

Saving the planet by saving the soil: Can cover crops fulfill their promise?

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Caleb Akin, a co-operator of A&W Farms in Cambridge, Iowa, looks at the buckwheat cover crop growing in his organic, no-till soybean field.

In this story:

- 'Prosperity,' customer pressure help stir cover crop interest
- The 'yo-yo' principle of managing cover crops
- Is USDA overpromoting cover crops?

This is the first part of a four-part series examining the promise of cover crops, the potential for them to meet the nation's environmental goals that rest on their success, and the potential pitfalls and unintended consequences of trying to make cover crops work in parts of the country where they currently don't. Future installments will look at what it takes for cover crops to work financially; the potential for turning cover crops into cash crops; and the impact of policy barriers and incentives on the practice.

A field on Barry and Eli Little's South Dakota farm is riddled with green one day this fall well after the harvest of their winter wheat crop. The green is the first telltale sign of a complex mixture of plants that are increasingly seen as the key to addressing some of America's most pressing environmental challenges, from water pollution to climate change.

The tops of purple radish bulbs pop out of the ground, surrounded by the leaves of 14 other plants. Barry Little rattled their names off one by one: cow peas, millet, sun hemp, turnips, flax, sunflowers, oats, buckwheat, African cabbage, crimson clover, sorghum, sudangrass and soybeans. Each species has a distinct function, he says.

The plant mixture is the Littles' cover crop for this winter, and the benefits include reduced soil erosion and compaction, less runoff of sediments into waterways, improved water infiltration, and fewer weeds, just to name a few.

"Under the soil, there's a lot going on," Barry Little said.

Eli, his son, jumped in and added, "We even found where we did some of the inter-seeded cover crop on the corn and on hilltops, we had better corn than we've ever seen."

That promise of improved crop yields, coupled with the potential for reduced inputs and the potential for payments from state and federal governments as well as private companies are fueling increased farmer interest in cover crops in many regions of the country.

Even President Joe Biden, who referred to incentivizing the practice for its climate benefits in his first address before Congress, has his eyes on their potential.

The \$2 trillion Build Back Better bill that he's trying to push through Congress includes more than \$27 billion in new conservation funding, which could add rocket fuel to the cover crop movement. The bill includes a new, five-year program that would pay farmers \$25 an acre for planting up to 1,000 acres of cover crops.

Cover crops could also provide farmers with new revenue streams. Some farmers already are cutting them for hay and allowing them to be grazed. Others are starting to earn credits through fledgling carbon markets. The U.S. airline industry is looking at oilseed cover crops as a potential feedstock for the biofuel needed to reduce the carbon footprint of jets.

But cover crops may not work well everywhere, and some farmers are warning about the unintended consequences that could occur if the federal government and private industry go too far in promoting the practice.

In water-strapped areas of the central and southern Plains and western regions of the United States, cover crops can pose a challenge for farmers like Dan Atkisson, who gets around 20 to 22 inches of rainfall each year on his cattle, wheat, sorghum and corn operation in northwest Kansas. He said many producers who raise sorghum in dry climates feel the same way.

"Moisture is going to be our limiting factor to what we can produce, and hence, our profitability," Atkisson told *Agri-Pulse*. "So, we don't want to see any kind of a mandated-type cover crop in a system, because they just don't necessarily work in every geography."

Sorghum and wheat growers are also concerned that incentives for cover cropping systems, which may work well for corn and soybean growers in the Midwest, will simply

encourage growers to plant more corn and soybeans in arid regions of the country — thereby reducing plantings of winter wheat and sorghum or incentivizing more irrigation.

A great deal depends on how you would structure a cover crop incentive program, says Clay Pope, a wheat grower and member of the National Association of Wheat Growers who farms near Loyal, Oklahoma. “Every area is going to be different,” he adds. “You’ve got to have some flexibility and the opportunity to make changes as more information becomes known.”

Cover crop usage spreads, but still concentrated

In every county in the United States where there is a cash crop such as wheat, corn, soybeans, cotton or fruit, nuts and vegetables, at least one farmer is now planting a cover crop, from Delaware to California and even Hawaii, says Rob Myers, the national liaison on cover crops and soil health for the Sustainable Agriculture Research and Education (SARE) program and the director of the University of Missouri’s Center for Regenerative Agriculture.

“The surge in interest really started happening around a decade ago and a lot of that was connected to soil health,” Myers told *Agri-Pulse*. “As people have learned more about how to manage soil health, the interest in cover crops has really shot upwards.”

In 2017, U.S. farmers planted 15.4 million acres of cover crops, according to a report by the U.S. Department of Agriculture’s Economic Research Service. That’s a 50% increase from 2012, when farmers planted 10.3 million acres.

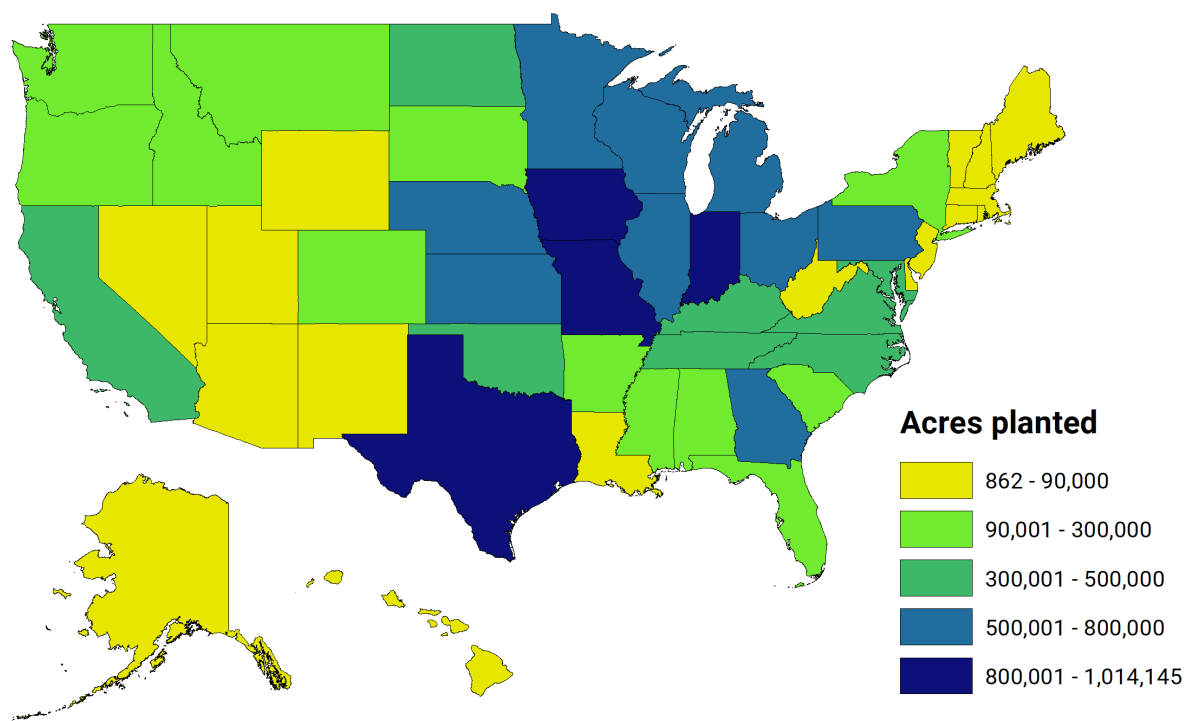
Producers are asking how cover crops can benefit their yields and overall soil health, and people like Jared Knock, who works in business development for Millborn Seeds, encourage everyone to be thinking about multiple benefits.

In recent years, he’s seen more organizations, both public and private, “who are looking to help farmers voluntarily adopt these practices, which have shared benefits, not only for the farmer but for the rest of the ecosystem.”

“There’s more prosperity in the farm community than we’ve had in a while so people are able to think longer-term, bigger picture, about what my farm might look like in 100 years instead of just trying to make annual payments,” Knock said. “Couple that with the talk about agriculture’s role of decarbonizing the environment and people are seeing that climate-smart agriculture is really conservation agriculture.”

Cover crops are more commonly used in some areas of the U.S. than others. In Maryland, where planting cover crops has been heavily promoted and incentivized by the state government to curb pollution into the Chesapeake Bay, cover crops were grown on 33% of the cropland in 2017, according to USDA. Other northeastern states have also seen high levels of adoption.

Acres planted with cover crops by state, 2017



Map by Noah Wicks

Data: USDA Census of Agriculture, SARE/Soil Health Institute

But in the Midwest and Great Lakes regions, the practice has grown at more moderate rates, and some states in the West — including Colorado, Washington, Wyoming and New Mexico — have actually seen declines in cover crop adoption.

Many species of plants can and do work for cover cropping, but some of the most common types are grasses, brassicas and legumes — including winter annuals like crimson clover and summer annuals like cowpeas.

Agronomists say producers have to factor in what might grow best with their soils, weather patterns and topography as they look to use cover crops to solve some of the problems they see in their fields.

“The thing is, like much else in ag, there cannot be a cookie-cutter approach,” said Francisco Calderon, the director of the Columbia Basin Agricultural Research Center at Oregon State University.

Management is key to getting the benefits

Lee Briesse, a crop consultant in North Dakota, said effectively getting benefits from cover crops takes time, effort, and experimentation. He compares it to learning how to do yo-yo tricks. Nobody can just pick up a yo-yo and know how to do advanced tricks. They have to take the time to learn them, one after another.

“This is a new technique,” Briesse said. “This is a new practice for a lot of farms and you actually have to work your way up to it. You have to learn how to get it to work in your system, and everybody's system is a little bit different.”

For a detailed look at cover crop benefits, read: [Cover crops can benefit farmers as well as the environment](#)

PepsiCo Inc., [one of many food industry giants that are trying to reduce their greenhouse gas emissions by working with farmers to sequester carbon through regenerative agriculture practices](#), has found that it's critical to provide growers with knowledgeable advice about cover crops.

The use of cover crops represents “a big change in an operation. You do not want to mess up your cash crop in doing cover crops the wrong way,” said Margaret Henry, PepsiCo’s director of sustainable agriculture.

PepsiCo provides payments directly to farmers and provides technical advice through independent organizations such as Practical Farmers of Iowa and the Illinois Corn Growers Association. Farmers in the program planted 89,000 acres of cover crops in 2020 and the goal was to have 200,000 acres in 2021.

In California, Braga Fresh Family Farms has incorporated Merced rye and a few cover crop mixes into its crop rotation plan for its operation that grows cool-season vegetables.

Eric Morgan, Braga Fresh’s vice president of environmental science resources, said the company aims to help stabilize slopes. He also said cover crops helped to capture residual nitrogen in the winter and convert that nitrogen into plant tissue, which can sometimes be made available for their first or second crop in the spring.

“A crop after a cover crop will have better yield, the soil will be softer,” he said. “Cover crops help us out quite a bit.”

Caleb Akin, who runs A&W farms in Cambridge, Iowa, with Noah Wendt, regularly deals with weeds like water hemp, ragweed, buttonweed, and foxtail — which he emphatically says is “the worst.” But for the farm’s organic, no-till soybean field, he and his partner needed a way to fight weeds without spraying, so they’ve implemented buckwheat between rows.

“Cover crops are the key to it,” Akin said. “Where there could be a weed growing, you’re putting a cover crop there instead. So now you’re in control of what weeds you’re dealing with.”

Briese said that cover crops can provide a lot of solutions to problems that are becoming increasingly harder to solve mechanically, like controlling herbicide-resistant

weeds. But he warns farmers that cover crop effectiveness depends on a variety of factors, some of which are out of the producers' control.

"It's a biological thing, it's not a mechanical thing," he said. "When we do something mechanically, whether tillage or mowing or whatever, you can force it to happen. When you're talking about biology, you need the environment to work for you."

But Missouri producer MacCauley Kincaid believes that a shift in mindset from depending on mechanical practices and chemicals to biologically based solutions is important for the long term.

"When you start thinking about your farm as an ecosystem, instead of a chemistry set, then that's when we can really start doing ecological benefits for the environment," Kincaid said.



Cover crops like this radish are becoming more commonplace on farms across the country.

Good management is critical to sequestering carbon, too

Cover crops add biomass to the soil, which helps to pull more carbon out of the atmosphere and store, or sequester, it in the soil, which can help reduce greenhouse

gas emissions. That's why cover crops are a key part of the Biden administration's strategy to use agriculture to help cut U.S. emissions in half by 2030.

To keep the carbon from returning to the air, the biomass has to stay in the ground, which is why effective carbon sequestration also requires management practices that don't break up the soil, said Rattan Lal, a renowned soil scientist at The Ohio State University who was awarded the World Food Prize for his research around restoring soil fertility and carbon sequestration.

When plants photosynthesize and take in carbon dioxide, they create biomass, one of the most common forms of soil organic carbon below and above the ground. That biomass returns to the same land where the plants are growing and, over time, gets broken down by soil microbes into humus — a substance similar to compost, but made without oxygen.

"Grow a cover crop," Lal said. "Suppress it, mow it, but don't plow it. Then, carbon will stay in the soil."

Jinshi Jian, a former research associate at the Pacific Northwest National Laboratory-University of Maryland Joint Global Change Research Institute, was part of a group of scientists that collected 1,195 soil organic carbon comparisons from 131 different studies and conducted a meta-analysis that looked at soil organic carbon changes after the use of cover crops.

The researchers found that cover cropping caused a 15.5% increase in soil organic carbon in soils at or above 30 centimeters deep, leading them to conclude in the paper that "inclusion of CCs (cover crops) into agricultural rotations can potentially increase soil carbon sequestration."

"The results clearly show that if we manage our croplands properly, then we can increase the carbon stock," Jian said.

Additionally, the study found that soils planted with cover crop mixes had larger soil organic matter increases than mono-species cover crops. Legumes and legume mixtures also saw significant soil organic carbon increases, while grass and grass-legume mixtures did not change soil organic matter significantly.

Jian said legumes tend to do better than grasses with storing soil organic carbon because they tend to have more biomass and a low carbon-to-nitrogen ratio.

“Combined, these two tend to have a good feedback to the soil organic carbon,” Jian said.

Soil types also play a role. Fine-textured soils saw a 39.5% mean change in soil organic carbon after cover crops, while coarse-textured and medium-textured soils saw mean changes of 11.4% and 10.3%, respectively.

