



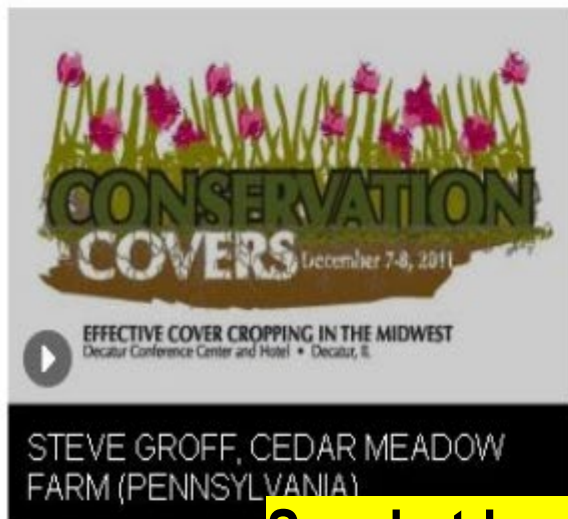
Managing Cover Crops for Modern Production Systems

Joel Gruver
WIU Agriculture

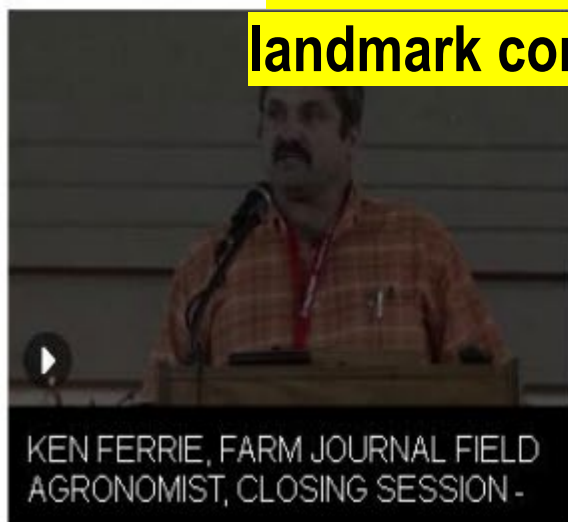
EFFECTIVE COVER CROPPING IN THE MIDWEST

2011

THESE VIDEOS WERE SHOT BY JOHN CRELLIN AT THE EFFECTIVE COVER CROPPING IN THE MIDWEST CONFERENCE, HELD DECEMBER 7-8, 2011 IN DECATUR, ILLINOIS. MORE INFORMATION AND PRESENTATIONS FROM THE CONFERENCE AVAILABLE AT SWCS.ORG/COVERCROPS



So what has happened on the CC front since this landmark conference in Decatur IL 10 years ago??

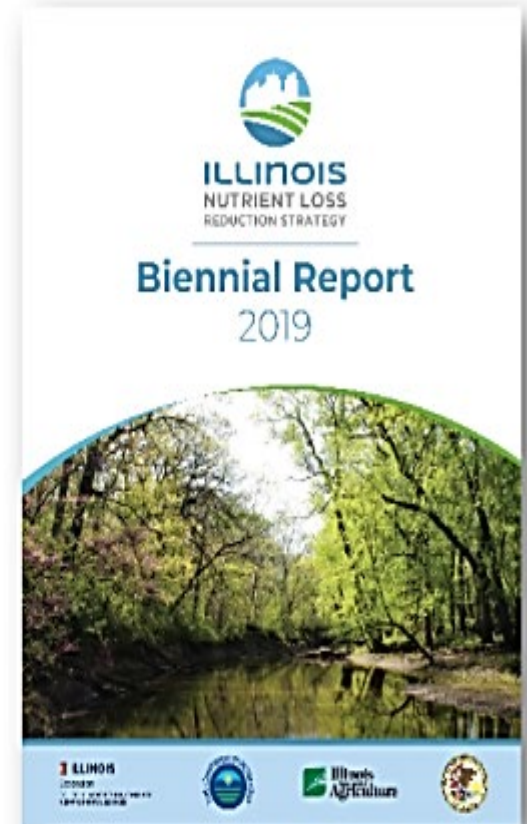
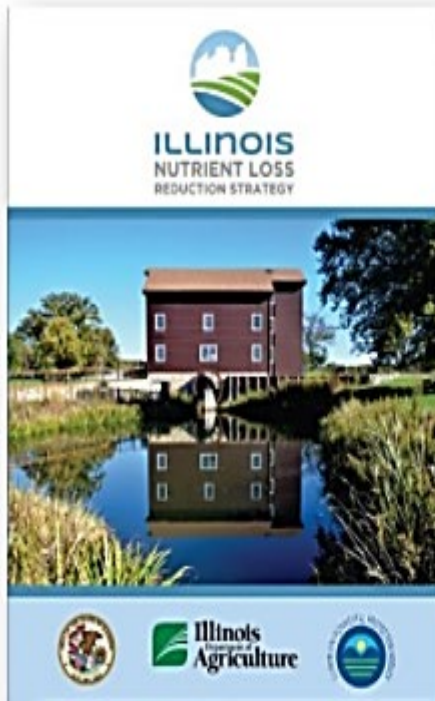


**So, Why Do You
Want Me to Grow
Cover Crops???**

Why is gramps
so skeptical?



The **Illinois Nutrient Loss Reduction Strategy** established lofty **interim** and **long-term** goals ~5 years ago... how are we doing?



GOAL: 45% REDUCTION IN TOTAL N & TOTAL P LOSSES BY 2035
INTERIM: 15% REDUCTION IN NO₃-N & 25% REDUCTION IN TOTAL P
BY 2025

Not so well on a state-wide basis...

Statewide Riverine Flow and Loads

| | <u>1980-96</u> | <u>2013-17</u> | <u>% change</u> |
|-------------------------------------|----------------|----------------|-----------------|
| Nitrate-N Load (Million lb N/yr) | 397 | 425 | +7% |
| Total P Load (Million lb P/yr) | 34 | 43 | +26% |



McIsaac
2019

Significant **Point Source** reductions have been achieved (at high \$\$\$)

POINT SOURCES

» TOTAL N LOSSES

- REPRESENTS 18% OF “THE PROBLEM”
- **14% REDUCTION** SINCE 2011

» TOTAL P LOSSES

- REPRESENT 48% OF “THE PROBLEM”
- **22% REDUCTION** SINCE 2011

IL Conservation Transect Survey data is actually getting worse ☹️

| County | < 1 *T | 1-2*T | > 2*T |
|-----------|--------|-------|-------|
| Adams | 85 | 12 | 3 |
| Brown | 75 | 17 | 8 |
| Hancock | 91 | 6 | 3 |
| Henderson | 91 | 7 | 2 |
| McDonough | 85 | 12 | 3 |
| Pike | 70 | 18 | 11 |
| Schuyler | 83 | 13 | 4 |

These fields need more green!

<http://www.agr.state.il.us/darts/References/transect/transect06.pdf>

T = tolerable level of erosion according to NRCS
(traditional but controversial concept)

No-Till, Cover Crop Expert Mike Plumer Passes



By No-Till Farmer Editors posted on December 27, 2017 | Posted in Cover Crops, Soil Health

The former University of Illinois Extension educator died on Christmas night, but left an invaluable gift of no-till knowledge for growers to follow.

It's with great sadness that we report that cover crop expert and consultant Mike Plumer passed away Dec. 25, 2017.

The former University of Illinois Extension educator had been hospitalized in hopes of receiving a lung transplant next month. He was 68. Visitation and funeral arrangements can be found by [clicking here](#).

"Mike was a great friend of *No-Till Farmer* and a staunch advocate for helping farmers succeed with cover crops," says *No-Till Farmer* editor Frank Lessiter. "He was a tireless teacher. He would stand in the hallways at our meeting for hours on end taking questions from farmers and helping them find answers to their cover crop challenges.

"We offer our condolences to his family, close friends and colleagues. He really gave a lot of himself to us all."

Plumer was a frequent speaker at the National No-Tillage Conference, most recently at the 25th anniversary edition of NNTC held in St. Louis, Mo. Additionally, he was named in



Mike Plumer



Cover Crops

Why to use them in Illinois

Some of Mike's unmatched CC expertise is still available on-line

Mike Plumer
Illinois C-BMP

Effects in Dry Weather 2012



Mike's greatest legacy
hundreds of IL farms with better soil!



