

Is the U.S. cover crop seed industry ready to support projected adoption rates?

A snapshot of the industry



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Introduction

In recent years, interest in adoption of cover crops on U.S. farmland has surged in the public and private sectors, as well as with farmers. Cover crops are crops planted to cover the soil and reach different climate and soil health benefits, such as reducing erosion; increasing water availability; and providing weed, pest or disease control; and to enhance biodiversity on a farm (Clark 2015). To promote use of climate-smart practices such as cover crops, the federal government launched new funding programs, including the Partnerships for Climate-Smart Commodities program, which invested \$3.1 billion in projects providing financial and technical assistance to farmers and ranchers (USDA 2024). Several private companies have their own initiatives to incentivize farmers to use cover crops (Marston 2022). In their own right, farmers across the country are using cover crops at higher rates to reach specific objectives, such as building soil health and accessing these cover crop incentive payments (SARE, ASTA, and CTIC 2020).

With heightened investment — and interest — in cover crop adoption, we are faced with the question of whether the seed industry is prepared to meet the demand for quality cover crop seed. Evidence suggests that farmers currently perceive lack of seed availability as a key constraint to using cover crops (CTIC and SARE 2020). Although this lack points to a potential market opportunity for seed producers and companies, this industry is unique because cover crops are typically considered a noncash crop. Cover

crop seed may, therefore, not have the supportive infrastructure available to cash crops such as soybean and corn. To ensure that efforts to extend adoption of cover crops are fruitful, the cover crop seed industry needs to be bolstered and expanded.

This paper examines the present state of the cover crop seed industry, drawing from U.S. Census of Agriculture data; literature reviews of academic studies, news reports and white papers; and qualitative interviews conducted with representatives involved in the cover crop seed industry. We interviewed seven individuals who lead or work for seed companies that sell cover crop seed in North America. We asked interviewees to describe how their company operates, from seed production to sales. We then asked for their perspectives on the U.S. cover crop seed industry today, the biggest opportunities and challenges facing the industry, and what policies are programs they see as beneficial or crucial to growing the cover crop seed industry. We conducted qualitative analyses of interview transcripts to draw out key themes and unique perspectives.

From these interviews and the abovementioned available information, we seek to provide a baseline for where the U.S. cover crop seed industry is today, in 2024. We start by describing, first, the trajectory of cover crop adoption in the U.S., and then, current drivers. Next, we analyze U.S. agricultural census data to describe our current domestic and imported supply of

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cover crop seed. We then provide overviews of the cover crop seed production cycle, types of cover crop seed suppliers, and the major players in the industry today. From there, we present key challenges facing the cover crop seed industry today, describe opportunities for the industry to evolve, and discuss future considerations.

Cover crop adoption in the U.S.

According to the most recent U.S. agricultural census, use of cover crops on U.S. farmland has been trending upward (USDA National Agricultural Statistics Service 2022). About 18 million acres of cropland was planted with a cover crop in 2022, which represented a 17% increase compared to 2017 (USDA 2023). Although adoption has been growing, cover crops are still being used as a practice on only a small portion of U.S. cropland. Of the 301 million acres of harvested U.S. cropland reported in the 2022 Census of Agriculture, only about 6% was planted with cover crops. Note that some of that land, such as winter wheat fields and hay fields, cannot be planted with winter cover crops. States with higher adoption by percentage include the northeastern states of Maryland, Delaware and Connecticut, but it is important to understand that each of those states has much less cropland acreage than do Midwestern states.

