Cover Crops, N Management, and Getting Started

Dr. Eileen Kladivko
Agronomy Dept.
Purdue University

kladivko@purdue.edu

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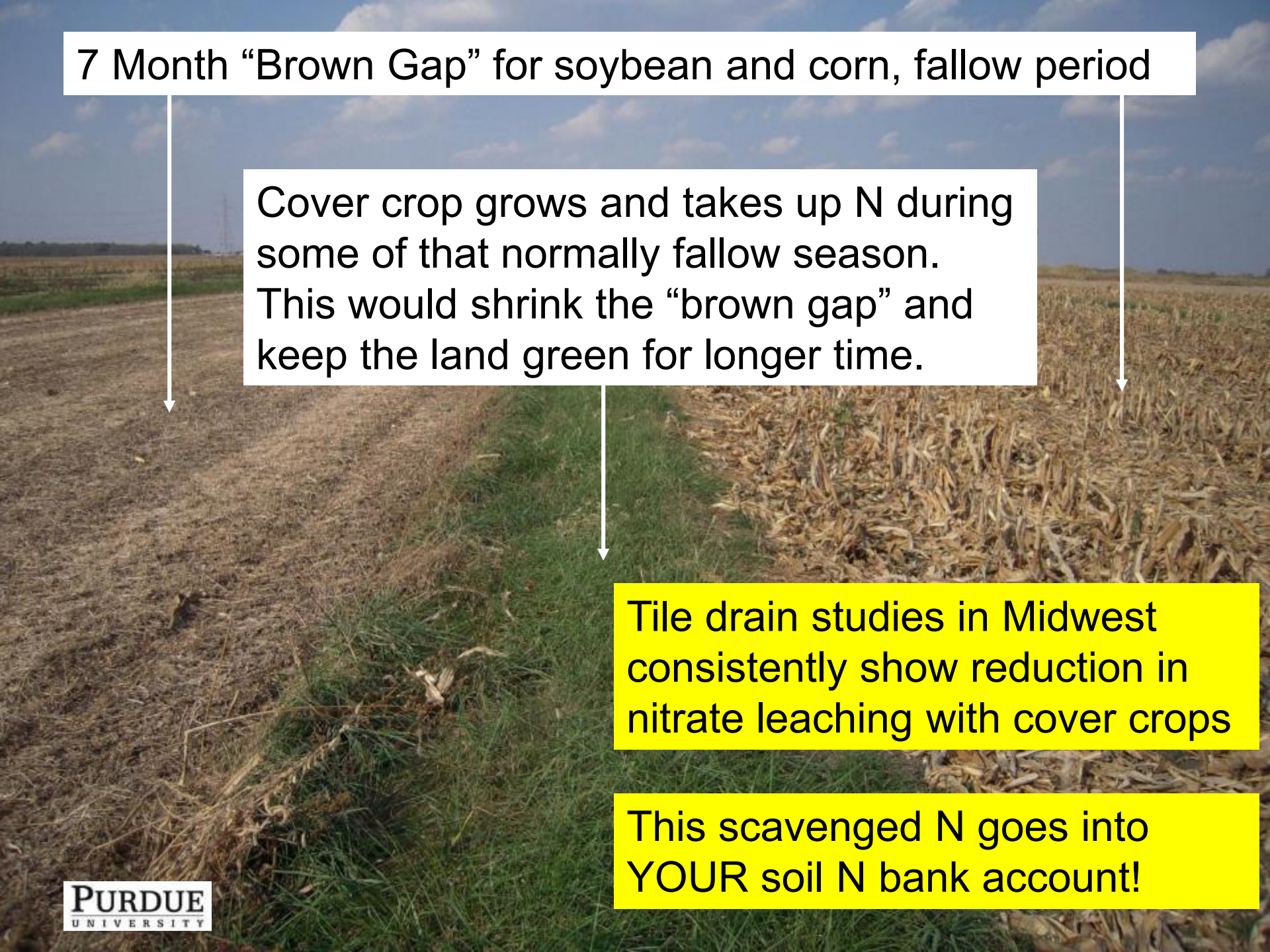
Cereal rye, SE Indiana

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, improve soil health
- 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.
Tile drain studies in Midwest consistently show reduction in nitrate leaching with cover crops
This scavenged N goes into YOUR soil N bank account!
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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, or other local considerations?

