

# Managing Risks with Cover Crops

A Case Study of the Most Profitable Illinois Farms Using Cover Crops



Precision Conservation Management



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# Topics

1. In depth study of cover crops in PCM
2. Why cover crops?
3. Cover crops: Corn-to-soybeans
4. Incentive payments for cover crops
5. Cover crops: Soybeans-to-corn
6. Summary



# In Depth Study of Cover Crops

# Soybean, High Soil Productivity Rating (SPR) 2015-23 Average Values

	Overwintering	Winter Terminal	No Cover Crop
# Fields	1,340	44	4,554
Yield Per Acre	68	71	70
Soil Productivity Rating	139	139	140
Gross Revenue	\$723	\$762	\$747
Cover Crop Seed	\$14	\$16	\$0
Total Direct Costs*	\$180	\$180	\$173
Cover Crop Planting	\$11	\$16	\$0
Other Power Costs**	\$95	\$75	\$89
Total Power Costs	\$106	\$91	\$89
Overhead Costs	\$33	\$33	\$33
Total Non-land Costs	\$318	\$304	\$295
Operator & Land Return	\$375 to \$425	\$435 to \$485	\$452
Estimated Soil Loss (Tons/A)	1.24	1.12	2.03
GHG Emissions (Metric Tons CO <sub>2</sub> e/A)	-0.42	-0.42	-0.02

\*Fertilizers, pesticides, seed, cover crop seed, drying, storage, and crop insurance.

\*\*tillage, fall fertilizer application, spraying, planting, cover crop planting, sprint/in-season fertilizer application, harvesting, and grain hauling.

# Cover Crop Evaluation Research

## Each year

- Completed a summary of cover crops compared to no cover crops
- This study goes into greater detail to identify the most promising and profitable cover crop strategies.

## Approach

- Conduct more detailed analysis of PCM data.
- Identified and talked to farmers with most profitable cover crop fields.

# Managing Risks with Cover Crops

A case study of the most profitable Illinois farms using cover crops



Precision Conservation Management

Illinois Soybean Growers Association and the Illinois Soybean Association

## Recommended Starter Program & Budget

**FINANCIAL ANALYSIS: KEEPING COSTS LOW IS KEY TO REMAINING PROFITABLE WITH COVER CROPS.**



Farmer interviews suggest that farmers without experience with cover crops start with cover corn into soybeans. **A low cost, low risk plan is to:**

- ✓ Drill or broadcast cereal rye without incorporation after corn harvest.
- ✓ Terminate before planting and/or when cereal rye is relatively small.

Minimal difference in yield between fields with cover crops and those without. In cover crop systems generally come from reduced herbicide cost, and reduced fertilizer costs.

Reduced herbicide costs do not entirely offset the cost of cover crop

Indicated that revenue from another source should be used to cover the costs. These include: 1) EQIP and CSP, 2) pay-for-practice programs like PCM, and

Benefits from these programs included in the budget below.

Benefits from PCM, Central Illinois, 2019-2022 Average Values

No-till No Cover Crops <sup>2</sup>	One-pass No Cover Crops <sup>3</sup>
67.8	68.0
\$783	\$786
\$189	\$174
\$75	\$87
\$33	\$33
\$0	\$0
\$297	\$294



Patience is needed on your first attempts with cover crops, but long-term soil conservation and carbon sequestration

# Why Cover Crops?



# Learn more at [www.precisionconservation.org](http://www.precisionconservation.org)

**PCM**  
Precision Conservation Management

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## Increasing Farm Incomes and Environmental Outcomes

*An Innovative Farm Conservation Service Program serving Illinois, Nebraska and Kentucky*

