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# Cover Crop

## MANAGEMENT GUIDE

# Cover Crop Guide

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**On the Cover:** Cereal rye is a cover crop suitable for Iowa's growing conditions. It's beneficial for grazing and weed suppression, while also reducing compaction and erosion. Learn more about this cover crop and others in this guide.

Photo: Joclyn Kuboushek



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# Cover Crop Management Guide: A Season-Long Guide to Cover Crop Management

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**I**owa Soybean Association's Research Center for Farming Innovation wants to help Iowa farmers meet their productivity, profitability and sustainability goals. For many years we have conducted research trials in collaboration with Iowa farmers on cover crops and how to be successful utilizing a new cropping system.

We also have a team of conservation agronomists who work directly with farmers to identify cover crop funding opportunities and help offset implementation costs. They provide technical support and management guidance to help farmers successfully integrate cover crops into their operations.

Over the years we have learned a lot from our own research, work from other partners and universities, and most importantly from farmers who are trying new techniques and practices on an annual basis and finding success.

While many cover crop guides and resources are available to farmers, they often focus on specific management areas, such as termination timing, species selection or nutrient management. Our goal for creating an updated cover crop management guide was to consolidate resources into a single guide for farmers

to reference throughout the growing season as they make decisions about how to manage their cover crop.

Additionally, one of the most common suggestions we hear from experienced farmers is to talk to other farmers who are trying new things in their area. In this guide, you'll find suggestions from farmers across the state who have successfully added cover crops to their operation. This guide is not all encompassing, but it will provide a solid foundation on which to plan and execute your cover crop management techniques.

Cover crops can be managed to help farmers meet different goals on their farm, but they are also an incredibly effective method to help improve water quality across the state. Our data, which includes water quality monitoring information since 2015, shows that cover crops have helped reduce phosphorous and nitrogen loss.

When we look at fields that utilize cover crops versus those that do not, we see a consistent reduction in tile nitrates of 28% on fields that utilize cover crops compared to fields that do not.

If you have any questions about the material you read in this guide, or want to connect with someone on our team, please call us at 515-251-8640.

# Matching Cover Crops to Farm Goals

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**E**very growing season brings new and intensified challenges, such as fighting herbicide-resistant weeds, heavy rain events, soil compaction, rising input costs and stretching forage resources for livestock. While no one can control environmental factors, farmers can control how they respond to them by adjusting management decisions.

Cover crops provide a management option that could help manage difficult weeds, influence nutrient cycling, reduce soil erosion and compaction, and provide grazing value for livestock.

This management guide brings together farmer experience with research data to better equip you and your farm for whatever Mother Nature throws your way.

## Five common reasons why Iowa farmers use cover crops:

### 1. Managing difficult weeds

Herbicide resistance in weeds like waterhemp, marehail and giant ragweed is becoming an increasingly challenging problem. The more cover crops grow above ground, the better they can suppress annual weeds, especially during late-winter and early spring when weeds can get a head start. Cover crops pair well with herbicide programs but are not meant to completely eliminate them.

### 2. Reducing soil erosion

After harvesting corn and soybeans, fields in Iowa lose their protection against heavy rain events and wind erosion. Whether as a winterkill or an overwintering species, cover crop roots help hold your field's soil in place, and the leaves act as a shield to protect against wind and water erosion.

### 3. Grazing livestock

Many producers that have livestock often graze corn stalks to reduce winter feed costs, extend the grazing season, and reduce labor. Starting a cover crop before letting the cattle roam can add nutritional forage value, providing a quality protein and drier ground for calves in the spring.

### 4. Reducing soil compaction

As equipment size increases, the potential to cause soil compaction increases. While tillage is sometimes seen as a short-term solution to compaction, cover crops can be a long-term solution. Species with a taproot structure can fracture shallow compacted layers. Improved soil structure is good for crop rooting and for water infiltration to recharge soil moisture.

### 5. Nutrient cycling

After harvesting in the fall and before planting in the spring, soils cycle nutrients from immobile to plant-available forms in the soil. Plant-available nutrients tend to be leaky if there's no growing plants to uptake the nutrients. Nutrients are then lost through the soil profile or have the potential to flow away in drainage tile. Growing a cover crop in the fall and spring can hold onto those nutrients, which later become available to the following cash crop following termination and breakdown of the plant's residue.

Cover crops can help achieve several farm goals. After identifying your reason(s) to use a cover crop, the next step is to choose which species align with your management goals. Manage your cover crop with the same intentionality as your cash crop to reach the desired benefit.



“I started small around 2010, but now we cover crop everything we can. I first started trying to stabilize soil and realized we could keep some nitrates out of our groundwater. The longer you do it, the more benefits you see. You’re increasing organic matter and reducing purchased inputs like herbicides and fertilizer.

“I’ve also seen yields improve over time. I’ve read data showing long-term soybean yields are up about 10% and corn are up about 4%, and from what I’ve seen on my farm, that’s true.

