Cover Crops and Soil Health

Sheboygan River Progressive Farmers

Spring Field Day and Kickoff Event
June 13, 2018
Second Look Holsteins –Eden, WI

Mike Ballweg
Crops and Soils
UW-Extension Sheboygan County

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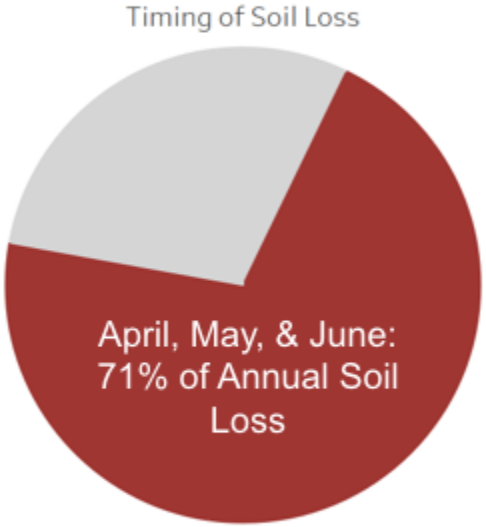
SHEBOYGAN RIVER
PROGRESSIVE FARMERS

Cover crops can make a difference

- **Reduce soil erosion**
- **Increase water infiltration**
- **Improved water quality & crop yields**
- **Improve soil structure**
- **Nitrogen Credits/Rotational Benefits**
- **Scavenger N -- that N is not always available for the next crop**
- **Maximize the growing season and land base. Approximately 40% of precipitation and GDDs accumulate after August 1st.**
- **Forage Production**
  - Small grains after wheat or vegetable crops
  - Late season grazing & stockpiling

Use site specific and a network of conservation practices in April, May and June to control soil loss and phosphorus loss.



April, May, and June: Combination of vulnerable fields and intense storm events.

Reduce soil losses by providing protection during this critical time period.