Too dry? Too cold? Cover crops won't work for me, some farmers say

Farmers cite several challenges with cover crops. One is the additional time and labor they require; some 38 of 66 cover crop non-users surveyed by SARE and the Soil Health Institute raised that concern.

Planting a cover crop, in addition to a cash crop, creates a new burden for a farmer to bear. In addition to caring for their cash crop, farmers must think about what their cover crop requires, particularly when it comes to seeding and termination. And, since some producers wait until after harvest to seed cover crops, they only have a limited window of time to get that crop planted.

“One reason farmers that have not yet used them often cite as a barrier is they feel they don't have time to get them planted such as in the fall if they're growing summer crops like corn and soybeans,” Myers said. “So they may feel really busy in the fall with harvest and fall fieldwork, and they just don't have time to do a cover crop.”

That planting window can get especially small in the northernmost U.S. states. Brieseman said in North Dakota, where frosts tend to come at the end of September or sometime in

October, it can be difficult to establish a cover crop in the time right after the corn or soybean harvests.

“The recommendation really is if we can get them seeded before the third week in August, we get pretty good cover crop growth,” Briesse said. “If we get into September, then it's marginal whether or not you want to do it, just because we don't have enough time for growth.”

Growing cover crops, like all other plants, requires water, which can be another challenge to producers in arid and semiarid regions of the Great Plains and West.

Steven Nielsen, a former USDA Agricultural Research Service scientist, told *Agri-Pulse* he's grown frustrated with the Natural Resources Conservation Service for what he deems the “universal promotion” of cover crops, which spurred him to research their applicability in the water-scarce regions of the Central Great Plains.

NRCS “made some incredible claims about them not using water to grow and so that was the impetus of my research, to really determine whether cover crops grown in mixtures didn't use water, which was just an annoying claim to me, and, I thought, irresponsible to farmers in the Central Great Plains,” Nielsen said.

Through his research, Nielsen said he has found that aside from providing cover and increasing resistance to wind erosion, cover crops “aren't very useful” in water-limited areas of Kansas, Oklahoma, Colorado and Texas. His studies have tested grasses, oats, some oilseeds and some legumes.

“Cover crops have their potential uses in high precipitation areas or under irrigation,” he said. “They don't really have a valuable use in water-limited situations and in dryland agricultural systems. That's my opinion.”

One [report](#) he helped author on the subject states that on dryland operations in semiarid regions, “cover crop water use may result in significant yield loss in following crops such as winter wheat.”

Barry Evans, a cotton grower near Kress, Texas, midway between Lubbock and Amarillo, worries about farmers irrigating their cover crops to get them to grow. He fears that will further deplete the [Ogallala Aquifer](#), the lifeblood of the region's agriculture.

"I think there can be some negative things in our area about being incentivized to pump water" for cover crops, he said.

Evans, who was recently named farmer of the year by Field to Market, an organization that works with the ag supply chain to facilitate sustainable farming practices, protects his soil's fertility and moisture with rotations of high-residue crops such as sorghum or wheat and leaving fields fallow.

John Holman, a professor of agronomy at Kansas State University, has also been researching some cover crops like winter triticale, winter wheat, winter lentils, spring oats, spring triticale, spring peas and some mixes to try to figure out how cover crops impact moisture in Kansas soils.

One of Holman's findings: The longer a cover crop grows before the next cash crop, the more negative the impact on the cash crop's yield.

"If you terminated that thing the minute it came out of the ground — right when it emerged — it's not going to use any water, but you're not going to get any benefit either," he said. "And if you let it grow too long, what we've seen is it's a lot bigger impact on the next crop."

Farmers face similar concerns in water-stressed Western states.

"Most guys can't put water on a cover crop because it's not returning much economic yield and the water that they have they're trying to save for the crops they're trying to grow," said Cannon Michael, who grows tomatoes, melons, extra long staple cotton and other crops in California's Central Valley. "There's some additional challenges, I think, with California."

Most of the research on cover crops has been done in other regions of the country, so it's not clear how effectively they can be used in the Central Valley, he said.

"We're just trying to learn and see if it's going to be beneficial and what other practices might make sense," he said. "We're not against them, but it's just a little bit more complicated out here."

However, some scientists are trying to find ways to make cover crops work in dryland systems. For example, Oregon State University researchers are testing cover crops on winter wheat cash crops in Morrow County, Oregon, which gets around nine inches of rainfall a year. One of the researchers, Christina Hagerty, said they're seeing some promise with winter peas, spring barley and a mixture of fall-planted cover crops.

"Those were kind of our standouts in terms of getting nice biomass and that biomass is then what contributes to eventual organic matter, trapping snow, things of that nature," Hagerty said.

Don Hineman, who farms 10 miles outside of Dighton, Kansas, hasn't had much success with cover crops. But he has found after the summer wheat harvest, if he leaves the remaining stubble in the soil until the spring, he can get some of the benefits.

"We absolutely see an increase in yields for corn and milo (grain sorghum) when we plant into standing wheat stubble," he told *Agri-Pulse*.

Other regions of the U.S. have problems with excess water, an entirely different challenge for cover crops. One of those is the Delmarva Peninsula, the flat region sandwiched between the Atlantic Ocean and the Chesapeake Bay that has poorly drained soils.

Managed properly, cover crops can actually help soak up some of the excess moisture, said Ray Weil, a professor of soil science at the University of Maryland.

“Even when your water's a problem, it's less of a problem with the cover crops, especially if you learn to plant green,” he said, referring to seeding the cover crop before the cash crop is harvested.

Jay Baxter, who farms near Georgetown, Delaware, half an hour from the Atlantic Ocean shoreline, says one low spot in his field that sees continued soil compaction can become a “puddle” after filling with water. However, cover crops have helped him get rid of some of that excess water by increasing infiltration.

“As long as we can keep from having 6-, 8-, 10-inch rain, we generally can shrink that puddle,” he said. “We’ve seen year in and year out that we’ve been able to average things out a lot easier.”



South Dakota farmer Eli Little explains his experience with cover crops.

In northeastern Arkansas, farmers in that flat region need good drainage to grow cover crops in the clay soils where farmers often deal with excess water in the winter, said Brad Doyle, who grows soybeans, rice and wheat in the area.

"We can still do it (cover crops). We can still get away with it. But it's proper drainage. As flat as we are, you need the drainage," said Doyle, who is vice president of the American Soybean Association.

It's taken time, but SD farmers sold on cover crops benefits

When the Littles started planting cover crops on their South Dakota farm in 2014, their main goal was to get another feed source for their cattle. But the possibility of having living roots in the soil throughout the winter became more important as the Littles learned about — and saw — the soil health benefits.

"There's people who think that planting cover crops is our goal," Barry Little said. "But cover crops are just a tool to fix our soil."

The turnips, radishes and sunflowers break up soil compaction. The millet scavenges nitrogen. The sorghum sudangrass has become a nutritious source of feed for their cattle. The remaining species contribute in some way to the overall health of their soil.

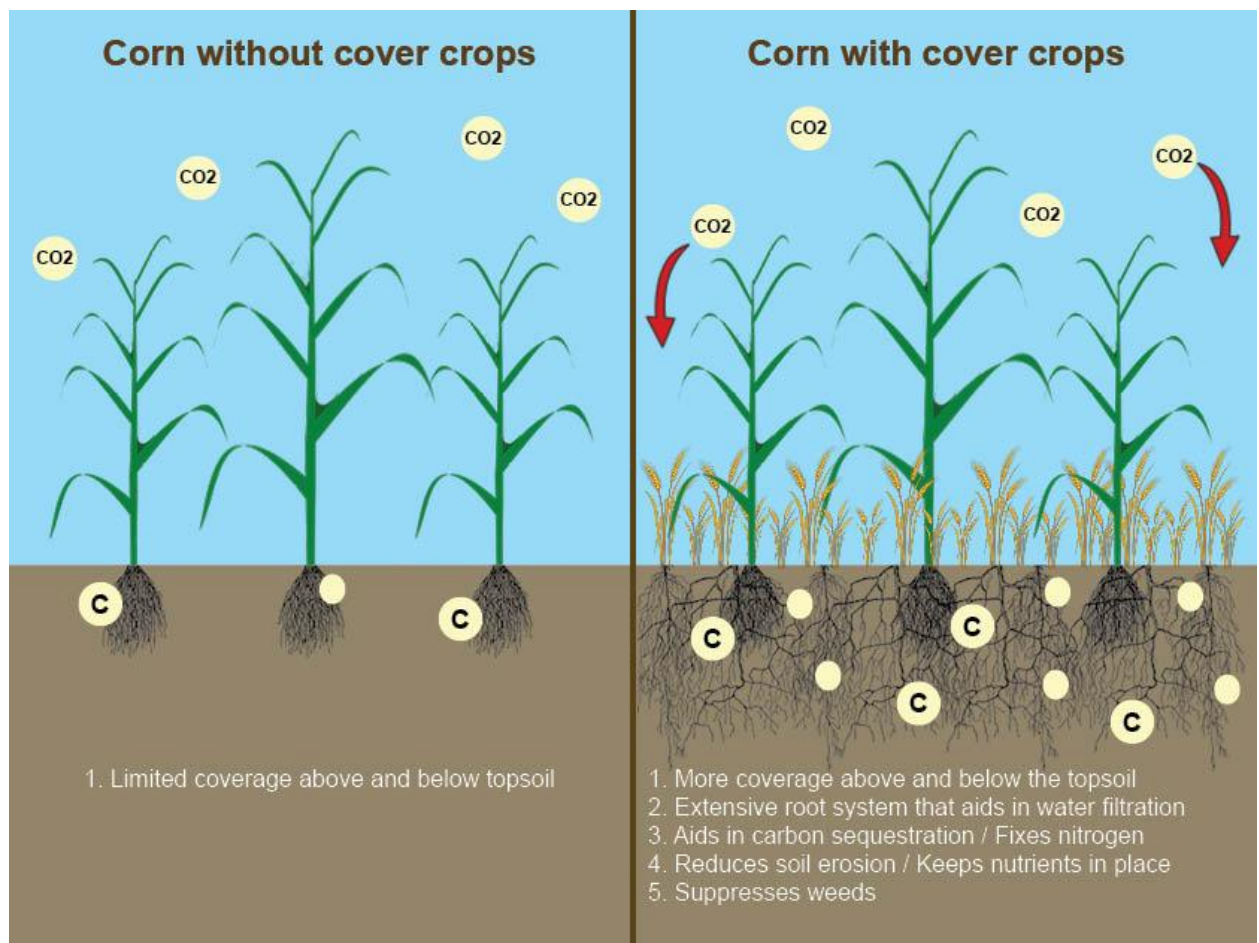
"It seems to work," he said.

Cover crops can benefit farmers, earth in many ways

The [Midwest Cover Crops Council](#), the [Northeast Cover Crops Council](#) and the [Southern Cover Crops Council](#) have created tools to help producers in their regions decide on the right cover crops based on their goals, soil types, growing season lengths and locations.

[USDA-funded Sustainable Agriculture Research and Education program](#) and other experts say that if used correctly, cover crops can provide the following benefits in certain conditions:

- **Carbon sequestration:** Farmers who use the right cover crops in conjunction with a no-till system can trap an extra 750 to 800 pounds of carbon per acre per year in the soil, says Rattan Lal, a soil scientist at The Ohio State University. Similarly, a study analyzing data from 131 different studies found that cover cropping increased soil carbon by 15.5% near the surface. Lal cautions that the soil must be left unplowed to retain the carbon. Biomass also could be lost through haying and grazing, he says. Carbon sequestration rates depend on temperature, latitude, soil texture and other environmental and management factors.
- **Reduced fertilizer costs:** Cover crops such as hairy vetch, medium red clover, Austrian winter peas and fibrous-rooted cereal grains can contribute nitrogen to the following cash crops. Reducing nitrogen usage, in turn, can reduce emissions of nitrous oxide from fields, the largest source of greenhouse gas emissions from U.S. agriculture.
- **Reduce soil erosion:** With enough stalk and leaf growth, many cover crops can help prevent soil loss, particularly in winter months when nothing else will grow in fields.



- **Suppress weeds:** Cover crops use water and nutrients and block light that is needed by weeds. Cover crops also change the soil surface temperature or possess herbicidal compounds in their roots that can effectively prevent weeds. Cereal rye, barley, oats and mixtures can be effective for keeping weeds at bay, SARE says.
- **Improve soil health and nutrient cycling:** According to SARE, there are several ways that cover crops can improve soil health. For example, rye can add organic matter to the soil, sorghum sudangrass has deep roots that can help relieve soil compaction and ryegrass can “stabilize field roads, inter-row areas and borders when soil is wet.”
- **Conserve soil moisture:** Cover crops can help increase water infiltration and reduce evaporation. Rye, wheat and sorghum-sudangrass hybrids can effectively cover the soil surface, while legumes like medic and Indianhead lentils may conserve more moisture than conventional bare fallow in dryland areas.
- **Protect water quality:** Cover crops can reduce pollution from sediments, nutrients and chemicals by taking up excess soil nitrogen, reducing erosion and slowing runoff. Authors of the SARE report cite a study conducted on Georgia corn fields that found a rye cover crop “scavenged” between 25 to 100% of residual nitrogen.

Next: Many farmers who try cover crops complain that it costs more to grow them than they're worth. How do farmers make them work financially, and how long does it take?

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Making cover crops pay off: what it takes to cover the cost

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KEYWORDS COVER CROP BENEFITS COVER CROP COSTS COVER CROP PAYMENTS COVER CROP PLANTING COVER CROPS DEPARTMENT OF AGRICULTURE ECONOMIC RESEARCH SERVICE ERS FERTILIZER MILLBORN SEEDS RAY WEIL ROB MYERS SARE SOIL HEALTH SOIL HEALTH INSTITUTE SUSTAINABILITY SUSTAINABLE AGRICULTURE RESEARCH AND EDUCATION PROGRAM USDA



Diakon radishes (Photo: Edwin Remsberg/SARE)

- ***Producers can break even in as little as two years***
- ***But seed, planting costs challenge economics***
- ***Landowners can frustrate farmers' cover crop hopes***

This is the second part of our four-part series looking at the promise of cover crops and the challenges that farmers face. The first installment, which focused on the [management and promotion of cover crops](#), can be found on [Agri-Pulse.com](#).

