Cover crops-

Benefits, selection, strategies

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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!

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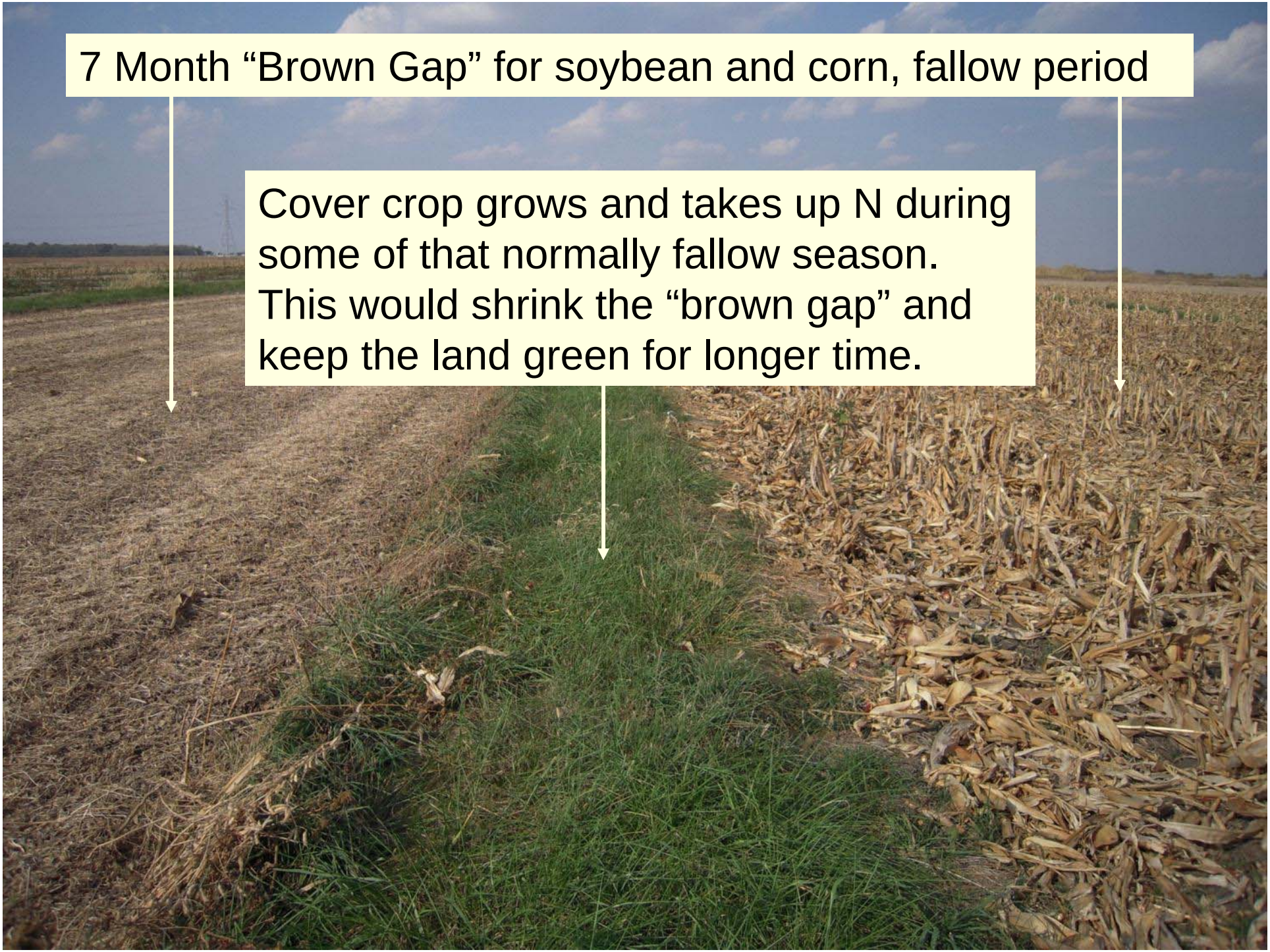
7 Month “Brown Gap” for soybean and corn, fallow period
Cover crop grows and takes up N during some of that normally fallow season. This would shrink the “brown gap” and keep the land green for longer time.

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”!

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How select cover crops?