“What I like about cover crops is that they’re not only helping my farm, they’re helping society too. When you’ve got acres covered, you don’t see as much soil blowing during the winter and early spring winds. There’s a lot of value there beyond what happens on your own farm.”

# Species Selection

Choosing between a winterkill or overwintering cover crop starts with understanding your operation's goals, management style and spring workload. While both options can provide soil health and conservation benefits, each comes with different tradeoffs related to growth, nutrient retention, termination and planting management.

## Winterkill

- Pros: Spring termination is not necessary.
- Cons: Shorter growing season before a killing frost, less opportunity for living roots to scavenge nutrients in the spring, and reduced spring weed suppression.

## Overwintering

- Pros: Increased growth and soil protection, more forage for grazing.
- Cons: Spring management is crucial to avoid impacts on the cash crop. Termination in spring is vital. If termination is later, it can set back the cash crop.

Family	Species	Overwinters	Overwinter with adequate growth	Winterkill	Best if seeded in early fall	Forage graze	Suppress weeds	Nutrient cycling	Erosion control	Reduce compaction
GRASSES	Cereal Rye	X				X	X	X	X	X
	Winter Wheat		X			X	X	X	X	X
	Barley*			X	X	X		X	X	X
	Oats			X	X			X	X	
	Triticale	X				X	X	X	X	X
BRASSICAS	Radish			X	X	X				X
	Turnip			X	X	X				X
	Kale			X		X	X			
	Winter Camelina	X								
	Rapeseed			X	X					X
	Mustard			X	X			X		X
LEGUMES	Field Peas	X				X				X
	Hairy Vetch		X		X				X	X
	Clovers		X		X	X			X	X

Figure 1. \*Some varieties of barley can overwinter in Iowa.

## Cover Crop Cocktail Mixes

Mix	Benefits
<p>STRAIGHT GRASS (ahead of corn or soybeans) Cereal rye 60 lbs. OR Oats 70 lbs.</p>	<p>Fibrous roots scavenge excess nitrates and fight soil erosion. Cereal rye is winter hardy, requiring spring termination. Oats will winterkill. Great option for first time cover cropping.</p>
<p>SOIL NITROGEN FIXER (ahead of corn) Cereal rye 45 lbs. Radish 1-2 lbs. Hairy vetch 10 lbs. OR red clover 10-15 lbs.</p>	<p>Cereal rye is winter hardy, requiring spring termination. Vetch and clover have low carbon:nitrogen (C:N) ratios and fix atmospheric nitrogen (N) with inoculated seed. Higher C:N ratios are seen with mature cover crops. Radish's tuberous roots break through compaction layers, helping infiltrate water and scavenge deep nutrients.</p>
<p>AERIAL-APPLIED SOIL SAVER (apply in standing row crops) Cereal rye 60 lbs. Radish 2 lbs. Rapeseed 2 lbs.</p>	<p>For increased soil health benefits, increasing the rate of cereal rye while keeping radish and rapeseed at standard rates helps break through compaction layers and performs well in dry conditions. Cereal rye is winter hardy, requiring spring termination. The others will winterkill. Increased seeding rates if applying aurally. Great option for aerial application with a drone or airplane. This mix has larger seeds to penetrate leaf canopy. Earlier application allows increased biomass and maximizes cover crop potential.</p>

Figure 2. Cover crop mix recommendations for specific goals by ISA Conservation Agronomists.

Soil microbes require a carbon:nitrogen ratio of 24:1. These control soil's ability to decompose and cycle nutrients. Cover crop residues with higher ratios like

rye or wheat straw can tie up nitrogen, whereas lower C:N ratios like hairy vetch will decompose faster, improving soil's ability to cycle nutrients.

Material	Carbon:Nitrogen Ratio
Rye straw	82:1
Wheat straw	80:1
Oat straw	70:1
Corn stover	57:1
Rye cover crop (reproductive)	37:1
Pea straw	29:1
Rye cover crop (vegetative)	26:1
Ideal Microbial Diet	24:1
Beef manure	17:1
Hairy vetch cover crop	11:1
Soil microbes (average)	8:1

Figure 3. Soil microbes' ideal diet requires a 24:1 C:N ratio.  
Source: USDA NRCS



### Radish

Radish is a cool-season annual, which does best in early fall seedings and will not overwinter. They're best known for a large tuber and long taproot that improve water infiltration, bust compaction layers and add forage value when grazing. C:N ratios range from 19:1 to 20:1.

### Cereal Rye

Cereal rye is a winter annual grass that will overwinter. It's the most common cover crop in Iowa due to its vigorous biomass growth that makes it a great option for forage grazing, suppressing weeds, erosion control, cycling nutrients and reducing compaction. It can germinate in soil temps as cold as 34°F. C:N ratios are 26:1 in vegetative stages, and 37:1 in reproductive stages (after anthesis).