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MCCC tool can help with these!

Three main categories of cover crops have different effects

- Grasses
- Brassicas
- Legumes

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Cover crops and N cycling

- Legumes—biological N fixation
  How much N fixed? and released?
  and when?

- Non-legumes—How much N trapped?
  and released? and when?

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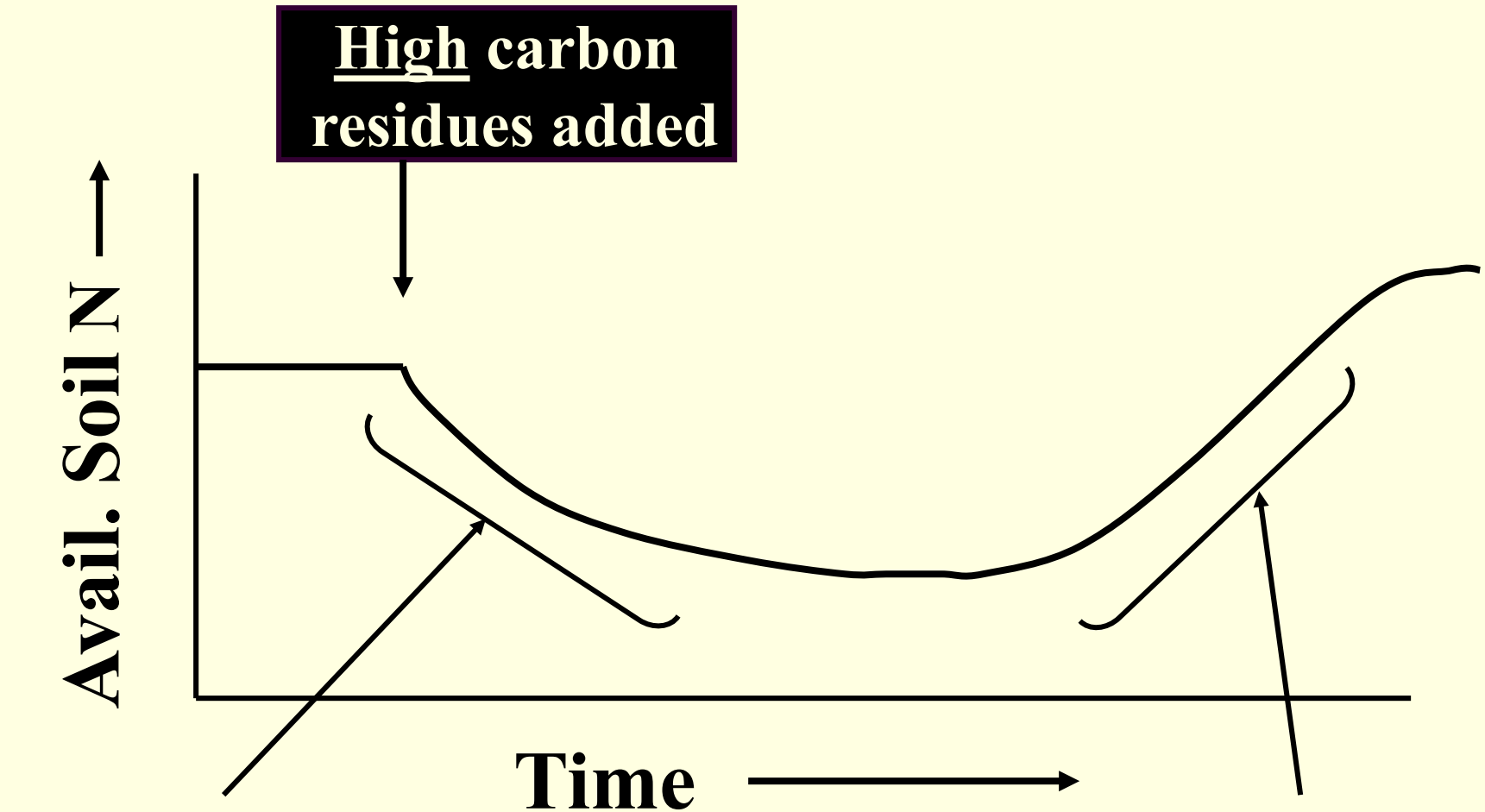
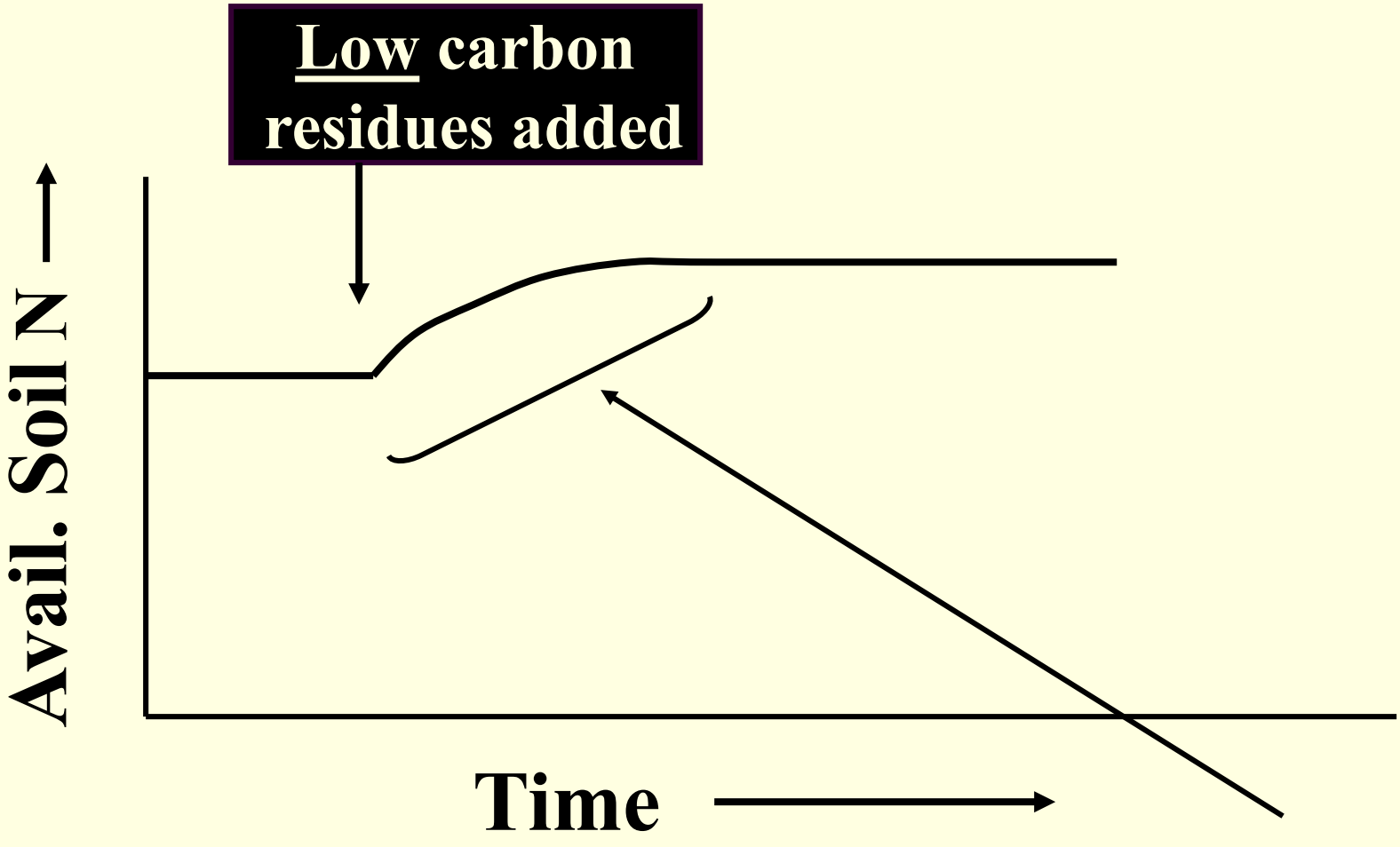
N-scavenging crops