- **What is your main purpose?**
- **What is your cropping / tillage system?**
  - Current cash crop and next cash crop?
  - No-till, strip till, or other systems?
- **What time windows are available?**
- **How will you seed the cover crop?**
- **Soil types, climate, drought, manure, herbicide carryover, other local issues?**

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MCCC tool can help with these!

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 N_2 for use by plants

Benefits and Purpose (2)

- Reduce erosion
- Improve soil health
  - 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**

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Cereal rye, SE Indiana

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 ½ - 1” diam.

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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!

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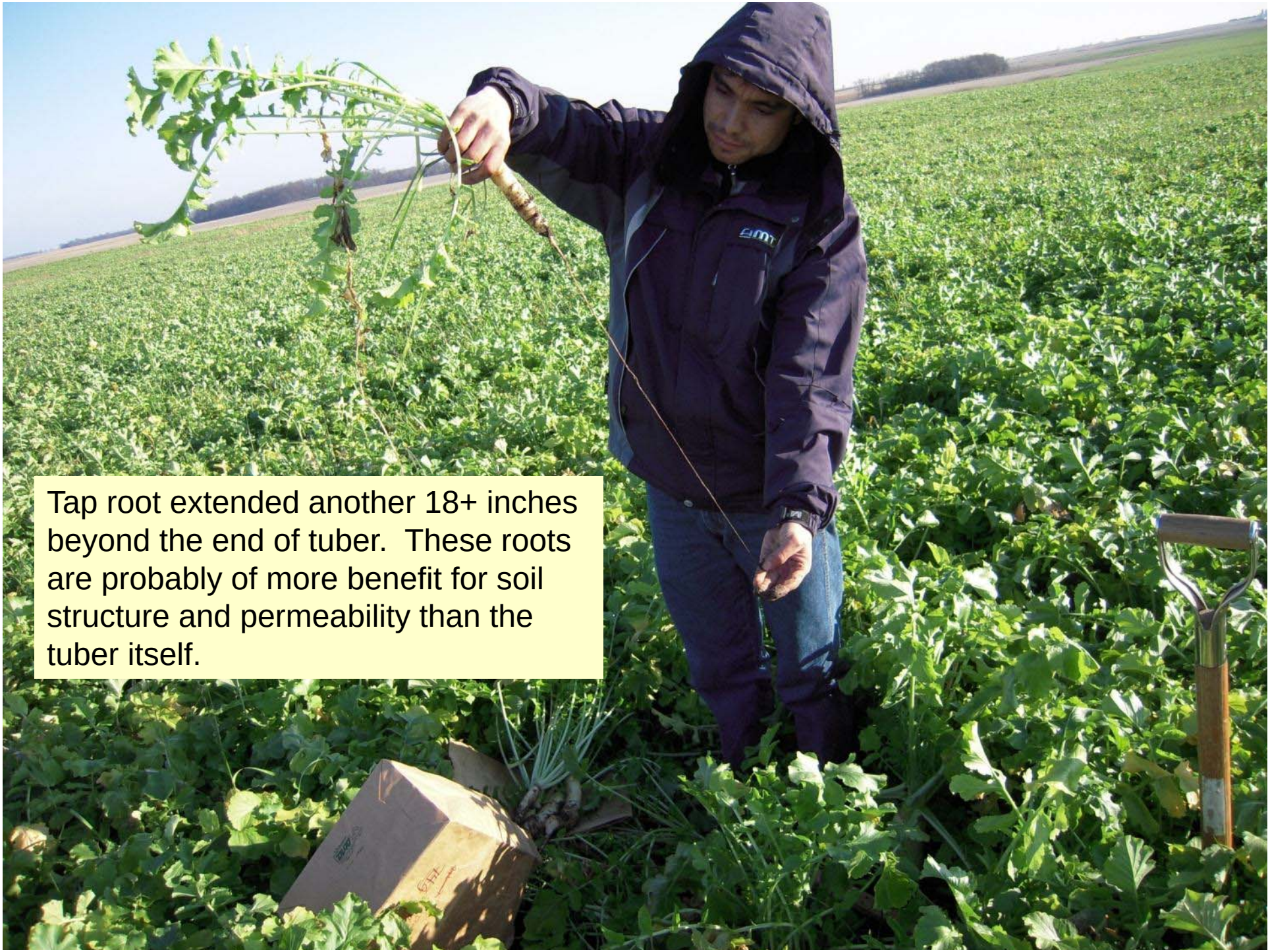
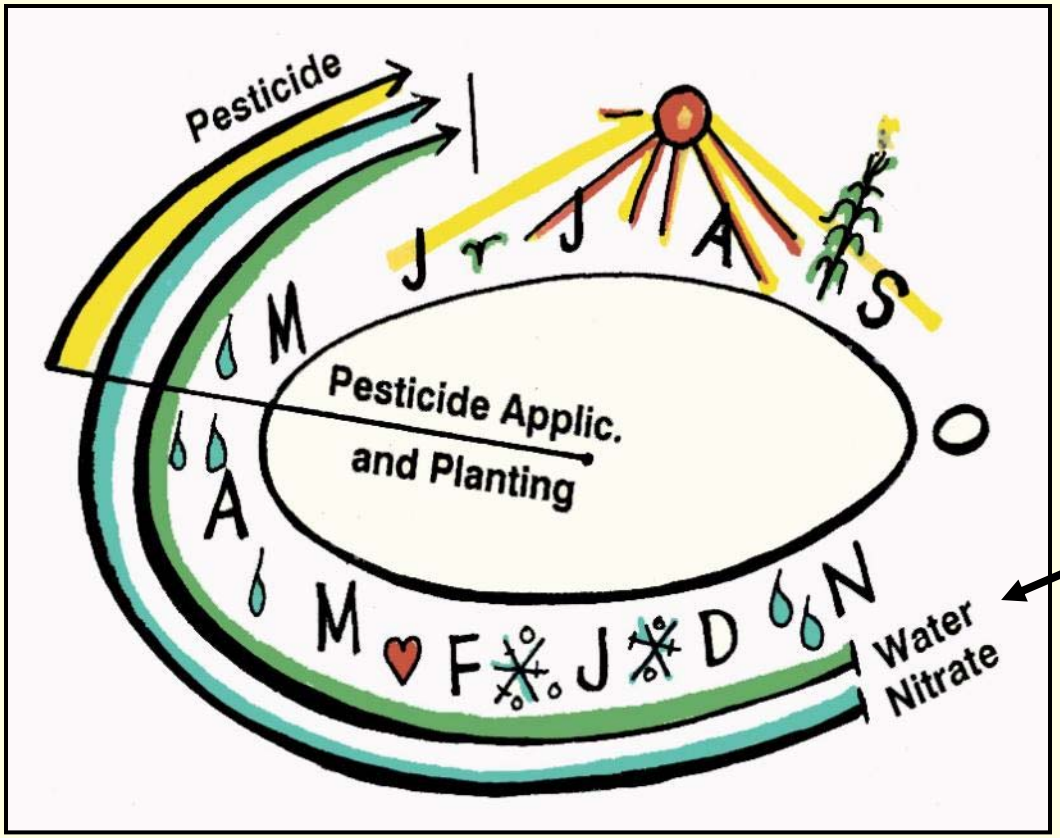