### Hairy Vetch

Hairy vetch is a winter annual legume, which does best in early fall seedings and can overwinter if there's adequate growth. It has good ratings for erosion control and reducing compaction. Adding a legume to a cover crop mix can help lower C:N ratios. Hairy vetch's C:N ratios range from 10:1 to 19:1.





“We choose species and seeding rates based on the specific goals of the customer. Some farmers might have grazing goals, while others are focused on nitrogen fixation, biomass or reducing compaction.

“Every plant family has advantages and disadvantages. Grasses are great biomass producers and easy to establish; legumes can help add nitrogen with enough growing time, and brassicas are excellent nutrient scavengers and compaction busters.

“Winterkill species typically have great fall growth because they don’t save energy for winter survival. The biggest advantage is that they do not need termination in the spring.

“The key is tailoring species to fit your operation and the following cash crop so the cover crop works for you, not against you.”

# Seeding Methods for Cover Crops

There are a multitude of methods to seed cover crops. The best option for your farm ties back to your goals. If your main goal is to manage difficult weeds, you'll need evenness across the field and more time for biomass accumulation.

Interseeding and post-harvest seeding are the most common timings to seed cover crops.

## Interseeding cover crops

Interseeding cover crops is the practice of planting cover crops into a growing cash crop, typically before harvest. This allows the cover crop to become established earlier and begin growing before the main crop is removed from the field. Typically, applications for interseeding include drone, airplane, helicopter, and high clearance machines.

- Pros of interseeding: Early seeding allows more time for cover crop growth. This lends to increased biomass accumulation, weed suppression and forage potential.
- Cons of interseeding: Less seed-to-soil contact, competition for resources like water and sunlight, and herbicide compatibility concerns with residuals. *(Caution: Do not broadcast interseed if conditions are dry and there is no rain in the forecast.)*

## Post-harvest seeding

Post-harvest seeding methods are broadcast and drill:

- Pros of post-harvest: Better seed-to-soil contact, no competition with the crop for resources like water and sunlight.
- Cons of post-harvest: Shorter growing season as winter gets closer, less biomass growth in the fall.

## Seeding considerations

Each seeding method has specific benefits and setbacks. While an airplane can spread seed early, it will have poor seed-to-soil contact, evenness across the field and added costs.

And while a drill is cost-effective, good for seed-to-soil contact and evenness, it requires more labor in the field and later post-harvest timing. Refer to the accompanying chart for more benefits and drawbacks to the various seeding methods.

Whichever seeding method you choose, do a test strip to check seed distribution. This ensures that mixes are well blended and distributed — avoiding banding that might occur if broadcast from the ground or air. That could impact a management goal or spring termination.

Factor	INTERSEEDING			POST-HARVEST	
	Drone	Airplane or Helicopter	High Clearance	Broadcast	Drill
COST	Moderate/Variable	Challenging	Moderate/Variable	Favorable	Favorable
LABOR	Moderate/Variable	Challenging	Challenging	Favorable	Moderate/Variable
SEEDING RATE	Moderate/Variable	Challenging	Moderate/Variable	Moderate/Variable	Favorable
TIMING	Favorable	Favorable	Moderate/Variable	Moderate/Variable	Moderate/Variable
SEED-TO-SOIL CONTACT	Challenging	Challenging	Moderate/Variable	Moderate/Variable	Favorable
EVENNESS	Favorable	Challenging	Favorable	Moderate/Variable	Favorable

Figure 4. Cover crop seeding methods have benefits and challenges. These are some common pros and cons to consider when deciding how to plant cover crops.



“I have tried all methods of seeding cover crops. Planting or drilling seed is ultimately the best, but time and timing are big factors. Preharvest drones work really well with no damage to the cash crop, but they can be expensive. The Harvest Air Seeder, for me, is the way to go. It’s a time saver and cost saver, and the covers look great.

“Planting or drilling is very good, but it’s time-consuming and comes with a higher per-acre cost. Drone seeding is also a very good option, but it can be costly. If you don’t have other options, spreading with fertilizer is still a good way to get cover crops established.”

# Herbicide Cautions for Cover Crops

**A**s with any crop, it is important to follow all herbicide labels and directions. However, cover crop species are often not listed in replant restrictions on labels.

This can lead to confusion and uncertainty when making decisions about what species to plant and when to plant them for cover crops. When the cover crop species is not listed use “other crops” as the replant interval, and when using a multi-species mix, the longest interval should be used.

## Grazing cover crops

Do you plan to graze your cover crops?

Federal law requires that you follow the label for replant restriction labels when using the cover crop for grazing. Many residual herbicides used in corn and soybeans will have a minimum replant restriction but always review labels before making a final decision.

Iowa State University has available resources to further plan herbicide programs for fields with grazing cover crops.