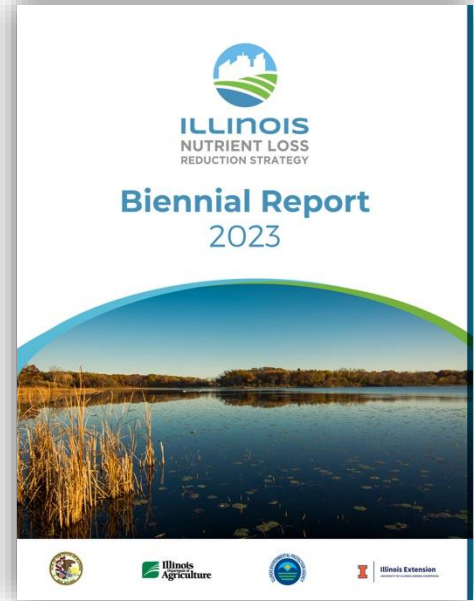
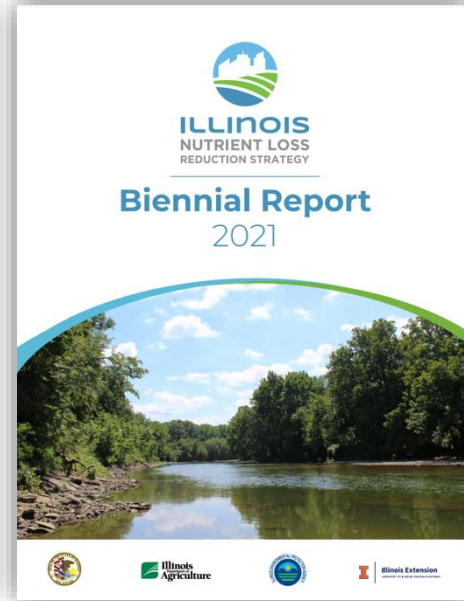
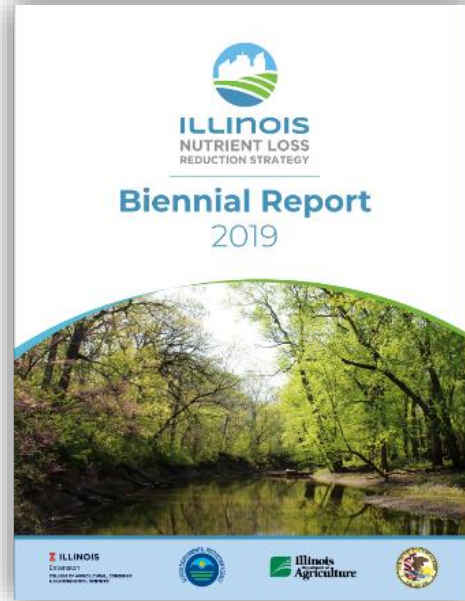
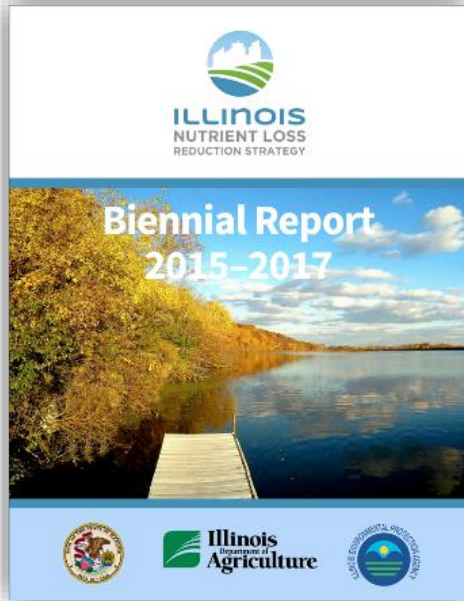
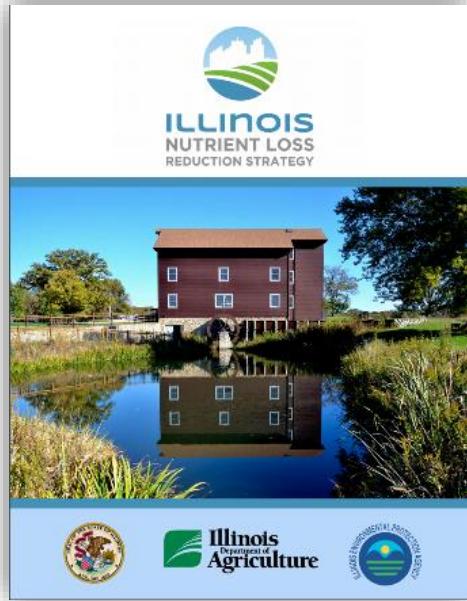
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- Field Level Farm Data**  
Farm Data – Farmers collect detailed field data using the **free Farmer Portal** tool  
Services – PCM provides analysis & one-on-one consultations with conservation experts  
Data Security Guarantee – Individual farm data is protected [not shared] unless the farmer chooses to do so  
[Read More...](#)
- Data Analysis for Business Decision Support**  
Projections & Reports – Based on the unbiased, detailed conservation practices of **Real Farmers**  
Results – Improved economic performance & measurable improvements in conservation practices  
[Read More...](#)
- Conservation, Government Program & Supply Chain Support**  
Data – Supporting improvement in precision farming practices  
Farmer Access – To projects & partners that support their conservation efforts  
[Read More...](#)
- Environmental Impact & Measurable Improvements**  
Measurable Improvements – For Farmers, Supply Chain Members, Consumers & Legislators  
End Goal – Continue to move the needle to improve water quality & soil health  
[Read More...](#)