Missouri producer Macauley Kincaid started planting cover crops in 2014, primarily for the financial benefits he thought they would provide. It took time, but they paid off.

By 2020, he noticed a 70% reduction in the amount of nitrogen, phosphorus and potassium that he needed to apply to his fields, said Kincaid, who plants cover crops on all of his 650 acres of corn and soybeans.

And even with the reduced fertilizer usage, he's been averaging 120 bushels of corn the last four years, which is over his county's trend-adjusted actual production history (APH) for corn at 112 bushels.

"We're over the county average, but our expenses are probably less than half of the average farmer in our area," said Kincaid, who farms near Jasper in southwest Missouri. "So the cover crops have really saved us a lot of money."

That's music to the ears of any farmer who's considering whether to undertake the practice and all the complexities and challenges cover crops can bring. But the benefits of cover crops — both in terms of soil health and potential profits — don't appear quickly or uniformly. And some farmers who rent their land may have trouble getting landlords on board.

On average, it takes about three years for producers to break even with cover crops, said Rob Myers, the national liaison on cover crops and soil health for the Sustainable Agriculture Research and Education (SARE) program and the director of the University of Missouri's Center for Regenerative Agriculture.

In the first year or two, producers may see some of the most apparent benefits, such as reduced erosion and increased weed suppression. However, some of the longer-term benefits, including improved soil health, take longer. By the third year most producers should see the economic benefits offset the costs, and then in the years following, they should return a net profit, Myers says.

“What happens is the yield of the cash crop gradually increases in a modest fashion,” Myers said. “For example, soybeans after three years will be about 3% higher [and] about 5% higher after five years, on average.”

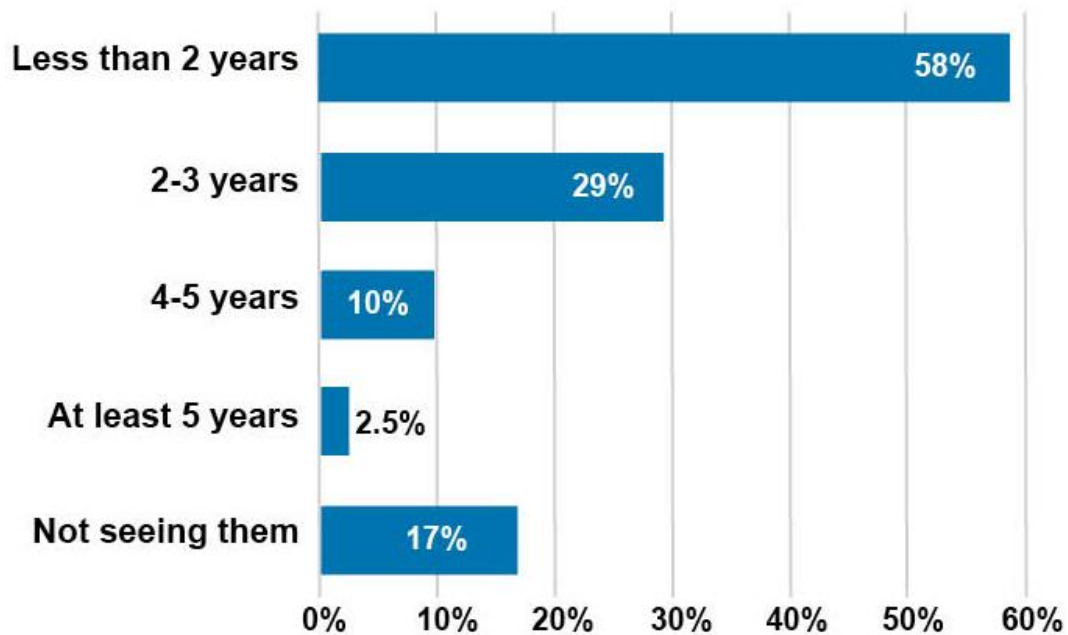
In a [2019-2020 survey](#) conducted by SARE, the Conservation Technology Information Center and the American Seed Trade Association, 58% of 746 responding producers said they began seeing soil benefits to their farm in less than two years of planting cover crops. Additionally, 35% of producers reported a net profit increase of 5% or more after planting them.

Approximately 29% said it took two to three years to see soil benefits; 10% said it took four to five years. For another 2.5%, it took more than five years. A little more than 23% of producers said they saw their net profits increase 2% to 4% following their use of cover crops.

About 16% of the farmers surveyed, or 125 growers, hadn’t found any soil benefits from growing cover crops. However, 74 of these producers had three years or less of experience with cover crops. About 3% said cover crops had actually cut their net income.

Another farmer who’s seen economic and agronomic benefits within a few years is Matt Ulmer, who grows corn, soybeans and small grains on about 500 acres in central Pennsylvania. He started planting cereal rye as cover 12 years ago when he began farming. He was focused on preventing soil erosion and building overall soil health and resiliency to better cope with extreme weather events.

How long does it take farmers to see soil health benefits from planting cover crops?



Source: SARE

Ulmer said he's seen improvements in all of these aspects, but particularly in soil retention, which was a big concern for him.

"Some of the land we have is quite rolling and fairly steep — and fairly sizable plots in some places that are completely on a hillside," he said. "The cover crop does an amazing job of holding everything there."

Ulmer says he has "greatly reduced" his fertilizer inputs. He also likes to see six to 12 inches of regrowth in the spring because it helps keep the soil covered and provides some weed relief. But he did note that it may take a while for some producers to see the benefits.

“Sometimes it feels like you’re at it a few years before you start seeing anything,” he said.

In Maryland, the potential for capturing excess nitrogen has encouraged the state government to heavily incentivize farmers for their use. But Ray Weil, a professor of soil science at the University of Maryland, says in order for nitrogen capture to effectively happen, farmers must plant at the right times.



Ray Weil, University of Maryland (Photo: Edwin Remsberg/SARE)

Weil says studies have shown that during the winter, cover crops are dormant and don’t do much to take in excess nitrogen. By seeding cover crops before the end of

September — which, for most, would mean interseeding cover crops among still-growing cash crops — producers can get the most nitrogen reduction possible.

“There's a huge difference in the concentration of nitrogen in the drainage water coming out of the fields looking at an early planted cover crop versus no cover crop,” Weil said. “If it's planted very late, you may have a little bit there, but the effect kind of disappears.”

Despite the benefits cover crops can provide, they are still an investment, and it can be hard given the potential trade-offs for producers to take the risk of changing their practices.

“In California we just have very high labor costs. So doing extra operations, we have to be really careful that that's gonna return value,” said sixth-generation specialty crop producer Cannon Michael .

“So, I would say that there's probably more people on the sidelines, trying to figure out if this is going to make economic sense and then also just trying to learn.”

Seed, planting costs figure big in cover crop economics

Cover crops, like any cash crop, are an investment. When planning their rotations, producers factor in the costs of buying seed, planting it and making sure it gets terminated before their next cash crop.

Seeds and planting account for the lion's share of growing cover crops. Seed expense alone represents about two-thirds of the total cost of planting cover crops, based on an average seed cost of \$25 an acre, [according to a SARE analysis](#). Planting expenses accounted for most of the rest. Termination costs can range from nothing to \$10 an acre; some cover crops die on their own.

The median cost of seed was actually lower than \$25 at \$16 to \$20 an acre in the 2019-20 survey by SARE, the Conservation Technology Information Center and the American Seed Trade Association. The median in the 2012, 2013 and 2014 surveys was \$25 an acre.

Myers said some types of seed, like cereal rye, may have become less expensive per pound because more farmers are growing it for cover crop seed. However, he said seed for clovers and vetches are not likely to be much cheaper than a few years ago.

Radish, winter pea and clover are among the most expensive species, and they are most popular with horticulture producers on small plots of land, the latest survey indicates. About two-thirds of the survey's 151 horticulture respondents reported paying more than the median range for seed, and about one in four paid more than \$40.

A separate study by the [USDA Economic Research Service](#) said oat seed planted as a cover crop on cotton, corn and soybean acres cost about \$19 to \$21. Winter wheat seed cost about \$15 to \$16.

Justin Fruechte, a senior forage and cover crop specialist at the South Dakota-based Millborn Seeds, said grains and brassicas are generally the cheapest seed types per acre, while legumes are the most expensive.

When Millborn Seeds designs mixes for South Dakota producers, the company considers issues such as the producer's goals, how the seeds will be planted, and the distinct nature of the farmers' soil and climate, Fruechte said.

"We can do a lot of cover crops for around \$15 per acre, and as guys want to get more creative or try different things or have more legumes in the mix, then that cost per acre can get more expensive," he told *Agri-Pulse*. "But usually it probably peaks at \$25 to \$30 per acre."

He's noticed that many producers in the area tend to like radishes, turnips and rye, and a growing number are planning to use cover crops as livestock feed.

Kent Wasson, a Montana wheat and cattle producer, is in the latter group. He plants a mixture of cowpeas, chickpeas, millet, sorghum, radishes, turnips and an early maturing type of corn to primarily be used as cattle feed.

He had to pay more than \$20 an acre for seed this year, but by grazing his cover crops he also cuts back on his feed costs, he said.

Seeding method affects timing, effectiveness

There are a number of different methods for planting cover crops, but when producers choose which route to take, they need to consider timing, effectiveness and cost, experts say.

Cover crops can be “planted green” into standing cash crops or they can be planted after or during harvest. Some of the most common methods include:

- **Interseeding:** According to [extension educators at the University of Nebraska-Lincoln](#), producers can plant cover crop seed into crops like corn and soybeans, but during periods when the crop’s canopy isn’t closed. Most of the time, interseeding is done early in the season by broadcasting, using a drill or using specialized or modified equipment.
- **Overseeding:** According to [the University of Wisconsin-Madison](#) extension office, cover crops can be planted into standing crops late in the season by broadcasting or by using aerial or highboy equipment. However, [Weil with the University of Maryland](#) noted most farmers wouldn’t buy the kind of specialized equipment used to do this. Producers also need to consider the potential of cash crops like corn blocking sunlight or catching seeds before they hit the ground, which can hinder the effectiveness of this approach.
- **Manure Slurry Seeding:** According to a [Purdue University study](#), producers can mix cover crops with liquid manure inside spreader tanks. Then, they commence with the “shallow injection seed and manure to facilitate the germination and establishment of the cover crop.” The study found the method was an “efficient and effective” method for use in no-till cover cropping systems.

- **Post-harvest seeding:** Cover crops can also be planted following a cash crop. Most of the time, this is done with a drill, air seeder or using aerial equipment like planes or drones.
- **Equipment:** Seed drills, air seeders and airplanes all are used by farmers for seeding cover crops, and there are new technologies coming on the scene, including drones.

Of all seeding technologies, no-till or conventional drills are among the most effective at ensuring cover crops are planted fully, although farmers generally have to wait until after the cash crop is harvested to seed their fields. Still, the drills help ensure that the seeds are placed in the ground at the right depth and rate.

Weil, the University of Maryland professor, said no-till drills are very common among farmers in the Northeast.

“It’s reliable, you’ll get a good stand,” Weil said. “Drilling works, but it means you have to wait until after harvest.”

However, using a drill often requires more time than other methods, which can be difficult for producers who are more focused on harvesting their cash crops. Additionally, it may be hard for producers to effectively use their window of time for seeding if they are seeing rain or wet conditions.

Airseeders, which blow seeds through hoses to the ground, are also commonly used for seeding cover crops. Noah Wendt, who co-owns an Iowa farm with Caleb Akin, has previously seeded using an air seeder mounted on a neighbor’s vertical tillage tool. The airseeder blew seed in front of the tillage tool, which worked it into the ground.

“We got two benefits out of that,” Wendt said. “We got the cover crop seeded and it also tilled the soil.”

Wasson, the Montana wheat producer, has 70-foot air seeders that he uses to plant brassicas. He normally tries to get them at least $\frac{3}{4}$ to 1 inch deep in the ground.

“We seed it just like we would wheat, only a little bit shallower,” he said.

For producers who need more flexibility, aerial seeding options might be a more appealing choice. Airplanes can drop seeds in a variety of conditions, including when soils are wet after rain or when cash crops are sitting in fields.

According to a 2019 industry survey by the National Agricultural Aviation Association, aerial applicators use planes to seed about 956,000 acres of cover crops every year.

“Probably the number one reason for the popularity for aerial application of cover crops is, it can occur before the cash crop has been harvested,” Scott Bretthauer, the director of education and safety for the National Agricultural Aviation Association, told *Agri-Pulse*.

The most common airplane hopper size is 500 gallons, though others can range from 200 to 800, depending on the model. One potential challenge can present itself if applicators run out of seeds. To reload, they often need to go back to their airstrip.

However, if the airstrip is located far from the fields they are seeding, seeding will take more time and producers may need to pay extra.

Additionally, some light seeds can catch the wind when being dropped from the air and drift away from the intended location. Others might land on top of large cash crops like corn and never fully reach the ground.

Drones are an emerging technology and like planes, they have been adapted to plant cover crops aerially. They can be completely remote-controlled, but the downside is that they are small and can't hold very much seed.

Lee Tesdell, an Iowa landowner who has worked with a farmer renting his land to establish cover crops, tried drones this year but found they can only plant about 20 pounds of seed per acre at a time, which means they can't cover very many acres before needing to be refilled.

“I'm not real optimistic about drones at the rate I'm using them,” Tesdell said. “I want more seed on the ground.”

According to a SARE report, costs for seeding cover crops can range from \$5 to \$18 per acre, though a 2012 survey found a median cost of \$12 an acre.

Hiring an aerial applicator may cost \$12 to \$18 per acre, while a 10-foot drill may cost around \$10 an acre and a 40-foot row crop planter could amount to \$10 an acre. If seeding with fertilizer, producers would likely just pay the cost of the fertilizer application and the seed.

Myers said cost-conscious farmers have found ways to reduce their cost of cover crop seeding. For example, some are using more efficient methods of seeding like a 30-foot-wide row crop planter rather than a 10-foot-wide drill. Others are having their fertilizer dealers mix their cover crop seed in with their fertilizer to save an extra trip over the field.

Some 20% to 30% of farmers are using lower seeding rates per acre for cover crops than they used to, either to stretch their dollars, make it easier to plant green, or just because they believe they can get the cover crop they need with less seed, according to Myers.