## Nongrazed cover crops

Cover crops not used for forage or grazing do not need to follow the label, but farmers assume the risk of cover crop injury if the label is not followed.

The influence of soil type, weather, rainfall and timing of residual herbicide applications impacts how herbicide carryover may affect cover crop growth and development.

Dry summers pose the greatest risk of herbicide carryover injury on cover crops. Many farmers are beginning to interseed cover crops into corn and soybeans, which can allow for greater fall growth. However, farmers should carefully review the herbicides used for weed control in the cash crop and consider application timing to ensure enough time has passed between herbicide application and cover crop planting so growth is not hindered by carryover.

Effective weed control in the cash crop should be the priority, and rates should not be reduced to accommodate the planned cover crop.

Iowa State University and the University of Missouri have done work on the impact of herbicide carryover on cover crop growth. As a general rule of thumb, radish is highly sensitive to carryover, and cereal rye and hairy vetch are some of the most tolerant to herbicide carryover.

Commonly used herbicides in soybeans that have higher carry over risk include:

- fomesafen (Flexstar/Prefix)
- pyroxasulfone (Zidua)
- imazethapyr (Pursuit)
- acetochlor (Warrant) and
- sulfentrazone (Authority products)

Commonly used herbicides in corn that have higher carryover risk include:

- topramezone (Impact)
- mesotrione (Callisto/Halex GT)
- clopyralid (Stinger/SureStart)
- isoxaflutole (Balance Flexx)
- pyroxasulfone (Zidua) and
- nicosulfuron (Accent Q)

## Biomass considerations

One last consideration for a farmer’s herbicide program is termination of the cover crop and how biomass impacts residual herbicide efficacy for pre-emergence herbicides. University of Wisconsin studies have shown that increases in biomass can have a positive impact on weed suppression, but fields with high levels of biomass (greater than 18 inches) will reduce the amount of herbicide that reaches the soil and limiting its efficacy.

Iowa State University recommends that farmers use a residual pre-emergence herbicide in their burndown pass in fields with cover crops that are less than 12-18 inches or if cover crop growth is not uniform across the field.

If cover crops are greater than 12-18 inches and have uniform growth, residual herbicides should be incorporated in the first post-application pass.

Depending on the timing of these applications, considerations should be made on what species and planting date will be chosen for the following year’s cover crop.

**MOST TOLERANT**

CEREAL RYE

HAIRY VETCH

OATS

WINTER WHEAT

ANNUAL RYEGRASS

CLOVER

PEAS

RADISH

**MOST SUSCEPTIBLE**

Figure 5. Radish peas and clover are more sensitive to herbicide carryover. Hairy vetch and cereal rye are most tolerant to herbicide carryover.



“When implementing a weed management program with cover crops, several factors should be considered. The first is establishment. Farmers should identify herbicides that may carry over to the desired cover crop at planting and follow Extension recommendations on fall planting intervals. Cover crop biomass and termination timing also matter. Low biomass or early termination often increases reliance on chemical weed control, while high biomass and termination closer to planting can improve weed suppression and reduce herbicide dependence. Ideally, weed management programs should combine both cultural and chemical control strategies.

“A residual herbicide targeting key weed species should be applied with the burndown if it is within 14 days of planting. Some residual herbicides can become tied up in heavy cover crop residue and may work better in thinner stands or be left out of the program. A planned post-application when weeds reach 3 to 4 inches tall is also essential to keep fields weed-free. Including a residual herbicide with the post application should depend on how close the crop is to canopy, but residual products can help reduce late-emerging weeds and improve season-long weed control.”

# Termination Planning

**T**ermination planning may be the most crucial step in determining cover crop success for farmers. Ensuring you have a goal in mind for your cover crops and aligning a termination plan is critical to success.

Though terminating cover crops at 12 inches or less will provide successful erosion control, you need to allow the cover crop to grow to 28-32 inches to most effectively use cover crops for weed suppression, according to research by the University of Wisconsin.

## Developing your plan

When talking to farmers, we see a consistent pattern that “logistics beats agronomy,” meaning that what is often agronomically optimal is usually superseded by the logistics of equipment and competing priorities for farmers.

Consider the following when developing your termination plan:

- What control do you have on cover crop termination?  
Having the ability to time when termination will happen may allow for a more aggressive termination plan.
- What other spring field work would be prioritized over termination?

Answering these questions early in the cover crop plan can help decide between winter hardy and winterkill species, as well as plans for spring termination timing. Not having access to a sprayer, for example, may make winterkill species such as oats in front of corn more desirable to minimize yield loss risks. You may then target winter hardy species such as rye to be planted in front of your soybean crop.

## Managing biomass

ISA’s on-farm studies in long-term cover crop trials show that the biggest indicator of yield loss potential in cover crops is the amount of biomass accumulated in both corn and soybeans.