Tillage and no cover crop

12 years cont. no-till corn + cover crop

INFORMATION PROVIDED BY A GRANT FROM THE HOWARD G. BUFFETT FOUNDATION

HIGH-YIELD CONSERVATION

Volume 8, Number 5

**Three Years
From Worst Field
to Best Yield**



**HARVESTING
THE POTENTIAL**
FARMING TO FEED THE WORLD

**Lots of high-quality but short
profiles of how farmers are
making CCs work**

INFORMATION PROVIDED BY A GRANT FROM THE HOWARD G. BUFFETT FOUNDATION

HIGH-YIELD CONSERVATION

Volume 8, Number 1

**Martin Family Farms
Seeks to Visualize
Soil Health**



**HARVESTING
THE POTENTIAL**
FARMING TO FEED THE WORLD



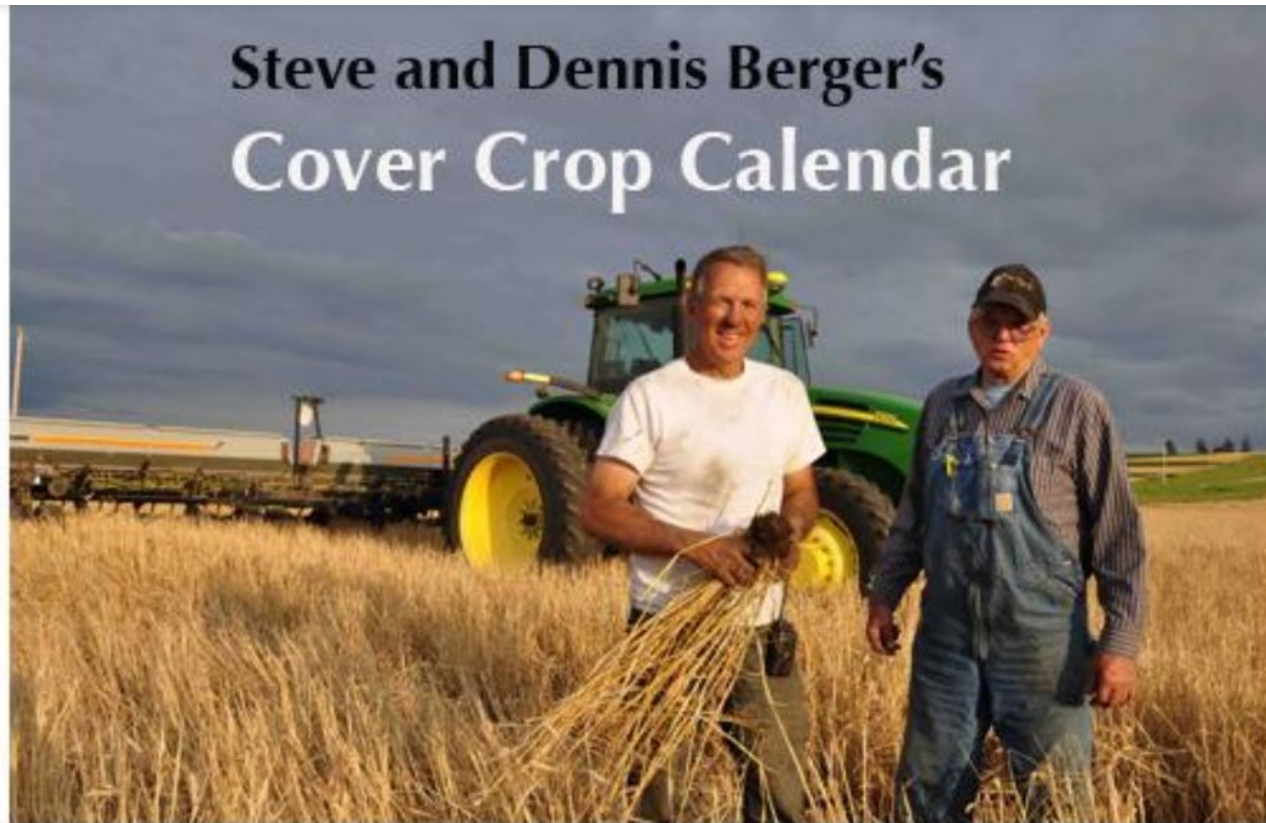
This series in NT Farmer magazine contains long format articles that regularly discuss integration of CCs in detail



**What I've Learned From No-Tilling:
Balancing Nutrients Restores Soils While
Raising No-Till Yields**

Effective CC integration >> CC planting and termination

as detailed in this year long profile of CC management on the Berger farm



Steve Berger's Cover Crop Calendar

> 40 photos taken throughout 2012

by Lynn Betts



Steve Berger has fine-tuned his planter for excellent stands of well-fed crops in CCs

DeltaForce

vDrive Meters

SpeedTube

UAN Y-Band

CleanSweep

RID Gauge Wheel

In-furrow 6-24-6/Insecticide

Smart Firmer

Spike Closing Wheel

Drag Chain



Check YOUTUBE for detailed explanations of Steve's integrated strategies for high yield crops w/ CCs

Manage for Success

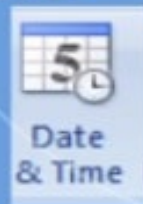
1. Planter



2. Nitrogen



4. Time



3. Insects



**Steve is one of many IA farmers who field-tested
this 7 part strategy for success with CCs**

Make Cover Crops Pay on your Farm

Farmer-led Research Results from PFI's Cooperators Program

1. Control Cover Crop Costs
2. Control Herbicide Costs
3. Avoid Cover Crop Establishment Failures
4. Avoid Redundant Expenses
5. Avoid Corn Yield Drag
6. Realize Soybean Yield Gains
7. Feed Cover Crops

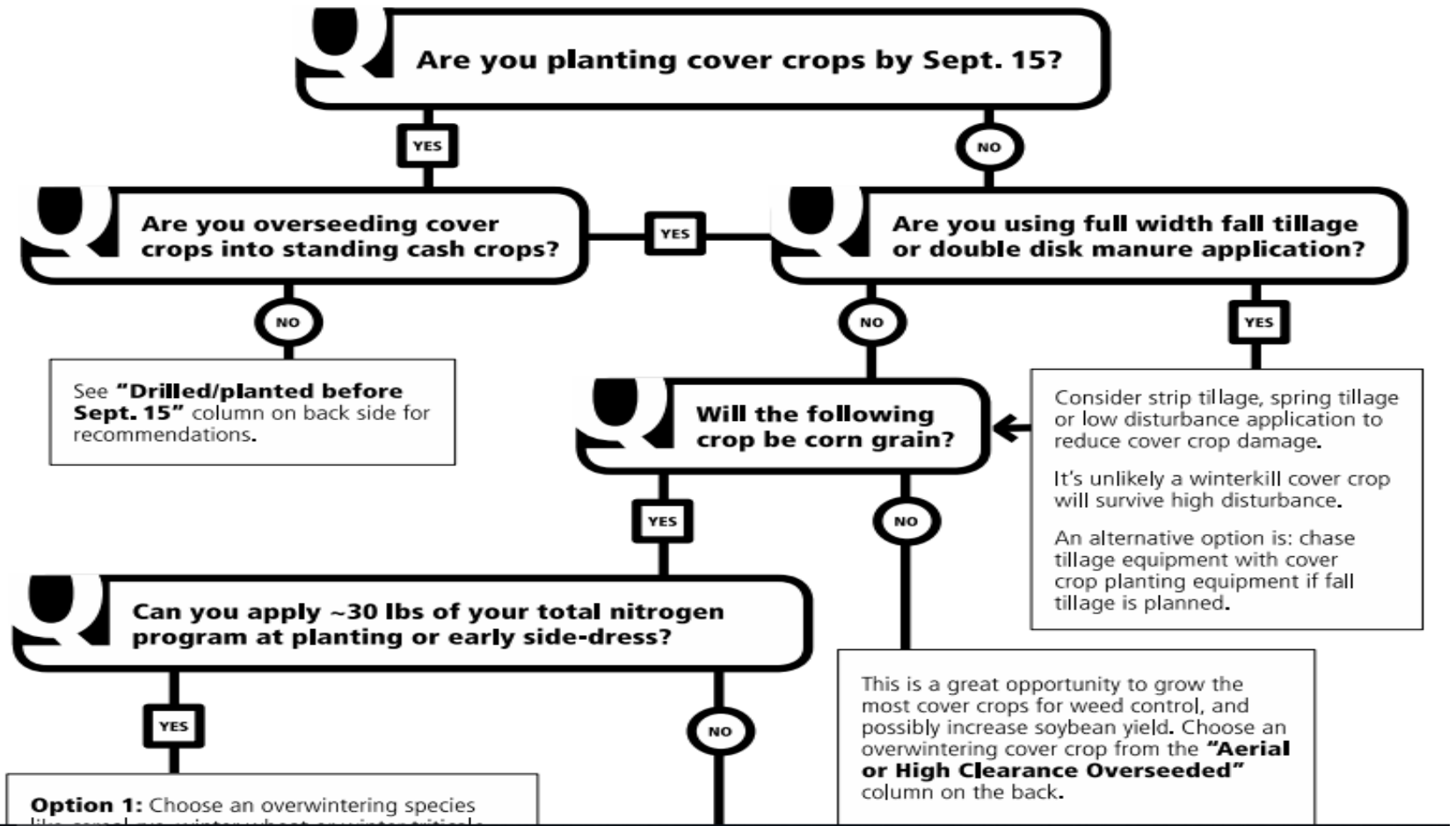


PRACTICAL FARMERS OF IOWA
**COOPERATORS'
PROGRAM**
FARMER-LED RESEARCH

PFI Cover Crop Decision Tree



Cover Crop Decision Tree



Accessible field-tested CC management guidelines



Recipe for Success: Corn Following a Cereal Rye Cover Crop

Careful management is required to harness the benefits of cereal rye covers while maintaining corn yields.

