

Cover crops-

Benefits, purposes, and soil health

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Cover crop movement sweeping across the Midwest and Ontario too!

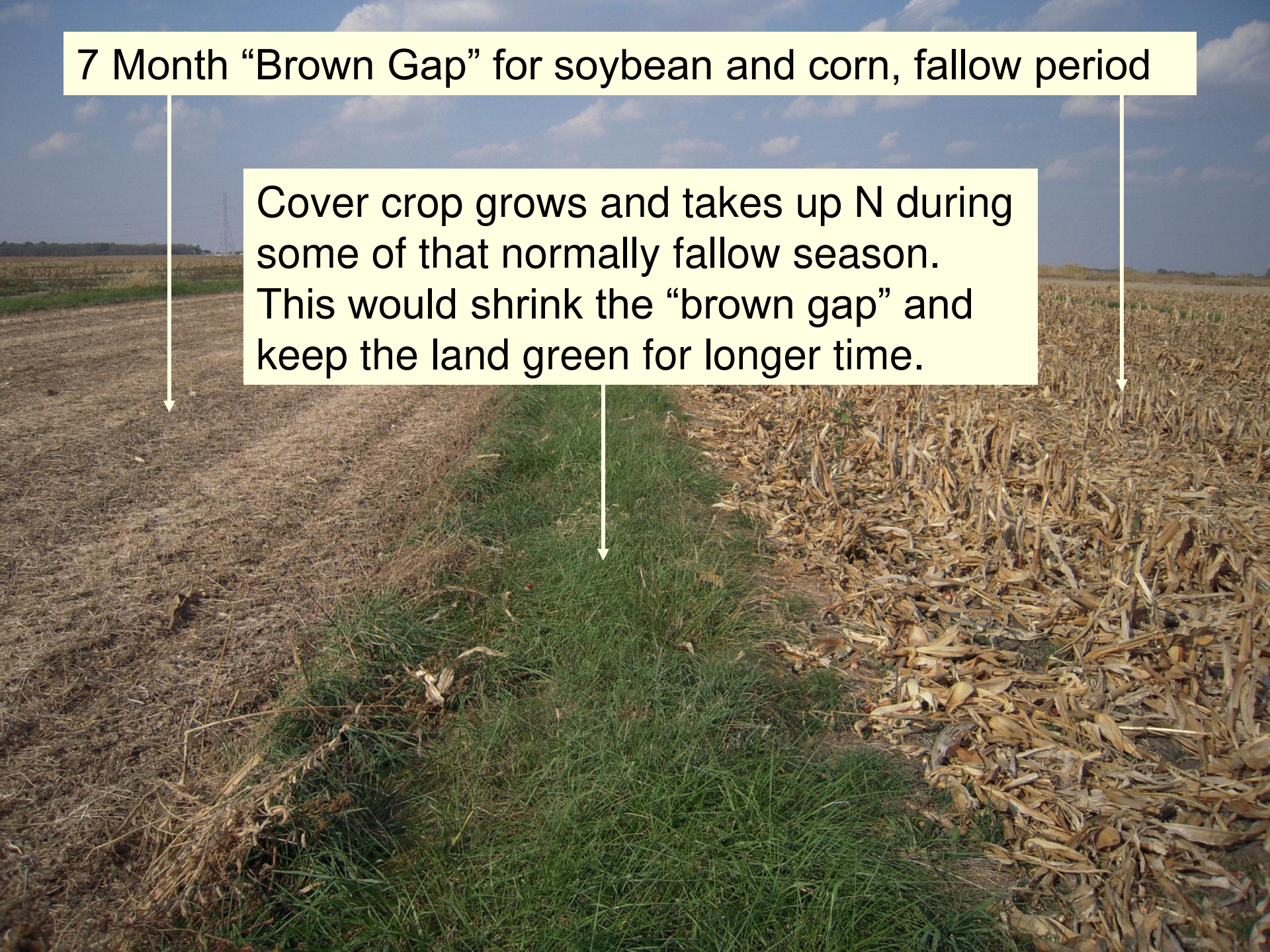
- Lots of interest the past few years, esp. in eastern Cornbelt and Great Lakes
- Interest sparked by many things, including:
 - Higher fertilizer and energy prices
 - Concerns about water quality
 - Desire to improve soil quality and biology
 - Increase resilience to climate variations

Rationale for 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
- Make better use of the resources and time available!

7 Month “Brown Gap” for soybean and corn, fallow period

Cover crop grows and takes up N during some of that normally fallow season. This would shrink the “brown gap” and keep the land green for longer time.