- 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,
- Those plant factors, along with climate, weather, soil type, termination timing and method, determine decomposition rate. Very difficult to predict!
- Cereal rye, annual ryegrass, wheat, oats, barley, triticale are common

Residue Addition and N Availability



Residue Addition and N Availability



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

Legume green manure covers

Many challenges to their use for providing N to next crop

- Too short of growth period to produce enough biomass to fix sufficient N, in cooler climates (for full season corn in field crop system)
  - Good results in south (longer winter growth)
- Good results for clover frost-seeded into winter wheat, and grown rest of season. Ontario N credits to corn of up to 50-70lb/A, depending…
- Often used before organic veggie crops, incorporated into soil before planting veggies
- New work trying clovers continuing to grow into corn
- But still useful to increase soil health, SOM, biodiversity, …

How estimate N credits?

- Decomposition, release and availability of N depend on many factors, and not readily predictable
  - Cover crop species, biomass produced, C:N
  - Soil type
  - Termination method, timing, incorporation or not
  - Climate and weather—Cold? Dry? (some older approximations came from warmer, wetter climate zones)
- Usually need fertilizer, manure, composts, or other organic materials in addition to legume covers, to provide sufficient N to main crop

How estimate N credits from legume cover crop?

Some possibilities:

- Use PSNT test before sidedress
- Do N rate strip trials on legume cover crop vs. no cover crop
- What is different if legume is part of mix containing grasses and brassicas?

How to get started?

- Many farmers and crop advisors are interested in using cover crops
- Many reasons, incl. soil health, N scavenging, erosion control, weed suppression
- But how to start? Many options, for species and management. Sometimes overwhelming.
- These “recipes” are aimed at new cover crop users, to learn basic mgmt., get experience, w/ relatively low risk. Then many other options possible after learning basics.

Cover Crop "Recipes"

Midwest Cover Crops Council

IOWA STATE UNIVERSITY Extension and Outreach

IOWA COVER CROP RECIPE

MCCC-103
CROP 3158

Post Corn, Going to Soybean: Use Cereal Rye

This publication is intended to provide a starting point for farmers who are new to growing cover crops. With experience, farmers may fine-tune the use of cover crops for their systems.

Introduction

The following recipe provides an introductory approac
to integrating a cover crop into a corn-soybean rotatio
Planting a cover crop ahead of a soybean cash crop is
the easiest way to introduce cover crops into your rota

Planning and Preparation

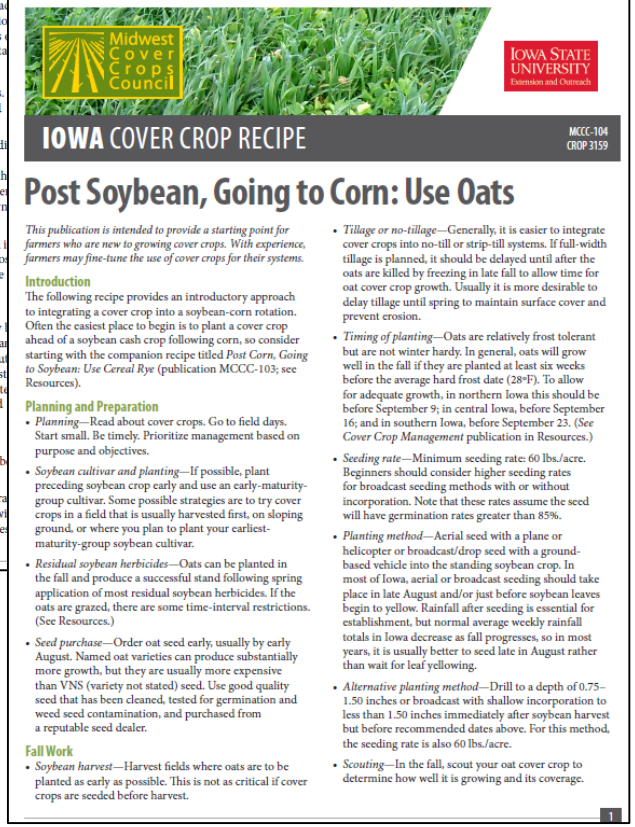
- *Planning*—Read about cover crops. Go to field days. Start small. Be timely. Prioritize management based on purpose and objectives.
- *Corn hybrid and planting*—If possible, plant precedi corn crop early and use an early maturity hybrid. Possible strategies are to use cover crops in a field th is usually harvested first, on sloping ground, or whe you plan to plant your earliest maturity hybrid, corn silage, or seed corn.
- *Residual corn herbicides*—Cereal rye can be planted i the fall and produce a successful stand following mo spring-applied residual corn herbicides. If cereal rye is grazed or harvested for forage, there are some time-interval restrictions. (See Resources.)
- *Seed purchase*—Order cereal rye seed early, usually early August. Named rye varieties can produce substa more growth and have predictable development, bu are usually more expensive than VNS (variety not st seed. Use good quality seed that has been cleaned, t for germination and weed seed contamination, and purchased from a reputable seed dealer.