Spring is the season for planting. It's time to get corn into the ground, but the first step is to handle the over-wintered cereal rye which is greening and growing just when the farmer needs to plant. Because competition for nutrients and water between rye and corn can potentially lower yields, the sequence of events leading up to corn planting must be handled adeptly. But, there is absolutely no reason that with a little practice and determination, corn can't be successfully grown after rye every time. In each aspect of spring management, there are general rules that should be followed, but every farmer has to find a strategy that fits in their operation to follow these rules. These are the "recipes for success" from Practical Farmers' members who use chemical methods to terminate rye before planting corn on their farms.

Terminate Rye

When to spray:

Spray when the rye is actively growing.

- Mow the yard once and then get ready to kill your cereal rye. It needs to be growing.
- Spray when the addition of day + night temps = 100°F or higher.
- Spray only after the first warm (>50°F) overnight low.
- It is usually better to spray when you can rather than wait for perfect conditions with bigger more mature plants.
- Spray in the middle, warmer part of the day. Plan to terminate 10-14 days prior to planting corn.
- Graze for 30 days in early spring and spray regrowth at 6-8".
- Terminate rye at 6" or less.



How to spray:

Use the full recommended rate.

IA Soybean Association's On-Farm Network[®] Replicated Strip Trial Database

| Year | Crop | Trial Type and Detail | |
|-----------|-----------|---------------------------------|---------------------------------------|
| All Years | All Crops | All Trial Types | All Trial Details |
| 2014 | Corn | Cover Crop | Cereal Rye vs Untreated |
| 2013 | Soybeans | Crop Management | Fall Cover Crop Mix vs Untreated |
| 2011 | | Crop Management - Planting Date | Rye vs Untreated |
| 2008 | | Crop Management - Population | Tillage Radish vs Untreated |
| | | Crop Management - Roller | TillageMax CHARLOTTE mix vs Untreated |
| | | Crop Management - Row Spacing | TillageMax DOVER mix vs Untreated |
| | | Crop Management - Tillage | TillageMax INDY vs Untreated |

| Location | | | |
|---------------------------|--------------------|---------------------|--------------|
| All Landform Regions | All Crop Districts | All Watersheds | All Counties |
| Des Moines Lobe | 2 (North Central) | Lower Iowa | Adams |
| Iowan Surface | 3 (North East) | Maquoketa | Boone |
| Southern Iowa Drift Plain | 5 (Central) | Middle Des Moines | Chickasaw |
| | 6 (East Central) | One Hundred and Two | Dallas |
| | 7 (South West) | Skunk | Des Moines |
| | 9 (South East) | South Skunk | Floyd |
| | | Upper Cedar | Jones |

| <u>Year</u> | <u>Landform Region</u> | <u>Crop District</u> | <u>Watershed</u> | <u>County</u> | <u>Crop</u> | <u>Trial Type</u> | <u>Trial Detail</u> | <u>Avg. Yield Difference bu/acre</u> |
|-------------|---------------------------|----------------------|---------------------|---------------|-------------|-------------------|---------------------------------------|--------------------------------------|
| 2008 | Des Moines Lobe | 5 (Central) | Middle Des Moines | Boone | Corn | Cover Crop | Rye vs Untreated | -15.8 |
| 2008 | Southern Iowa Drift Plain | 7 (South West) | One Hundred and Two | Adams | Soybeans | Cover Crop | Rye vs Untreated | 1.6 |
| 2011 | Iowan Surface | 6 (East Central) | Maquoketa | Jones | Corn | Cover Crop | Rye vs Untreated | 1.2 |
| 2013 | Des Moines Lobe | 5 (Central) | Middle Des Moines | Dallas | Corn | Cover Crop | Tillage Radish vs Untreated | 4.0 |
| 2013 | Des Moines Lobe | 5 (Central) | Middle Des Moines | Dallas | Corn | Cover Crop | TillageMax CHARLOTTE mix vs Untreated | 0.0 |
| 2013 | Des Moines Lobe | 5 (Central) | Middle Des Moines | Dallas | Corn | Cover Crop | TillageMax DOVER mix vs Untreated | 7.0 |
| 2013 | Des Moines Lobe | 5 (Central) | South Skunk | Polk | Corn | Cover Crop | TillageMax TALLADEGA mix vs Untreated | -6.2 |
| 2013 | Des Moines Lobe | 5 (Central) | South Skunk | Polk | Corn | Cover Crop | TillageMax DOVER mix vs Untreated | 7.7 |
| 2013 | Des Moines Lobe | 5 (Central) | South Skunk | Polk | Corn | Cover Crop | TillageMax CHARLOTTE mix vs Untreated | -4.1 |
| 2013 | Des Moines Lobe | 5 (Central) | South Skunk | Polk | Corn | Cover Crop | TillageMax DOVER mix vs Untreated | 3.2 |
| 2013 | Des Moines Lobe | 5 (Central) | South Skunk | Polk | Corn | Cover Crop | TillageMax TALLADEGA mix vs Untreated | -11.4 |
| 2013 | Iowan Surface | 2 (North Central) | Upper Cedar | Mitchell | Soybeans | Cover Crop | Rye vs Untreated | 0.5 |
| 2013 | Iowan Surface | 3 (North East) | Upper Wapsipinicon | Chickasaw | Corn | Cover Crop | Tillage Radish vs Untreated | 4.1 |

Negative CC effects on corn stem from
2 main manageable factors:
N immobilization
and/or **root pathogens**

Stay tuned – more detail later this presentation!

PCM is the premier conservation program of the Illinois Corn Growers Association.



Great things are also happening in IL!

We seek to enhance the effectiveness of conservation for the farm operation, while helping reduce complexity and manage the risks associated with practices.

🔍 Search ...

RECENT POSTS

Currently, PCM staff work with 250 farmers in 16 Illinois counties and 10 Kentucky counties, representing approximately 250,000 acres of row crop agriculture.

PCM Specialist Clay Bess Awarded Partner of the Year, Spotlight Advisor

Similar to ILFBFM – PCM specialists help farmers benchmark their conservation management

[INDUSTRY NEWS](#) [PCM NEWS](#)



🔍 Search ...

RECENT POSTS

[Another \\$5M Available for PCM Farmers](#)

[PCM Specialist Clay Bess Awarded Partner of the Year, Spotlight Advisor](#)

[PCM Receives 2020 Field to Market Collaboration of the Year Award](#)

[How Conservation Can Pay For Itself](#)

[Cost & Returns from Different Nitrogen Application Timing in Illinois](#)

[Strip-Till Implementation in Illinois](#)

[Tillage Passes & Returns on](#)

The Business Case for Conservation

Cost-Benefit Analysis of Conservation Practices

**Preliminary
analysis of the
economics of
CCs on IL farms**



Precision Conservation Management



Applications due TOMORROW – 1/15!

Cover Crop

Premium Discount Program

You must complete the entire application before submitting. If you leave this page before completing the application, any data you may have entered will be erased.

Please have the following information prepared to complete your application:

- Applicant Information
- Contact Information
- Farm, Tract, and Field Information
- Files to Attach:
 1. Form FSA 578
- Complete all applicable fields, follow additional instructions and checkoff each of the acknowledgements and signoff.

Business/Individual Applicant

Business/Individual Name:

Insurancy Policy Number:

Add Another Row

Remove Last Row



SEARCH

- Home
- Getting Started ▾
- Selector Tools
- Species ▾
- States/Provinces ▾
- Other Resources
- About ▾
- Subscribe to MCCC listserv

Clearinghouse for CC info in the Midwest region

Cover Crop "Recipes" for farmers new to cover crops

Click the photo for state and province recipes!



What is a cover crop?



MCCC Calendar of Events



2021 MCCC Virtual Conference

Cover Crop Recipes

These publications are 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. Additional states coming soon!

Illinois

- [Illinois Cover Crop Recipe – Post Corn, Going to Soybean: Use Cereal Rye](#)
- [Illinois Cover Crop Recipe – Post Soybean, Going to Corn: Use Oats/Radish](#)

Indiana

- [Indiana Cover Crop Recipe – Post Corn, Going to Soybean: Use Cereal Rye](#)
- [Indiana Cover Crop Recipe – Post Soybean, Going to Corn: Use Oats/Radish](#)

Iowa

- [Iowa Cover Crop Recipe – Post Corn, Going to Soybean: Use Cereal Rye](#)
- [Iowa Cover Crop Recipe – Post Soybean, Going to Corn: Use Oats](#)
- [Iowa Cover Crop Recipe – Post Corn Silage, Going to Corn: Use Cereal Rye](#)
- [Iowa Cover Crop Recipe – Post Corn Silage, Going to Soybean: Use Cereal Rye](#)



ILLINOIS COVER CROP RECIPE

MCCC-105

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 approach to integrating a cover crop into a corn-soybean rotation. Planting a cover crop ahead of a soybean cash crop is often the easiest way to introduce cover crops into your rotation.

Planning and Preparation

- **Planning**—Educate yourself. Start small. Be timely. Prioritize management based on your purpose and objectives. Visit mccc.msu.edu for many helpful resources.
- **Corn hybrid and planting**—If possible, plant the preceding corn crop early and use an early maturity corn hybrid. One strategy is to use cover crops on the field you usually harvest first, on sloping ground, or on a field where you can watch it regularly, and to plant your earliest maturity hybrid on that field.
- **Residual corn herbicides**—Cereal rye can be seeded and a successful stand will occur in the fall following most of the spring-applied residuals used in corn. However, if cereal rye will be grazed or fed to livestock, there are some restrictions (see Resources section).

termination date. Thus, it is easier to integrate cover crops into no-till or strip-till systems.

