increased Weed Potential: Could be a moderate problem
Increased Insects/Nematodes: Could be a moderate problem
Increased Crop Diseases: Occasionally a minor problem
Hinders Crops: Could be a moderate problem
Establishment Challenges: Rarely a problem
Mature Incorporation Challenges: Could be a major problem
Comments Pro/Con:

Additional Information

Additional Information from Managing Cover Crops Profitably, 3rd Edition, Edited by Andy Clark, Sustainable Agriculture Network
[Rye, Winter Cereal](#)

Other Resources

<http://www.mccc.msu.edu/documents/managingccp/>
[Aerial Seeding Winter Rye In Southeast Minnes](#)
<http://www.mda.state.mn.us/Global/MDADocs/protecting/conservation/aerialrye.aspx>
[Are You Covered? Stop Soil Erosion on Canning](#)
<http://www.mn.nrcs.usda.gov/technical/ecs/agron/Cover%20Crop/Are%20You%20Covered.pdf>
<http://ruraladvantage.org/pdf/RyeasaCoverCropPrioritoOrganicSoybeans.pdf>
[Treat Your Fields to a Cover Crop or Green Ma](#)
<http://www.extension.umn.edu/horse/components/pdfs/covercrops.pdf>
[Region: Cover Crop Chart](#)
[Region: Environmental Benefits and Management of Small Grain Cover Crops in Corn-soybean Rotations](#)
[Region: Small Grain Cover Crops for Corn and Soybean](#)
[Region: Michigan Cover Crop Technical Guide](#)
[Out of Region: NRCs Conservation Practice Standard; Cover Crop](#)

Links to inform

- Local
- Cash C
- Plant
- Harvest
- Soil Drain
- Artificial Drain
- Flood
- Cove
- Cover Crop Sele
- Cover Crop Attribut
- Cover Crop Attribut
- Cover Crop Attribut
- Use within the s
- Drilled Seeding D
- Drilled Seeding
- Broadcast Seeding
- Aerial Seeding
- Seed C
- Frost S
- Fly-free
- Inoculation
- Comm
- Termination Meth



Termination Information

Termination Methods: Tillage, Mow, Chemical, Roller Crimper
 If terminating with only tillage, multiple passes often required/Crimp during reproductive stage (full bloom and milk or dough stage). Roller crimping is the most difficult/variable termination method.

Performance and Roles

Legume Nitrogen Source: Good
Total Nitrogen: 25-60 (lb./A)
Dry Matter: 2000-5000 (lb./A/yr.)
Nitrogen Scavenger: Very Good
Soil Builder: Very Good
Erosion Fighter: Excellent
Weed Fighter: Very Good
Good Grazing: Poor
Quick Growth: Good
Lasting Residue: Very Good
Forage Harvest: Fair
Grain Seed Harvest: Poor
Cash Crop Interseed: Poor
 Total N (lb/A) derived primarily from
Comments: formula that relies on dry matter (lb/A/yr) numbers.

Comments: If participating in a cost share program, check for specific required planting dates and rates. If the system is organic, be careful to use an OMRI certified inoculum.

Potential Disadvantages

Delayed Emergence: Could be a minor problem
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Additional Information

Additional Information from Managing Cover Crops Profitably, 3rd Edition, Edited by Andy Clark, Sustainable Agriculture Network

[Vetch, Hairy](#)
[Rye, Winter Cereal](#)

Other Resources

<http://www.mccc.msu.edu/documents/managingccp/>
http://www.mccc.msu.edu/documents/managingccp/ManagingCoverCropsProfitably_rye.pdf
[Michigan Cover Crop Technical Guide: http://efotg.sc.egov.usda.gov/references/public/MI/Cover_Crop_%28AC%29_%28340%29.pdf](http://efotg.sc.egov.usda.gov/references/public/MI/Cover_Crop_%28AC%29_%28340%29.pdf)
[Hairy Vetch: http://www.agry.purdue.edu/ext/forages/ForageID/legumes/hairy_vetch.htm](http://www.agry.purdue.edu/ext/forages/ForageID/legumes/hairy_vetch.htm)
[NRC Conservation Practice Standard: Cover Cr: http://efotg.sc.egov.usda.gov/references/public/IN/340_Cover_Crop.pdf](http://efotg.sc.egov.usda.gov/references/public/IN/340_Cover_Crop.pdf)

Comments: nematode and a poor host for soybean cyst nematode. Rye is a non host for root knot nematode, sugarbeet cyst nematode or soybean cyst nematode.



SARE Cover Crop Learning Center



Grants and Education to Advance Innovations in Sustainable Agriculture

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Cover Crops

Cover crops are one of the most effective ways to improve soil health, reduce off-farm inputs and protect natural resources. The following is a collection of educational materials developed out of decades of SARE-funded cover crop research.

 **Selection and Management**
Better understand how legumes, grasses, brassicas and other cover crop species can contribute to your operation.