Tap root extended another 18+ inches beyond the end of tuber. These roots are probably of more benefit for soil structure and permeability than the tuber itself.

Roots or shoots?

- 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.

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)

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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

N-scavenging crops

- Amount of biomass produced is key to nutrient uptake—good stand, rapid growth
- Age/stage of plant when killed, determines N%, C:N, plant composition, and therefore decomposition rate (along with weather!) Huge challenge!
- Cereal rye, annual ryegrass, wheat, oats, barley, triticale

C:N ratios of common organic residues

Organic material	C:N ratio
Newspaper	120:1
Wheat straw	80:1
Corn stover	57:1
Rye cover crop, anthesis	37:1
Rye cover crop, vegetative	26:1
Hairy vetch cover crop	11:1
Soil microbes (average)	8:1

C:N ratios wider than 25:1 cause N immobilization for some time period. If utilizing covers with wide C:N ratios, then should either:

- allow time for decomposition before high N-using crop (corn)
- apply extra starter N
- don't choose high C:N covers before corn

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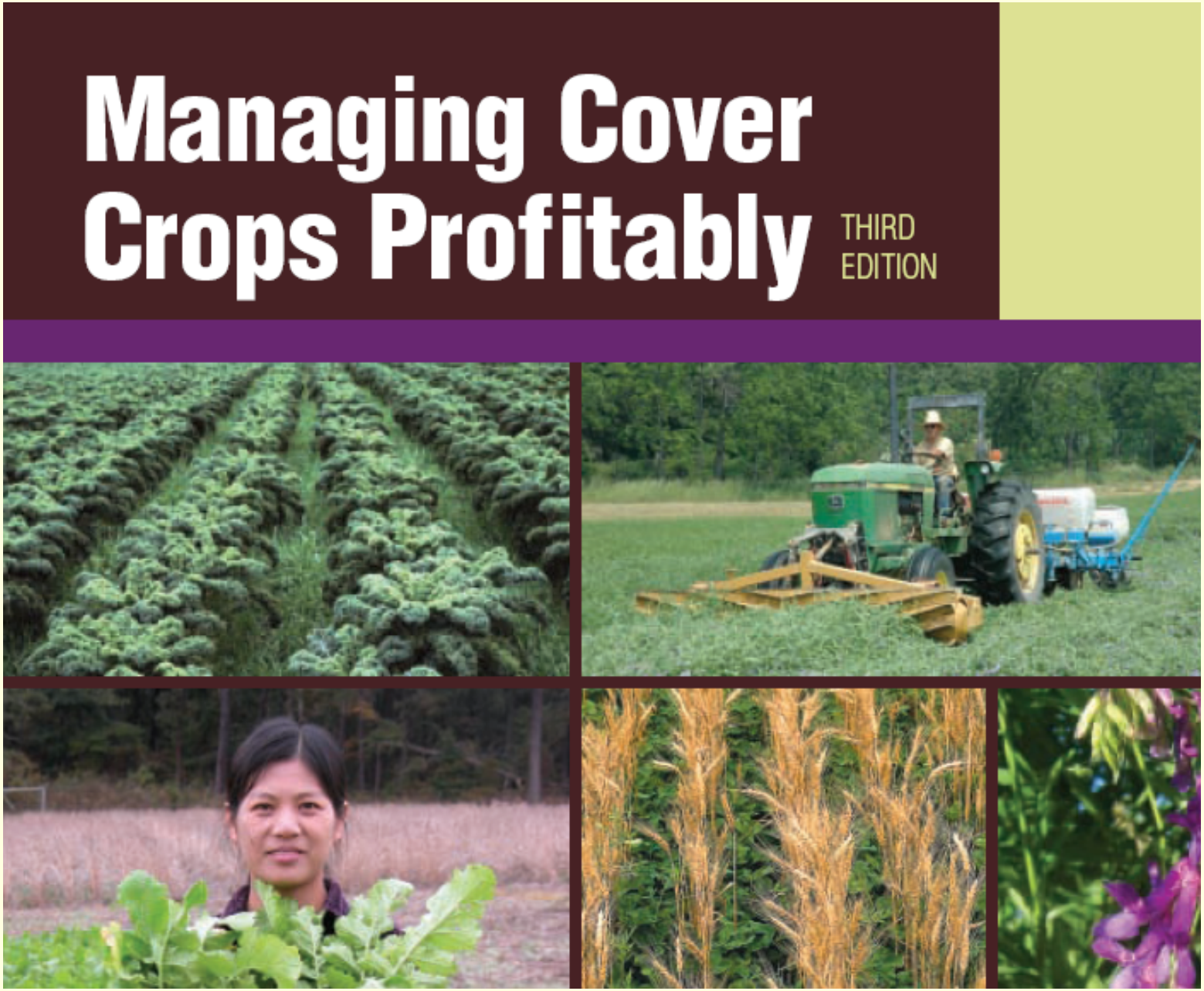
SARE-*Managing Cover Crops Profitably*



Midwest Cover Crops Council



Illinois Indiana Iowa Michigan Minnesota North Dakota Ohio Wisconsin Ontario

www.mccc.msu.edu

- Home
- About Us
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- Cover Crop Resources
  - Cover crop species
  - Cover crops selector
  - Innovator profiles
  - Extension material

Selector tool

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 [illegible] concerns in the Great Lakes and Miss[illegible] including Indiana, Michigan, Ohio, M[illegible]ois, Wisconsin, Minnesota, Iowa, and North Dakota).

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!