Fall Work

- *Corn harvest*—Harvest fields where cereal rye is to b planted as early as possible.
- *Tillage or no-tillage*—Generally, it is easier to integra cover crops into no-till or strip-till systems. If full-wi tillage is planted, do it immediately after corn harve

or delay it until after the planned cover crop termination date in the spring to allow time for cover crop growth.

- *Timing of planting*—Ideally, plant cereal rye as soon as possible after corn harvest and before two weeks after



Midwest Cover Crops Council

IOWA STATE UNIVERSITY Extension and Outreach

IOWA COVER CROP RECIPE

MCCC-104
CROP 3159

Post Soybean, Going to Corn: Use Oats

This publication is intended to provide a starting point for farmers who are new to growing cover crops. With experience, farmers may fine-tune the use of cover crops for their systems.

Introduction

The following recipe provides an introductory approach to integrating a cover crop into a soybean-corn rotation. Often the easiest place to begin is to plant a cover crop ahead of a soybean cash crop following corn, so consider starting with the companion recipe titled *Post Corn, Going to Soybean: Use Cereal Rye* (publication MCCC-103; see Resources).

Planning and Preparation

- *Planning*—Read about cover crops. Go to field days. Start small. Be timely. Prioritize management based on purpose and objectives.
- *Soybean cultivar and planting*—If possible, plant preceding soybean crop early and use an early-maturity-group cultivar. Some possible strategies are to try cover crops in a field that is usually harvested first, on sloping ground, or where you plan to plant your earliest-maturity-group soybean cultivar.
- *Residual soybean herbicides*—Oats can be planted in the fall and produce a successful stand following spring application of most residual soybean herbicides. If the oats are grazed, there are some time-interval restrictions. (See Resources.)
- *Seed purchase*—Order oat seed early, usually by early August. Named oat varieties can produce substantially more growth, but they are usually more expensive than VNS (variety not stated) seed. Use good quality seed that has been cleaned, tested for germination and weed seed contamination, and purchased from a reputable seed dealer.

Fall Work

- *Soybean harvest*—Harvest fields where oats are to be planted as early as possible. This is not as critical if cover crops are seeded before harvest.
- *Tillage or no-tillage*—Generally, it is easier to integrate cover crops into no-till or strip-till systems. If full-width tillage is planned, it should be delayed until after the oats are killed by freezing in late fall to allow time for oat cover crop growth. Usually it is more desirable to delay tillage until spring to maintain surface cover and prevent erosion.
- *Timing of planting*—Oats are relatively frost tolerant but are not winter hardy. In general, oats will grow well in the fall if they are planted at least six weeks before the average hard frost date (28°F). To allow for adequate growth, in northern Iowa this should be before September 9; in central Iowa, before September 16; and in southern Iowa, before September 23. (*See Cover Crop Management* publication in Resources.)
- *Seeding rate*—Minimum seeding rate: 60 lbs./acre. Beginners should consider higher seeding rates for broadcast seeding methods with or without incorporation. Note that these rates assume the seed will have germination rates greater than 85%.
- *Planting method*—Aerial seed with a plane or helicopter or broadcast/drop seed with a ground-based vehicle into the standing soybean crop. In most of Iowa, aerial or broadcast seeding should take place in late August and/or just before soybean leaves begin to yellow. Rainfall after seeding is essential for establishment, but normal average weekly rainfall totals in Iowa decrease as fall progresses, so in most years, it is usually better to seed late in August rather than wait for leaf yellowing.
- *Alternative planting method*—Drill to a depth of 0.75–1.50 inches or broadcast with shallow incorporation to less than 1.50 inches immediately after soybean harvest but before recommended dates above. For this method, the seeding rate is also 60 lbs./acre.
- *Scouting*—In the fall, scout your oat cover crop to determine how well it is growing and its coverage.