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DISCOVERY FARMS WISCONSIN

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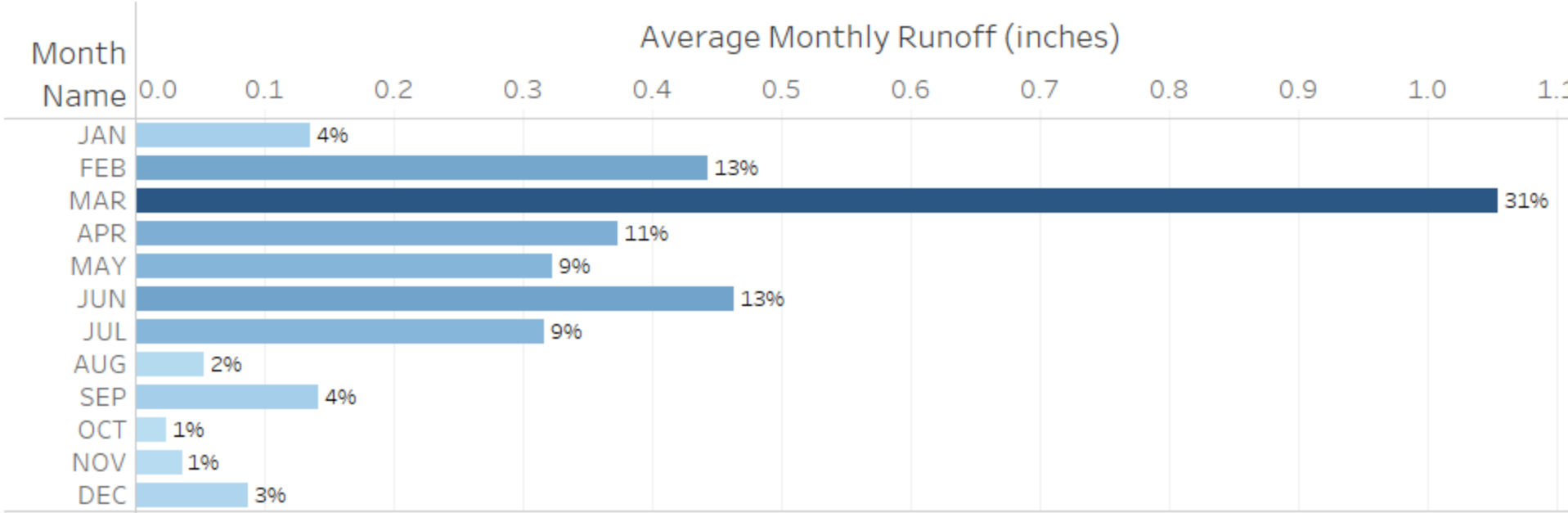
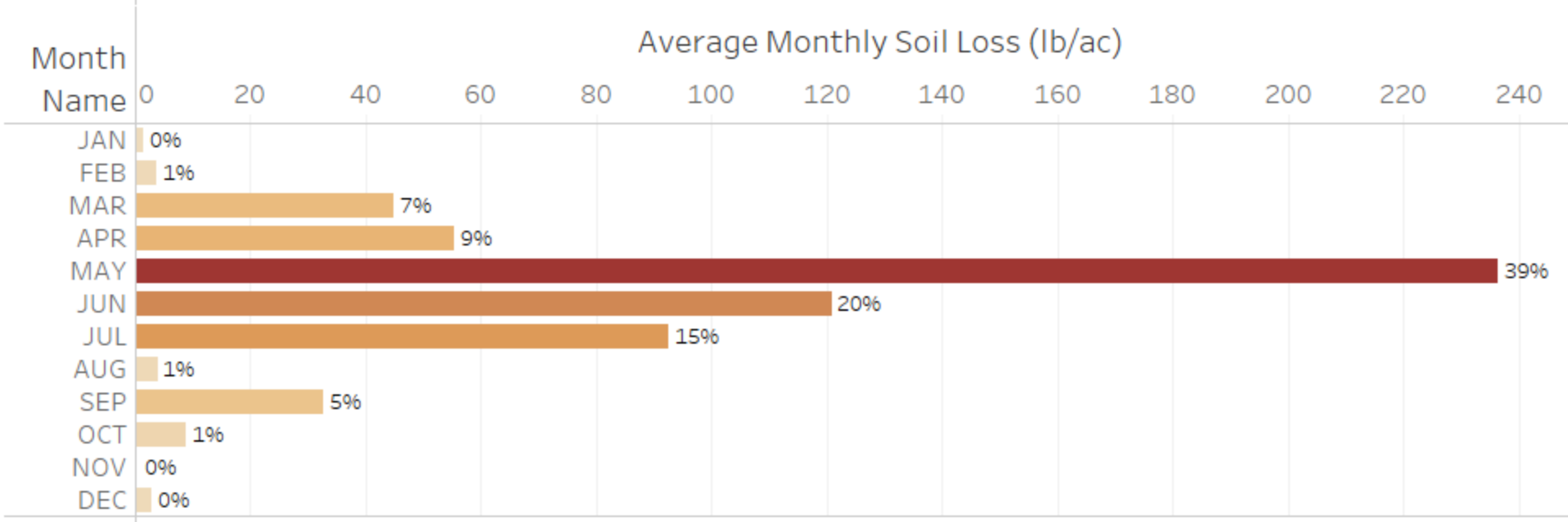




Good Residue Management is a starting point for Improved Soil Health

Soil Health Continuum

• Little Soil Structure • Low Aggregate Stability • Compaction	Tillage Adjustments	• Good Soil Structure • Greater Aggregate Stability • Friable Soils
• Little Crop Residue	Tillage Adjustments – Cover Crops & Crop Rotations	• Crop Residue
• Poor Water Infiltration • Low Aggregate Stability	Residue, Cover Crops, Crop Rotations	• Good Water Infiltration • Greater Aggregate Stability
• Eroded Soil	Crop Residue, Cover Crops Tillage Adjustments	• Little Soil Erosion
• Low Organic Matter • Little Biological Activity	Cover Crops	• Higher Organic Matter • Improved Biological Activity

Mike Ballweg
Crops & Soils Agent
UW-Extension Sheboygan County

Why Cover Crops

- A living, growing plant at times of year when we normally have nothing growing.
- Capture sunlight, feed soil organisms, sequester carbon, trap and recycle nutrients
- Reduce rainfall impact and help with water infiltration