When biomass was low, typically around 6 to 12 inches, both corn and soybeans showed minimal yield loss. However, when wet springs delayed termination and cover crop biomass was not controlled, both crops experienced significant yield loss, with corn typically affected more than soybeans.

See Figure 6 for relative differences in yields across 112 site years of data. In these studies, the high biomass occurred at 18% of corn sites and 37% of soybean locations and was associated with years that had higher-than-average spring rainfall.

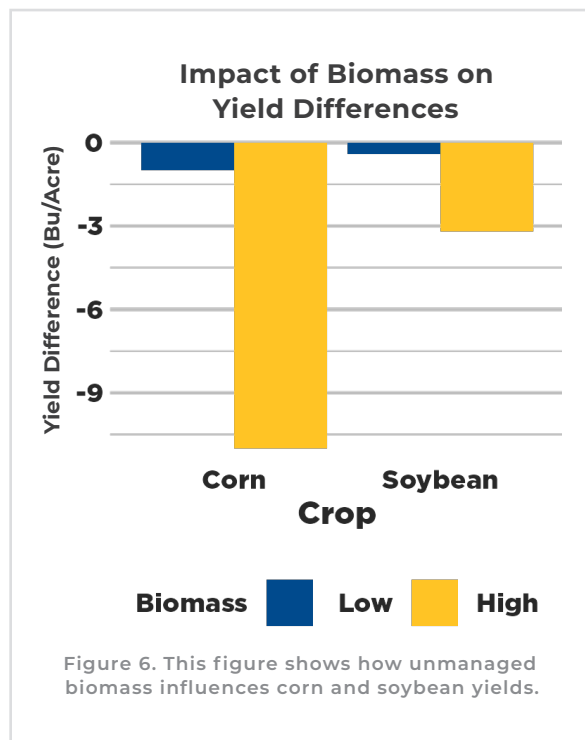


Figure 6. This figure shows how unmanaged biomass influences corn and soybean yields.

## Timing, conditions and selection

The recommended timing for termination is 10-14 days before the corn or soybeans are planted. ISA agronomists recommend “planting dead or green, no in-between,” meaning that early termination is recommended, but if termination is delayed, planting into a living “green” cover crop is preferable with termination within a day of planting. This is because partially terminated cover crops wrap around planter parts and cause issues.

Consider your cover crop species and chemical options when it comes to termination. See Figure 7 for commonly used herbicides and their ratings on different species.

Be wary of tank mixes that may cause antagonism between different chemistries (a commonly reported issue is mixing glyphosate with UAN 32%).

Once a herbicide has been selected, scout your fields to understand the size of the cover crop and determine the appropriate rates to use. Reducing application rates will likely result in inconsistent termination and lead to yield loss.

Be aware of forecasted temperatures as this will impact the efficacy of many herbicides. Herbicides work best when the plant is actively growing, with recommendations for glyphosate to have daytime temperatures above 60°F and nighttime temperatures above 40°F.

## Alternatives to herbicide termination

ISA strongly recommends using chemical termination strategies to most effectively terminate the cover crop. Other termination options include tillage and roller crimping.

Tillage has not shown consistent results and is not recommended for cover crop termination.

Roller crimping is an advanced method that requires waiting until the cereal rye is at the flowering stage, when the stem will snap rather than bend, effectively terminating the cover crop. Roller crimping will maximize the cover crop growth but is also more likely to interfere with the cash crops’ growth and development. With roller crimping, choosing cereal rye that is a specific variety will help ensure that cover crop growth is uniform across the field, but this will likely increase your seed costs.

	TERMINATION METHOD	CLOVER	HAIRY VETCH	RADISH	RAPESEED	ANNUAL RYEGRASS	CEREAL RYE	WHEAT	TRITICALE	OATS
Non-chemical control	Winterkill	N	N	E	N	N	N	N	N	E
	Roller crimping	P	F	N	G	N	G	G	G	G
	Chisel plow	G	G	E	E	G	G	G	G	G
	Vertical tillage	P	P	P	P	P	P	P	P	P
Glyphosate-based mixes	Glyphosate (1.13 lb a.e.)	F	F	E	E	G	E	G	E	E
	Glyphosate (0.75 lb a.e.) + 2,4-D (1 pt)	G	E	E	F	P	E	E	E	E
	Glyphosate (0.75 lb a.e.) + Dicamba (0.5 lb a.e.)	G	E	E	F	P	E	E	E	E
	Glyphosate (0.75 lb a.e.) + Sharpen (1 oz.)	F	P	E	P	F	E	E	E	E
	Glyphosate (1.13 lb a.e.) + Sharpen (1 oz.)	G	F	E	F	G	E	E	E	E
Paraquat-based mixes	Gramoxone (2 pt.)	P	P	G	F	P	F	F	F	F
	Gramoxone (3 pt.)	F	F	G	G	F	G	G	G	G
Other chemical controls	Select Max (Clethodim 16 oz.)	N	N	N	N	G	E	E	E	E
	Dicamba (0.5 lb a.e.)	E	E	P	P	N	N	N	N	N
	Glufosinate	P	G	ND	ND	P	P	F	P	F

Figure 7. Commonly used termination methods and efficacy ratings for cover crop species. Always review labels before applying. E=Excellent, G=Good, F=Fair, P=Poor, N=No control, ND=No data. Ratings below excellent may require additional control passes.