Drivers for increased use

As noted in the previous section, cover crop use continues to increase nationally. The

reasons for producer adoption, however, continue to evolve. A focus on soil biology and soil health has long been a primary driver for cover crop use and adoption; however, new considerations such as voluntary carbon offset markets and biofuels policy focused on carbon intensity may drive further adoption in the future. The National Sustainable Agriculture Research and Education (SARE) program, Conservation Technology Information Center (CTIC) and American Seed Trade Association (ASTA) have conducted a National Cover Crop Survey on seven previous occasions dating back to 2012 (SARE, CTIC, and ASTA 2023). These surveys offer insights regarding the drivers for cover crop use by U.S. agricultural producers. One of the most-often-cited economic benefits of cover crops by experienced users is their impact on the resiliency of the cropping system (SARE et al. 2023). Long-term benefits of cover crop use include decreased soil erosion and loss of topsoil, improved water infiltration, nutrient cycling, improved soil aggregate structure, and increased soil organic matter (SOM) and soil organic carbon (SOC). Use of cover crops has also been a strategy for producers to address herbicide-resistant weeds, potentially decrease input costs, and provide a source of forage for diversified producers with livestock. The National Cover Crop Survey also highlights the potential impact of cover crop use, over time, on crop yields. Producers with more years of experience more often cite improved productivity (SARE et al. 2023).

More recently, some market investors have focused on ESG (environmental, social and

governance) investing, which is a reference to how companies rank on metrics such as corporate climate policies and energy use. Groups such as the Science Based Targets initiative (SBTi) help companies develop strategies to reduce greenhouse gas (GHG) emissions (Science Based Targets initiative 2024). SBTi is now used globally by thousands of companies. Protocols such as the Greenhouse Gas Protocol are used by companies to inventory GHG emissions and for accounting standards and guidance (Greenhouse Gas Protocol 2024). All these efforts are focused on accurately accounting for the GHG footprint of a company (Scope 1, 2 and 3 emissions) and establishing strategies to reduce carbon emissions. Although these efforts are mainly voluntary, in March 2024 the Securities and Exchange Commission (SEC) adopted rules to enhance and standardize climate-related disclosures by public companies and in public offerings (U.S. Securities and Exchange Commission 2024). Agricultural producers, through management strategies such as the use of cover crops, can generate outcome-based carbon credits that can be verified and sold to companies wishing to reduce their supply chain (Scope 3) carbon emissions. The voluntary carbon offset market, in addition to carbon insetting market opportunities, provides another avenue for producers to realize economic benefits from cover crop use and may drive additional acres in the future.¹

¹ To learn more about carbon offsets and carbon insetting markets, see Textile Exchange, 2022, [Regenerative Agriculture Landscape Analysis](https://textileexchange.org/knowledge-center/reports/regenerative-agriculture-landscape-analysis) (textileexchange.org/knowledge-center/reports/regenerative-agriculture-landscape-analysis).

Supply of cover crop seed

To establish a baseline of the current supply of cover crop seed, we analyzed economic trends and data from the U.S. census.

This section provides an overview of U.S. production and cover crop seed imports within the limits of the data available on the cover crop seed industry.

U.S. production

Currently, data on U.S. cover crop seed production is limited. The Willamette Valley in western Oregon is the primary location where cover crop seed is grown, particularly clover (*Trifolium*) (Martins et al. 2021; White 2014) and some of the grass and Brassica cover crops. A few other U.S. regions grow different cover crop seed species. The states of Washington and North Dakota produce some winter pea (*Pisum sativum*) seed. The Northeast U.S. produces winter annuals, including legumes and cereal grains; California and the southeastern U.S. produce cowpeas as a summer cover crop; and Hawaii produces sunn hemp, another summer legume (Treadwell et al. 2012).

Cover crop seed imports

To balance U.S. seed demand, alleviate U.S. supply disruptions, and stabilize seed prices, the U.S. imports a large proportion of cover crop seed from other countries. Of the cover crop seed that was imported from 2019 to 2023, 82.7% of seven common cover crop

Table 1. U.S. cereal rye and crimson clover seed imports (2019 to 2024).

Country	Cereal rye		Crimson clover	
	Kilograms	Percent of total	Kilograms	Percent of total
Canada	296,999,731	98.8	73,575	8.0
Czech Republic	0	0.0	453,695	49.1
Germany	1,092,004	0.4	53,511	5.8
Italy	2,349,017	0.8	157,790	17.1
Rest of World	40,124	0.0	162,683	17.6
South Korea	50,000	0.0	22,745	2.5
Total	300,530,876	100.0	923,999	100.0

Source: U.S. Census Bureau.

species — cereal rye, oats, crimson clover, red clover, annual ryegrass, radish and turnips — originated from Canada. Other countries with greater than 1% of the share of U.S. seed imports include New Zealand, the Netherlands, Italy and Germany. Note that these imports may be destined for uses other than cover crops, such as a grain or forage crop.