# Illinois Nutrient Loss Reduction Strategy



**Goal: 45% Reduction** in **Total N & Total P** Losses by **2035**

**Interim:** 15% Reduction in  $\text{NO}_3\text{-N}$  and  
25% Reduction in Total P by 2025

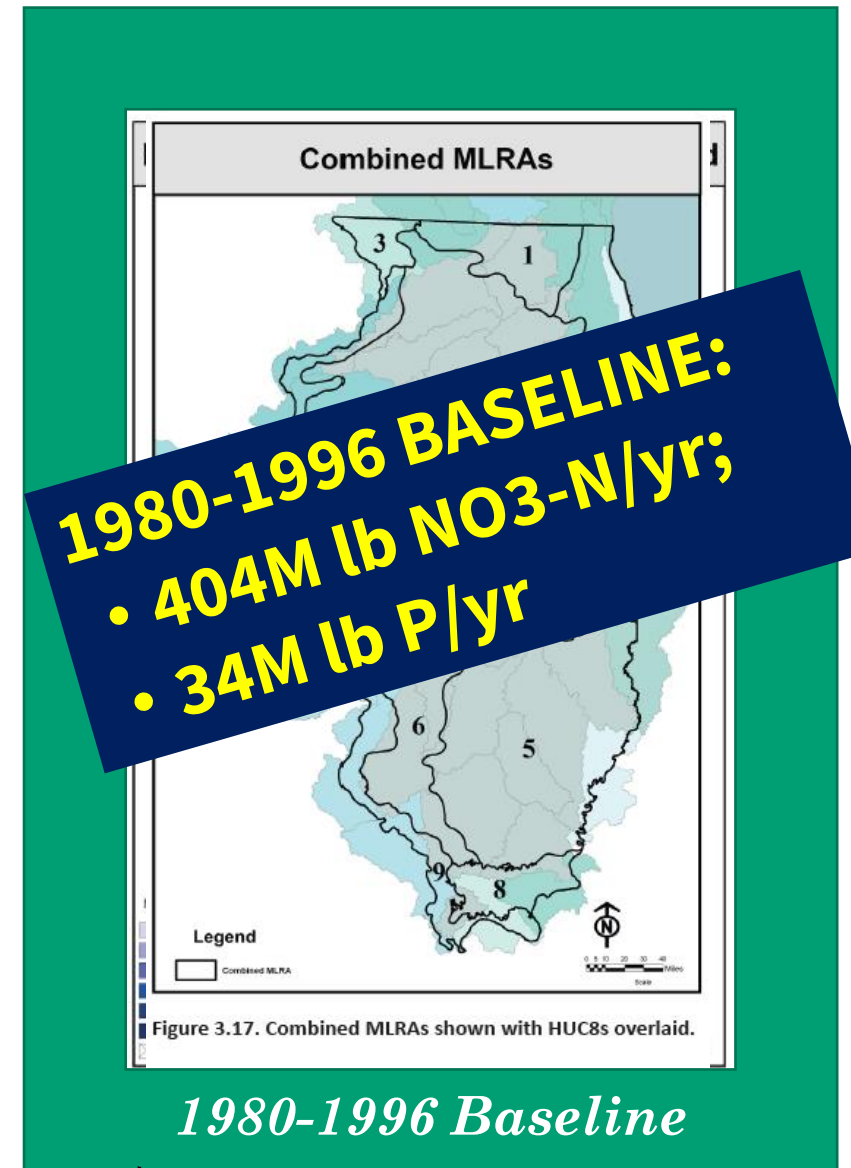
<https://epa.illinois.gov/topics/water-quality/watershed-management/excess-nutrients/nutrient-loss-reduction-strategy.html>

# Science Assessment

Mark B. David, Gregory F. McIsaac, Gary D. Schnitkey,  
George F. Czapar, and Corey A. Mitchell

## Determined

- NO<sub>3</sub>-N and P losses for the state of IL during the baseline period
- Regional loadings
- Management practice effectiveness & scenarios



# Science Assessment

Mark B. David, Gregory F. McIsaac, Gary D. Schnitkey, George F. Czapar, and Corey A. Mitchell

**1980-1996 BASELINE:**  
**404M lb NO<sub>3</sub>-N/yr;**  
**34M lb P/yr**

## Determined

- NO<sub>3</sub>-N and P losses for the state of IL during the baseline period
- Regional loadings
- Management practice effectiveness & scenarios

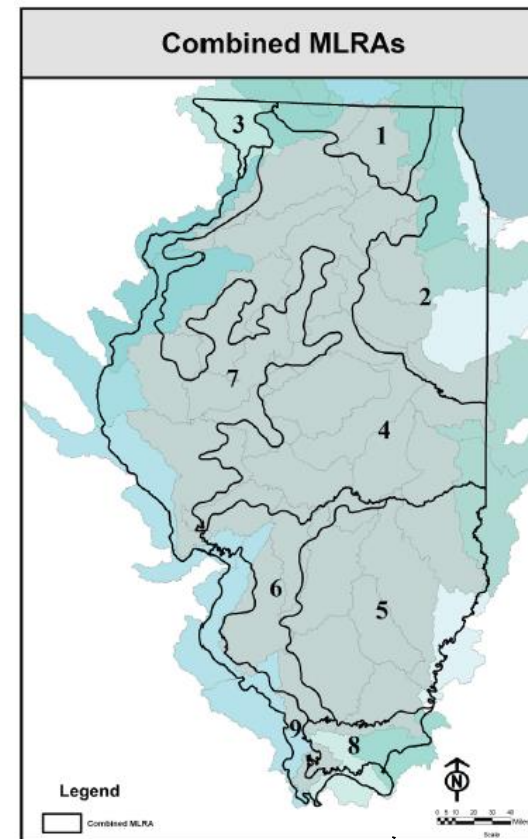
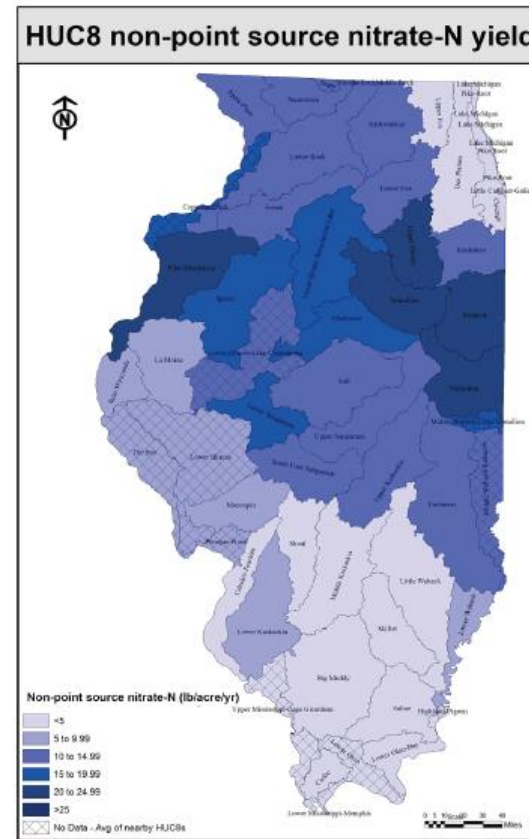