Getting that landlord (or renter) on board

Cost isn't the only factor farmers have to consider: Producers can't even get to the point of figuring out whether a cover crop will pencil out if they rent their land and the owner doesn't want cover crops.

In other cases, landowners may want their renters to use cover crops, but can't convince them to adopt the practice.

More than half of the cropland in the contiguous 48 states is rented.

In the latest SARE survey, 19% of farmers surveyed had concerns about using cover crops on rented land. In the same survey, more than 15% of respondents said they did not own the land they farmed, over 19% owned up to 25% of the land they farmed and just under 8% owned between 26% and 50%.

In Louisiana, where Naveen Adusumilli has been researching the adoption of conservation practices on rented land, there's an upward trend of farmers using cover crops between the years 1997 and 2020. There's also a clear increase in tenant-farmed land acres, as more landowning farm operators age and decide to rent out the land instead of continuing to work it. However, as there's no hard data on the two together, it's unclear whether there's a link or not.

"That's the kind of a connection we would like to make," Adusumilli, an associate professor of agricultural economics and agribusiness at Louisiana State University, told *Agri-Pulse*. "But hard numbers are tough to report."

But according to Adusumilli, many of the barriers to cover crop adoption on rented ground tend to present themselves when the landlords aren't actively engaged in the operation of the farm.

According to USDA, 80% of rented farmland in 2014 was owned by landlords who are not actively involved in farming. And nearly 20% of the acres rented in eight states — Kansas, North Dakota, Oklahoma, Mississippi, Texas, Washington, Idaho and Arkansas — was owned by landlords who lived more than 100 miles away from the land.

It can be difficult for tenant farmers to convince a landowner who is not actively involved in the day-to-day operations of the farm to support the adoption of cover crops on the operation and even more difficult when those landowners live long distances away.

"There is — I wouldn't say an uphill task — but a little bit of a substantive argument that a farmer has to make with these absentee landowners," Adusumilli told *Agri-Pulse*. "So

that's one of [the barriers], which is, is the farmer an actively-engaged owner or an absentee landowner?"

For instance, according to a study by USDA's Economic Research Service, states with a higher percentage of absentee landlords had a lower percentage of cropland under cover crops in 2017. However, the report's authors noted there was no statistical association between the percentage change in cover crop usage over the period studied.

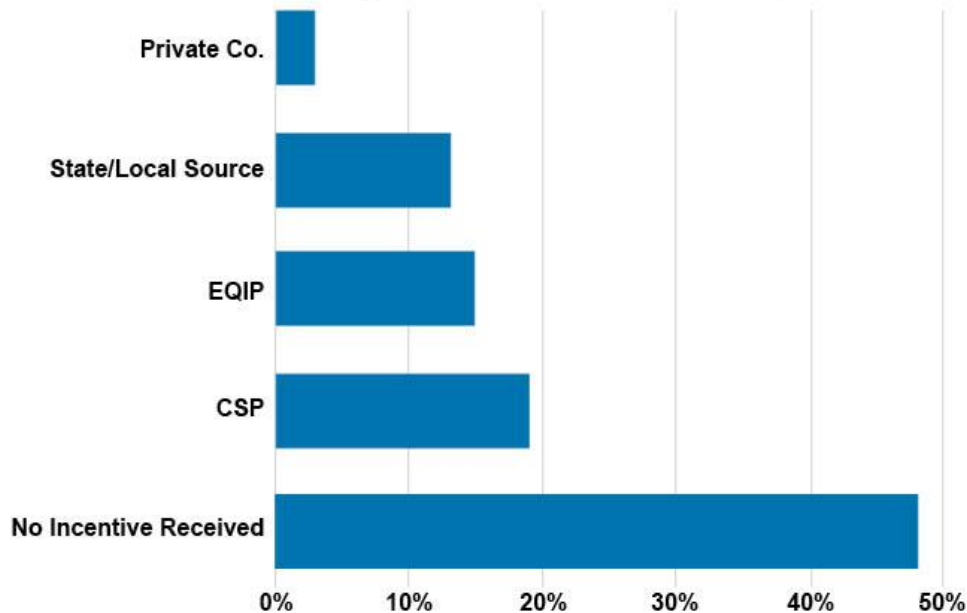
"I think nowadays it's just not so much of that landlord interaction with the growers anymore because a lot of them are either renting through a farm management group or they're living away from the farm," said Adam Smith, a farmer who rents land in Iowa and also works at Beck's Seed Co. "So they're not really seeing what's going on."

Smith said he hasn't had much of a problem with implementing cover crops on his rented ground, however. He said that the owners take a fairly hands-off approach and

let him handle most of the management decisions.

Incentives help many farms start cover crops

Sources of payments to farmers for cover crops



Half of farmers surveyed said they received an incentive payment for planting cover crops in 2019.

USDA's Conservation Stewardship Program provides payments for soil or water-protecting practices under a five-year contract. The Environmental Quality Incentives Program provides cost-share assistance to undertake or install practices or purchase equipment.

Some states or local soil and water conservation districts provide incentive payments.

Some private companies also pay farmers for implementing cover crops.

Source: SARE

As for landowners who want to implement cover crops on their land, they often must make the initial steps with their renters, said Tesdell, who worked with the farmer renting his Iowa farmland to adopt the practice.

"Tenants are going to be a little reluctant to try new practices on rented ground," he said.

"So the point I like to make with landowners is, step up and take the lead. Get yourself educated about conservation."

Plus, there's the question of who pays the cost of cover crops. Most landowners lease out their acreage either through a crop share arrangement, in which case the owner shares in the production costs and profit or loss, or through a fixed annual rent.

Farmers who pay cash rent don't have to share their profits with landowners, but those farmers also have to cover their own costs themselves, including the expense of cover crops.

Smith said that he pays for most of his own cover crop costs on his rented ground.

Tesdell, on the other hand, shares the cover crop costs with his renter.

"I think the landowner needs to step up and pay for some initial costs," Tesdell said.

Perennial cover crops find home in orchards, vineyards

Most of the cover crops that are currently being used in row crop operations are annuals, which means they have to be reseeded every year. But perennials, such as grasses and legumes, are used in orchards and vineyards, and with further research, some experts say they could have a place alongside field crops, too.

In Pacific Northwest orchards, perennial grasses like perennial ryegrass and red fescue have been used as cover crops for decades.

According to David Granatstein, a sustainable agriculture specialist at the Washington State University Center for Sustaining Agriculture and Natural Resources, producers began to see the value of planting grasses between rows of trees in the '30s and '40s, after they began noticing issues with soil degradation and runoff that bare soils caused.

So, to fix the issues, they began planting grass between rows and in many Washington orchards, the practice stuck.

"Here in Washington, people were already growing this perennial grass," Granatstein said. "They didn't consider it a cover crop in the sense that annual crop farmers do. It

was just, they planted it, mowed it a few times a year and that's about all they did. They sort of ignored it.”

The potential benefits of growing perennial cover crops in orchards are similar to the benefits seen nationwide with annual cover crops: improved water infiltration, better soil quality, nitrogen capture and improved management of some pests. Additionally, Granatstein said they cost less than annuals because you only need to seed them once and they will reestablish themselves in the years following.

“Some of the benefits you don’t see until several years go by because they’re changes in soil quality that take a while to happen and maybe are more subtle to express,” Granatstein said.

One barrier to cover crops does appear in California nut orchards that use large vacuums to harvest the nuts, Granatstein said. If the alleyway only consists of dirt, the dust that is sucked up will blow out of the back of the large vacuum machines. But plants in the alleyway could plug up the vacuum, creating an extra obstacle during the nut harvest.

Another problem for cover crops in orchards is the possibility that they will attract some unwanted pests. Granatstein said nearly all legumes are attractive to voles, a major pest for fruit producers. Legumes also draw concern about lygus bugs and leafhoppers, the latter of which can spread the X-disease (Little Cherry Virus) to cherry, peach, nectarine, almond, plum and chokecherry orchards.

“If you’ve got legumes in the orchard, the leafhoppers feed on the legume, pick up the diseased organism, fly to the tree, suck on the tree, inject it into the tree, and now you’ve got problems,” said Granatstein. “So it’s really set back any interest in alternatives in terms of the legumes — in fact, in terms of most things.”

Vineyards are also primary users of perennial cover crops. Patty Skinkis, a professor and viticulture extension specialist at Oregon State University, said it’s common to see

perennial ryegrasses and fescues growing in the alleyways between rows of grapes in Oregon.

“We're on hillsides, so it's a big problem to have a vineyard floor that's not got stability, mainly for the rainy season in the winter,” Skinkis told *Agri-Pulse*. “So we see that in a lot of the west side of the state, we are growing something, always, in the alley.”

While she couldn't speak to vineyards in other parts of the U.S., Skinkis said another common cover crop for Oregon vineyards was crimson clover — which seems to grow well in the climate. She said she hasn't seen very many producers planting just legumes, because grapevines don't need a lot of nitrogen. The legumes that producers do use are often mixed with grasses.

She also noted that vetches are not very common, because if they are not properly taken care of, they can grow up the grapevines.

Besides their soil health benefits, cover crops can help provide a tourism benefit to vineyards, many of which draw revenue from the people who come to visit each year. To appeal to tourists, grape growers will often plant visually appealing varieties of cover crops near their tasting rooms and wineries, Skinkis said.

“People will grow crimson clover or California poppies — those seem to be the two most common,” she said. “They're easy to seed, very visual in the spring between the vine rows and usually they're mixed with another grass or a cereal grain.”

While they have their uses in orchards and vineyards, perennial cover crops aren't often planted with annual cash crops like corn or soybeans. Integrating perennial cover crops into an annual system isn't easy, according to Iowa State University agronomy professor Kenneth Moore.

Moore has been working with several other researchers on perennial ground cover crops for about 15 years and he is convinced that perennial cover crops can work in

corn and soybean fields. This approach, he said, can potentially save producers time and money, since they only have to plant the cover crop once.

But if done wrong, perennial cover crops can pose more challenges than they prevent. Using incompatible perennials with corn and soybeans can result in decreased yields, according to [one study](#) the researchers conducted. Planting incorrectly or at the wrong time could also have similar effects. In corn, Moore said, it all boils down to a phenomenon called shade avoidance.

If a juvenile corn plant senses competition or is shaded by another plant, that corn plant will alter its growth to avoid it — even if the other plant, a cover crop for instance, doesn't pose much competition. The result is lower grain yield.

So, the trick behind getting perennial cover crops to work is to find ways to reduce competition, both real or perceived. Moore said the researchers are working on different herbicide and tillage practices to decrease the competition between cover crops and corn. So far, they've found that using a strip-tiller to create zones for the corn and some other suppression technologies have helped offset this effect.

At this point in time, Moore believes more research is needed before farmers can start trying to grow perennial cover crops in their corn and soybean fields.

"I call it a brittle system," Moore said. "It's too brittle for farmers to employ on a large acreage because when it breaks, it can break bad."

Right now, the best cover crop candidates for use in corn fields appear to be cool-season grasses, which remain relatively dormant when the corn is growing and have one-to-two-inch root systems that won't go as deep as the corn roots do.

Among the species the researchers have studied are Kentucky bluegrass, which is native to the U.S., and red fescue, a very shade-tolerant farm grass.

Poa bulbosa, also known as bulbous bluegrass, also has potential. It is native to Eurasia and North Africa and goes dormant in late March and early April, only to appear

again in late September and mid-October. “It goes completely dormant during the summer, I mean, it disappears and you think it's gone and dead forever,” Moore said. “Then in the fall there's just a carpet of green there from it and it's providing excellent coverage to the soil.”



Kura clover (Photo: Ken Albrecht, University of Wisconsin-Madison)

Ken Albrecht, a University of Wisconsin agronomist who has spent the last 25 years doing research on kura clover, says the perennial legume's deep root system helps it spread and give it greater persistence than other forage legumes. It flourishes in northern climates like Wisconsin, Minnesota, Michigan and the Dakotas.

Research that Albrecht and his students have done on kura clover showed an 80% reduction in soil loss on 6% to 12% slopes. The research also found improved water infiltration and greater earthworm and nightcrawler activity.

But it can be challenging to grow kura clover in a field of corn, and risky to grow it with soybeans.

If kura clover isn't suppressed and grows more than three inches tall it starts competing with the corn plants. Treating the kura clover with Roundup weedkiller in the spring will help — as long as the corn is glyphosate tolerant — and zone tillage or strip-tillage can be used as well to suppress the cover crop, Albrecht said.

The problem in soybean fields is that both kura clover and soybeans are legumes. That means kura clover can serve as a host for alfalfa mosaic virus. In soybeans, the virus can cause stunting, reduced seed size and reduced pod numbers.

Kura clover can be even more difficult for organic farmers to work with since they can't use conventional herbicides. Organic farmers can suppress the clover in other ways, including mowing, tilling or burning it with propane equipment, but growers are still likely to see reduced corn yields, Albrecht said.

Even with the challenge that perennial cover crops now pose to farmers, Moore, the Iowa State University scientist, is convinced that with more study they can eventually be made to work.

"I think it's an idea that has a lot of merit," he said. "And I think that there are enough smart people in the agricultural community that can make it work."

For more news, go to [Agri-Pulse.com](https://www.agripulse.com).

Next: Cover crops can be cash crops, too. Some farmers are starting to make a profit off their cash crops by participating in ecosystem markets, while others are cutting theirs for hay or allowing them to be grazed. And there's more significant cash cover crops on the horizon, if the airlines and biofuel producers have their way.

Cover crops as cash crops: Farmers angle to profit off the practice

12/13/21 12:00 AM By Noah Wicks

KEYWORDS AMERICAN FARMLAND TRUST BAYER CAMELINA CARBON PAYMENTS CARBON SEQUESTRATION CARNATA CORTEVA COVER CROPS COVERCRESS INDIGO MIKE DECAMP NATIONAL ASSOCIATION OF WHEAT GROWERS NAWG NICOLE BERG PENNY CRESS RENEWABLE DIESEL SAF SARE SUSTAINABLE AGRICULTURE RESEARCH AND EDUCATION SUSTAINABLE AVIATION FUEL TRUTERRA



Carinata growing in a field. Photo: Joel Love/North Florida Research and Education Center, University of Florida Institute of Food and Agricultural Sciences

In this installment:

- **Biofuel boom sparks rush for cover crop options**
- **Carbon payoff hinges on fledgling markets**
- **Easy money: Farmers find quick benefits from grazing**

This is the third part of a four-part series examining the promise of cover crops, the potential for them to meet the nation's environmental goals that rest on their success, and the possible pitfalls facing policymakers. Previous installments on the [management and promotion of cover crops](#) as well as the [underlying economics of the practice](#) can be viewed on [Agri-Pulse.com](#).