- **Timing of planting**—Ideally, plant cereal rye as soon after harvest as possible and before two weeks after the average hard freeze date (28°F). In northern Illinois, this would be approximately before Oct. 30; in southern Illinois, before Nov. 20. Use the Selector Tool (in Resources section) for more precise dates for your county.
- **Seeding rate**—Drilled seeding rate: 40–60 lbs./acre. Broadcast with shallow incorporation: 50–70 lbs./acre. These rates are based on high-quality seed with germination rates of 85–98%. Based on fall growth and tillering, earlier planted rye (September) can be planted at lower seeding rates than rye planted later in the fall (November).
- **Planting method**—Drill to 0.75–1.50 inches deep or broadcast with shallow incorporation. You can also use an air-seeder mounted on a vertical tillage tool or an aerial application via plane.
- **Fertility or liming**—If applying P, K, or lime, complete the application prior to the seeding operation or apply to the growing rye before the ground freezes. If it is necessary to inject manure, low-disturbance injectors are available that will minimize soil disturbance and prevent soil



ILLINOIS COVER CROP RECIPE

MCCC-106

Post Soybean, Going to Corn: Use Oats/Radish

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 ahead of corn. Planting cover crops prior to corn requires a different set of management considerations than planting them prior to soybean.

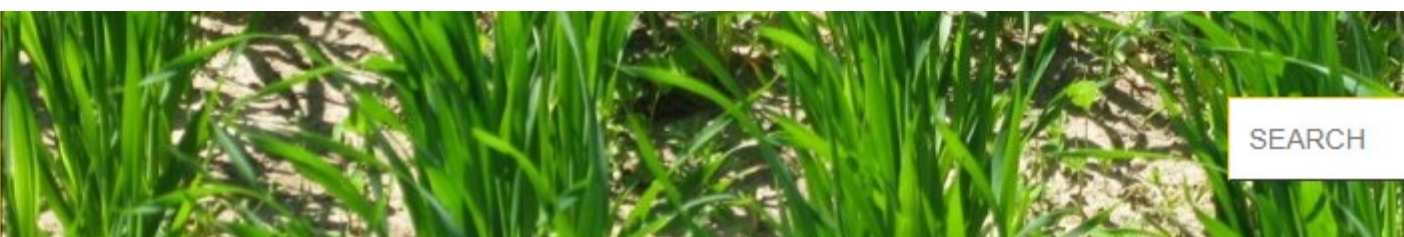
Planning and Preparation

- **Planning**—Educate yourself. Start small. Be timely. Prioritize management based on your purpose and objectives. Visit mccc.msu.edu for many helpful resources.
- **Soybean variety and planting**—If possible, plant the preceding soybean crop early and use an early maturity soybean cultivar. One strategy is to use your earliest-maturity-group soybeans on the fields where you plan to seed cover crops and plant those beans first.
- **Residual soybean herbicides**—Because oats are very tolerant of most soybean residual herbicides, few restrictions apply unless grazing is being considered. Radish is more sensitive and will likely be harmed if ALS-type (e.g., 2,4-D, PPO-type (e.g., glifosinate)) herbicides

are used. If you are interested in beginning with cover crops. But non-winterkill options, such as planting triticale or winter barley, can be incorporated. Remember that this will add an extra level of management, though, because you would have to terminate those cover crops in the spring.)

Fall Work

- **Soybean harvest**—Harvest fields where a mix of spring oats/radish are to be planted as early as possible.
- **Timing of planting**—Ideally, plant oats/radish immediately after harvest. In most of Illinois, this should occur by mid-September. See Selector Tool (in Resources section) for more precise dates for your county.
- **Planting method**—Drill to a depth of 0.25–0.50 inch or broadcast, but note that incorporation of the seed, if any, should be light since excessive disturbance of soybean stubble may reduce any erosion benefit of the cover crop. See Resources for more details on seeding methods.
- **Seeding rate in oats/radish mix**—Drilled: oats, 25–60 lbs./acre; radish, 1–3 lbs./acre. Broadcast: oats, 35–65 lbs./acre; radish, 2–4 lbs./acre.
- **Aerial seeding or overseeding**—An alternative to seeding after harvest is to do aerial seeding with a plane or



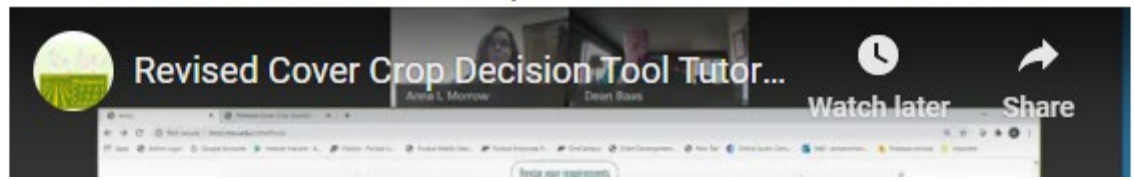
Selector Tools



MCCC Cover Crop Decision Tools

The Midwest Cover Crop Council (MCCC) Cover Crop Decision Tools are web-based systems to assist farmers in selecting cover crops to include in field crop and vegetable rotations.

Revised Cover Crop Decision Tool Tutorial



Available Cover Crops

Planting periods: Reliable Establishment Freeze/Moisture Risk to Establishment Current cash crop growing period

Goal fulfillment: 4 =Excellent, 3 =Very good, 2 =Good, 1 =Fair, 0 =Poor

Start of fly free period: ◆

| Cover Crop | Type | March 1 | April 1 | May 1 | June 1 | July 1 | August 1 | September 1 | October 1 | November 1 |
|-------------------------------------|---------|---------|---------|-------|--------|--------|----------|-------------|-----------|------------|
| A Ryegr/ Cr Clover | Mixes | | | | | | | | | |
| A Ryegr/ OS Radish | Mixes | | | | | | | | | |
| Barley, Winter | Grasses | | | | | | | | | |
| Rye, Winter Cereal | Grasses | | | | | | | | | |
| Ryegrass, Annual | Grasses | | | | | | | | | |
| Triticale, Winter | Grasses | | | | | | | | | |
| W Barley/ Cr Clover | Mixes | | | | | | | | | |
| WC Rye/ H.Vetch | Mixes | | | | | | | | | |
| WC Rye/ Rapeseed | Mixes | | | | | | | | | |
| Wheat, Winter | Grasses | | | | | | | | | |
| Millet, Japanese | Grasses | | | | | | | | | |
| Millet, Pearl | Grasses | | | | | | | | | |
| Oats, Spring | Grasses | | | | | | | | | |
| Sorghum | Grasses | | | | | | | | | |
| Sorghum-sudangrass | Grasses | | | | | | | | | |



Recent developments
in the **science of CCs**

Can Cover Crops Improve the Efficiency of Fall Applied Nitrogen within Conventional Midwestern Cropping Systems?