Figure 3.17. Combined MLRAs shown with HUC8s overlaid.

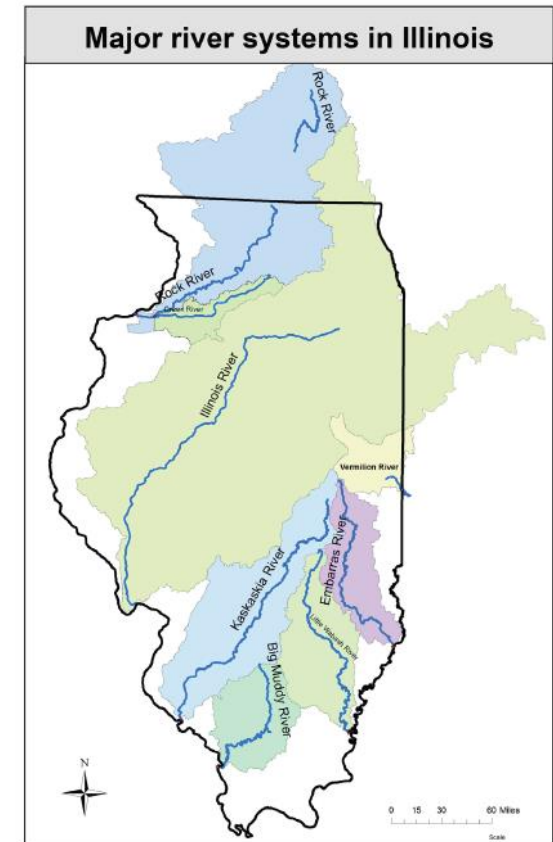


Figure 3.1. The eight major river systems used in estimating state nutrient loads. Note that gaging stations are upriver from the state boundary, so the estimated area is smaller.

# Science Assessment

Table 3.11. Example statewide results for nitrate-nitrogen reductions, with shading to represent in-field, edge-of-field, land use, and point source practices or scenarios.

Practice/scenario	Nitrate-N reduction per acre (percent)	Nitrate-N reduced (million lb)	Nitrate-N reduction from baseline (percent)	Cost (\$/lb removed)
Reducing N rate from background to MRTN on 10 percent of acres	10	2.3	0.6	-4.25
Nitrification inhibitor with all fall-applied fertilizer on tile-drained corn acres	10	4.3	1	2.33
Split application of 50 percent fall and 50 percent spring on tile-drained corn acres	7.5-10	13	3.1	6.22
Spring-only application on tile-drained corn acres	15-20	26	6.4	3.17
Split application of 40 percent fall, 10 percent pre-plant, and 50 percent side dress	15-20	26	6.4	
Cover crops on all corn/soybean tile-drained acres	30	84	20.5	3.21
Cover crops on all corn/soybean non-tiled acres	30	33	7.9	11.02
Bioreactors on 50 percent of tile-drained land	25	35	8.5	2.21
Wetlands on 35 percent of tile-drained land	50	49	11.9	4.05
Buffers on all applicable crop land (reduction only for water that interacts with active area)	90	36	8.7	1.63
Perennial/energy crops equal to pasture/hay acreage from 1987	90	10	2.6	9.34
Perennial/energy crops on 10 percent of tile-drained land	90	25	6.1	3.18
Point source reduction to 10 mg/L		14	3.4	3.3

In Field

Edge-of Field /End-of-Pipe

Land Use Change

## For Each Practice, Load Reductions:

- Per acre
- Statewide
- Percent of Baseline
- Implementation cost (\$/lb removed)