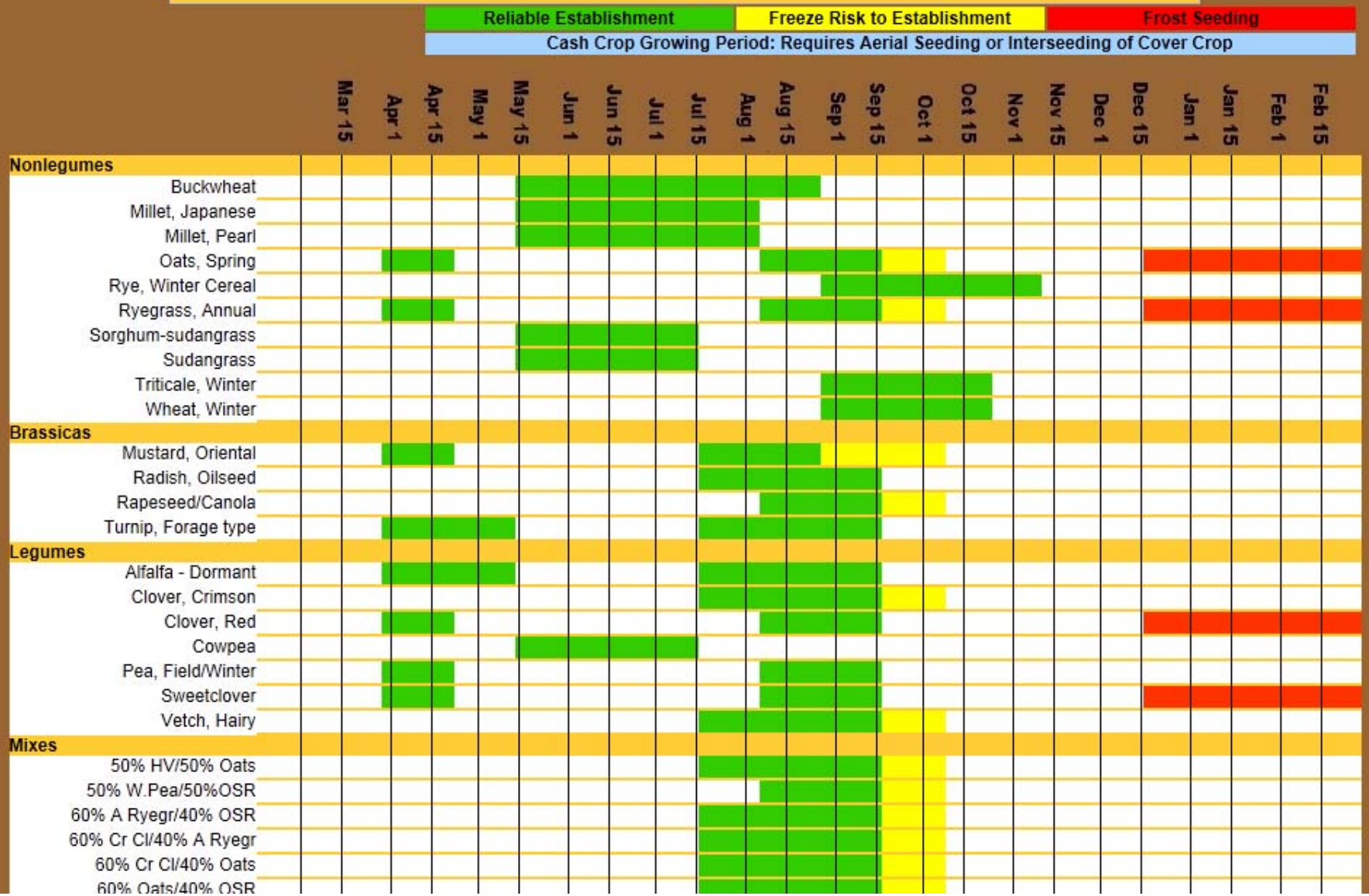
MCCC Cover Crop Decision Tool released for Indiana, Michigan, and Ohio

Midwest Cover Crops Council - Cover Crop Decision Tool

Illinois: Henry County Seeding Dates

ation Information | Cash Crop Information | Soil Information | Attribute Information

Select cover crop to create information sheet: 60% Oats/40% OSR [Submit]

