

Managing Risks with Cover Crops

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



Precision Conservation Management

A program of the **IL Corn Growers Association** and the **Illinois Soybean Association**

Precision Conservation Management (PCM) is the premier conservation program of the IL Corn Growers Association and Illinois Soybean Association. **By applying financial analysis to in-field conservation practices, we aim to identify conservation practices that effectively address environmental issues without risking farmers' bottom line.** PCM publishes an annual summary of the average environmental and financial outcomes of Illinois PCM farmers according to their various management practices. For this booklet, we take a closer look at cover crops by compiling data and personal experiences of the most profitable PCM farmers in Illinois who use this conservation tool. All farmers in this publication agreed to share their information to help farmers who are new to cover crops understand the process used to adopt and adapt cover crops on their acres.

Project summary: Cover crops remain the best conservation practice in the organic rich soils of the Midwest where nutrient loss, soil health, and climate change are concerns. Many farmers have also seen agronomic benefits related to weed control, water infiltration, and protection during crop-loss weather events. Still, there are hindrances to cover crop adoption, including the decision fatigue associated with identifying the right combination of species, planting methods, herbicide treatments, and termination timing.

To help farmers understand how to use cover crops without sacrificing profitability, **we interviewed 10 corn/soybean farmers enrolled in PCM who have successfully used this conservation tool for at least three years.** Each of these farmers is among the top 25% of the most profitable cover crop farmers in the PCM program and represent diverse soil types and climates across Illinois.

PCM data demonstrates (and farmers confirmed) that yield improvements have not yet been realized with cover crops, but as cover crop use evolves, more profitable systems for using this tool have emerged.

Methods: Key findings are based on aggregated data from PCM, observations from researchers involved in PCM, and interviews with farmers enrolled in PCM.

Farmer motives: All farmers interviewed believe that cover crops have long-term soil health benefits — a belief that is reinforced by numerous environmental research studies. Most farmers mentioned reduced soil erosion as a prime benefit, while others focused on building organic matter over time to increase available nutrients in the soil. Several farmers also believe there will be financial opportunities for early cover crop use as carbon markets evolve.

Findings in this report corroborate other studies, including:

- Illinois Nutrient Research & Education Council. Cover Crop Guide. [Cover Crops for New Adopters](#). 2021.
- United States Dept. of Agriculture. Natural Resources Conservation Service. [Guide Sheet: Using a Cover Crop Before Soybeans](#). 2018.
- Midwest Cover Crop Council. University of Illinois Extension. College of Agricultural, Consumer & Environmental Sciences. [Illinois Cover Crop Recipe](#). 2019.



Implementing cover crops ahead of soybeans is generally straightforward with little impact on profitability. Planting cover crops ahead of corn presents more challenges.

An earlier planting date for both corn and soybeans has a positive impact on yield (with or without the use of cover crops).

Cover crop termination should be done before planting a corn crop. However, there may be some advantages to later termination ahead of a soybean crop.



PLANTING METHOD

TIMING

COST

ALL HAVE A SUBSTANTIAL IMPACT ON SUCCESS AND PROFITABILITY.

Species selection:

- **Cereal rye is the cover crop species of choice ahead of soybeans** among the farmers in this assessment.
- Species selection is more complex ahead of a corn crop. Careful consideration should be made to ensure success.

Financial considerations:

- **Keeping costs low is key to remaining profitable** with cover crops.
- **Cover crop systems can improve weed control and reduce herbicide costs.** The top 25% of farmers had below average herbicide costs.
- **Revenue from programs like EQIP, CSP, PCM, or carbon markets can offset the costs** of cover crops, protecting farmers' bottom line.

Farmers 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

Cover Crops Ahead of Soybeans

A relatively standard system has evolved in utilizing cover crops in soybeans after corn: **Cereal rye is the species of choice.**

- In 2022, **75% of the cover crop fields** in PCM used cereal rye.
- Cereal rye **is one of the lowest cost** cover crop species.
- Cereal rye **reliably overwinters** in all parts of Illinois.
- **Killing with glyphosate is straightforward** and generally 100% effective.
- Cereal rye planting occurs after corn harvest.