Corey Lacey
M.S. Candidate In Agriculture Sciences

Dr. Shalamar Armstrong
Assistant Professor of Soil Science and Agronomy

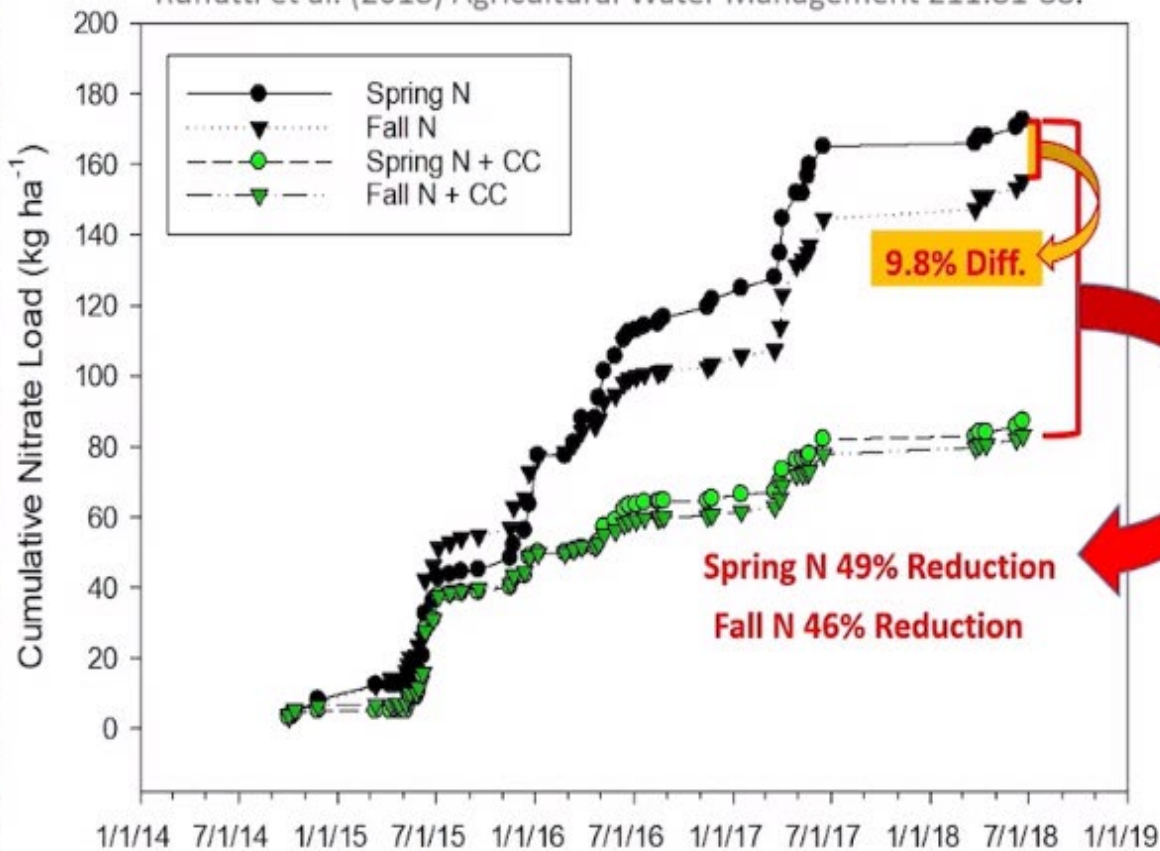
Now
back at
Purdue



DEPARTMENT OF
AGRICULTURE
Illinois State University

Water Quality Impacts of Cover Crops

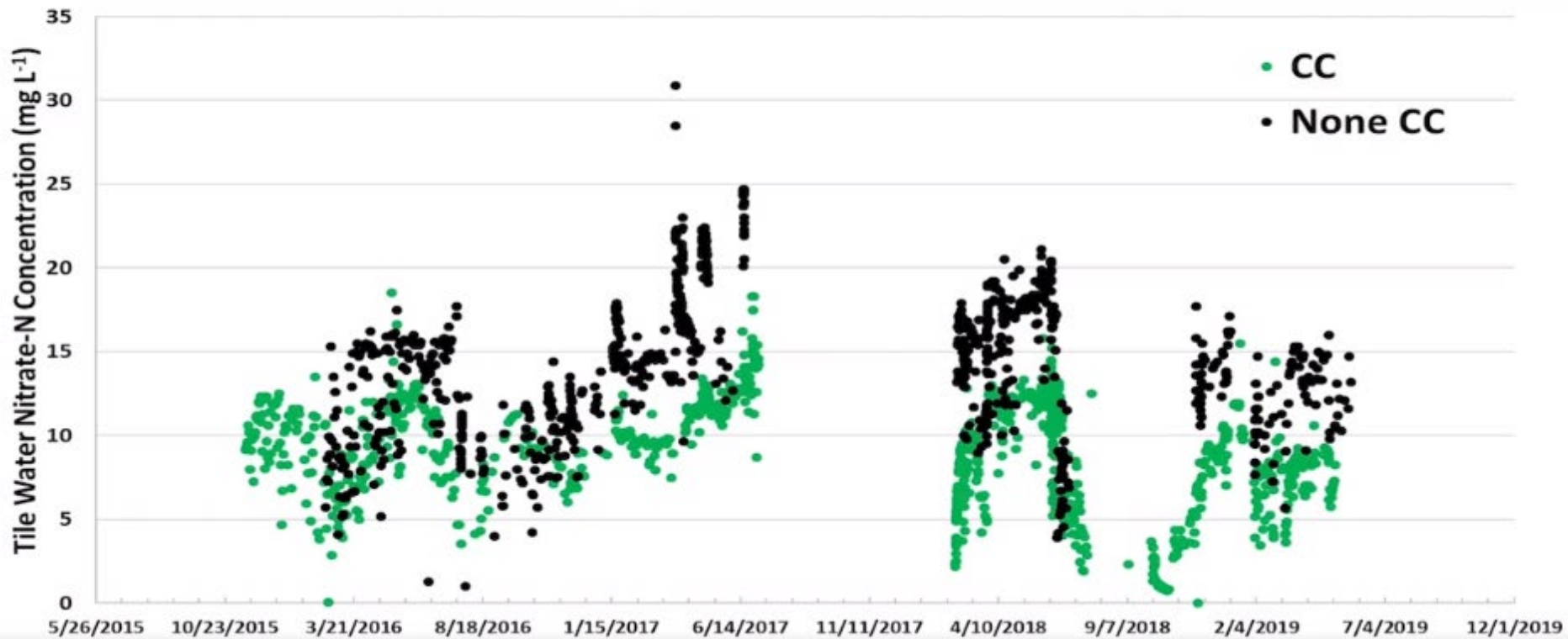
Ruffatti et al. (2018) Agricultural Water Management 211:81-88.



Interseeded Cereal Rye/Radish Mix (Mid Sept.), Average cover crop biomass: 1,200 lbs. ac⁻¹
Average shoot N uptake was 59 lbs/A, Terminated 2 weeks before planting

Landmark study showing the large impact of widespread adoption of CCs throughout a watershed

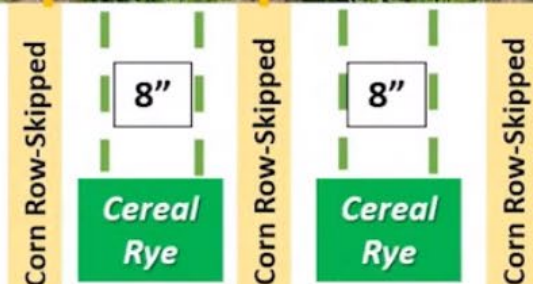
Watershed Impact of Mass Cover Crop Adoption



Armstrong - 2020

Dr. Armstrong's new project

Precision Planted Cover Crops



Potential Benefits

- Non-intersecting growing zones for cover and cash crops
- Potential reduce in seeding rate
- Gives flexibility with spring termination
- Could reduce N immobilization
- Could increase spring warmup in cash crop growing zone.

Acharya, J., Bakker, M.G., Moorman, T.B., Kaspar, T.C., Lenssen, A.W., Robertson, A.E. 2018. **Effects of fungicide seed treatments and a winter cereal rye cover crop in no till on the seedling disease complex in corn.** Canadian Journal of Plant Pathology. 40(4):481-497. <https://doi.org/10.1080/07060661.2018.1506503>. DOI: <https://doi.org/10.1080/07060661.2018.1506503>

Interpretive Summary: Cover cropping is a valuable conservation practice that reduces sediment and nutrient losses from agricultural systems and improves soil quality. However, farmers using cover crops need to adjust management to minimize risks and maximize benefits of this practice. For example, the risk of seedling disease may be higher for corn planted following a winter rye cover crop,

comp of mi occur appr seed fungi effec

Our experiments confirmed the potential of rye cover crops to elevate disease pressure on corn seedlings when conditions are cold and wet. Among several potential corn seedling pathogens, organisms belonging to the genus *Pythium* appear to be most important in causing corn seedling disease after rye cover crops. We also found that seed fungicides that contained the active ingredient metalaxyl were the most effective.

nt types may e cide ively

new practice in corn rotations, it is important to identify which fungicide seed treatments are most effective with this management practice. Additionally, by testing different fungicides with active ingredients that are more effective against particular seedling pathogens we will be able to identify which micro-organisms may be most important in causing corn seedling disease following rye cover crops. We performed a series of experiments in which corn seeds were given fungicide