# ADVANTAGES OF COVER CROPPING



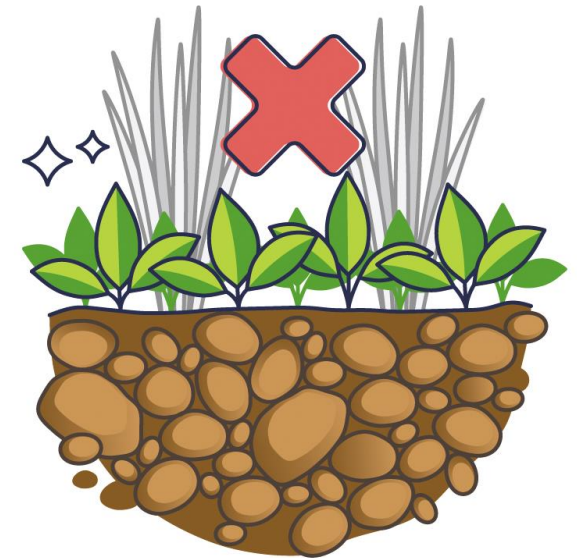
**BUILDING  
SOIL HEALTH**



**NUTRIENT  
RETENTION**



**EROSION  
CONTROL**



**WEED  
REDUCTION**

# Cover Crops Corn-to-Soybeans





## Specifications

1. Cover-crop species
2. Timing of cover-crop planting
3. Timing of cover-crop termination and planting of crop

# Species of Choice: Cereal Rye

1. Generally low cost choice of cover crop
2. Relatively easy to establish with timing in fall being less of a concern
3. Consistently overwinters



# Planting timing and method

## Plant after corn harvest

### Method varies

- **Broadcast with dry fertilizer**

*Low cost but poorer*

- **Broadcast and then light tillage pass with vertical tillage**

*Moderate costs, better establishment*

- **Drill or plant**

*High costs, but good establishment, more labor/time intensive*

- **Attachments to combine**

*Eliminates tillage pass, generally lower costs, slows/complicates harvest*



# Termination of cover crops

- **Plant soybeans early!!**

- **Termination:**

- Before planting (Reduces risk of cover crop competing with soybeans, decreases chance of eliminating herbicide passes)
- After planting (Increases risk of cover crop competing with soybeans, increases chance of eliminating herbicide passes)

**Reduction in herbicide costs and increase in weed control is a benefit of planting cover crops**

# Note on risks

- In PCM data, lower average yields with cover crops may occur (if not following standard system)
- But cover crops do not increase low tail-end risks