Cover crops are part of a system!

- Different potential benefits and challenges for each type of cover crop
- Must adapt cropping system, including nutrient mgmt, NT (tillage) system, manure, pest mgmt, crop rotation
- Not just an “add-on”!



Cereal rye, SE Indiana

How select cover crops?

- What is your main purpose?
- What is your cropping/NT system?
- What time windows are available?
- Soil types, climate, other local considerations?

What are potential benefits?

What is your main purpose?

- Nitrogen scavenger (trap N that would otherwise leach away)
 - Save N for later use by cash crop
 - Decrease N loss to drainage water
- Nitrogen producer (legume)
 - Fix atmospheric N₂ for use by plants

Benefits and Purpose (2)

- Reduce erosion
- Improve soil quality
 - Build soil organic matter
 - Increase biological activity and diversity
 - Improve aggregation
 - Build macropores, permeability, deeper rooting, reduce compaction
 - Buffer soil from variable weather

Benefits and Purpose (3)

- Conserve soil moisture
- Recycle nutrients
- Weed control, pest suppression
- Extra forage
- **Increase crop yields over long term, and decrease year-to-year variability**

Soil physical properties improved

- Aggregation (esp. fibrous-rooted)—
 - cover crop roots enmesh particles;
 - exudates feed microbes which then produce polysaccharides that “glue” particles together
- Porosity, permeability (esp. tap-rooted)
 - Deep roots, macropores, can aid water infiltration, aeration, rooting
- Soil surface protected, plus better aggregation, can mean less crusting or erosion
- Roots give strength to soil for trafficability

After Simulated Rainfall



NO COVER CROP



OAT COVER



RYE COVER

Corn silage land with and without a cereal rye cover crop



(T. Kaspar)