FALL CONSIDERATIONS: COVER CROP PLANTING METHOD

Method +	Drill	Drilling works well.
	Broadcast without incorporation, generally with fertilizer	Low cost.
	Broadcast with incorporation (Incorporation often occurs with a vertical tillage-type tool.)	Improves cover crop seed contact and percent emergence.
	Applied with attachments to combine at harvest	Additional field passes are not needed.
	Aerial application before harvest	Quick, less harvest time workload.

Method -	Drill	Slow. Faster methods likely need to be used if several fields need to be seeded.
	Broadcast without incorporation, generally with fertilizer	Emergence of the cover crop seed can be hampered.
	Broadcast with incorporation (Incorporation often occurs with a vertical tillage-type tool.)	Tillage could affect your eligibility for carbon market payments.
	Applied with attachments to combine at harvest	Harvest is slowed because of filling seed bins.
	Aerial application before harvest	High cost, requires higher seeding rate, lower percent emergence than other methods.

SPRING CONSIDERATIONS: PLANTING AND TERMINATION TIMING

Plant soybeans early into cover crops.	Planting soybeans in April before planting corn is common among the most profitable cover crop users in PCM.
	Yield advantages exist for planting soybeans early (with or without cover crops). ¹

Termination of cover crops vary.	Termination timing has trade-offs depending on weather during the growing season.
	Terminating early could lower risk in dry years, whereas late termination could create an advantage in wet years.
	Using glyphosate for late termination can also help with weed suppression.

¹Sellars, S. C. [Three Essays on the Economic and Environmental Impact of Production Practices in Cornbelt Agriculture](#). University of Illinois Urbana-Champaign. Academic Units. Graduate Dissertations and Theses at Illinois. 2023.

Recommended Starter Program & Budget 5



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



PCM data and farmer interviews suggest that farmers without experience with cover crops start with cover crops going from corn into soybeans. **A low cost, low risk plan is to:**

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

Note:

1. There is no statistical difference in yield between fields with cover crops and those without.
2. Lower direct costs in cover crop systems generally come from reduced herbicide cost, and occasionally lower fertilizer costs.
3. Yield differences and reduced herbicide costs do not entirely offset the cost of cover crop seed and planting.
4. Interviewed farmers indicated that revenue from another source should be used to cover the costs of cover crops.* These include: 1) EQIP and CSP, 2) pay-for-practice programs like PCM, and 3) carbon markets.

***Potential payments from these programs are not included in the budget below.**

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

	Cover Crops ¹	No-till No Cover Crops ²	One-pass No Cover Crops ³
Yield (bu/a)	67.3	67.8	68.0
GROSS REVENUE	\$783	\$783	\$786
Direct costs	\$177	\$189	\$174
Power costs	\$73	\$75	\$87
Overhead costs	\$33	\$33	\$33
Cover crop costs	\$25	\$0	\$0
TOTAL NON-LAND COSTS	\$308	\$297	\$294
OPERATOR & LAND RETURN	\$475	\$486	\$492



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**

Photo courtesy of Soil Health Partnership

¹ Includes cover crop fields with cereal rye as the species and seeded after harvest using drill or broadcast without incorporation. ² Fields that were no-tilled and did not have a cover crop. ³ Fields with one-pass of a tillage implement and no cover crops.

Cover crops before corn have proven much more complex than cover crops into soybeans. Species selection is less straightforward and will ultimately impact planting costs and fertilizer needs.



Clover: Planting clovers — that fix nitrogen — seems advantageous as corn uses nitrogen, but it is unclear how much nitrogen can realistically be fixed by clover species between harvest and planting of cash crops. Planting clovers after soybean harvest often *does not result* in a good stand, causing many farmers to plant cover crops earlier into standing soybeans. Cover crop mixtures including clover are often planted using aerial application to accomplish this. Both aerial application and the use of clover seed cause planting costs to be higher than other options.