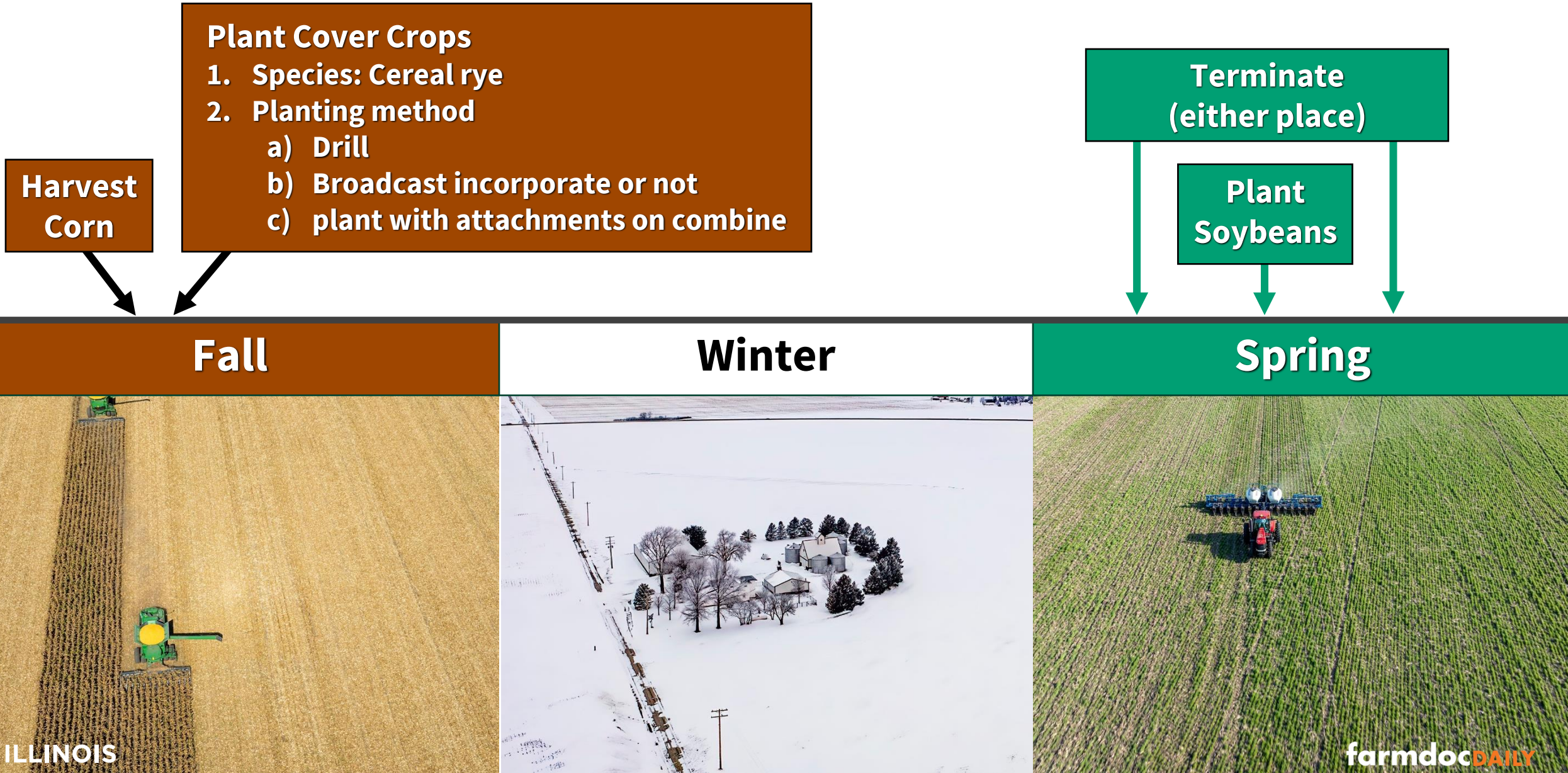


# Yields for Soybean Fields With and Without Cover Crops, High-Productivity Soils in East Central Illinois, Precision Conservation Management<sup>1</sup>

Year	Average of All Fields			Average of 5% Lowest Yielding Fields (2)		
	Without Cover Crop	With Cover Crop	Diff	Without Cover Crop	With Cover Crop	Diff
2017	63	65	-2	22	24	-2
2018	72	68	4	26	23	3
2019	60	59	1	18	19	-1
2020	65	63	2	22	20	1
2021	71	69	2	25	22	2
2022	69	68	1	25	27	-2
<b>Average</b>	<b>67</b>	<b>65</b>	<b>2</b>	<b>23</b>	<b>22</b>	<b>1</b>

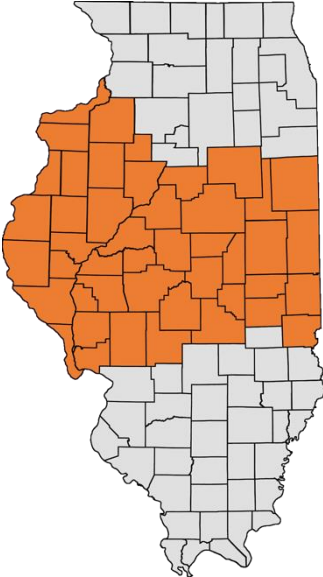
<sup>1</sup>Includes over-wintering cover crops. No over-wintering species are included in the analysis.

# Reduced Risk Cover Crop System for Soybeans



# Per Acre Soybean Results from Precision Conservation Management, Central Illinois, High-Productivity Farmland, Average from 2019 to 2022.

	Cover Crops	No cover crops	No cover crops
	No-till	No-till	One Tillage Pass
Yield (bushels/acre)	67.3	67.8	68.0
Gross Revenue (\$ per acre)	\$783	\$783	\$786
Direct costs <sup>4</sup>	177	189	174
Power costs <sup>5</sup>	73	75	87
Overhead costs	33	33	33
Cover crop costs <sup>6</sup>	25	0	0
Total non-land costs	\$308	\$297	\$294
Operator and Land Return	\$475	\$486	\$492



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# Summary findings (Cover Crop before Soybean)

- There is no statistical difference in soybean yield between fields with cover crops and those without.
- Lower direct costs in cover crop systems generally come from reduced herbicide cost, and occasionally lower fertilizer costs.
- Yield differences and reduced herbicide costs do not entirely offset the cost of cover crop seed and planting.

# Summary findings

Interviewed farmers indicated that revenue from another source should be used to cover the costs of cover crops.

These include:

- EQIP and CSP
- Pay-for-practice programs like PCM
- Carbon markets



# PCM and Incentives for Farmers



# Types of cover crop funding

## Public

**Federal: USDA-NRCS**

USDA Partnership for Climate-Smart Commodities

**State: Fall Covers for Spring Savings & Partners for Conservation**

## Private

Pay for practice or carbon/ecosystem service markets

## Combination funding



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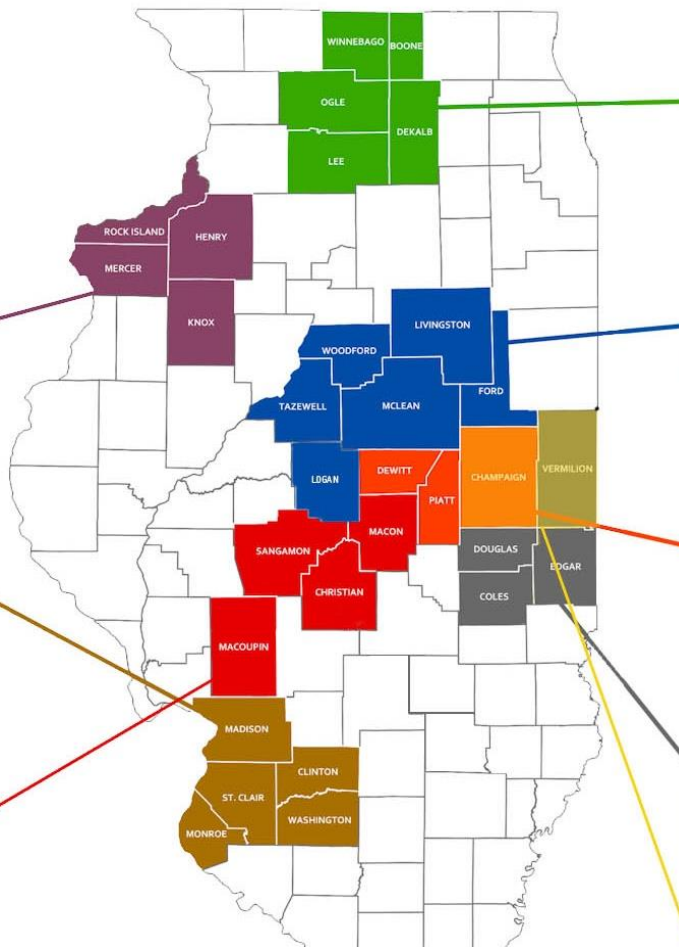
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# PCM Specialists