For all their environmental and agronomic benefits, the cost of growing cover crops is one barrier that stops many farmers from even trying them.

Enter entrepreneurs like Mike DeCamp, CEO of CoverCress Inc., a company that developed a variety of pennycress, a weed in other parts of the world, that could double as a cover crop and a feedstock for the trucking and airline industries' growing appetite for low-carbon biofuels.

"You get all the best soil health and other ecosystem benefits of a cover crop planting CoverCress. In addition, you get this economic opportunity to be able to harvest and get paid for the production," DeCamp told *Agri-Pulse*.

CoverCress has the financial backing of two agribusiness giants, Bayer and Bunge, as the industry searches for new ways to incentivize farmers to grow cover crops.

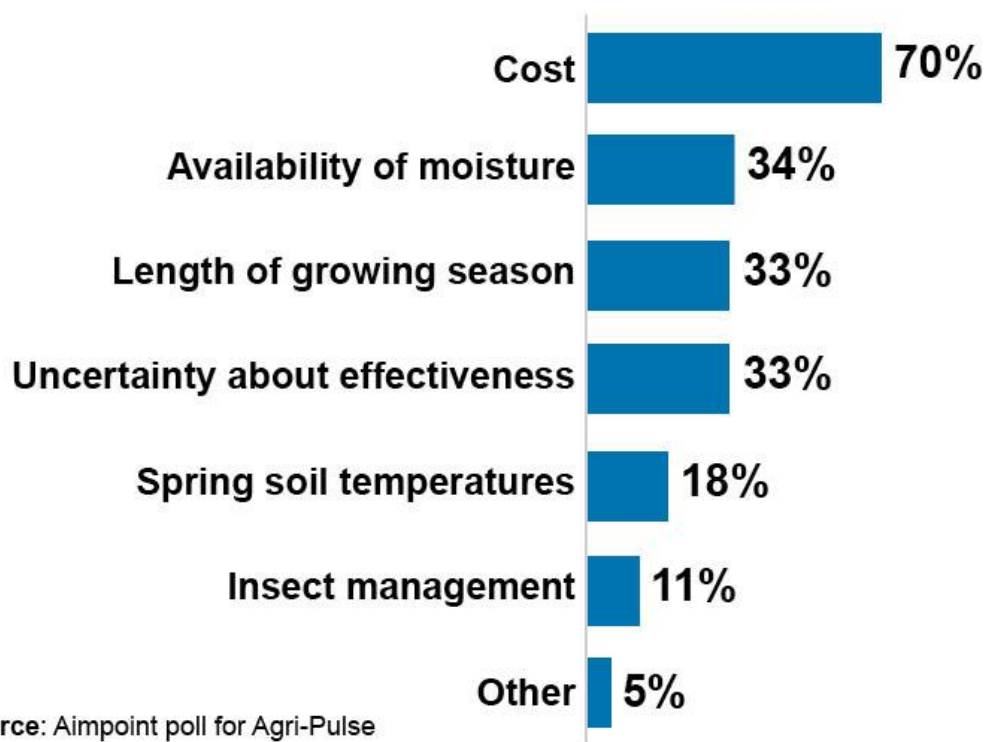
Whether cover crops can pay off as biofuel feedstocks remains to be seen. But many advocates of the practice say getting widespread, long-term adoption will require proving that farmers can make money from planting cover crops long after any government incentives run out.

Some farmers already are generating revenue, a few by grazing the cover crops or cutting them for hay. Others are participating in the emerging carbon markets and ecosystem payment programs that pay anywhere from \$6 to \$30 an acre, but are still very much in the experimental stage.

According to an [Agri-Pulse poll conducted this fall by Aimpoint](#), large majorities agreed that cover crops can improve soil health and prevent soil erosion, but 70% of farmers said cost was the biggest reason they wouldn't plant cover crops. The next most important impediment, cited by 34%, was the availability of moisture and for 33% of farmers, the length of the growing season and uncertainty about effectiveness.

What prevents farmers from planting cover crops

Fall 2021 survey of U.S. farmers



Source: Aimpoint poll for Agri-Pulse

"In dryland agriculture, since we're only 6 inches of rain and the driest area in the world, growing cover crops is not a practice that really anybody uses," says Nicole Berg, vice

president of the National Association of Wheat Growers, who farms near Paterson, Wash. "We basically let the land sit fallow for a year and so we plant every other year because of the moisture issues. If I were to put in a cover crop, it would take all my moisture. You need to do everything you can to keep moisture in the ground."

Success with cover crops depends on a variety of environmental conditions and economic factors.

"I think it's important that people understand that there is an economic cost to the farm to do these things and we can do different things, but we need to factor in the economics of it," said Cannon Michael, president and CEO of Bowles Farming Co., a diversified, 11,000-acre farming operation in California's Central Valley.

Despite the potential profit from harvesting cover crops, plants aren't considered cover crops under USDA rules if they are harvested. As a result, they would also be ineligible for incentive payments under existing conservation programs.

Winter wheat is considered a great cover crop on the High Plains, keeping some protection on the ground over winter. But if harvested in the spring, it would not qualify for any government incentives. Cover crops need to be terminated in time for the following cash crop to properly grow.

According to a [2014 report](#) by USDA's Economic Research Service, double cropping occurred on about 2% of U.S. cropland for most years between 1999 and 2012. The report noted that double cropping can provide many of the same benefits as cover crops, such as reducing the need for fertilizer and protecting soil from wind and water erosion.

Here is a look at these three ways that farmers could cash in on their cover crops:

A biofuel bonanza? Soaring soy demand puts focus on novel oilseeds

Soybean oil prices are skyrocketing on the rapidly growing market for renewable diesel, and the squeeze will get far worse if the planned production capacity comes online in

the next few years. Then, there is the airline industry's pledge to use at least 3 billion gallons of biofuel by 2030 and go carbon neutral by 2050.

Soybean oil production would have to double by 2024 just to meet the needs of the renewable diesel production capacity that's planned or coming online, says economist Dan Basse, president of AgResource Co. That would require farmers to increase soybean acreage by 40 million acres, an impossible target given that that land is needed for corn and other crops.

But the feedstocks for biofuels will have to come from somewhere, hence the interest in oilseed cover crops.

"With the societal push and drive towards the carbon-reducing technologies, I think that creates a bright future for any technology, in this case a biofuel, that has a significant reduction in terms of carbon, which would apply for biodiesel, renewable diesel and sustainable aviation fuel," said economist J. Alan Weber, a senior adviser to the National Biodiesel Board who joined the CoverCress board in May.

A 2020 study by McKinsey and Co. and the World Economic Forum estimates that 10 billion gallons of sustainable aviation fuel, known as SAF, could be produced globally each year from cover crops such as camelina, carinata and pennycress. By comparison, [aviation used 95 billion gallons of fuel worldwide](#) in 2019.

"If the end goal is to displace every drop of aviation fuel in the world, and it is, then we're gonna have to go well beyond existing feedstocks, but that's gonna be a generational effort," said Gene Gebolys, president of World Energy, a longtime biodiesel producer that is now producing SAF from animal fats and restaurant grease at a refinery in California.

"Cover crops are going to be an important part of increasing yields on existing land. We can get a lot more value out of each acre of land that we have ... not only in the U.S. but around the world."

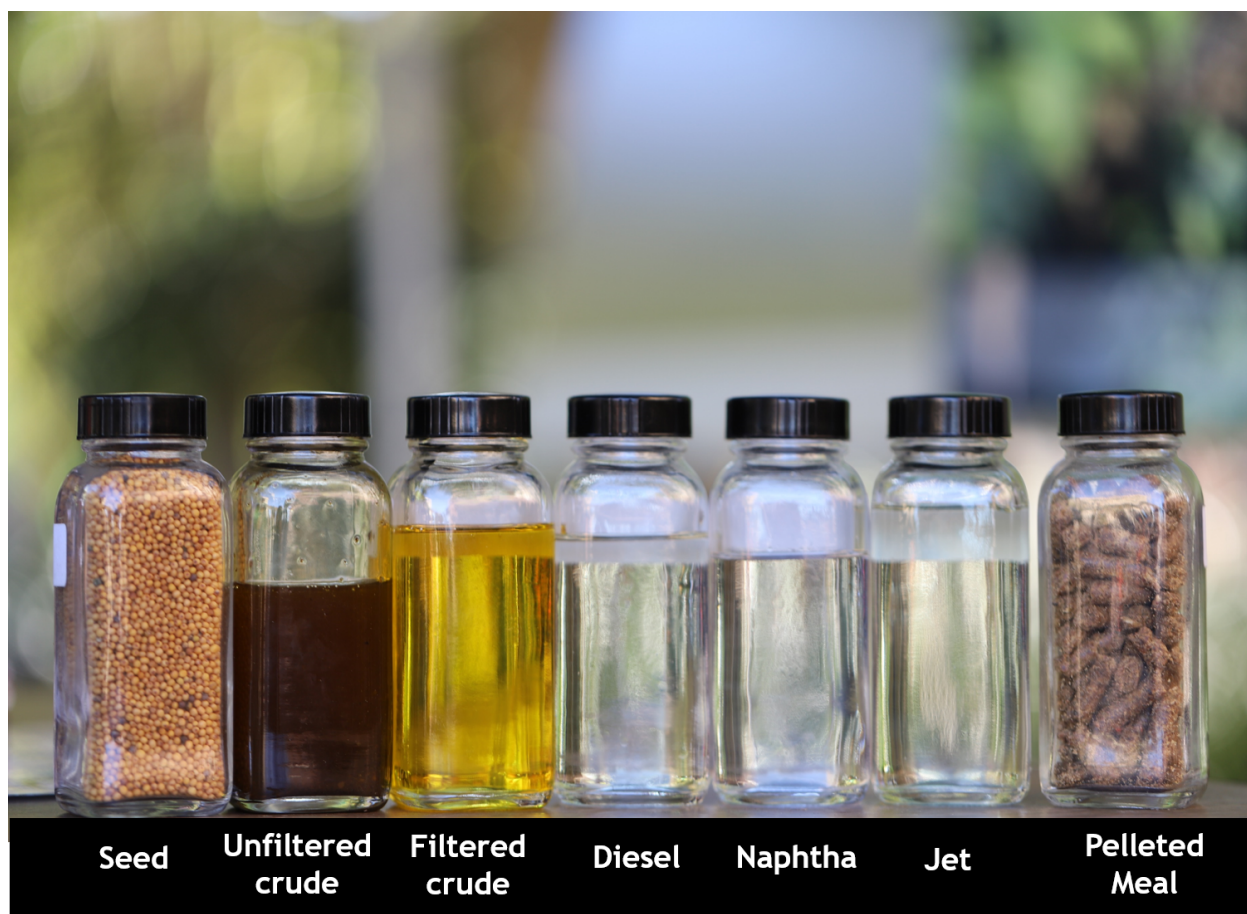
A group backed by the airlines and aircraft manufacturers, the [Commercial Aviation Alternative Fuels Initiative](#), sees cover crops as a way to avoid the concerns about using food crops for fuel. "Because cover crops don't interfere with traditional food crop production and provide additional production of crops on existing land, they are anticipated to have no effect on local food availability or prices and low or no induced land-use change, an important factor in the life cycle emissions calculation," the group says.

Because much of the land in one-cropping systems sits idle for part of the year, there's lots of land available for producers in certain regions to plant oilseed cover crops. The warm climate of the Southeast makes it an ideal place to plant carinata, or Ethiopian mustard, in the wintertime. CoverCress, an oilseed developed from pennycress, has a lot of potential in the southern Midwest. And winter camelina, a hardy brassica, is being eyed as an option for parts of the upper Midwest that have a short growing season and cold winters.

"As with any crop, various cover crop solutions are better suited to different locations based on soil health/biome, growing hours/days, temperature profiles, precipitation, herbicide residues, biomass residue, etc.," Steve Csonka, executive director of the aviation fuel initiative, said in an email to *Agri-Pulse*. He said there is breeding work going on to develop pennycress and carinata that yields oils more suitable for jet fuel.

Puneet Dwivedi, a University of Georgia scientist who is developing carinata with \$15 million in research funding from USDA, says there's a big future market for biofuel feedstock for airports in Southeast cities such as Atlanta and Miami.

"It is putting more money into the pockets of farmers," Dwivedi told *Agri-Pulse*. "In the winter months, they don't make any money. The land is sitting there doing nothing ... But with carinata coming in it's a win-win for the environment, a win-win for carbon climate change and definitely win-win for farmers."



Carinata seed can be used as a feedstock for renewable fuels. Photo: North Florida Research and Education Center, University of Florida Institute of Food and Agricultural Sciences

One company that has been working to develop a carinata seed for biofuel cover crops is Nuseed, which has distributors in several different countries. Nuseed Carinata is in its third year of commercial sales in Argentina.

Alex Clayton, the Nuseed Carinata global business development leader, said the company is currently doing research on land in Georgia, Florida and Texas, and hopes to launch commercial programs in the U.S. within the next three years. The company has also been lobbying Congress on “the use of cover crops for advanced biofuels,” according to [disclosure records](#).

“We would like to see biofuel policy in the U.S., in the EU and worldwide that fully recognizes the potential for Nuseed Carinata to reduce emissions, remove atmospheric carbon and restore soil carbon and health,” Clayton wrote in an email to *Agri-Pulse*.

“Our independently certified program requires Nuseed Carinata not displace food production, and instead contributes to it through its co-product traceable source of plant protein, or require additional farmland when it’s grown. Both are very critical to maximizing our impact on carbon reduction with minimal impact on food production.”

Meanwhile, CoverCress is targeting farmers in the Midwest. In 2021, the first year of commercial plantings for CoverCress, producers from Missouri and Illinois have planted about 500 acres of the crop.