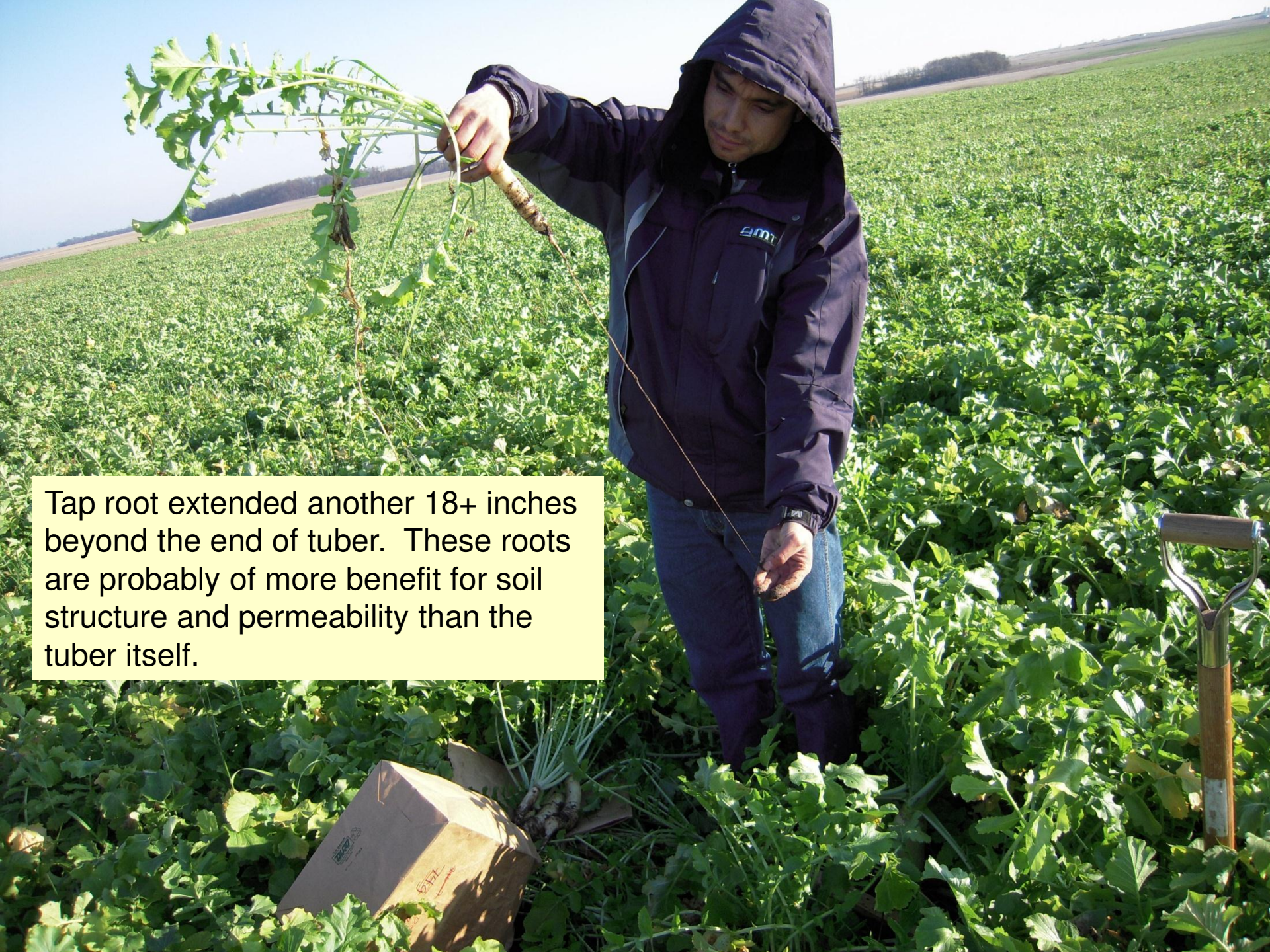


Good stand of both oats and radish in narrow drain spacing plot (11/24/09).

Radish tops ~5-8 inches tall; oat tops ~11-16 inches tall; radishes $\frac{1}{2}$ - 1" diam.



Radish + annual ryegrass as of Nov. 27, 2009, Fountain Co., IN. Seeded after wheat harvest and manure application. Radishes 8-12+ inches long, with about half above ground—hard to walk without tripping!

A man wearing a dark, hooded jacket and jeans is standing in a field of green, leafy plants. He is holding a long, thin taproot that extends far beyond the main tuber. The background shows a rolling green field under a clear sky. A cardboard box is visible on the ground in the lower left, and a shovel is in the lower right.

Tap root extended another 18+ inches beyond the end of tuber. These roots are probably of more benefit for soil structure and permeability than the tuber itself.

- When building soil quality, esp. with NT, the cover crop ROOTS are probably more significant than the shoot growth
- Still need good shoot growth for erosion control, mulch effects for moisture conservation, weed suppression, etc.

Soil biology

- Plant growth during normally “fallow” period (Sept-Nov, March-April) provides more food for soil organisms
- Diversity of plant materials may also increase diversity of soil biological community
- Soil organic matter maintained or increased



Some common cover crops

Grasses (N scavengers)

- Cereal rye
- Annual ryegrass
- Oats
- Wheat

Brassicas (N scavengers)