Dr. Eileen Kladivko
Agronomy Department
Purdue University

Selecting Cover Crops that Fit

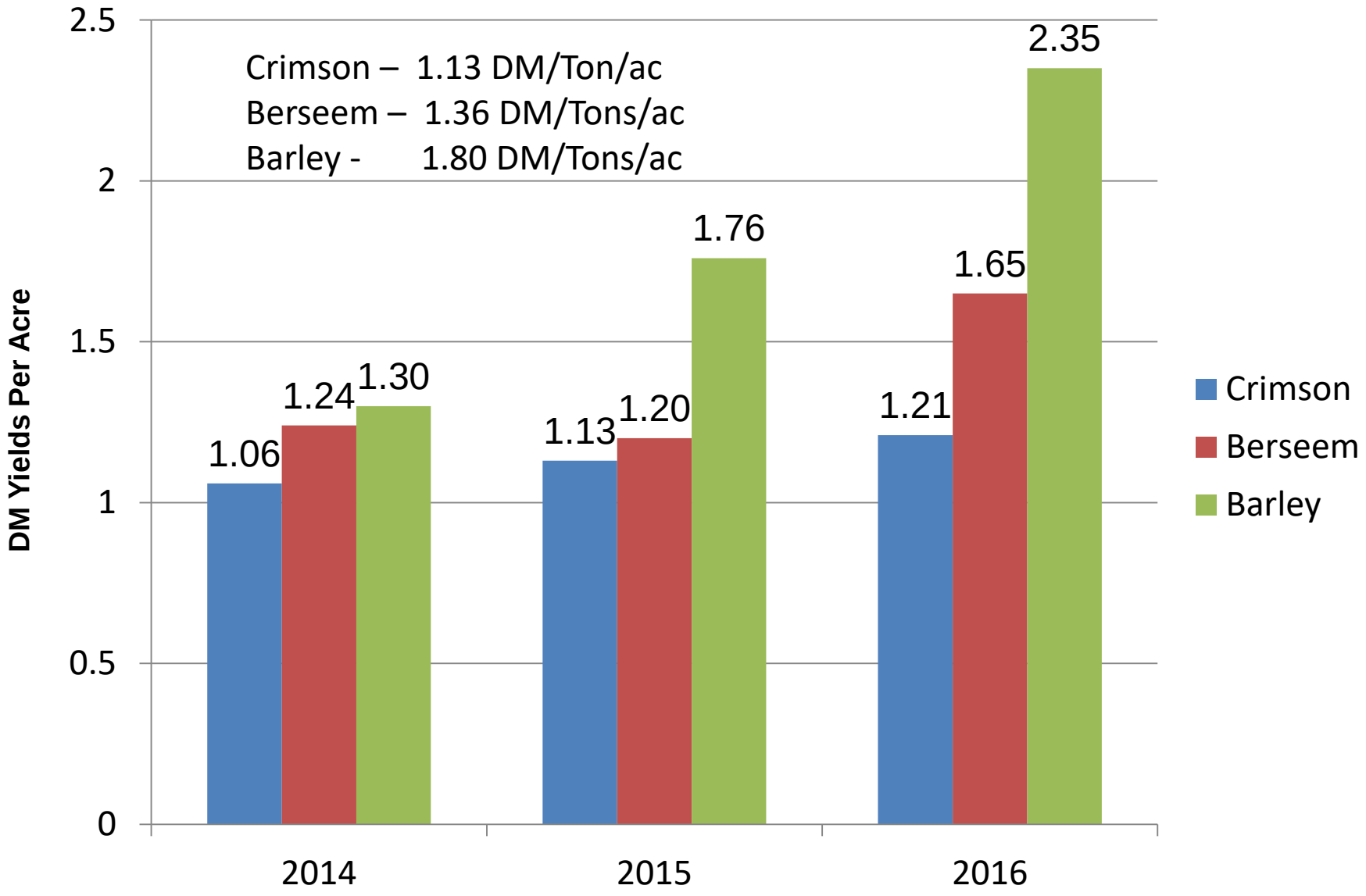
1. Cover Crops After Short Season Crops

Winter Wheat, Canning Crops

2. Cover Crops after full Season Crops

Cover Crops after Corn Silage, interseeding into corn or soybeans - aerial or broad cast applications