“We can be a really important solution to this feedstock deficit that the industry faces, and we’re never going to be *the* solution,” said DeCamp, the CoverCress president and CEO. “But our work is complementary to everything else.”

CoverCress has gained the attention of investors like Leaps by Bayer, the company’s corporate venture capital group that invests in companies that “create significant breakthroughs that have a high return for society.” Derek Norman, the vice president for venture investments at Leaps by Bayer, told *Agri-Pulse* that he sees CoverCress as a way to help drive cover crop adoption while filling the need for renewable fuel feedstocks.

“I think that is a challenge with cover crops in general, the extra work and time cost of planting a cover crop that probably does provide longer-term agronomic benefits,” he said. “It becomes much easier, much easier to justify when you’re also getting that shorter term.”

Camelina — which is similar to pennycress, but native to the colder climates of Northern Europe — is considered a good candidate for production in states with cold winters and

shorter growing seasons, such as Montana, North Dakota, South Dakota and Minnesota.

In Montana and northwest North Dakota, federal crop insurance is even available for camelina.

[Sustainable Oils](#) is a subsidiary of [Global Clean Energy](#), a company that has recently converted a refinery in Bakersfield, California, to a renewable diesel operation.

Sustainable Oils has partnered with Cenex Harvest States to encourage Montana farmers to plant camelina when they otherwise would be fallowing land between crops.

Mike Karst, president of Sustainable Oils, says in Montana camelina can be planted in April and harvested in August so farmers can “come back in and plant winter wheat in behind us that same year and then have a winter wheat through the next winter season.”

Sustainable Oils had 15,000 acres in camelina in Montana last year, and Karst says he expects that figure to be “substantially higher” in 2022. Exxon Mobil has signed an agreement with Global Clean Energy to buy 5 million barrels of renewable diesel per year for five years.

Scientists with the Forever Green Initiative at the University of Minnesota [project](#) a camelina and soybean relay cropping system can produce around 130 gallons of oil per acre, compared to about 60 gallons per acre for a sole full-season soybean crop.

According to scientists with the USDA Agricultural Research Service in Ames, Iowa, the combined yields of winter camelina and soybeans were equal to or exceeded the yields of growing soybeans with no camelina.

But there are some potential downsides to planting camelina. Rob Malone, one of the ARS scientists on the project, says the soybean-camelina system can use more water, which could pose difficulties in years of water stress. Plus, the ARS research so far shows the system doesn't reduce the loss of nitrogen from fields.

“One of the real critiques of these relay systems or double-cropping systems is they use more water, at least a little bit more water and in some years that little bit is enough to cause some water stress,” Malone said.

Meanwhile, Bayer rival Corteva Agriscience is doing research on winter canola, another oilseed that has biofuel potential in the U.S., as well as winter peas, which contain a lot of protein and can be used in livestock feed or plant-based meat products.

Research scientist Sarah Lira has been working on these projects for Corteva and said she’s heard a lot of producers express interest in the idea of adding winter crops as a second profit source.

“Diversifying their potential sources of income and having some nimbleness in reacting to the markets — that’s of tremendous value to them,” she told *Agri-Pulse*. “They’re very excited. The market needs to exist and they’ve also told me that, but they really like that idea.”

Bewildering array of private payment programs lure farmers to cover crops

Big corporations and entrepreneurs also are combining to drive the development of programs that will pay farmers adopt cover crops or, in some cases, buy credits for the carbon their cover crops and other practices can sequester in the soil.

Not all of these programs are the same — in fact, these programs vary drastically across the landscape. Some are specifically geared towards cover crops, while others may require producers to not only add cover crops, but several other practices like no-till.

Some programs pay farmers simply for undertaking a practice such as cover crops. Other programs pay based on the amount of carbon that they store, or sequester, in the soil. All of these programs are pointing to a future when energy companies, airlines, food companies and other sectors will routinely buy ag carbon credits to offset their own greenhouse gas emissions.

Research has found that cover crops could sequester anywhere from 0.16 to 0.77 metric tons of carbon dioxide equivalent per acre, according to a report by the [American Farmland Trust](#). When combined with no-till and strip-till practices, the carbon sequestration potential rises to a range of 0.76 to 1.13 tons per acre.

Several major companies, including PepsiCo, ADM, Bunge, Bayer, Cargill, Unilever, and Lifeline, have already partnered with a farmer-led organization, Practical Farmers of Iowa, to pay farmers specifically for planting cover crops. These programs are offered to producers through the companies and grain elevators they sell to and though they vary somewhat, almost all of them offer farmers a \$10-per-acre payment on up to 200 acres.

“It doesn't cover everything,” Lydia English, strategic initiatives coordinator at Practical Farmers of Iowa, told *Agri-Pulse*. “But it helps lower the economic barrier for sure, which can be great, especially for those folks that might be newer and haven't recouped costs in any other way yet.”

Research has shown that it can take up to eight years for the agronomic benefits of cover crops to start to cover the costs, said Shalamar Armstrong, a Purdue University economist.

“If these farmers can have some kind of resources coming back ... that's going to ease the risk,” he said.

Producers enrolled in these programs can also receive funding from government programs and can stack these payments to help cover their expenses. However, participating producers are not allowed to enroll in other private incentive programs.

Additionally, producers are required to follow various rules like attending soil health field days, participating in surveys, providing documentation of the cover crop acres they farmed and discussing a cover crop plan with a PFI agronomist.

“We're flexible on what they seed and when they seed it, how they do it, whether it's an overwintering species or a winter kill species,” English said. “We just want them to do

cover crops and to be happy with that system.”

Other programs are broader and incentivize several practices, including cover crops, based on a specific environmental goal. Some of the clearest examples of this are carbon capture programs, which pay producers with the intention of sequestering carbon.

These programs have become increasingly more prevalent as talk of the need to sequester carbon to counter the effects of climate change has become more prominent. Companies like Bayer, Indigo Ag, Corteva and the Land O’ Lakes subsidiary Truterra, have launched their own carbon programs to pay producers for carbon sequestration practices.

Major payment programs	Payment
Bayer US Carbon Program	\$6 an acre for cover crops, plus \$3 per acre for conservation tillage for maximum of \$9 per acre
Corteva Carbon Initiative	Minimum of \$15 per metric tons of carbon sequestered or abated
Ecosystem Services Market Consortium	Payment depends on change in soil carbon, net greenhouse gas reduction, improvements to water quality and quantity
Indigo Carbon	Guaranteed minimum of \$10 per verified carbon credit; price increases based on buyer demand
LocusAg CarbonNOW	\$48 minimum per acre over 4 years
Nori	\$15 per ton of carbon
Nutrien’s Carbon Program	Payment varies by pilot -- general range of \$20/acre/yr
Practical Farmers of Iowa and Partnering Companies: Keurig, Dr. Pepper, PepsiCo, ADM, Bunge, Cargill, Bayer, Lifeline.	\$10 per acre on up to 200 acres
Soil and Water Outcomes Fund	About \$25 per acre, variable by water and carbon outcomes
Truterra	\$20 per ton of carbon based on recently adopted changes in practices. In 2022, farmers may be eligible for additional \$2 per acre for enrolling.

Truterra's 2021 program, launched in February, paid farmers \$20 per ton of carbon they have sequestered by adding management practices like reduced tillage, no-till or cover crops, which they measured through crop modeling and in-field sampling. The program has distributed more than \$4 million in cash payments and, on average, participating farmers received \$20,000 in the program.

"The carbon program is based on a measured and a model approach where we use actual soil samples to calibrate [our model]," Anthony Robertson, a supply chain manager at Truterra, told *Agri-Pulse*.

The 2022 iteration of the program will also feature a second approach that will pay farmers looking to implement practices like cover crops for the first time by providing them with one-time payments of up to \$2 per acre and offering them support services to help with the transition.

"It's going to be a market access program where we're working with growers to, one, help them find the financial assistance and support that they need [and] two, we're trying to make sure that they have the right conservation agronomy support," Robertson said.

Nick Smith, who farms with his dad and brother in Epworth, Iowa, told *Agri-Pulse* that their farm is enrolled in the Truterra program. Through the program they are getting a total of \$5,000.

Smith said he's still a little "green" on the program because this is the first year the farm is enrolled.

"I think the intention is good and the goals are good," he said. "I don't know where their money comes from, but again, I think that the intention's a good one for sure."

Corteva is another company that has become actively involved in the carbon market. Corteva's Carbon Initiative pays farmers a guaranteed \$15 per carbon credit for practices like reduced tillage, cover cropping and reduced applications of nitrogen,

though the company says on its website that it projects most farmers to receive about \$30 per credit. These credits are measured and verified through sampling and certification conducted by program partners Corteva and Indigo Ag.

“We pay on outcomes, we pay per ton. Which means that if for some reason you need to change your agronomic plan to not include a cover crop ... that's just fine,” said Ben Gordon, the carbon and ecosystem services global portfolio leader at Corteva. “You're not going to get paid, but there's not going to be any penalty.”

The credits are then sold to buyers in Corteva's network. Producers in the program do sign a 5-year contract, but they can opt out of the program at any time. However, doing this means that they forfeit any unvested payments.

A similar program headed up by the Soil and Water Outcomes fund exists; however, this program is not just targeted towards sequestering carbon. It also aims to improve water quality.

Adam Kiel, the executive vice president of AgOutcomes and a co-administrator of the program, said it has the same principles as a carbon program and the payments that are distributed to farmers are based on environmental outcomes.

“Farmers need to add something new to their operation,” Kiel said. “That could be a cover crop, that could be no-till, it could be something else. We collect a fair amount of data from farmers about what they do in those fields, we model that to come up with estimates of what the environmental benefits are and then we structure a customized payment to that farmer based on what those outcomes are.”

Outside of cover crops, the program also incentivizes farmers to add an extended rotation, convert a field into a perennial crop, and implement no-till. According to the fund's website, participating farmers sign one-year annual contracts and can re-enroll if they are willing to continue or include more practices.

According to Kiel, about 120,000 acres of land in the United States were under contract in the program this year, with the average farmer payment at around \$35 per acre. There is also no acre cap per farmer, though enrollment does close once the acre goal for the year is reached.

“I feel like the Soil and Water Outcomes Fund is the closest thing to an environmental market,” Kiel said. “The more bushels of corn they produce, the more potential revenue there. Think about it, what we're doing here, the more environmental benefit there is, the more financial gain there is.”

Cover crops as cattle feed can pay off quickly

According to the USDA-funded Sustainable Agriculture Research and Education Program, grazing cover crops is one of the best ways to provide a positive first-year return.

In a [cover crop budget model](#), SARE estimates that producers could bring in an extra \$49.23 per acre per year from grazing a cereal rye cover crop instead of hay when assuming that hay is valued at \$80 per ton and that the grazer already has a fence and water access in their grazing area.

“Whether grazing cover crops pays back the first year depends on the amount of cover crop growth, the length of the grazing period and the costs for fencing and a water supply, if those are not already in place,” SARE researchers said in [an article on the organization's website](#). “Where grazing infrastructure is present, even a modest amount of grazing from cover crops will normally pay for seed costs while also providing some soil improvements.”

A study conducted by Practical Farmers of Iowa calculated a profit of \$71.81 for every 1,000-pound animal unit that producers could gain. [South Dakota State University researchers found](#) utilizing cover crops for grazing would increase the profit of a farm by \$17.23 per acre in the first year of planting and \$43.61 per acre in the second year.

Texas A&M University research found grazing summer cover crops could increase net return by as much as \$38 to \$44 per acre, compared to non-grazed cover crops.

A farmer who will attest to the benefits of mixing cattle and cover crops is Kent Wasson, who grows wheat and raises about 500 head of Black Angus cattle near Whitehall, Montana. He uses a multispecies mix of cover crops that includes legumes, vetch, radishes, turnips, cowpeas, chickpeas and several brassicas.

Wasson said that in 2016, one of his most successful years planting cover crops, some of his calves weighed around 450 pounds when he moved them to the field to graze cover crops in mid-September. By Halloween, he said some of them weighed up to 662 pounds, an increase of about four pounds per day that Wasson said he doesn't even see in a feedlot.

While he hasn't seen a year quite as successful as 2016, Wasson said the 200 calves he has grazing cover crops this year have likely gained around two pounds based on his own eye.

"You get a payback way quicker with the cattle in the same year," he said. "If you can gain a half a pound a day on the calves on cover crops, you're gaining 80, 90 cents a day per calf. I think that's the way that we recover our money quicker."

Ben Dwire, who follows a corn-soybean-small grain crop rotation on land west of Marshall, Minnesota, usually seeds two-thirds of his acres with cover crops. He said in a normal year, he can save between 70 cents and \$1.50 per head per day if he grazes cover crops instead of buying hay. In addition, the manure the cows leave behind helps reduce the amount of fertilizer needed later on.

"When I graze the cattle out here, everything they eat gets deposited right back," Dwire said. "They're probably only going to walk off 5% of the nutrients that they consumed as animals. 90 to 95% of it's deposited right back on the field."

However, Dwire said the economic benefit grazing cover crops provides him varies from year to year. Cover crops require water to grow, so during periods of drought when there is less growth, there will be less for the cattle to eat.

“It is fully dependent on how much rain you get,” he said.



Cattle graze in a cover-cropped field. Photo: Ben Dwyer

Dwire also rents out some of his cover crop acres to his neighbor for grazing, which brings him an extra \$35 to \$40 per acre. Plus, since he charges roughly \$1.30 per pair, it can help save his neighbor some money as well.

“He's saving anywhere between 70 cents and \$1.50 per cow by grazing on the cover crops and I'm getting a little extra money off of my cover crops,” he said. “It helps pay for the seed for me.”

Previously, RMA reduced prevented planting payments by 65% if producers hayed, grazed or chopped cover crops before Nov. 1, but the agency changed the rule this year and opened up the program to allow producers to receive 100% of the payment, even if they hayed, grazed or chopped before the deadline.

“We are dedicated to responding to the needs of producers, and this flexibility is good for agriculture and promotes climate-smart agricultural practices,” Richard Flournoy, the acting RMA administrator at the time. “We are glad we can better support producers who use cover crops.”

In semiarid and arid regions of Texas where water is scarce, Texas A&M soil scientist Paul DeLaune said planting cover crops for grazing is how cover crops “make the most sense” for producers in the region.