Precision Conservation Management

PCM specific  
 Cover Crop  
 RCPP funding  
 available in  
 20 Illinois  
 counties



United States Department of Agriculture  
 Natural Resources Conservation Service

# Benefits

Illinois farmers enrolled in PCM are eligible to receive up to **\$35 per acre** for the conservation practices listed below. There is no cap on number of acres per farmer, and practice payments are stackable!

Cover Crops	No-Till/Strip Till	MRTN/10% N Reduction
\$15/acre 1 <sup>st</sup> and 2 <sup>nd</sup> year	\$10/acre 1 <sup>st</sup> and 2 <sup>nd</sup> year	\$10/acre 1 <sup>st</sup> year
\$10/acre 3 <sup>rd</sup> year and beyond	\$5/acre 3 <sup>rd</sup> year and beyond	



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# Incentive Programs

- **Transition Incentive Payments (TIP)**

- **NEW cover crop acres**

- \$25/a Year 1
- \$15/a Year 2
- \$10/a Year 3
- Can enroll up to 1000 acres/farmer
- Look back period for eligibility is 1 year  
*(i.e. if field was not cover cropped previous year, it is eligible as a "new" field/acre)*

- **Signing Incentive Payments (SIP)**

- **OLD cover crop acres**

- \$2/a payment for 1 year (up to 600 acres)
- Access to DTN's Digital Marketplace connecting you to other ecosystem service opportunities



# Incentive/Cost-Share Programs through PCM



## PCM RCPP – Cover Crop Cost-Share

- \$40 to \$60/acre in 20 counties in IL and 10 in KY
- Based on ranking criteria

## Illinois Soybean Association – TNC Cover Crop Incentive

- \$10/acre (200-acre cap per farmer)
- For new acres only
- Stackable

# Cover Crops

## Soybeans-to-Corn



# Why More Challenging?

## **Agronomics make cover crops more difficult**

- Corn is less tolerant of stress compared to soybeans
- Cover crops sequester nitrogen, needed by corn

## **Timing of cover crop planting and termination becomes more difficult**

## **Costs are more difficult to control**



# Three systems show promise

1. Clovers – seed before harvest
2. Cereal rye – after harvest
3. Winter terminal cover crops



# Clovers

Seed before soybean harvest  
generally in late September  
(need to have time for clovers to establish)