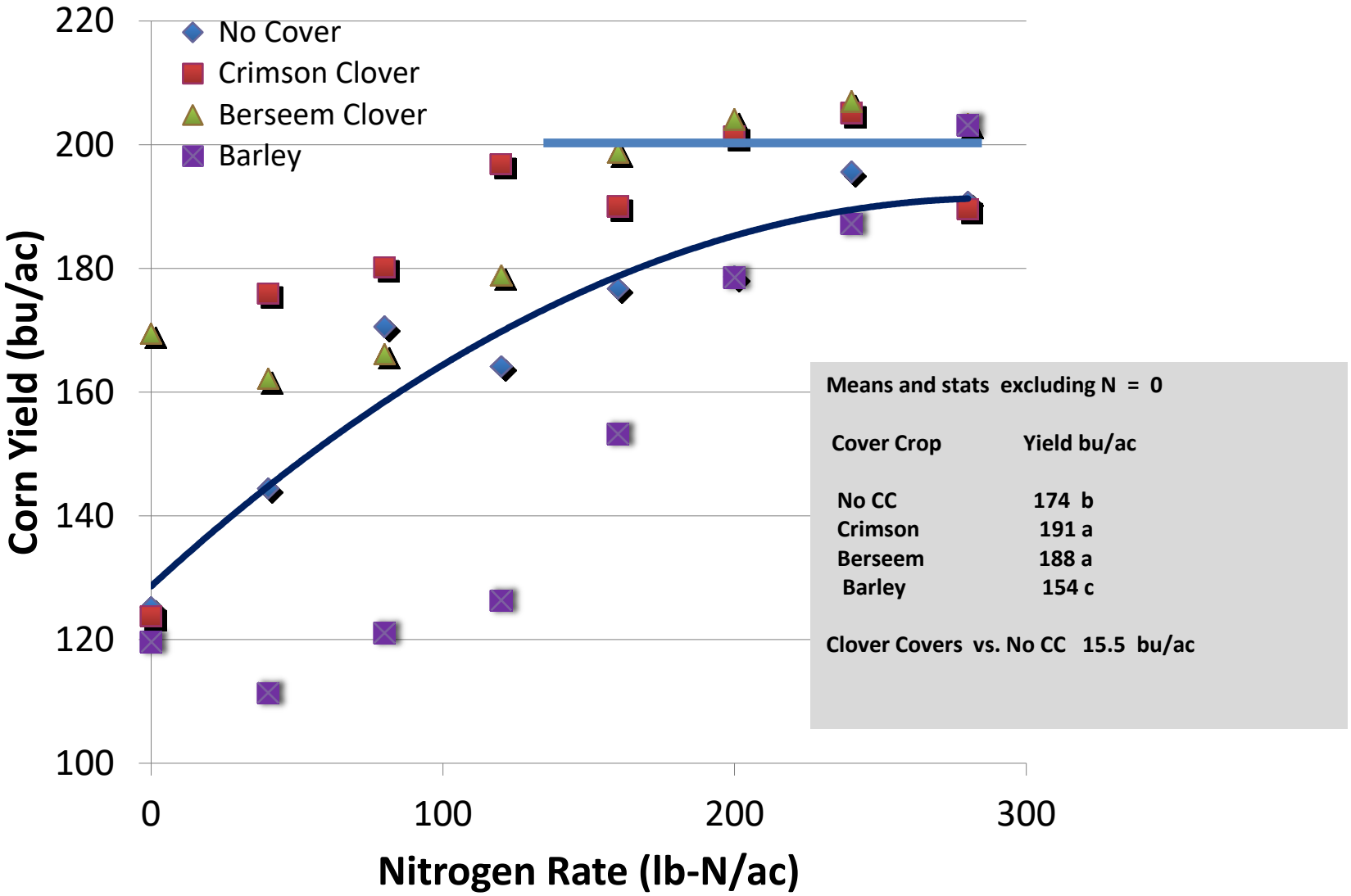
Cover Crop DM Yields After Wheat



Carbon to nitrogen ratios of crop residues and other organic materials

Material	C:N Ratio
rye straw	82:1
wheat straw	80:1
oat straw	70:1
corn stover	57:1
rye cover crop (anthesis)	37:1
barley – Sheboygan County	38:1
oats – Sheboygan County	30:1
pea straw	29:1
rye cover crop (vegetative)	26:1
mature alfalfa hay	25:1
Carbon: Nitrogen - Neutral	25:1
rotted barnyard manure	20:1
oilseed radish	20:1
legume hay	17:1
beef manure	17:1
crimson – Sheboygan County	14:1
berseem – Sheboygan County	14:1
young alfalfa hay	13:1
hairy vetch cover crop	11:1

Both crimson and Berseem clovers provide yield benefits - 2015 - Sheboygan County