Cereal Rye: Some farmers consider planting grasses (e.g., cereal rye) following soybean harvest to lower costs. This keeps costs low but introduces nitrogen issues in the spring with the following corn crop. Cereal rye is a grass, like corn, and can harbor pathogens that can infect the corn crop. While the cereal rye sequesters nitrogen (keeping it out of streams and other water bodies), it also likely causes the nitrogen to be unavailable to the corn crop, requiring fertilizer to be placed with the corn at or before planting.



Winter Terminal: Winter terminal cover crops such as oats are low cost and generally easy to implement. Since there is no growth in the spring, there is no need for termination and there should be no effect on nitrogen availability for the following corn crop. However, the lack of nitrogen sequestration in the spring means winter terminal cover crops are less effective at protecting our waterways from nutrient runoff and the carbon benefit is minimal from a carbon market perspective.



When growing cover crops, there is a learning curve which hopefully results in long-term increases in productivity while conserving natural resources.

**JOE ROTHERMEL
CHAMPAIGN COUNTY**

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



Although utilizing cover crops ahead of corn presents some challenges, **three different systems show promise.**

THREE PROMISING SYSTEMS

✓ Plant clovers into standing soybeans

OR

✓ Plant cereal rye after soybean harvest

OR

✓ Plant winter terminal crops in the fall

- Plant before harvest to allow clovers to establish.
- Use aerial application. (Drones may be a way to lower costs and keep applications within preferred times.)
- Seed clover late enough to avoid harvest issues.
- Terminate cover crop before planting corn in the spring.

- Plant after harvest.
- Use broadcast method at a low rate or try to plant between future corn rows in a strip-tillage system.
- Terminate cover crop before planting corn in the spring.
- Provide additional nitrogen at planting to avoid corn yield losses.

- Plant early enough to allow for growth before the first frost.
- No termination of cover crops needed in the spring.

Note:

1. Yields were the same with winter terminal cover crops, although the added cost results in a lower net return.
2. Maintaining yields for the corn crop is a challenge with overwintering cover crop species.
3. Interviewed farmers indicated that like soybeans, revenue from another source should be used to cover the costs of cover crops.* These include: 1) EQIP and CSP, 2) pay-for-practice programs like PCM, and 3) carbon markets.

***Potential payments from these programs are not included in the budget to the right.**

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

	Terminal Cover Crops ¹	Overwintering Cover Crops ²	One-pass No Cover Crops ³
Yield (bu/a)	218	215	217
GROSS REVENUE	\$1,087	\$1,066	\$1,070
Direct costs	\$436	\$451	\$441
Power costs	\$116	\$114	\$115
Overhead costs	\$40	\$40	\$40
Cover crop costs	\$30	\$26	\$0
TOTAL NON-LAND COSTS	\$622	\$631	\$596
OPERATOR & LAND RETURN	\$465	\$435	\$474

¹ Fields that had cover crops that terminate after the fall. ² Fields that had cover crops that overwintered. ³ Fields with one-pass of a tillage implement and no cover crops.

Cost-Effective Cover Crop Strategies

According to data and interviews from 10 of the most profitable Illinois farms enrolled in PCM who use cover crops, this practice is most successful when implemented ahead of soybeans, although promising strategies for implementing cover crops ahead of corn have emerged.

The added cost to plant cover crops can be offset by reduced herbicide costs, as well as funds from programs like EQIP, CSP, PCM, and emerging carbon markets.

Take a look back at PCM's agronomic and economic analysis of this important conservation practice inside.



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For one-on-one support in implementing cover crops without sacrificing profitability, reach out to your PCM specialist to discuss the best opportunities for your farm. Learn more at precisionconservation.org.