“I believe if done correctly, it can provide a soil health benefit as well as economic incentive to producers,” he said.

However, many factors impact the moneymaking potential of that system. Cattle producers need to consider how many cattle they put on cover crop acres and for how long they graze because too intensive of grazing can diminish the amount of biomass in the soil, which, in turn, eliminates some of the soil health benefits of cover crops. Additionally, the costs of fencing and providing water for the cattle can reduce the economic viability of cover crop grazing in expansive and dry regions.

Producers “need to make money if they're integrating cattle and sometimes that takes some time,” DeLaune said. “So it kind of goes back to the logistics of not only fencing, but water sources. You have to work within the environment that you have.”

Amy Mayer contributed to this report.

Next: A look at the policy barriers facing cover crops, the current and potential government incentives that farmers could claim, and how planned policy changes could backfire on farmers and the government.

For more news, go to www.Agri-Pulse.com.

Direct checks could ignite cover crop surge; crop insurance may play role, too

12/20/21 2:30 PM By Philip Brasher and Noah Wicks

KEYWORDS BILL NORTHEY BUILD BACK BETTER CHUCK SCHUMER
CONSERVATION STEWARDSHIP PROGRAM COVER CROPS CSP DEPARTMENT
OF AGRICULTURE ENVIRONMENTAL QUALITY INCENTIVES PROGRAM EQIP
JASON WELLER JOE MANCHIN MILLBORN SEEDS NATURAL RESOURCES
CONSERVATION SERVICE NRCS OGALLALA AQUIFER TRUTERRA USDA



Central Iowa farmer Noah Wendt examines his cover crops.

In this installment:

-Payment plan raises fears of seed shortage, water misuse

-Cuts in crop insurance could further entice farmers

-More farm advisers seen as critical

The is the last of a four-part series on the promise and pitfalls associated with cover crops.

The Biden administration is betting big that farmers across the country can be enticed to start growing cover crops by the combination of direct payments and the development of carbon markets that could turn the conservation practice into a long-term source of revenue.

The \$1.7 trillion Build Back Better bill that Democrats are vowing to enact in some form would authorize payments of \$25 an acre over five years to farmers who plant cover crops.

The payments would induce farmers to plant more than 50 million acres of cover crops by 2026, according to a Senate aide familiar with the Congressional Budget Office's analysis of the plan. That would be three to four times as many acres currently reported to USDA.

The payments would help farmers scale up the practice and eventually qualify for new revenue streams from carbon credits or premiums for commodities such as corn that qualify as low-carbon.

The administration is simultaneously looking to accelerate through the development of those carbon markets and "climate-smart" commodities through funding for a series of pilot projects that will be announced next year. Among the ideas suggested to USDA is the use of cover crops and other conservation practices to lower the carbon footprint of

corn that's sold for fuel ethanol production. USDA is expected to release rules for project funding in the first quarter of 2022.

There are concerns that accelerating the use of cover crops with an infusion of government cash could lead to seed shortages and incentivize the overuse of limited irrigation water, all while providing no benefits to farmers in dry areas where there is too little water for both cover crops and cash crops like wheat.

But Nick Smith, a farmer in central Iowa who has been planting cover crops for 10 years, is convinced it will take financial incentives to get many other producers who are dubious about trying the practice.

"We're still like a tiny, tiny, tiny minority of people in the world that are doing" cover crops, Smith said.

"You don't know if you don't try, and lots of times the arguments you hear from farmers who are stuck in their ways are, 'Well, why would I pay to put seed out there and then have to pay to kill it?' So that's where the mental roadblock is, and that's where these programs can help get past that."

The Senate staffer said the direct payment program would give farmers a more flexible alternative to trying to get funding through the oversubscribed farm bill conservation programs managed by USDA's Natural Resources Conservation Service. "This is a way for folks to maybe dip their toes in the water," the staffer said.

There also are proposals in development to further incentivize cover crops by reducing the cost of crop insurance based on data showing that the practice cuts the risk of growing corn and other cash crops.

The proposed cover crop payment program is estimated to cost \$5 billion over a five-year period. Farmers could receive the \$25 per acre payment on up to 1,000 acres, and if they don't own their land, their landlords would qualify for an additional \$5 per acre as an inducement to allow the practice. The median cost of planting and

terminating cover crops is \$37 an acre, according to the USDA-funded Sustainable Agriculture Research and Education program.

The Agriculture Department would write rules to determine eligibility for the program and the requirements for cover crops. USDA also would be responsible for verifying the cover crop acreage, something it could do with a separate \$600 million account earmarked in the bill for “carbon sequestration and greenhouse gas emissions quantification,” according to the Senate aide.

The Build Back Better bill also would provide more than \$20 billion in extra funding for the farm bill conservation programs, including the highly popular Environmental Quality Incentives Program. The funding could be used in part for cover crops as well as a range of other “climate-smart” measures, including feed additives that reduce methane emissions in cattle.

After recent revisions, the bill also addresses what cover crop advocates say is a critical need: advisers who can mentor farmers on the use of cover crops and other conservation practices. The bill would earmark \$2.35 billion over 10 years for conservation technical assistance, roughly about what NRCS currently spends in one year.

Prospects for the bill in the 50-50 Senate are uncertain. Sen. Joe Manchin, a West Virginia Democrat whose vote is crucial to passing the bill, announced Sunday that he couldn't support the legislation, dooming the bill in its current form. Senate Majority Leader Chuck Schumer, D-N.Y., told colleagues on Monday that the Senate would vote on a revised version of the package early next year and keep “voting on it (the legislation) until we get something done.” Manchin has not raised objections to the agriculture provisions, which are a relatively small part of the \$1.7 trillion package.

Seed companies insist surge can be managed despite supply concerns

Jason Weller, a former chief of USDA's Natural Resources Conservation Service who now runs Truterra LLC, the ag sustainability arm of Land O'Lakes, warned at the American Seed Trade Association's recent annual meeting that the demand for cover crop seed could outrun supply if the \$25-per-acre payments are approved.

"If I had stock in cover crop seed production, I would be fine right now. I mean, it's holy smokes, the demand for seed is going to exceed supply. So there's gonna be a huge supply challenge," he said.

A USDA spokesman told *Agri-Pulse* the department "is confident that it would have the ability to deliver (the) payment program and would engage with the seed industry and other stakeholders at the appropriate time as it would with any new program."

Officials with leading seed producers say the demand should be manageable and that rye and oats could be harvested for seed to accommodate a sharp increase in demand.

Farmers currently harvest about 1 million of the 3 million acres of oats they grow in a typical year, and 300,000 of the 2 million acres of rye. The rest of those crops are typically used for livestock forage. Harvesting an additional 10% of those crops — 300,000 acres of oats, and 200,000 acres of rye — could produce enough seed for 20 million acres of cover crops, said Jared Knock, head of business development for South Dakota-based Millborn Seeds

"These would be two of the biggest bucket species used for covers, but keep in mind that we use more than 100 species of crops as cover crop ingredients, so if certain individual species are in short supply for the season, we can easily make replacements," said Knock.

Bill Northey, who served as USDA's undersecretary for farm production and conservation during the Trump administration, believes that if farmers know far enough in advance that more seed is needed they could declare their rye cover crop as a cash crop for crop insurance purposes, harvest the rye in June, and then plant soybeans.

While the soybean yield may be reduced, the value of the rye seed could make up for the lost revenue.

“Eighty bushels of rye on a good stand, plus half a crop of soybeans, is going to be worth more than a full crop of soybeans,” Northey said.



Former USDA Undersecretary Bill Northey

But one of the challenges that seed companies and farmers would face is how much advance notice they would get of a surge in cover crop acreage.

The American Seed Trade Association has been talking to USDA about surveying farmers on cover crop intentions each year, something the National Agricultural Statistics Service now does every March for corn, soybeans, wheat and other spring-planted cash crops.

But a cover crop intentions survey would ideally be done the previous fall and winter to give seed companies the information they need, said LaCrosse Seeds President Dan Foor, who chairs an ASTA's sustainability working group.

Even with an early warning of farmers' plans, weather also will continue to be a factor in demand for seed. "If the fall is conducive to planting then obviously we see more acres (of cover crops) planted," Foor said.

Knock downplayed concerns that the need for cover crop seed production would have a significant impact on acreage for corn or soybeans. Citing data from GO Seed Inc. in Oregon, Knock said producing enough rye, turnip, radish, and clover seed to plant cover crops on every acre of the U.S. corn crop (more than 90 million acres in total) would require just 350,000 acres of seed production.

In his ASTA remarks, Weller also cautioned against relying excessively on cover crops to address sustainability goals, including reducing greenhouse gas emissions.

"Too often we lean on a single silver bullet of a cover crop and expecting cereal rye to be the savior; that's not going to happen," he said. "What you need is a holistic agronomy solution."

That, he said, will include conservation tillage as well as improved breeding of cash crops.

Wheat and sorghum growers: Don't leave us out

Farmers in drier areas of the country, including the western Plains and the Pacific Northwest, often say cover crops don't work for them because of the valuable soil moisture that they consume, but those producers also fear being left out of a surge of funding that's directed to cover crops. Wheat and sorghum are popular crops in areas with limited rainfall.

Don Hineman farms near Dighton, Kansas, where he sees just 19 inches of rain annually. He tried cover crops from 2012 to 2014 but gave up on the practice and told *Agri-Pulse* it doesn't make sense for the government to promote the practice in that region.

“They’re misguided if they’re going to push them for semiarid areas like we live in out here,” Hineman said. “Frankly our best sort of cover crop out here is standing wheat stubble ... We absolutely see an increase in yields for corn and milo (sorghum) when we plant into standing wheat stubble.”

Winter wheat is typically growing at the same time as cover crops but doesn’t count as a cover crop if it’s harvested.

Chandler Goule, CEO of the National Association of Wheat Growers, said he is concerned about the “optics” in the future for the wheat industry when reports come back that wheat growers are growing far fewer cover crops than producers of other commodities.

He said it’s often difficult for wheat growers to show enough environmental benefits from their practices to qualify for payments under the Conservation Stewardship Program, which has been one of USDA’s two main ways of funding cover crops and other climate-related practices.

Tim Lust, CEO of National Sorghum Producers, says planting sorghum or leaving wheat or sorghum stubble on fields can serve a similar purpose to cover crops, including protecting the soil from wind erosion. Like Goule, he said the \$25-per-acre payments would do little to help his members.

“We are interested in creative solutions to how incentives can help our members implement the climate-smart practices that fit their environment,” he said.

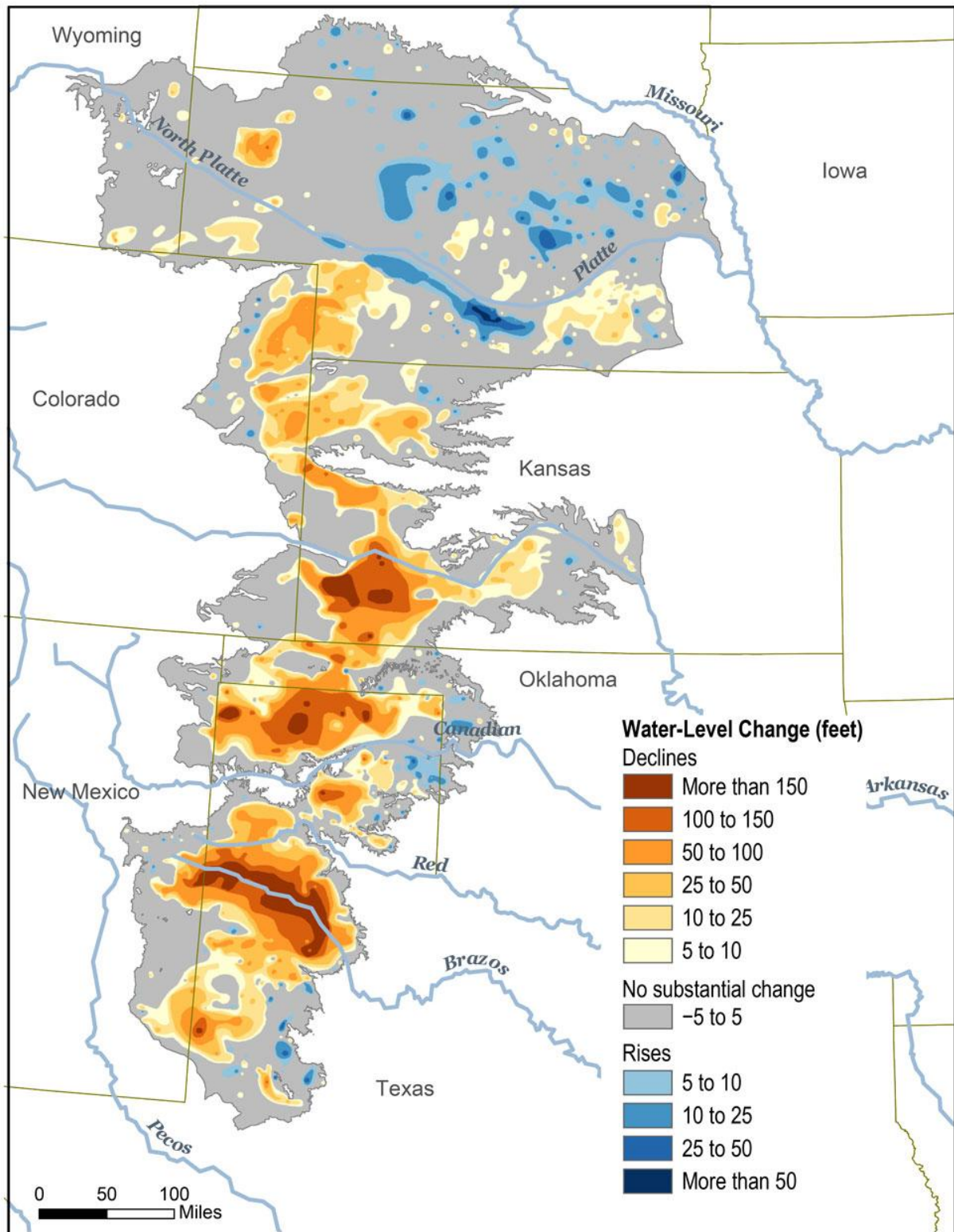
Farmers planted 44.5 million acres of wheat in 2021, including 30.5 million acres of winter varieties, and 5.9 million acres of sorghum. By comparison, farmers typically grow about 180 million combined acres of corn and soybeans annually.