Soybean health experiment – multiple locations across IL

Mustard
Rapeseed
Canola
Cereal rye
Cereal rye

incorporated
pre-plant

no-till

**Soybeans no-till drilled into cereal rye
were the top yielder in 2011**

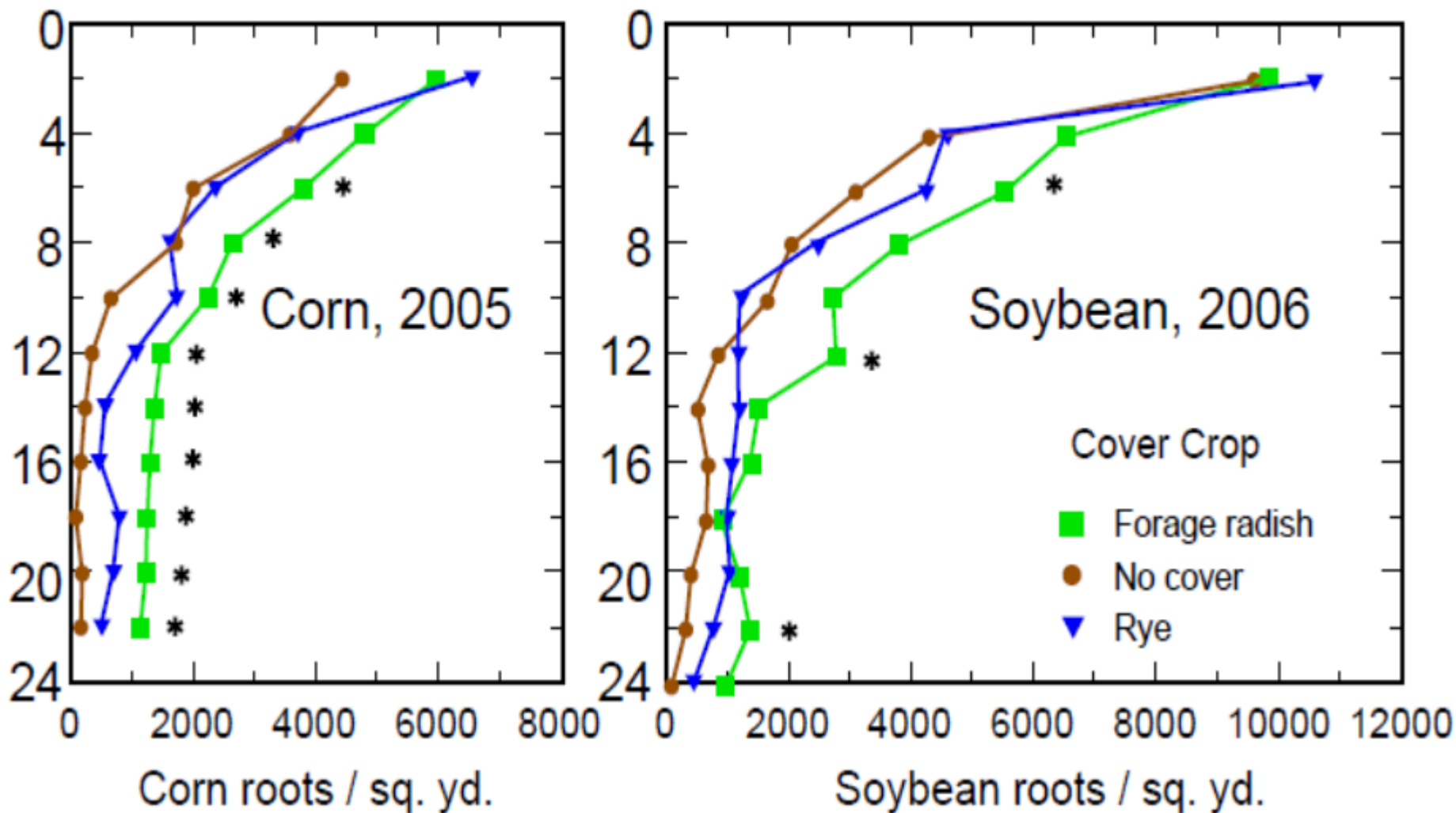
Abstract:

Healthier roots → > water and nutrient uptake

Field trials were conducted from 2010 to 2013 at four locations in Illinois to evaluate the impact of cover crops (cereal rye (*Secale cereale*), brown mustard (*Brassica juncea*), winter canola (*Brassica napus*), and winter rapeseed (*B. napus*) on soybean (*Glycine max*) stands and yield, diseases, pathogen populations, and soil microbial communities. Cover crops were established in the fall each year, and terminated the following spring either by using an herbicide (no-till farms), by incorporation (organic farm), or by an herbicide followed by incorporation (research farm). Although shifts in soilborne pathogen populations, microbial community structure were not detected, cover crops were found to induce general soil suppressiveness in some circumstances. **Cereal rye and rapeseed improved soybean stands in plots inoculated with *Rhizoctonia solani* and decreased levels of soybean cyst nematode in the soil. Cereal rye increased soil suppressiveness to *R. solani* and *Fusarium virguliforme*, as measured in greenhouse bioassays. Cereal rye significantly improved yield when *Rhizoctonia* root rot was a problem.** Using cover crops repeatedly, in the same field, may achieve more distinct effects on suppressing soybean diseases and build-up beneficial properties in the soil.