Aerial seeding method

**Advantage: Clovers sequester nitrogen  
which may be available for corn**

**Disadvantage: Higher costs:  
1) cover crop seed and 2) seeding method**



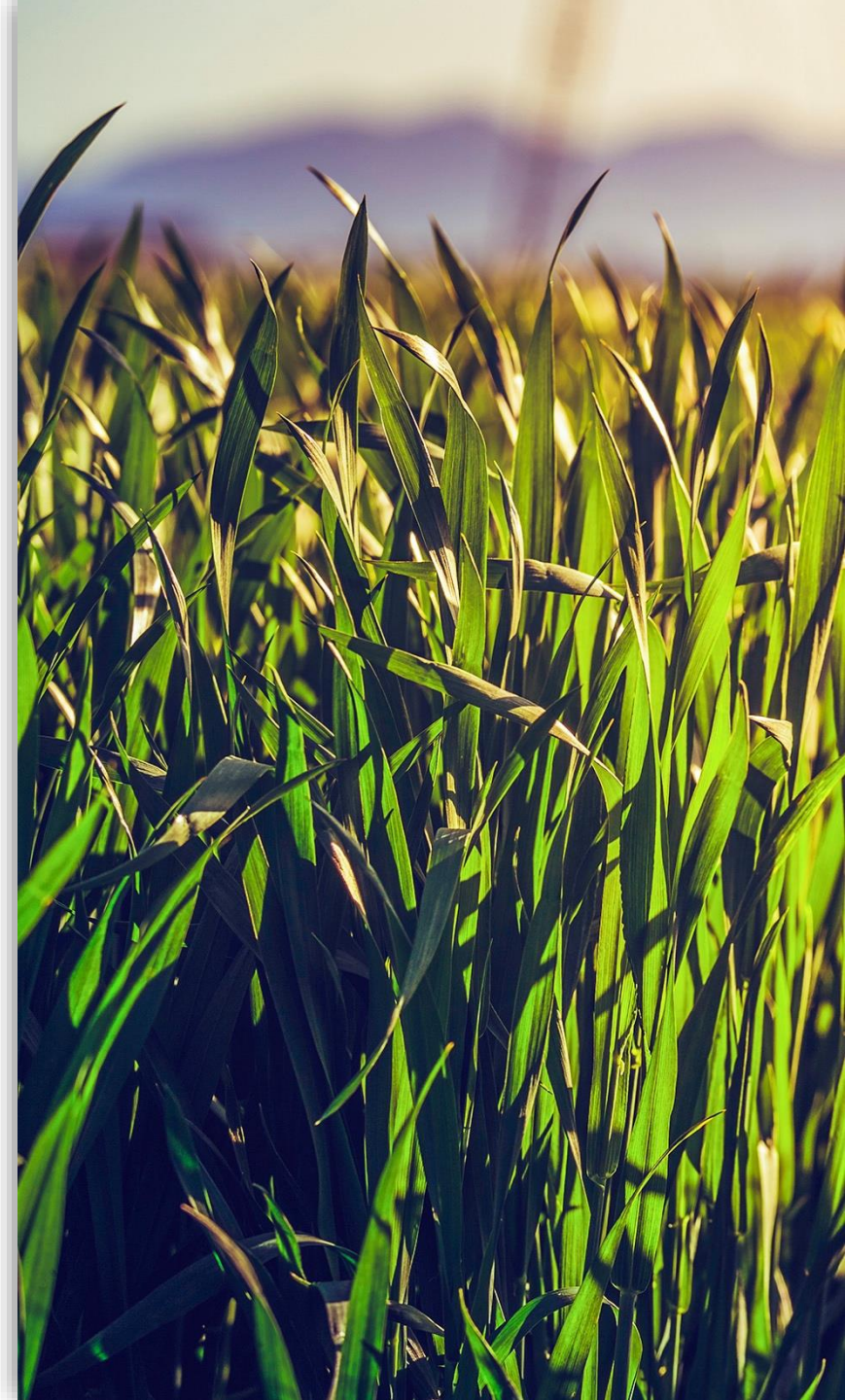
# Cereal Rye

Plant after soybeans are harvested  
using low seeding rates  
(strip till may have advantages)

Terminate early before corn planting

**Advantage: Lower cover crop costs**

**Disadvantages: Reliance on cereal rye,  
concerns with successive planting of  
grasses**



# Terminal Cover Crop

*Cover crop planted in fall that then is terminated by frost (e.g., oats, turnips)*

**Plant after soybean harvest**

**Advantage: Does not require special termination in spring**

**Disadvantage: No spring growth with its advantages (i.e., sequestration of nitrates)**



Per Acre Corn Results from PCM, Central Illinois,  
High-Productivity Farmland, 2019-2022 Average Values

	Winter Terminal Cover Crops	Overwintering Cover Crops	One-pass No Cover Crops
Yield (bu/a)	218	215	217
<b>GROSS REVENUE</b>	<b>\$1,087</b>	<b>\$1,066</b>	<b>\$1,070</b>
Direct costs	\$436	\$451	\$441
Power costs	\$116	\$114	\$115
Overhead costs	\$40	\$40	\$40
Cover crop costs	\$30	\$26	\$0
<b>TOTAL NON-LAND COSTS</b>	<b>\$622</b>	<b>\$631</b>	<b>\$596</b>
<b>OPERATOR &amp; LAND RETURN</b>	<b>\$465</b>	<b>\$435</b>	<b>\$474</b>

### Winter Terminal Cover Crops

Fields that had cover crops that terminate after the fall.

### Overwintering Cover Crops

Fields that had cover crops that overwintered.

### One-pass No Cover Crops

Fields with one-pass of a tillage implement and no cover crops.

# Yields for Corn Fields With and Without Cover Crops, High-Productivity Soils in East Central Illinois, Precision Conservation Management<sup>1</sup>

Year	Average of All Fields			Average of 5% Lowest Yielding Fields		
	Without Cover Crop	With Cover Crop	Diff	Without Cover Crop	With Cover Crop	Diff
2017	213	206	7	143	160	-17
2018	227	207	20	163	156	7
2019	197	194	3	121	144	-23
2020	209	200	9	139	153	-14
2021	218	208	10	150	169	-19
2022	226	221	5	168	170	-2
<b>Average</b>	<b>215</b>	<b>206</b>	<b>9</b>	<b>147</b>	<b>159</b>	<b>-12</b>

<sup>1</sup>Includes over-wintering cover crops. None over-wintering species are not included in the analysis.

# Summary

# Tips for those New to Cover Crops

- Plant cover crops before soybean
- Plant cereal rye after corn harvest. Broadcast cereal rye with fertilizer
- Plant soybeans "early" in spring, terminating cover crop near (before) planting





**Farmer should implement cover crops to get ahead of fertilizer regulations. Try it on a small number of acres and build a long-term program that works for your farm.**

*Steve Staker  
Mercer County*

**Patience is needed on your first attempts with cover crops, but long-term soil conservation and carbon sequestration is worth the effort.**

*Jason Lay*  
*McLean County*

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