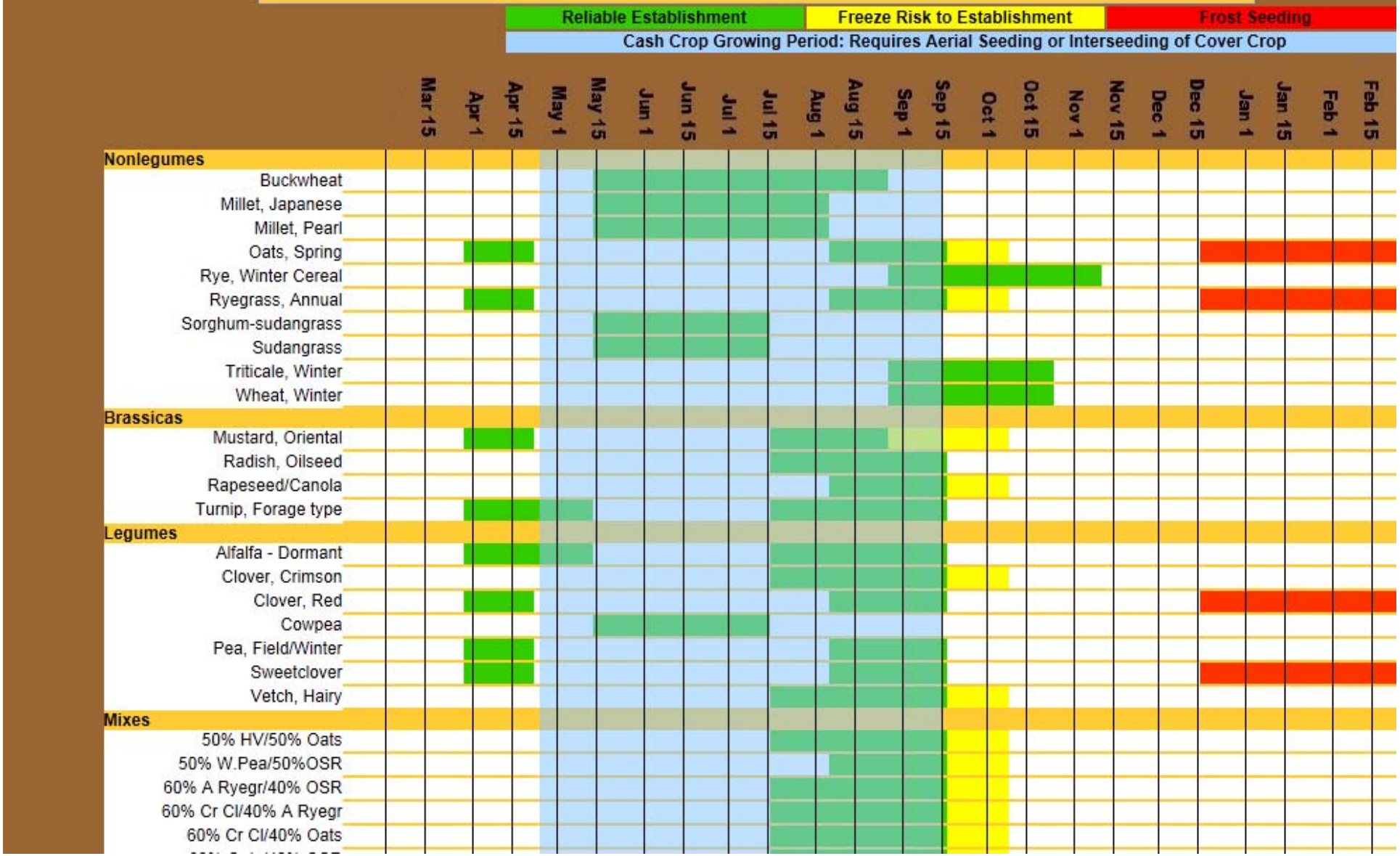


Illinois: Henry County Seeding Dates

Location Information | Cash Crop Information | Soil Information | Attribute Information