Incentives raise water concerns on southern Plains

According to USDA data, one of the most popular places in the country for cover crops is the Texas panhandle where they can protect the land from wind erosion as well as

sequester carbon. But some farmers irrigate the cover crops with water for the Ogallala Aquifer, which is critical to agriculture for a significant portion of the western Plains.

Farmers in much of the region have been using water from the Ogallala faster than it is replenished. While water levels in the aquifer have risen in some areas, especially Nebraska, they are "mostly in decline, namely from Kansas southward," [according to the National Oceanic and Atmospheric Administration](#) .



Ogallala Aquifer depletion (photo: NOAA)

The Fourth National Climate Assessment warned, "Current extraction for irrigation far exceeds recharge in this aquifer, and climate change places additional pressure on this critical water resource," the report said.

"Once that water is gone, it's gone," said Barry Evans, a cotton grower near Kress in the Texas panhandle. Paying farmers to grower cover crops that require irrigation could "create some unintended consequences and actually speed decline of our aquifer," he said.

Shawn Wade, director of policy analysis and research for Plains Cotton Growers, acknowledged that growing cover crops is a "balancing act" for the region's farmers.

Still, he said cover crops provide important environmental benefits and that a \$25-an-acre payment would help cover the cost. "Because there's plenty of other things that can go wrong out here ... it's nice to have that level of investment and encouragement to do those things," he said.

Rick Kellison, project director for the Texas Tech University-based Texas Alliance for Water Conservation, believes it's premature to know how much impact a \$25-per-acre payment would have on water demand, but he said a significant increase in irrigated cover crops could pose a challenge for underground water supplies.

Crop insurance barriers remain; group claims data to justify policy improvement

In the past, the federal crop insurance program has been widely viewed as an impediment to the adoption of cover crops. That perception is fading with changes in rules and guidance from USDA's Risk Management Agency and research that has pulled together USDA and private data on the impact of cover crops on the productivity of cash crops.

There are still some barriers to cover crop adoption left — the coverage isn't available for harvestable cover crops, including some intended for biofuel feedstocks, and some agronomic practices can affect coverage.

But temporary new premium subsidies for cover crops are easing the cost of cover crop adoption, and a data-based proposal is coming in 2022 that could lead to reductions in insurance costs for farmers who use cover crops.

What's fixed: For many years, farmers complained that RMA's termination guidelines for cover crops were too strict and that farmers were required to get preapproval for deviating from the guidelines to protect the insurability of the cash crop that followed.

Congress enacted a provision to address that complaint in the 2018 farm bill, and RMA subsequently issued updated guidelines clarifying that farmers could insure the cash crop at planting and that the farmers' cover crop management would be reviewed under normal RMA rules for good farming practices. The RMA rules come into play when an insurer questions whether a farmer is entitled to an indemnity for a loss on the cash crop.

RMA's updated guidelines make clear that they don't "function as a substitute for locally adaptive management for cover crop termination timing, but rather serve as but one option available to producers," according to the National Sustainable Agriculture Coalition, which advocated for the fix.

This year, USDA also removed a barrier to planting cover crops during years when farmers are unable to plant their cash crops. Until now, farmers who cut their cover crops for hay or grazed cattle on them before Nov. 1 lost 65% of their prevent-plant insurance payment. On Dec. 1, **RMA announced it was permanently removing the Nov. 1 restriction and accompanying penalty.**

Insurance barriers remain: USDA is required by law to ensure that crop insurance is actuarially sound, so there are additional barriers linked to concerns about the impact that some practices associated with cover crops could affect the yields of insured crops.

Cover crops that are harvested typically can't be insured, and harvesting a cover crop also can create issues with insuring the cash crop that follows.

Rye, for example, is insurable in some states but not in places such as Iowa, where there has been one of the most aggressive pushes for cover crop adoption to address the state's water quality issues.

For the most part, cover crops that are grown for biofuels aren't insurable either. One prominent exception is camelina, which can be covered by crop insurance under a pilot program in Montana and northwest North Dakota.

CoverCress Inc., a St. Louis-based company that has developed a version of pennycress that can be harvested for biofuels, plans to insure the crops grown by contract farmers.

But there could be questions about the insurability of the crops that follow the harvested cover crops, depending on the rules for the particular county where the producer farms, according to a statement to *Agri-Pulse* from RMA: "Producers should always talk to their insurance agent about what is an insurable crop and practice for their specific county."

Another issue that depends on rules for the farmer's location are restrictions on "relay cropping," the practice of seeding one crop into another that hasn't been harvested. Some farmers are seeding soybeans into their rye cover crop and then harvesting the rye over the young soybeans, said Sarah Carlson, strategic initiatives director for Practical Farmers of Iowa and a leading expert on cover crops.

While relay cropping can reduce the soybean yields, the rye suppresses weeds and the grain can be used for seed, offsetting the cost of producing the rye, said Carlson.

But because harvested cover crops are no longer cover crops under USDA regulations, the relay cropping may fall under rules for double cropping for purposes of crop insurance, RMA says.

Noah Wendt, who farms in central Iowa, expressed frustration that his relay-cropped soybeans can't be insured, but he thinks RMA will come around as the agency sees more data.

“I sell crop insurance and that's one of the things that makes me mad because we couldn't insure that field for the beans for our cash crop, and they're probably going to do just as good as the rest of the beans anyhow,” he said.

What's coming: A \$5-an-acre premium subsidy that the Biden administration created for 2021, using coronavirus relief funds, could be repeated in 2022. USDA has listed the program on its regulatory agenda for 2022, but it's not clear how a new round of assistance would be funded.

USDA provided \$59.4 million in assistance to farmers in 2021 on about 12 million acres of cover crops. To be eligible, farmers had to certify their cover crop acreage with the Farm Service Agency; FSA reported about 14 million acres this year, 2 more acres than the acreage farmers claimed the premium assistance for, according to an analysis by the Senate Agriculture Committee.

“It really cheapened our crop insurance up a lot this year. I think we saved \$5,000,” said Wendt.

That program was modeled after state programs in Iowa, Illinois and Indiana.

The bigger goal of cover crop advocates has been to make the case to RMA that cover crops and other practices such as conservation tillage could actually reduce the risk of crop losses.

That won't be easy, according to Northey, the former USDA undersecretary. He said it's much easier to track corn and soybean yields than it is to gauge the impact of cover crops on the production of cash crops. The impact on risk could be “very small.”

But one group, the AGree Environmental and Economic Risk Coalition, believes it has produced the evidence using USDA and private data to make the case to the department that cover crops reduce crop risk.

AGree, which worked with a private firm and farm groups to get approval this year from USDA for a policy endorsement for farmers who use split nitrogen applications, expects

to apply to USDA in 2022 for approval of a product related to cover crops, said Deb Atwood, AGree's executive director.

"The amount of data that's used is extraordinary," she told *Agri-Pulse*. She didn't disclose any details of what the group would submit to USDA under its Section 508 process for private insurance plans. But when asked if AGree has the data to prove that cover crops reduce crop risk, she said, "Yes, we do."

Separately, the University of Illinois is expected to report this spring on research that used data from USDA and an outside source to determine how the use of cover crops and conservation tillage affected planting in the Midwest 2019, a year when the spring was marked by exceptional flooding. The data is being analyzed to assess how the conservation practices whether and when crops could be planted and what impact the practices had on crop yields.

The study required linking records from three USDA agencies — RMA, NRCS and FSA — with detailed weather data compiled by the PRISM Climate Group at Oregon State University. The results will be used to advise farmers on cover crop and tillage practices, said Atwood.

The study is being carried out under an agreement between the Meridian Institute, the host organization for AGree, USDA and the university.

Wanted: More advisers for farmers

Getting many farmers to undertake a fundamentally new practice isn't easy, says Lee Briese, a certified crop adviser and cover crop consultant in North Dakota.

"They'll try things, but if it fails miserably, you've probably put a hold on that practice for a generation," Briese told *Agri-Pulse*. "Because when your yearly paycheck revolves around decisions you make, you get to be pretty risk-averse on taking big chances."

That's why advocates of cover crops say it's vital to connect farmers to mentors and advisers who can help them learn how to manage the practice in a way that's suited to their area and cropping systems.

"Cover crops is a big change in an operation ... the return on investment from doing cover crops can be one year, it can be 20 years," said Margaret Henry, sustainable agriculture director for PepsiCo Inc., which contracts with Practical Farmers of Iowa to advise farmers who the company pays to plant cover crops.

The \$2.35 billion earmarked in the Build Back Better bill would help NRCS hire additional staff, but also could fund advisers through conservation districts and private organizations such as PFI.

"Conservation technical assistance is the critical element in providing highly trained and skilled professionals to build capacity and work within communities to address the impacts of a changing climate," said Jeremy Peters, executive director of the National Association of Conservation Districts.

NRCS is the second-largest agency at USDA with about 11,000 employees, 10,000 of whom work in NRCS field offices. The agency didn't respond to questions about how many of its staff can currently provide technical assistance. The National Farmers Union, appealing earlier this year for an increase in NRCS assistance, said that the agency had 1,200 vacancies at one point in 2020.

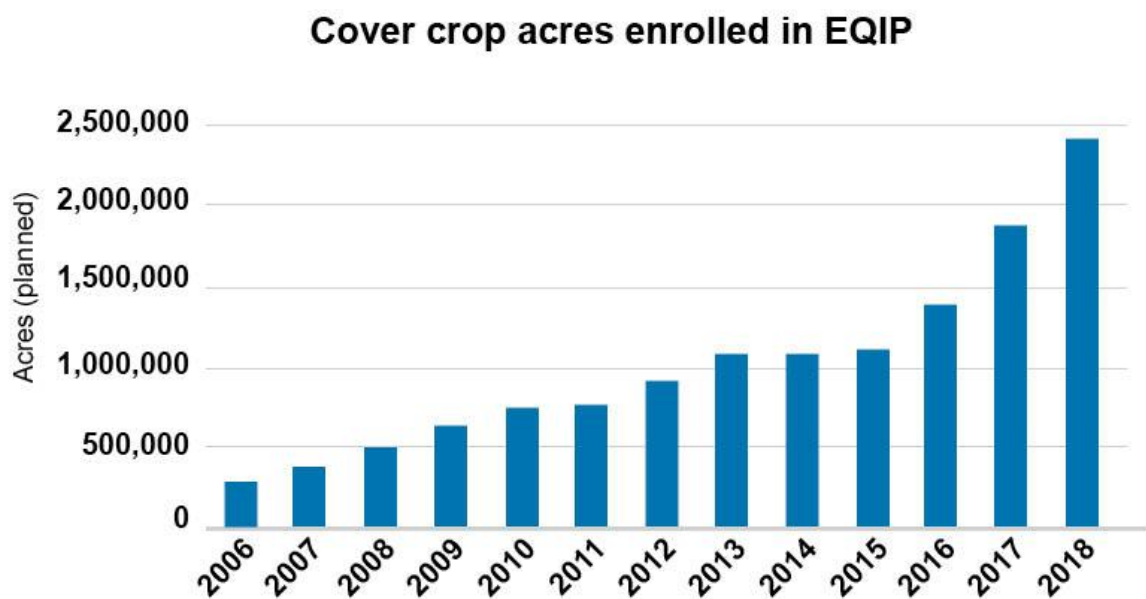
NRCS also certifies employees of private businesses, nonprofit organizations and state and local governments to serve as "technical service providers" to help farmers and landowners apply for conservation programs. About 1,250 individuals and about 100 businesses are certified as TSPs.

Underfunded conservation programs underpin progress to date

About one-third of the acreage planted with cover crops in 2018 received a financial assistance payment from either federal, state, or other programs that support cover crop adoption, according to a study by USDA's Economic Research Service.

Jay Baxter, who farms near Georgetown, Delaware, said federal programs are especially helpful to farmers who are on the fence about a practice such as cover cropping. They may be deterred by the financial risk or the added expense of "crop seed or hiring someone to do the application or hiring another person to plant in the fall," he said.

But the programs are chronically underfunded, including EQIP, which provides cost-share assistance for new equipment and practices, and the Conservation Stewardship Program, which can provide annual payments under five-year contracts to producers who undertake conservation practices.



Source: NRCS

Citing USDA data, the Environmental Working Group, a research and advocacy group, said there is a \$2 billion unfunded backlog for conservation programs, including EQIP and CSP. Some 87,000 farmers this year with valid EQIP applications couldn't get funding, the group said.

Under EQIP, producers can get funding for cover crops in fields in which they don't grow them already. Cover crops can be included in an EQIP contract for a maximum of five years on the same field and farmers who receive EQIP payments cannot harvest their cover crop for grain or seed. In certain states, they may be allowed hay or graze the cover crop to feed it to their livestock.

Cover crops are the top practice funded by EQIP. Cover crop acreage funded through EQIP quadrupled between 2006 and 2016 from 240,418 acres to 1,120,311 acres, according to ERS. EQIP funding for cover crops increased tenfold.

Payments under EQIP vary based on the state, according to the ERS report. For example, in the 2017 fiscal year, the median per-acre payment for the program in Illinois was \$62.33, while the payment for Delaware's program was \$92.27.

The report also states that funding for cover crops through EQIP has increased from \$7 million in 2005 to over \$155 million in 2018.

In 2019, the Trump administration was pushed to make some changes in EQIP that would further incentivize cover crops, including by easing limitations on grazing cover crops for soil health and wildlife benefits. USDA didn't go as far as cover crop advocates wanted, but the department left the door open to considering further changes to the EQIP regulations.

Under CSP, producers who are already planting cover crops could be eligible through the program to shift to enhanced cover crop systems, plant more diverse mixes or focus on targeting a certain environmental benefit, according to the ERS report.

The total cover crop acreage receiving CSP payments increased from more than 350,000 acres in 2010 to over 2 million acres in 2015, according to ERS.

Clay Pope, a farmer near Loyal, Oklahoma, who has participated in CSP, cautions that it's going to take time to shift more growers into practices such as cover crops.

"You can't turn an aircraft carrier on a dime," he said. "So giving the help to allow people to make those adjustments, to figure these things out, to sort through how you can benefit ... I think that's a huge piece of it."

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