 **Economics**
Cover crops can improve the bottom line in many ways, by reducing fertilizer needs, lowering weed and pest pressure, improving yields and more.

 **Establishment**
Timely establishment of cover crops in the late summer and early fall is one of the most critical factors in having success with them.

 **Rotations**
Success with cover crops relies on carefully planning how to fit them into your cash crop rotation.

 **Soil and Fertility Management**
From cycling nutrients to reducing erosion to breaking

Dig Deeper: Cover Crop Research

SARE has funded hundreds of research and education projects related to cover crops since 1988. This topic room features only a glimpse into SARE's entire portfolio of cover crop research.

To discover more, visit SARE's [database of projects](#) and conduct full text or advanced keyword searches.

Managing Cover Crops Profitably, 3rd Edition

Type: **Book**

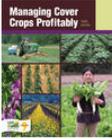
Managing Cover Crops Profitably explores how and why cover crops work and provides all the information needed to build cover crops into any farming operation.

Published: 2007 Pages: 244

Online Version: Free

 [Download File \(5.58 MB\)](#) | [View HTML](#)

Print Version: \$19.00 





USDA Guidelines

- NRCS Cover Crops Termination Guidelines
 - Version Three (September 2014)
- www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=STELPRDB1263099&ext=pdf
- RMA 2015 Cover Crops FAQ
- www.rma.usda.gov/help/faq/covercrops2015.html



Take Home Thoughts

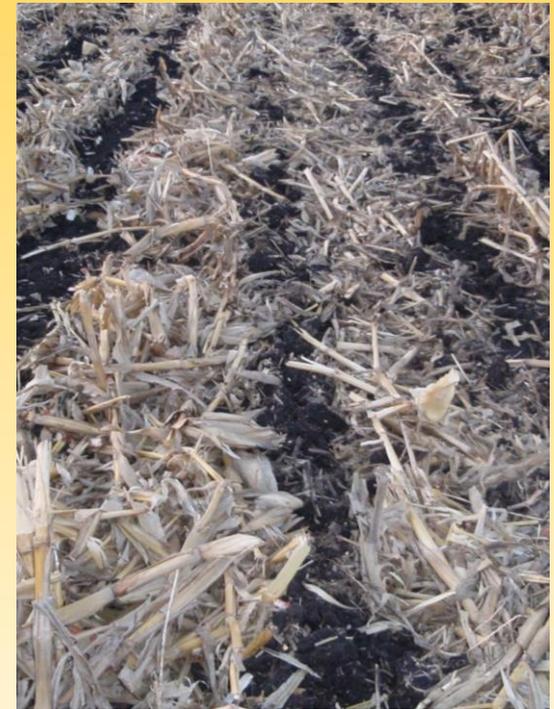
- Adjust management to the INDIVIDUAL farm
- Discovering new things all the time
- Try it on a few acres first (10% rule?)
- Research, ReSeArCh, RESEARCH
- **Contact insurance provider and local USDA office to be sure you are following program rules**



Reduced Tillage



- Conservation tillage
- Ridge Till
- Strip Till
- No Till



Questions?

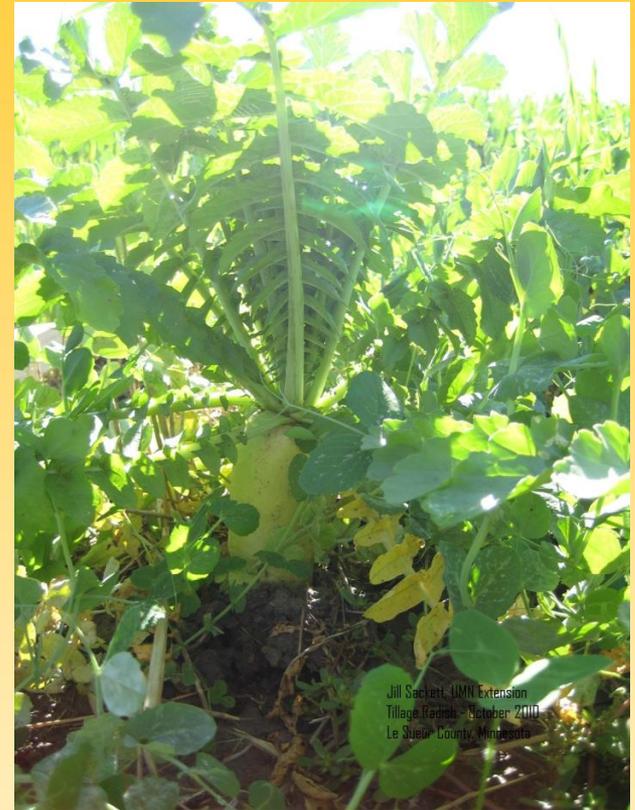
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Join the Minnesota Cover Crop Listserv!

UMN Extension – Conservation Agronomy is on Facebook!



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