Cash Crop: Corn - Grain | Plant Date: 04/25/2012 | Harvest Date: 09/15/2012

Select cover crop to create information sheet: 50% HV/50% Oats | Submit



Illinois: Henry County Seeding Dates

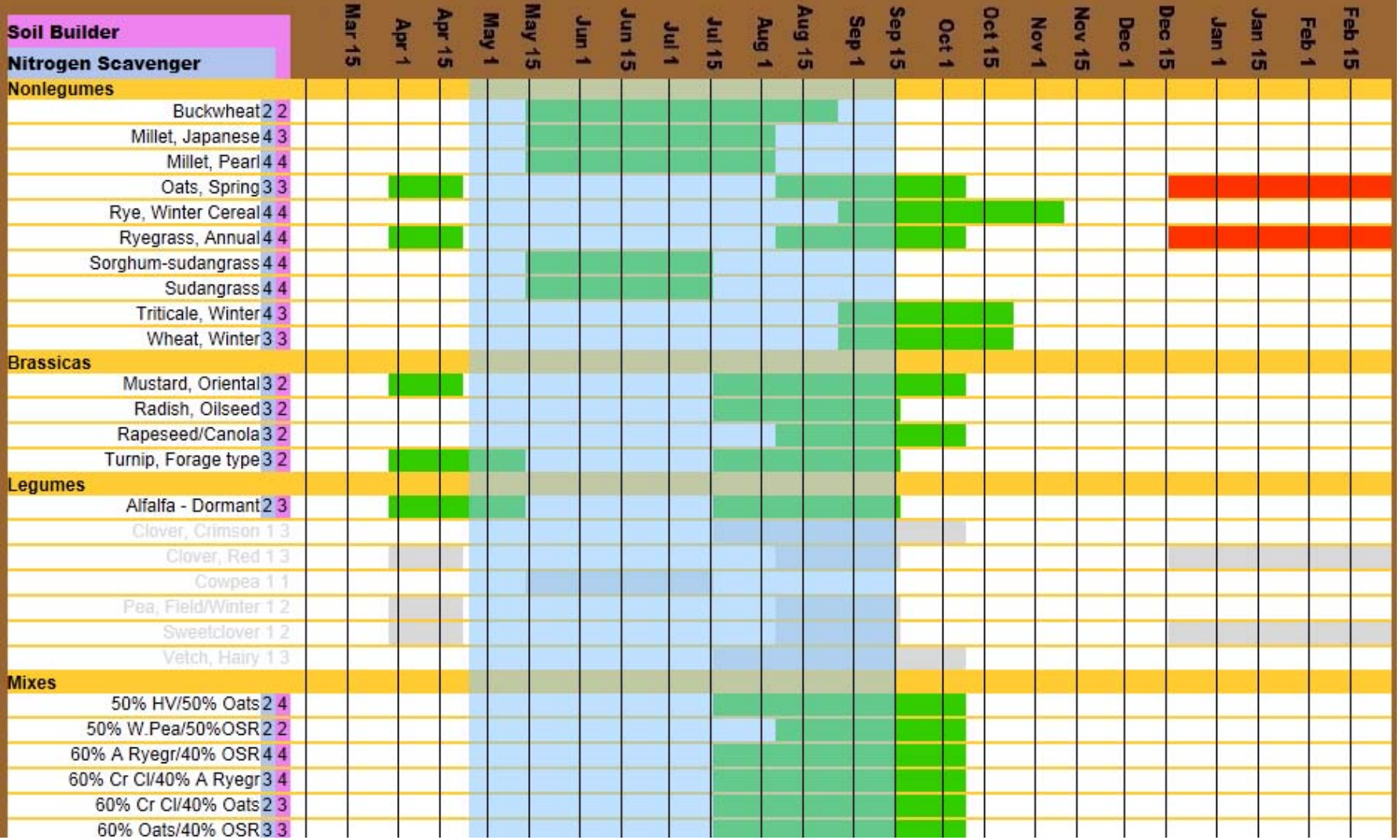
Location Information | Cash Crop Information | Soil Information | Attribute Information

Goal #1: Nitrogen Scavenger | Goal #2: Soil Builder | Goal #3: Select an attribute

Select cover crop to create information sheet: 50% HV/50% Oats — Submit

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



60% Oats/40% OSR Information Sheet

Considerations for using 60% Oats/40% OSR in Illinois

There are no special considerations

Links to information on using Cover Crops in Illinois can be found at: http://mccc.msu.edu/states/Illinois.html

Location Information

Location:	Illinois - Henry
Cash Crop:	Corn-Grain
Plant Date:	04/25/2012
Harvest Date:	09/15/2012
Soil Drainage:	None
Artificial Drainage:	No
Flooding:	No

Cover Crop Selection Information

Cover Crop Selected:	60% Oats/40% OSR
Cover Crop Attribute #1:	Nitrogen Scavenger
Cover Crop Attribute #2:	Soil Builder
Cover Crop Attribute #3:	Default
Use within the state:	Emerging