Source: Michigan State University Extension

## Cover crop termination management

Timely cover crop termination is an essential part of their management because higher biomass increases competition with the cash crops and decreases their yield potential. Early season fertility and timely termination are critical to the success of a cash crop.





Steve Rachut, Osage

“A couple years ago, I had a field that didn't get planted until June because of weather, and the rye was close to 6 feet tall and headed out. I planted into it green, terminated it chemically afterward, and it turned out a lot better than I expected. I wouldn't necessarily be afraid of a taller cover crop, but that was an extreme situation and not something I'd intentionally try to repeat.

“When it comes to termination, make sure you're using enough herbicide to get a complete kill. You don't want to just make the cover crop mad and have to come back again later. I've found it helps to pick a warm day and watch the forecast to make sure temperatures stay favorable for a day or two after spraying. The cover crop needs to be actively growing for the herbicide to work effectively, so paying attention to conditions can make a big difference.”

# Planter Setup Matters

**P**lanting depth based on soil moisture and seed-to-soil contact comes first, regardless of whether a cover crop was seeded.

When integrating cover crops into the operation, review planter settings to manage a high-residue system. If the operation is already no-till, few to no adaptations are needed, but otherwise reviewing row cleaners, coulters and downforce is crucial for good cash crop establishment.

## Plant dead or green, no in-between

ISA conservation agronomists suggest either plant dead or green, no in-between.

Residue from many grass cover crop species can bind in row cleaners as the plant dies, which is why experienced cover crop users often recommend planting either green or fully terminated to avoid planting issues. Knowing your termination strategy and expected residue levels can help guide planter adjustments and equipment investments.

When planting corn and soybeans, target a seeding depth of 2 inches for corn and 1.5 inches for soybeans.

As with any planter, check seed depth at each field to adjust for conditions. If there are areas of the field with noticeable differences in cover crop residue, check planting depths in these regions as well.

## Fine-tuning equipment

Coulters and row cleaners will be two of the biggest adjustments on the planter that will result in better outcomes in high residue environments.

Adjusting row cleaners to be aggressive and modifying coulters to create a clean furrow with minimal trash will help achieve optimal planting depths, good seed-to-soil contact and avoid hairpinning.

There are many adjustments and products available, and it is recommended to discuss with other farmers to understand what has worked for them in your area.

There will be some trial and error when adopting a new system but getting out of the cab frequently to check planting conditions will ensure planter settings are calibrated for field conditions.



**“To get started, you don’t need a lot of extra equipment. As long as you can slice through residue and get the trench closed, you’ll be fine. Closure is the key.**

**“Instead of smooth wheels, use something with notches to help close the trench. Residue managers are also important.”**

## Risks for planting green

When planting green, many Iowa farmers have removed row cleaners because they experience issues with the cover crop getting tangled in them.

University research has shown that when planting green, soil temperatures are typically lower, which can lead to delayed germination in both corn and soybeans. Seeds sitting in the soil longer will have an increased risk for seedling disease. Depending on field history, you may want to consider seed treatments to offset this risk.

Iowa State University has also observed increased risk of pythium in corn when planted green, which can lead to germination issues and potentially yield loss. Disease risk in soybeans has not had the same levels of risk reported.

In addition to early disease risk, insects may also be attracted to fields that have cover crops. These fields should be scouted closely for insect pressure that may also feed on the cash crop seedlings. Also consider what traits you have in the cash crop and if scouted insects are susceptible to this trait.

If a field has been terminated and has pests, the Crop Protection Network recommends delaying planting of these fields and not planting immediately after it has been sprayed. Sign up to receive text messages from Iowa State University Extension's Pest Alert Network about pests observed across the state. This helps inform timely scouting.

## Managing residue

Other options for reducing residue and potential cover crop competition with the cash crop include precision cover crop seeding and utilizing strip-till to reduce residue where the cash crop will be planted.

Precision cover crop seeding involves plugging certain rows on the drill so cover crops are not planted where the following cash crop row will be placed. This system requires guidance lines for the cover crop drill to align with the cash crop planter, and the planter should be equipped for no-till planting.

For farmers who use strip-till, this can be an excellent option for managing residue in cover-cropped fields while still allowing the cover crop to grow. Strip-till passes are then made after the cover crop has been established. The strip-till method can also be a good option when spring soil temperatures are a concern.