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Publication numbers:
CROP 3158 (and MCCC-103)
CROP 3159 (and MCCC-104)

Available from Iowa State Extension

And www.mccc.msu.edu, go to "getting started" tab

Recipes now also available for most other states in Midwest

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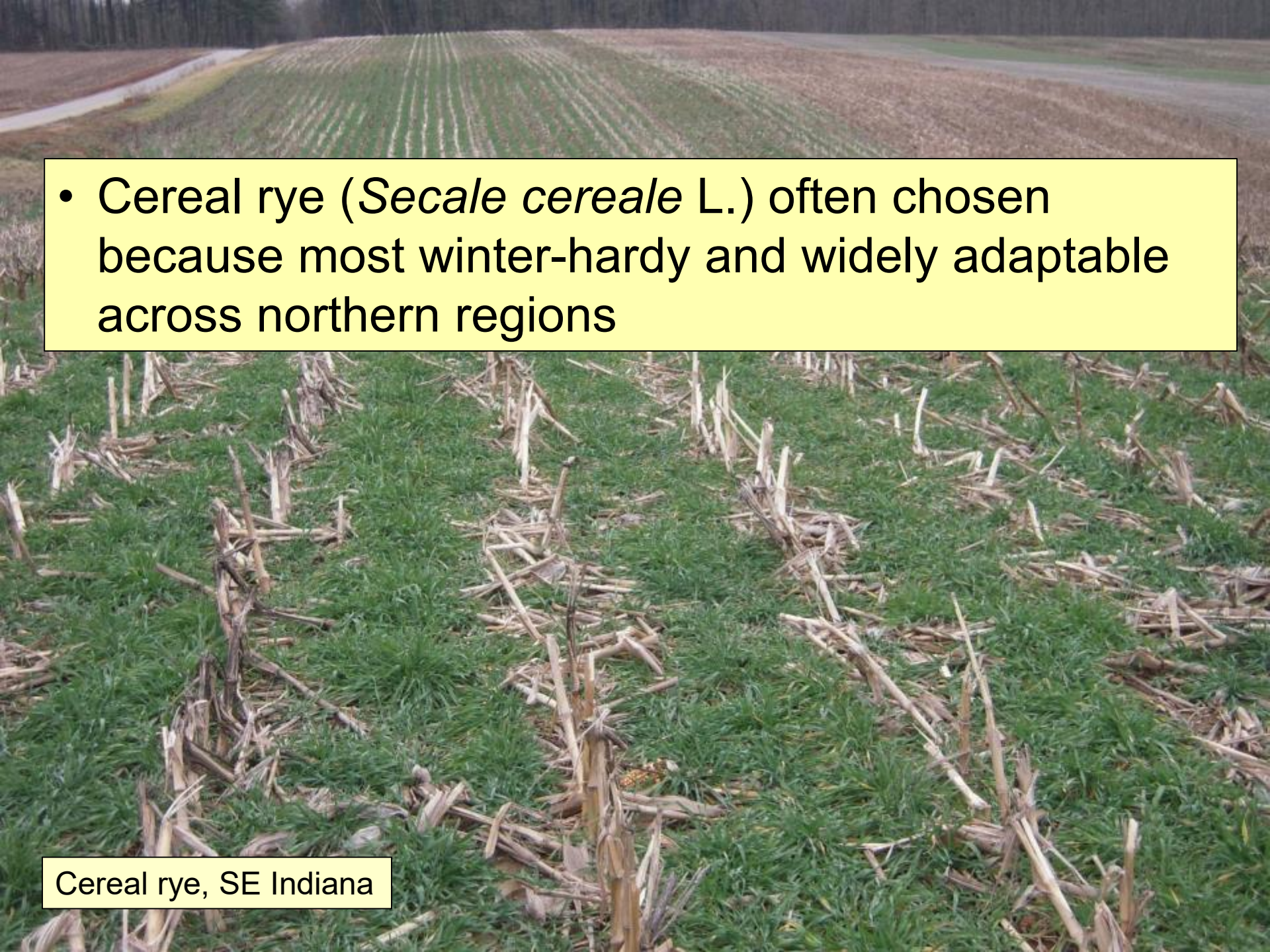

- Cereal rye (*Secale cereale* L.) often chosen because most winter-hardy and widely adaptable across northern regions

Cereal rye, SE Indiana

A Two-year Plan for Corn-Soybean Rotation

- **Step 1: Plant Cereal Rye into Corn Stalks**
  - **Drill**
  - **VT w/ air-seeder**
  - **Aerial seeding**

Seeding rates, and dates, available by county for Midwest states—see MCCC Decision Tool.
Or “Recipes” for your state.