MORE crop roots after CC roots

Crop root density as affected by preceding cover crop





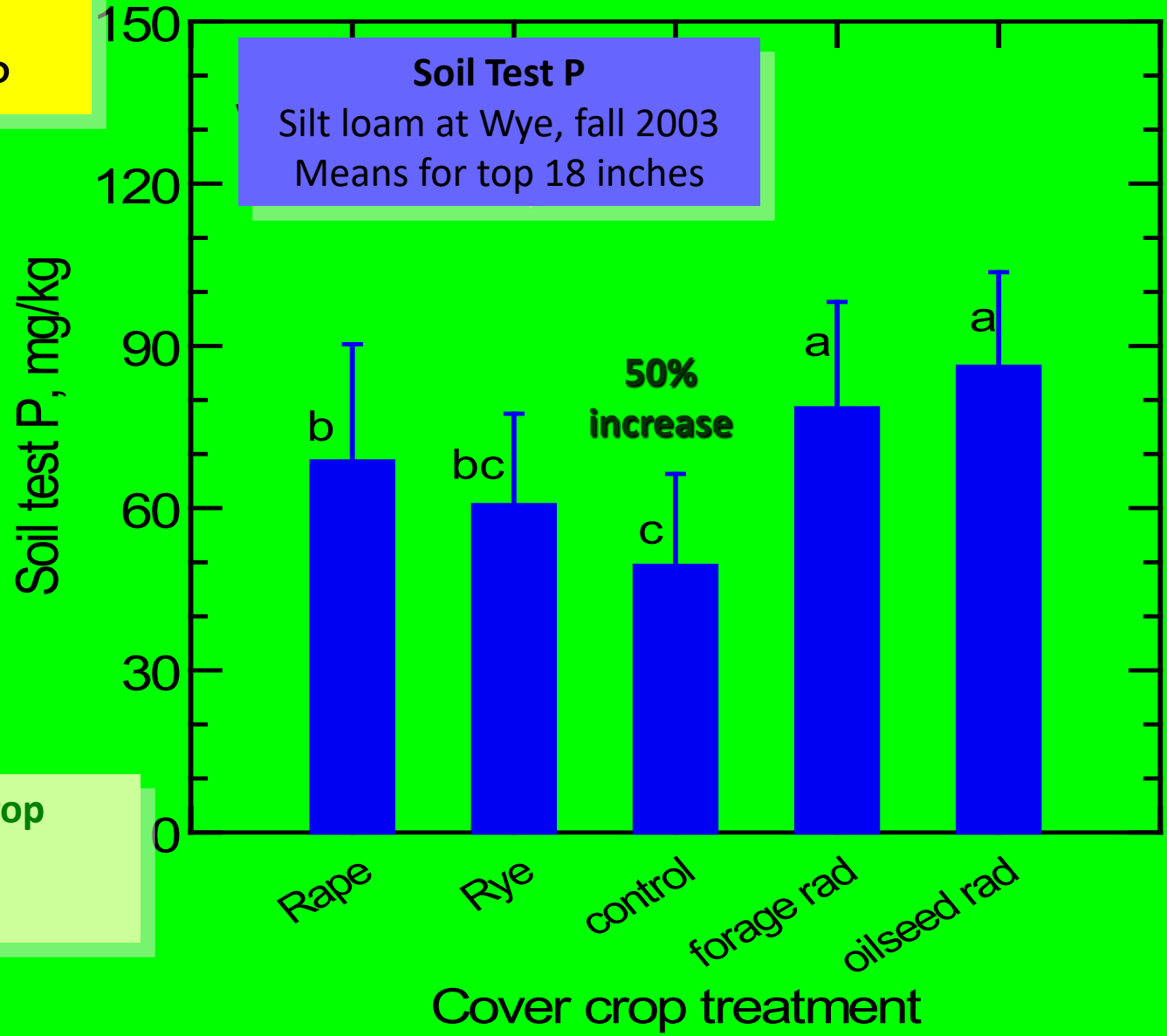
**Radish Roots
at ~ 40"
after 45 days**

Nutrient cycling: Phosphorus

Brassicas appear to be particularly adept at solubilizing P

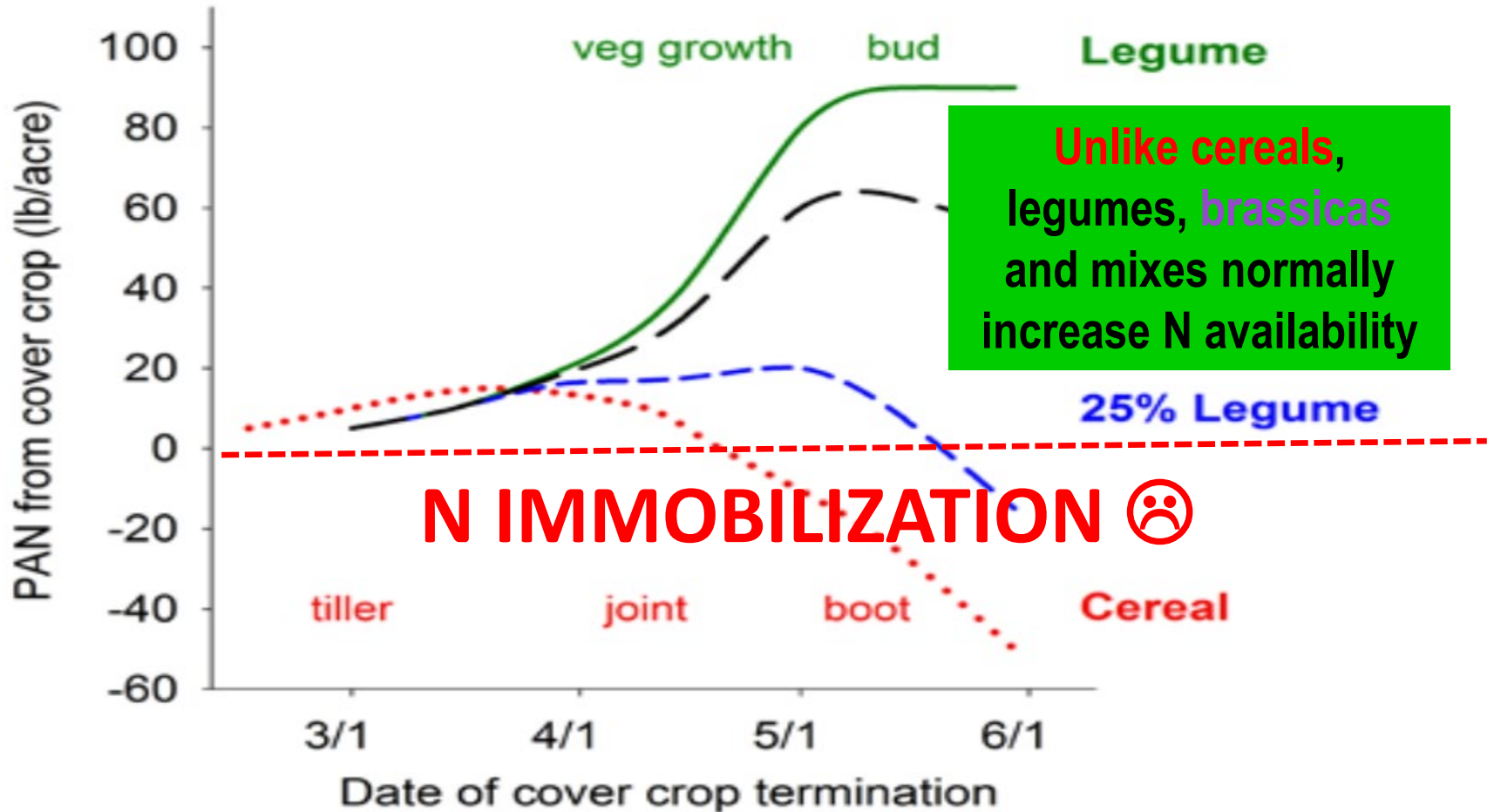
Biological pumping + organic acid root exudates

Third year of cover crop treatments in a corn-soybean rotation



Cereal CCs are great N scavengers

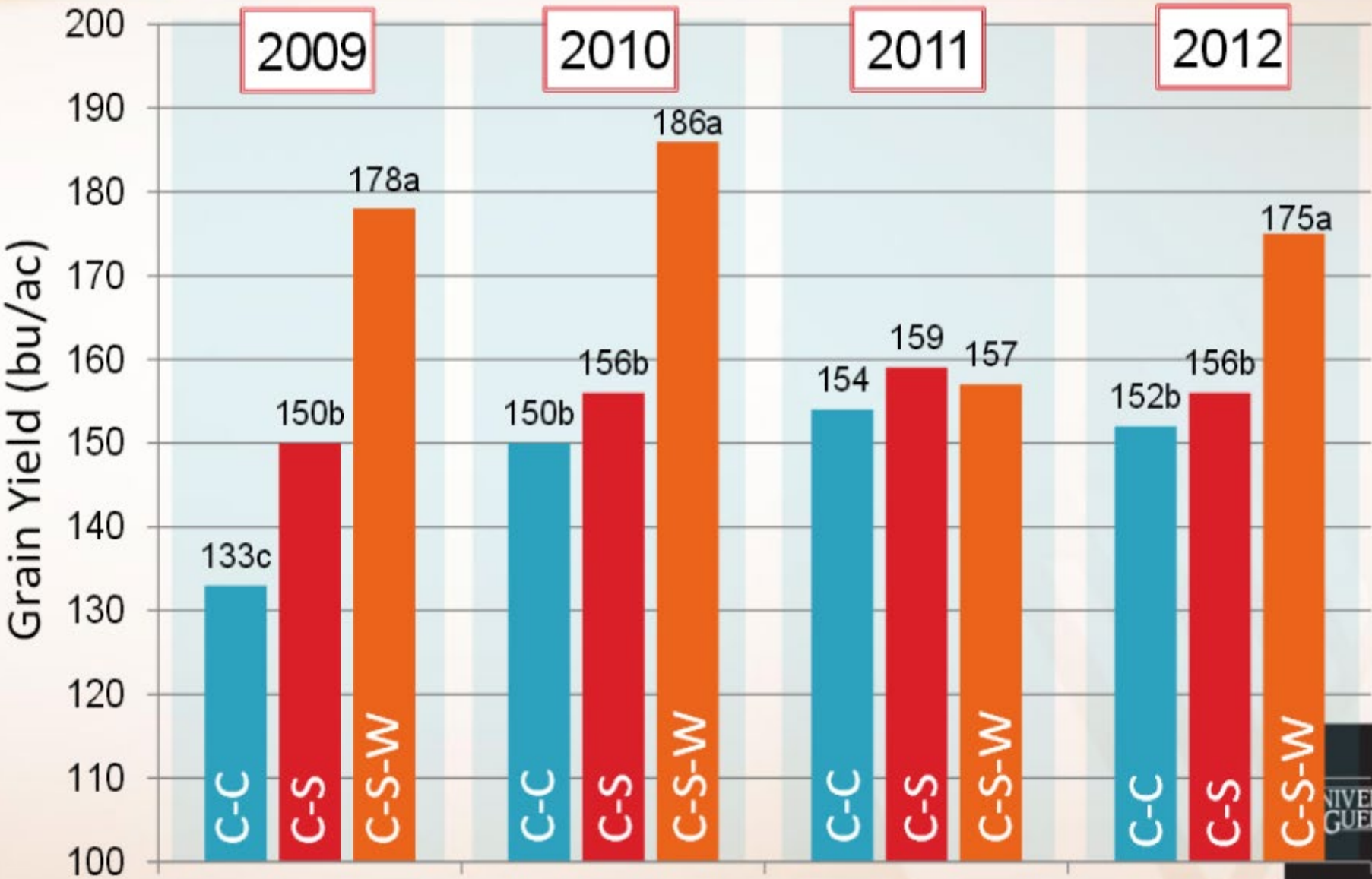
adjustments in N management for corn w/CCs are KEY!



Effect of kill date on typical plant available N (PAN) release from cereal, legume, or mixed stands. Based on compilation of field data from Willamette Valley cover crop trials. Source: D. Sullivan

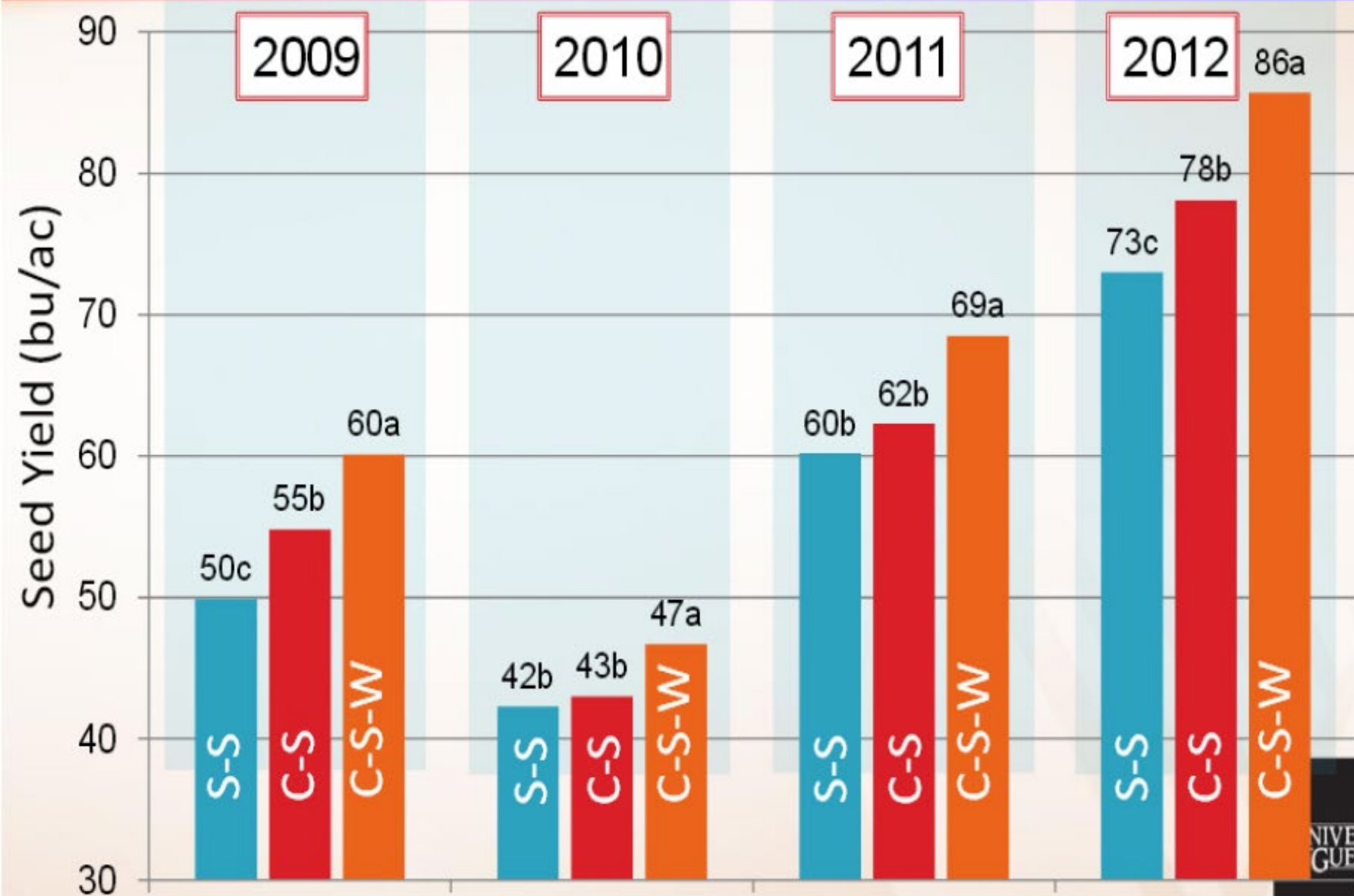
1. The "Rotation Effect" may be large enough to justify extending your rotation