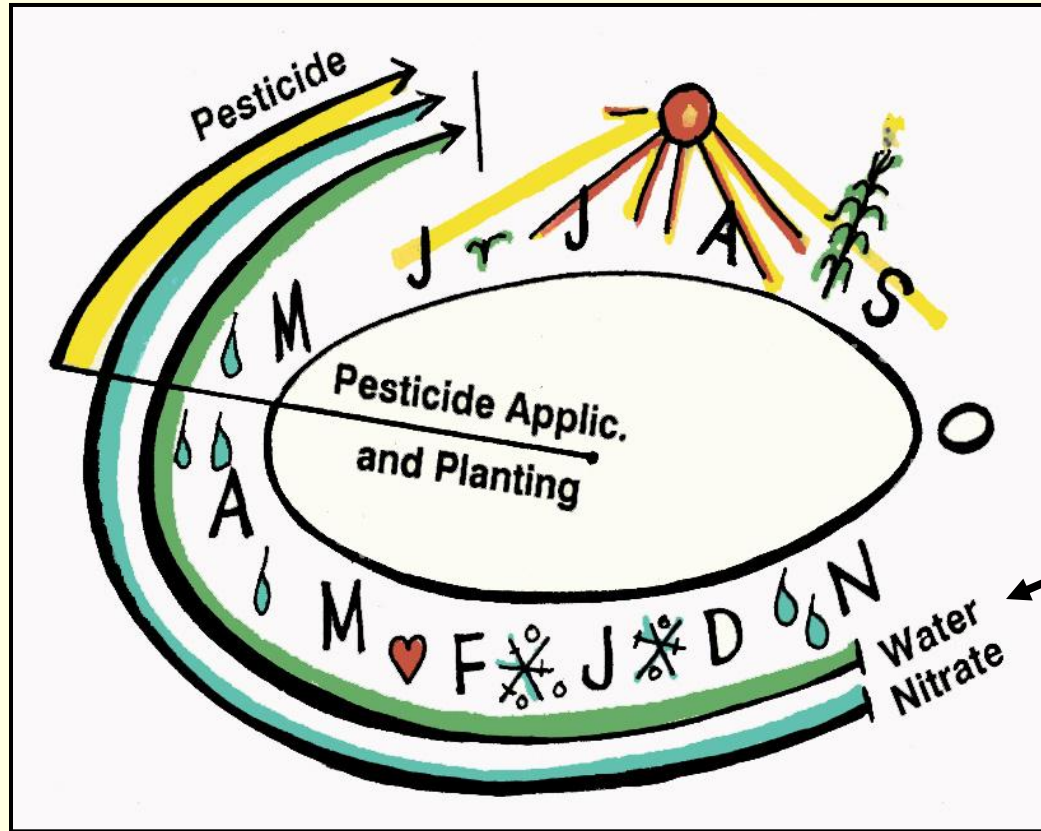
- Daikon radish
- Turnips

Legumes (N fixers)

- Crimson clover
- Austrian winter pea
- Hairy vetch
- Red clover

Rationale of cover crops for water quality:

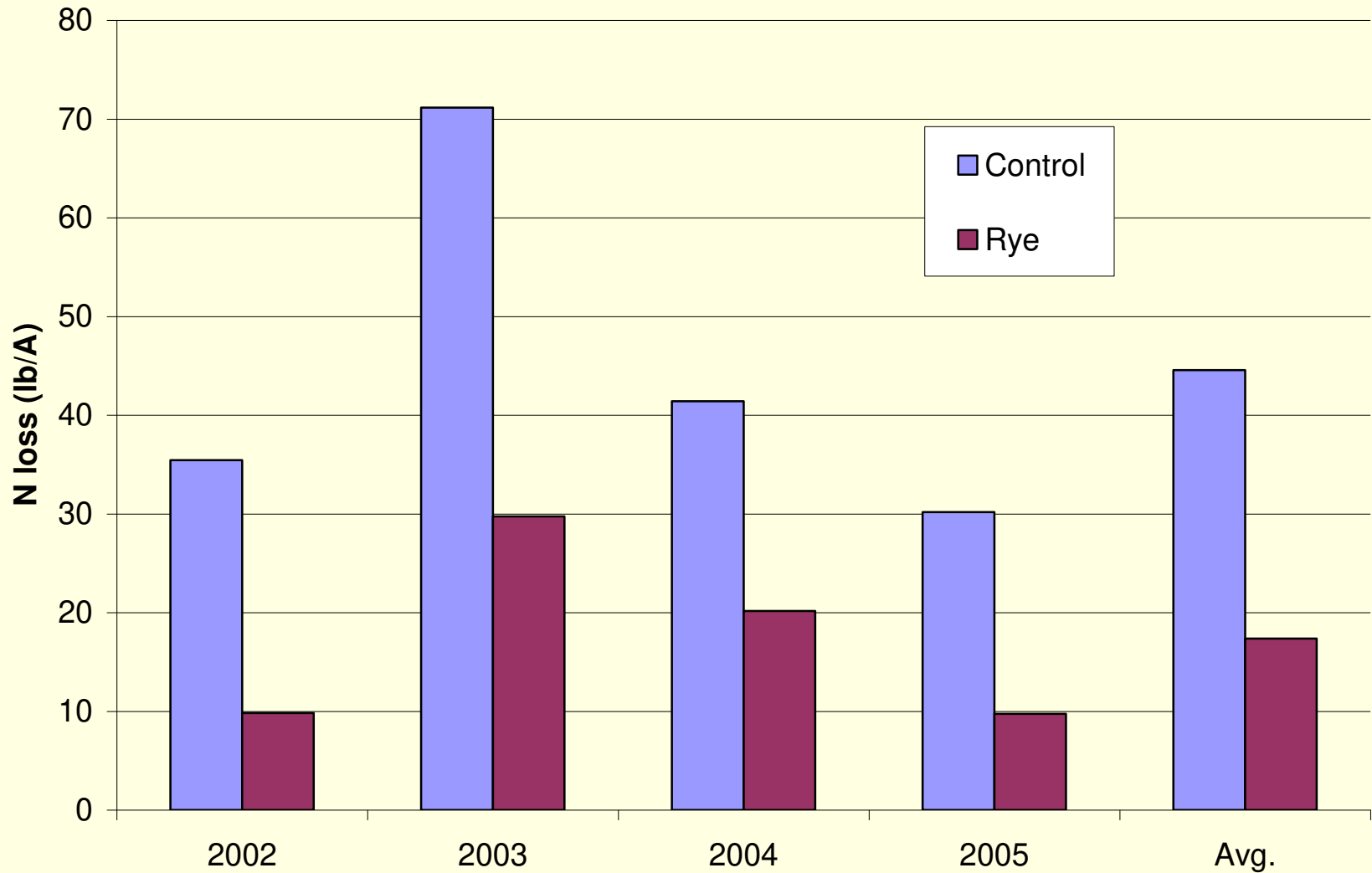
Corn-soybean system normally fallow from Oct – April.



