Cover Crops

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Rye after Corn Silage



Oats after Soybean



Corn and Soybeans have a 7 Month "BROWN" Gap

Corn or Soybean Crop at Maturity approx. Oct. 1



Cover Crops Fill the "BROWN" Gap with "GREEN" Plants

Benefits of Using Cover Crops

- Reduced erosion
- Reduced nitrate leaching
- Reduced phosphorus losses
- Increased soil organic matter
- Improved weed control
- Support and maintain soil organisms
- Improve soil structure especially no-till
- Grazing and forage potential

Erosion Measurements with Simulated Rainfall



NO COVER CROP

OAT COVER

RYE COVER







Nitrate Loss in Tile Drainage



Total Nitrate-N Lost 2002-2010

Treatment	Nitrate-N lost		
	9-yr total	9-yr avg	
	lbs/acre	lbs/acre	
Corn-soybean	386	43	
Corn-Soyb w. Rye	<u>181</u>	<u>20</u>	
Reduction	205	23	
% Reduction	53%		

Cover Crops and No-Till Soil Structure and Health



Rye Cover Crop Effect on Soil Quality in a Corn Silage System

- 17% more total soil organic matter
- 47% more Particulate Organic Matter (POM)
- 48% greater Potential N mineralization
- It is easier to see changes in these measurements in a corn silage system after 8 years, but they indicate that even in a corn grain system the trends are in the right direction

Cereal Rye Cover Crop Root Weight and Rooting Depth in the Spring

	Root Dry	Rooting
Year	Weight	Depth
	(lbs/acre)	(in)
		•
2004	294.4	38.0
2005	642.3	32.7
2006	606.7	45.8
2007	458.3	36.4
2008	388.1	38.8
Avg.	478.0	38.2





Selecting a Cover Crop for Iowa

- What is your cash crop rotation?
- Where are you in the state?
- Does the cover crop overwinter in lowa?
- How are you going to establish the cover crop?
- What is the seed cost/acre?
- Botton line! How much will it grow?

Possible Cover Crops for Iowa

- Small grains oats, cereal rye, wheat
- Brassicas radishes, turnips, mustard
- Forage grasses ryegrass
- Legumes hairy vetch, red clover
- Others sorghum-sudangrass, buckwheat, millet
- Mixtures ???

Approximate Cost of cover crop seed per acre -2012

- Winter Cereal Rye (1 bu/a)
- Oats (1 ½ bu/a)
- Annual Ryegrass (20-25#/a)
- Cover Crop Radish (5-8#/a)
- Pea + Radish Mix (35#/a)
- Crimson Clover + Radish (20#/a)
- Oats + Rye + Turnips (60#/a)
- Ryegrass + Crimson + Radish (21#/a) \$30
- Hairy Vetch (30#/a)

\$14-17 \$14-17 \$14-17 \$15-24 \$40-44 \$43-46 \$32-35 \$30-35 \$55-70

Guesses for Planting Dates before Average 28°F Frost Date in Iowa

- Winter Hardy Small grains 0 d
- Non-winter Hardy Small grains 35 d
- Brassicas 35 42 d
- Annual ryegrass 35 42 d
- Legumes 35 49 d

Story Co. Frost Dates 28°F Oct. 14 - 50% Oct. 28 - 90%



Cover Crop Planting Date





Overseeding Cover Crops into Soybean with an Airplane



Managing Cover Crops in the Spring?

- Only winter-hardy cover crops need to killed in spring with herbicide or tillage.
- Watch soil water, rainfall, and cover crop growth
- Before corn kill grass cover crops 14 days prior to planting or before cover crop is 6-8 inches tall.
- Before soybean biggest concern is dry conditions, otherwise cover crop can be sprayed 3 days before planting.

Methods of Terminating Cover Crops in the Spring

- Herbicide Glyphosate is the most commonly used; Follow BMPs; can take a while.
- Tillage Usually takes two or more passes; weather dependent.
- Rolling or mowing can work for some cover crop species after they have flowered or headed; don't let any seeds mature; usually later than desirable.

Cover Crop Kill Date

Rye Cover Crop Shoot Biomass vs Kill Date Planted Sept. 30, 2005



Some Risk to Main Crop Yields

- Soybean yields no change.
- Corn silage yields no change.
- Corn grain yields on average 4 to 6 bu/ac lower following winter rye cover crop in our experiments. Similar risk with other winter cereals or grasses. No decrease with oats, which winterkill. Can be managed.

What does 6 to 8 in of rye shoot growth look like?



What does 6-8 in of rye shoot growth look like?



Midwest Cover Crops Council Website http://www.mccc.msu.edu/



BOYD 42 SOY/RYE CC NT





Questions?

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BMPs for Killing a Rye Cover Crop with Glyphosate

- Apply acid equivalent (a.e.) of 1 lb/acre (28 oz
 WeatherMax or 43 oz of generic; I normally use less)
- Low spray volume check label (e.g. 5-10 gal/acre would be reasonable) use right nozzles and height
- Add AMS (ammonium sulfate; 4-6 lbs/100 gal). No UAN.
- Add Non-ionic Surfactant if not included in formulation (NIS is in WeatherMax already). No crop oil.
- Don't mix triazine or contact herbicides with glyphosate.
- It is usually better to spray when you can than wait for perfect conditions with bigger more mature plants

Which side has 30% cover?



RUSLE2 Erosion Estimates Using Beta Version of Cover Crop Vegetation Files

- Corn–Soybean rotation, NT, spring anhydrous, 5% slope, 150 ft slope length, Ames, IA
 - without rye cover crop = 2.1 t/ac/yr
 - with rye cover crop = 1.2 t/ac/yr
- Continuous Corn Silage, NT, spring anhydrous, 5% slope, 150 ft slope length, Ames, IA
 - without rye cover crop = 4.8 t/ac/yr
 - with rye cover crop = 1.9 t/ac/yr





Practices to Reduce the Risk of Corn Yield Drag Following Grass Cover Crops

- Kill grass cover crops 14 days before corn planting or use spring oat which winter kills
- Kill grass cover crops before they reach about 6 to 8 in tall
- Apply some N and P fertilizer at planting
- Use strip till or residue clearing attachments
- Monitor soil water conditions
- Increase corn population/stand ???