Wheat on Corn Yields Ridgetown 2009-12



1. The "Rotation Effect"

Wheat on Soybean Yields Ridgetown 2009-12



Small grains create large opportunities!



Solar corridors create opportunities



Making the Most of Mixtures: Considerations for Winter Cover Crops in Temperate Climates

Organic Agriculture

May 05, 2016

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Introduction

Cover crops can provide multiple benefits. For example, they can improve soil health, supply nutrients to cash crops, suppress weeds, help manage insect pests, produce forage, support pollinators and beneficial insects, and reduce water and air pollution. However, not all cover crop species provide the same benefits. How can you best reap the multiple benefits of cover cropping with so many species to choose from? To multiply and diversify your cover crop benefits, plant mixtures.

YOUR FIELD. YOUR MIX. SMART MIX.

Our SmartMix calculator creates a custom cover crop mix that's just right for your field. With easy-to-use educational resources, we help you identify the strengths and weaknesses of your selections and craft a mix that will serve you well.

1

TELL US ABOUT YOUR FIELD

Give us basic details about your field – where it's located, how many acres it is and what you're planning to plant next.

2

SET YOUR GOALS

What kinds of results do you want? More moisture, better crop retention, etc?



Hello, Roseville, IL!

Based on your zipcode of: 61473, the average annual rainfall is 37.59". For your area, the First Frost is around 10/14, the Last Frost is around 04/22 and the Plant Hardiness Zone (PHZ) is 5b.

Details

Name Your Mix:

CornPrep

Acres to Plant:

1

Zipcode:

61473

Bagging Option:

Tote 50

-- Select --

0

applied inches

Seeding Method:

Drilled

31

09/15/2015

Next Cash Crop:

Corn

31

05/01/2016

Your selected growing period will last 229 d

15.18 base 40 growing degree days.

Goals

Goal 1 (High Priority) Required

Nitrogen Fixation



Nutrient Cycling



Goal 3 (Low Priority)

Mycorrhizal Fungi Growth



- Increase Soil Organic Matter
- Erosion Reduction
- Nutrient Cycling
- Nitrogen Fixation
- Provide Lasting Residue
- Weed Suppression
- Compaction Breaking
- Supplemental Grazing
- Supplemental Hay
- Diversify Introduced Perennial Pasture
- Attract Beneficial Insects
- Salinity Tolerance
- Mycorrhizal Fungi Growth
- Nematode Control

The science behind intercropping

When plants can share nutrients, they can yield higher together than separately



By [Angela Lovell](#)

Contributor

Published: April 17, 2019

Crops, Features



corn
on
corn

HEL

livestock

fall
tillage

silage

*What are
the other
pieces in
your
puzzle?*





Who are the people who grow the seed, sell the seed, custom plant the seed, share on-farm experiences w/ you, inspire you, caution you...?



These people are your human resources and they are a key part of **YOUR CONTEXT** for making sound decisions about CCs!



**Growing #s of
service providers
are experienced
w/ CCs!**

CC objectives must be aligned with realistic establishment options

EARLY SEASON INTERSEEDING

Still experimental, but with good progress being made on techniques and equipment.

Quest for seeding technique options

This diagram shows some of the strategies being used to plant cover crops in conjunction with corn.

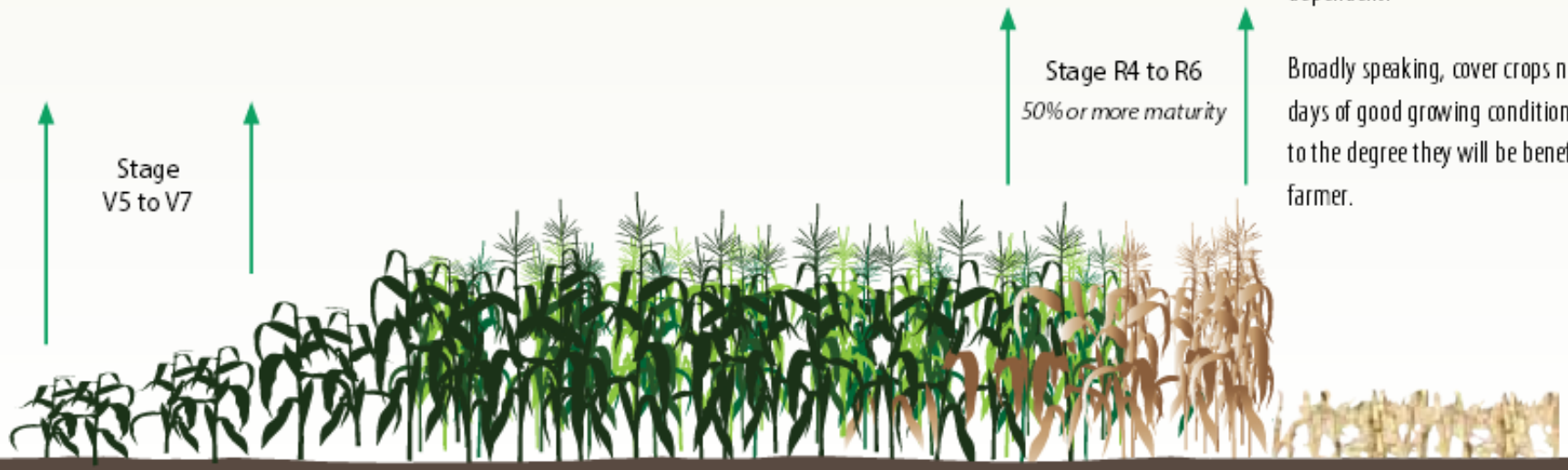
PRE-HARVEST SEEDING

There has been some success with a range of application types when the canopy is thinning allowing light to the surface.

AT-HARVEST, POST-HARVEST

Of all seeding methods listed above, pushing seed in the ground with a drill or planter is the most effective. The planting window may be narrower in some areas than others after harvest and is, of course, weather dependent.

Broadly speaking, cover crops need 30-45 days of good growing conditions to mature to the degree they will be beneficial to the farmer.



Managing your cash crop to cover crop effectively

Cameron Mills

NoTill Farmer Webinar – 4/7/15

<https://www.youtube.com/watch?v=hFA6oXevOQk>



VERTICAL TILLAGE w/ or following broadcasting of CC is a great option for planting CCs fast and cheap while sizing residues



Cover Crops to Improve Soil in Prevented Planting Fields

SD-FS-92

July 2013

Prolonged rain and flooding has resulted in many fields that will go unplanted this year. Farmers in this situation need to weigh not only their program and insurance options ("prevented planting"), but should also assess agronomic options to ensure long-term productivity from this difficult situation.

Producers should explore the benefits of planting a cover crop that has the potential to use excess water, fix nitrogen, control weeds, reduce compaction, control erosion, and/or improve soil health and biology during the remainder of the season.

These together can build considerable yield potential for following crops. With the potential "prevented planting" payment and the improved yield potential following a full season "green manure" crop, their economic potential for the whole rotation could be considerable.

Producers are advised to check with USDA's Farm Service Agency (FSA) and Risk Management Agency (RMA) on prevented planting requirements and harvest restrictions



Selecting high bio-mass cover crop mixes will rebuild topsoil. Cover crops, especially if no-tilled, will add organic biomass both above and below ground to rebuild topsoil quicker than if left to grow weeds or especially if left with no cover.

Avoid removing biomass from the field by harvesting for forage or tillage, which will reduce the organic matter benefits. Instead consider



Reconnecting topsoil and subsoil

CONVENTIONAL
MURK
SEPARATION

HEAVY
USE
FEEDING
AREA

OVERSTOCKED
OVERGRAZED
AREAS

PROPERLY
STOCKED
ROTATIONALLY
GRAZED
RESTED

PERMANENT
WATERWAYS
GRASS
SOIL



Repairing hydrologic function

Do you know any experienced
Ccers who can answer your Qs?