A winter cover crop “traps” some of the nitrate that otherwise leaches out during fallow season

Majority of drainflow and N-loads occur in fallow season (at SEPAC)
(64% Nov. – March; 80% Nov. – April)

Annual nitrate-N load in drainflow, Ames, Iowa (Tom Kaspar)



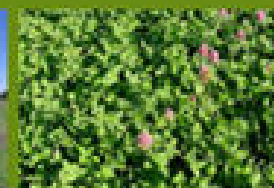
So why so important to seed cover crop after drought year?

- Large amount of residual N remaining in soil (poor corn crop didn't use it all)
- That nitrate will likely be leached out of rootzone as rains rewet soil, in fall, winter, and early spring
 - Loss of N you paid for
 - Water quality problems
 - Lost opportunity to build soil organic matter, biological activity, after dry year

How do these tools (cover crops)
fit into the system?

How select cover crops?

- **What is your main purpose?**
- What is your cropping/NT system?
- **What time windows are available?**
- **Soil types, climate**, other local considerations?
- **(MCCC Selector Tool can help!)**

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WELCOME TO THE MIDWEST COVER CROPS COUNCIL WEBSITE

The goal of the *Midwest Cover Crops Council* (MCCC) is to facilitate widespread adoption of cover crops throughout the Midwest, to improve ecological, economic, and social sustainability.

WHO WE ARE?

The MCCC is a diverse group from academia, production agriculture, non-governmental organizations, commodity interests, private sector, and representatives from federal and state agencies collaborating to address soil, water, air, and concerns in the Great Lakes and including Indiana, Michigan, Ohio, Wisconsin, Minnesota, Iowa, and North Dakota).

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Selector tool

WHY COVER CROPS?

NEWS

[Cover crops prevented planting update for IL, IN, MI, and OH \(6/10/11\)](#)

[OH and IN Senators Letter to USDA-Risk Management regarding cover crops and crop insurance](#)

June 30th
[IN Field Day- Cover crops, fertilizers, and soil testing](#)

[2011 MCCC Proceedings](#) now available!

[MCCC Cover Crop Decision Tool released for Indiana, Michigan, and Ohio](#)

Potential impacts for Great Lakes region

- Soil health and crop productivity
- Conservation of soils resource base
- Water quality
- Resilience to stresses from climate variations
- Long-term sustainability



- Purdue University (Indiana)
- Michigan State University
- USDA-Agricultural Research Service
- Iowa State University
- Ohio State University
- Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA)
- University of Guelph-Ridgetown Campus
- University of Minnesota
- University of Wisconsin
- North Dakota State University
- University of Illinois
- Other governmental and private organizations

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Midwest Cover Crops Field Guide

First Edition

ID-433

**EXPERT
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MIDWEST *Cover Crops* *Field Guide*



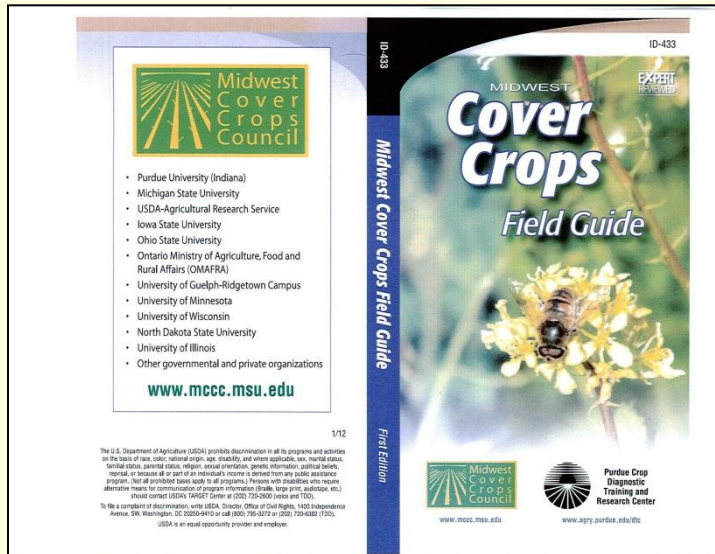
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Cover Crop Selector Tools
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