**“For first-timers or those still skeptical, we usually recommend terminating early, especially ahead of corn. As farmers gain experience, we suggest planting green. That’s often the easiest way and can reduce problems.**

**“One tip would be don’t get set in doing it one way. You may have to change what you’re doing based on environmental conditions. You have to be willing to pivot.”**

# Cover Crop Fertility

**F**ertility is an important aspect when considering the management of cover crops following corn and soybeans. Knowing the challenges and benefits is key when considering the management of the soil in cover cropped fields.

## Corn fertility management

### Fall

- Minimize nitrogen applications as the growing cover crop will uptake nitrogen prior to spring planting and not be available during vegetative growth for the following cash crop.
- If applying manure, consider low-disturbance injection methods to reduce disruption of cover crop growth.

### Spring

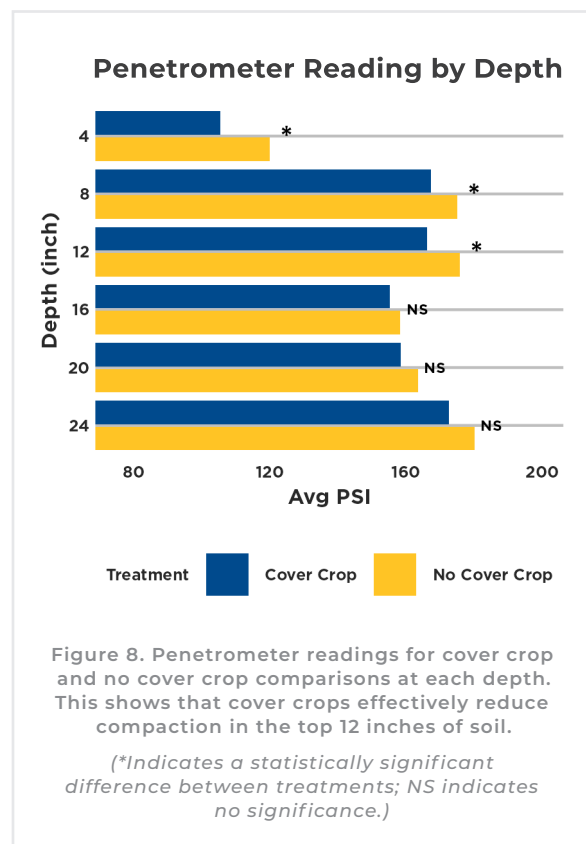
- Consider soil testing close to planting to assess nutrient composition after cover crop growth and apply a starter.
- Apply nitrogen close to the time of planting and post cover crop termination to minimize lost nitrogen due to cover crop immobilization.
- Applying a starter fertilizer with 20-30 pounds of nitrogen per acre can help minimize the impact of nitrogen immobilization.
- Phosphorus and potassium application timing does not need to be changed.

## Soybean fertility management

### Spring

- Consider soil testing close to planting to assess nutrient composition after cover crop growth.
- Apply a starter fertilizer to account for nutrients captured by cover crops.
- Phosphorus and potassium application timing does not need to be changed.
- Apply sulfur fertilizer to mitigate lost sulfur due to immobilization by cover crops.

- If sulfur levels in a field are unknown or have not been tested, the following two methods are recommended for testing:
  1. Plant tissue tests to determine if sulfur deficiency is an issue.
  2. Strips of 20 pounds of sulfur fertilizer if growing cereal rye cover crops to test if sulfur is needed, as recommended by Shaun Casteel at Purdue University.



## Benefits to soil fertility

Cover crops present many benefits when it comes to soil fertility.

Cover crops reduce erosion and help retain inputs, but the system requires careful management to ensure successful cash crops. The benefits from nutrient cycling are not immediate, but increased organic matter and nutrient stock improves soil fertility over time.

Cover crop foliage protects the soil surface from wind and water erosion. The roots of the cover crop improve soil structure allowing better water infiltration and water-holding capacity.

Maintenance or increases in soil organic matter with long-term cover crop adoption can further improve water-holding capacity. Internal research on long-term cover crop trials has shown reduced soil compaction with cover crops, especially at shallow soil depths (Figure 8).