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Step 2—Terminate in spring

- Preferred option
  - Spray 2 weeks before planting, or when cereal rye is 6-12 inches tall
    - Herbicide works effectively on undamaged cereal rye plants
    - Cover is dead before planting
    - Less residue to plant through

Step 2—Terminate in spring

- Preferred option
  - Spray 2 weeks before planting, or when cereal rye is 6-12 inches tall
- Alternatives under very wet conditions
  - Spray 1-2 days BEFORE planting
  - Spray AFTER planting (same day or within 1-2 days)
  - Advantages and risks with each option (see Table 1 in AY-353-W)

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Step 3: No-till Plant Soybean into Cereal Rye

Consider

- **short-season variety**
- **earlier planting**

(plant your earliest beans early, on fields going to cover)

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Step 4: Plant Cover Crops that Winter-kill

Oats/(daikon radish)

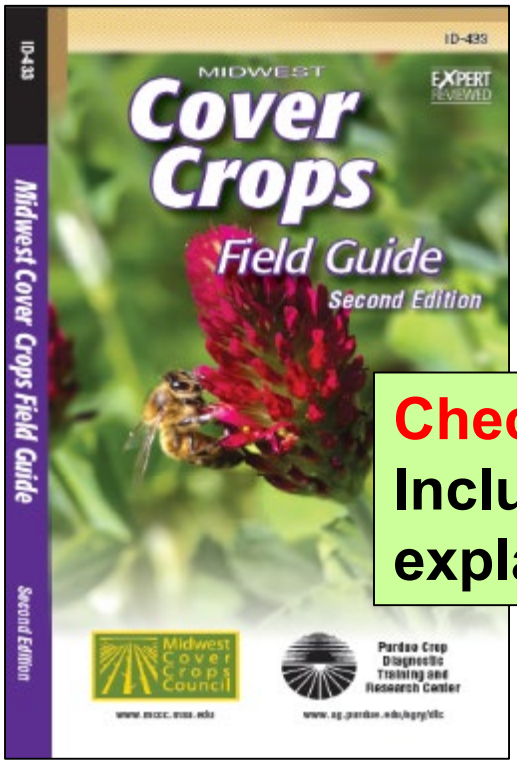
Low C:N ratio.

Winter-kill, so no termination timing issues before corn.

Step 5: No-till Plant Corn into Dead Cover

- **(alternatives of fall strip till; or shallow vertical till in spring)**
- **Starter (2x2) fertilizer, 30-50 lbs actual N per acre, should also be considered** (helps with any N tieup possible from the dead oats; gives a faster start)

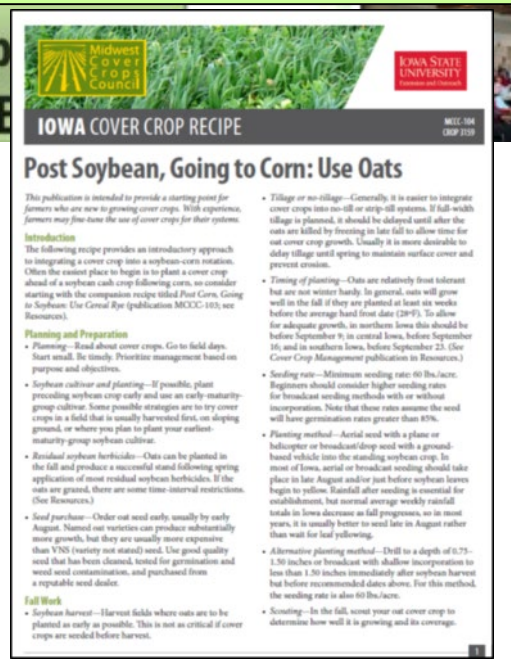
Resources



www.mccc.msu.edu

Cover Crop Selector Tools
(link on top menu bars)

Check out the "recipes" under Getting Started tab!
Including video/webinar of Indiana recipes explained in detail!



2nd Edition available!

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Speaker contact:
kladivko@purdue.edu

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