Cover Crop Seeding Rates & Planting Dates – Following Short Season Crops

Cover Crop	Seeding Rate lbs/acre	Seeding Dates
1) Berseem Clover	10 – 12	July 15 – August 15
2) Crimson Clover	10 - 12	July 15 – August 15
3) Berseem Clover	5 – 6	July 15 – August 15
Crimson Clover	5 – 6	July 15 – August 15
4) Berseem Clover	8 – 10	July 15 – August 15
Oilseed Radish	2	July 15 – August 15
5) Crimson Clover	8 – 10	July 15 – August 15
Oilseed Radish	2	July 15 – August 15
6) Barley	30 – 100 (depending on goal & planting date)	August 1 to September 15
7) Volunteer Winter Wheat	Will need to terminate	
8) Red Clover	10 – 12 (Will need to terminate)	Limited fall growth after wheat Frost seed into Wheat
9) Oilseed Radish	2 – 3 (When used in mixtures)	July 15 – August 15
10) Barley	10 – 20 lbs	
Berseem	5 – 6 lbs	July 15 – August 15
Oil Seed Radish	2 lbs	
11) Others – Winter-Fields Peas, Canola, Rapeseed, Hairy Vetch?		July 15 – August 15

Forage Crops

Oats	90 -95 lbs./ 3 bushels	August 1 – August 15
Oats & Peas	60 – 65 lbs./ 2 bushels/ Peas 30 – 40	August 1 – August 15

Few cover crop options for reliable cover crop establishment after September 15th

- Winter rye
- Triticale
- Winter wheat
- Barley/Oats ?

Cover Crops after Corn Silage

IMPORTANT CROP TO FOLLOW WITH COVER CROPS

Lack of residue

Little water infiltration

Greater soil erosion risk

Flipping the Cover Crop Strategy after Corn Silage Harvest

- Think plant cover crop first …asap after silage harvest.
- Allows for greater cover crop growth
- Use minimum disturbance manure applicators – Oct – Dec before freeze up
- Better manure N Credit for the next crop
- DNR allows manure applications to existing cover crops

"Sieren applied 140 pounds of N per acre to all treatments but varied the timing of application and the form of N applied. **Regardless of strategy, he scored top returns when he terminated the cover crop (rye) 19 days before planting.** He saw the best returns when the cover crops were terminated 19 days before planting and yields were also greatest. Nitrogen costs were greatest and returns on investment were least when the cover crops were terminated one day before planting".

Nitrogen costs were greatest and returns on investment were least when the cover crops were terminated one day before planting.

But across both farms, terminating the cover crop near the time of corn planting (either three days or one day before planting) often resulted in a yield reduction compared to when the cover crop was terminated about three weeks prior to corn planting (21 or 19 days before planting).

Higher N rates or varying the N strategy at the farms did not appear to overcome the yield-reducing effects of terminating the cover crop near corn planting." research conducted in Iowa

WallacesFarmer

By Nick Ohde
December 28, 2017

Cereal Rye Cover Crop Effect on Soil Quality in a Corn Silage-Soybean System after 10 years

- **A rye cover crop "increased" total soil organic matter (SOM) in the top 4 inches (10 cm) from 4.8% to 5.3%, or ½% change in SOM**(spring biomass production ~2.8 Mg/ha after silage, 0.5 Mg/ha after soybean)

- **44% greater particulate organic matter (POM) in top 2 inches (5 cm)**
  - **38% greater potentially mineralizable N (PMN) in top 2 inches (5 cm)**

- **These are really hard measurements to make –400 cores in 3.7 acres** Moore
  - Moore et al. 2014
- Iowa data

Cover crops need to fit the system

- What are the benefits and challenges for each type of cover crop
- adapt cropping system, including nutrient mgmt, NT (tillage) system, manure, pest mgmt, crop rotation
- Learning curve—need to do homework

Dr. Eileen Kladivko
Agronomy Department
Purdue University

Things to consider

- Cover crops are incredibly helpful for reducing erosion
- Grass Covers will take up nitrogen to grow –
  - They may reduce N credits from manure applications – depending on when applied
  - Grass covers may impact optimum N rates depending on the amount of biomass produced
  - To avoid risk when planting corn terminate covers as early as possible otherwise risk delayed soil drying and warm up.
  - Early termination is not as critical when planting soybeans

Before you get started . . .

- **Be clear about your cover crop goals**
  - Reduce soil erosion, improve soil structure & water infiltration, grow nitrogen & enhance rotational benefits, or slowly improve OM
- **Understand where they best fit into the cropping system**
  - After small grains, vegetable crops, corn silage, inter-seeding
- **Avoid half-hearted attempts**
  - Treat as you would other crops
- **Understand the impact on the next crop**
  - Winterkill or need to be terminated
  - What impact will it have in the spring?
  - What is the Carbon:Nitrogen ratio of residue
  - Herbicide carryover concerns?
- **Committed to learning about cover crops**