Planting Information

Drilled Seeding Depth:	½-¾ inches
Drilled Seeding Rate:	18-36 lb./A PLS Oats
Drilled Seeding Rate:	1.5-3.5 lb./A PLS Radish, Oilseed
Broadcast Seeding Rate:	21-41 lb./A PLS Oats
Broadcast Seeding Rate:	2-4 lb./A PLS Radish, Oilseed
Aerial Seeding Rate:	22-43 lb./A PLS Oats
Aerial Seeding Rate:	2-4 lb./A PLS Radish, Oilseed
Seed Count:	20,000 Seeds/lb
Seed Count:	34,000 Seeds/lb
Frost Seed:	No
Fly-free Date:	No
Inoculation Type:	
Comments:	

Termination Information

Termination Methods:	Freeze, Tillage, Chemical
Comments:	

Cultural Traits

Scientific Name:	Avena sativa Oats
Scientific Name:	Raphanus sativus Radish, Oilseed
Life Cycle:	Cool Season Annual Oats
Life Cycle:	Cool Season Annual Radish, Oilseed
Growth Habit:	Upright Oats
Life Cycle:	Upright Radish, Oilseed
Preferred Soil pH:	6.0-6
Min. Germination Temp.:	45F
Heat Tolerance:	Fair
Drought Tolerance:	Good
Shade Tolerance:	Good
Flood Tolerance:	Good
Low Fertility Tolerance:	Good
Winter Survival:	Seldom
Comments:	

Potential Advantages

Soil Impact - Subsoiler:	Good
Soil Impact - Frees P and K:	Good
Soil Impact - Loosens Topsoil:	Very Good
Soil Ecology - Nematodes:	Very Good
Soil Ecology - Disease:	Good
Soil Ecology - Allelopathic:	Very Good
Soil Ecology - Choke Weeds:	Excellent
Other - Attract Beneficials:	Fair
Other - Bears Traffic:	Fair
Other - Short Windows:	Very Good
Comments:	

Potential Disadvantages

Delayed Emergence:	Occasionally a minor problem
Increased Weed Potential:	Occasionally a minor problem
Increased Insects/Nematodes:	Could be a moderate problem
Increased Crop Diseases:	Rarely a problem

Some options (many others)

- oats / daikon radish mix
  - Good after SB before corn, or anything harvested early (poor corn, early harvest?)
  - Good N scavengers
  - Will winter kill (usually) so easy to do before C
- cereal rye after corn
  - Good esp. before SB
  - Can be planted late and still provide benefit

More options

- Mixes w/ crimson clover, or turnip, or pea
  - Extra forage needs? Legumes add protein
- Build soil organic matter (SOM), aggregation, soil quality more rapidly?
  - Fibrous roots, longer time, more diversity
  - Grass (rye; annual ryegrass), legume (N also needed for SOM), brassica

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

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Potential impacts for Midwest

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

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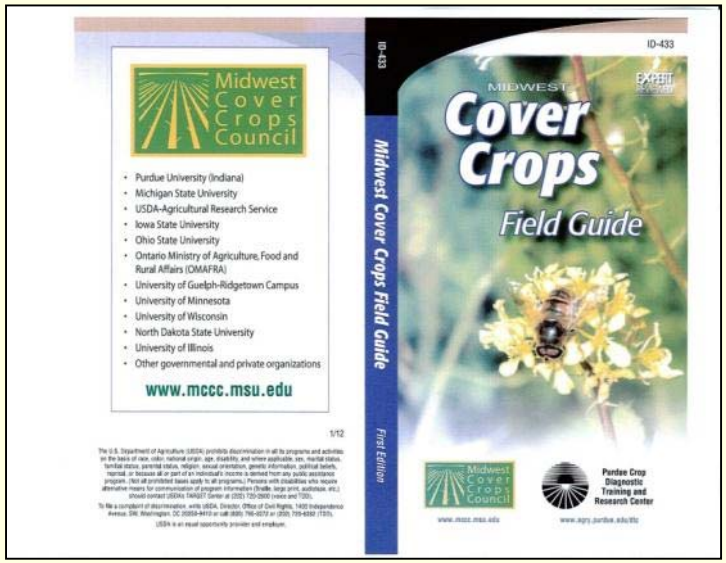
Resources, seeding rates, depths, dates



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www.the-education-store.com

www.mccc.msu.edu

Cover Crop Selector Tools
(link on left sidebar)

Indiana NRCS on-line Seeding Tool

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