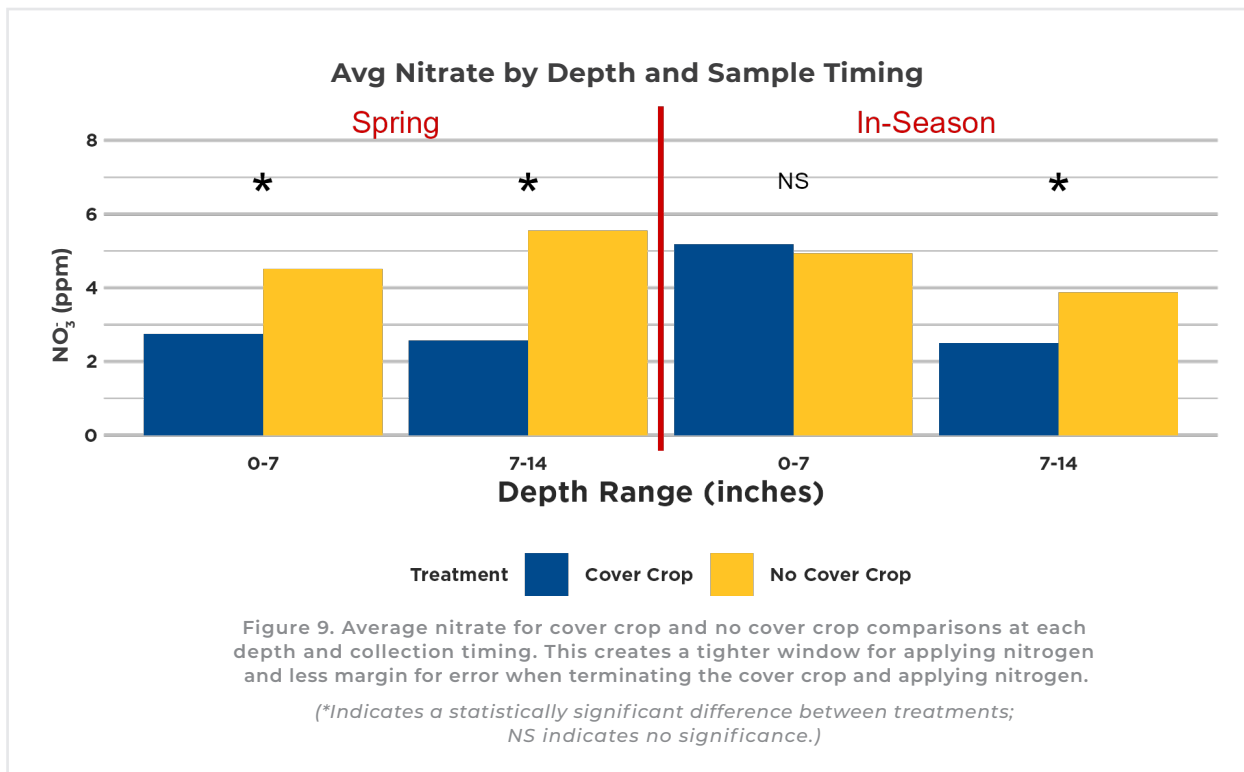
Cover crops eventually break down the compaction layer, which decreases crop rooting stress. Reducing the

compaction by ~15% PSI in the top 4 inches reduces stress on the cash crop when rooting especially early in its growth. Retaining soil by reducing water and wind erosion helps maintain higher soil fertility and increases the longevity of soil production.

## Fertility challenges

Cover crops uptake soil nutrients as they grow, leading to challenges when managing the following corn or soybean crop. Phosphorus and potassium are captured by the cover crop but cannot be used by the corn and soybeans in the same year.

These losses can be mitigated by applying a starter fertilizer. Nitrates are a larger challenge as they are vital to corn crop growth. Proper nitrogen application timing helps ensure nitrate is available when the crop needs it the most. Iowa Soybean Association's research on long-term cover crop trials shows how cover crops deplete nitrate levels in the soil at key times (Figure 9).





“There can be some nitrogen tie-up in the cover crop, so giving the cash crop an early-season shot of nitrogen can be very useful. On our farm, we’ve also seen sulfur become more important over time because of nutrient use intensity and tie-up. Supplementing sulfur now matters more for us than it did previously.

“Generally, you can manage fertility much the same to begin with, especially if you terminate the cover crop a week or more ahead of planting. Over time, you can adjust rates and fine-tune things as soil health improves and you find a new optimum for your farm.”

# CONSERVATION COMPASS



## Cost-Share Considerations

**F**inancial assistance is available for cover crops. Some programs can be added on top of other programs, commonly called “stacked” cost-share. When considering cost-share programs, look for specific practices that fit your farm goals.

Cost-share programs pay \$5 to \$90 per acre, with payments varying by location and cropping system. Payments can be financial incentives or cost savings, such as through the Crop Insurance Discount Program.

Most public funds can be accessed through your local USDA NRCS Service Center. Private funding options are available, too. Remember to keep all invoices of seeding expenses for program documentation.

Visit [thecompass.ag](http://thecompass.ag) to learn more about programs, whether programs can be stacked with others, and

multiple practices such as reduced tillage that could be available through other cost-share programs. This tool helps weigh the benefits and restrictions of each program, including:

- Ease of signup
- Contract length
- Funding source

ISA’s team of conservation agronomists is ready to help producers choose and enroll in the best program for their operation. Conservation agronomists are available across Iowa to discuss options for managing a cover crop — either establishment or termination — to reduce risk to the cash crop.

For more information on cost share options or cover crop assistance contact [conservation@iasoybeans.com](mailto:conservation@iasoybeans.com).



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