Grain seeds such as cereal rye and oats are grown in large quantities both domestically and in Canada. The cool, dry climate in parts of Canada is highly favorable for seed production. Clover seed is imported from a variety of sources but in smaller quantities than cereal rye. Winter annual grass cover crop species do well in cool climates such as those found in Europe. Brassica seed sources vary widely, depending on the year, with large quantities coming from Asia, Italy, the Netherlands and New Zealand. Table 1 shows

the country of origin for crimson clover and cereal rye seed imports into the U.S.

The value of U.S. seed imports typically used as cover crops doubled from \$34.3 million in 2019 to \$68.4 million in 2023. Figure 1 shows annual U.S. seed import value for selected seed varieties from 2019 to 2023. Cereal rye, oats, crimson clover and radish have experienced growth over the period. Cereal rye import value increased 136% between 2020 and 2023. Red clover and annual ryegrass seed imports have remained consistent or decreased over the five-year span.

Over the past five years, prices per kilogram of seeds typically used as cover crops imported to the U.S. can be described as either volatile or trending upward. Figure 2 illustrates seed price per pound for selected species from 2019 to 2023. Red clover, annual

ryegrass, cereal rye and crimson clover seed prices all increased slightly over the period. Oat seed prices increased through 2022 but

fell substantially in 2023. Radish seed prices experienced substantial volatility over the period.

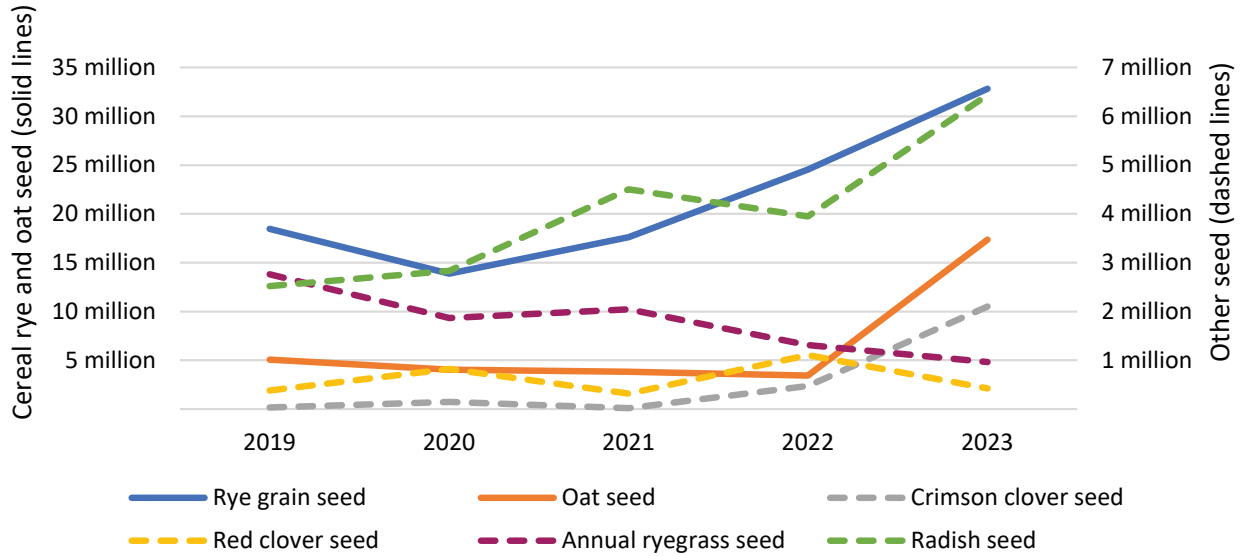


Figure 1. U.S. seed import value for selected seeds (U.S. dollars). (Source: U.S. Census Bureau)

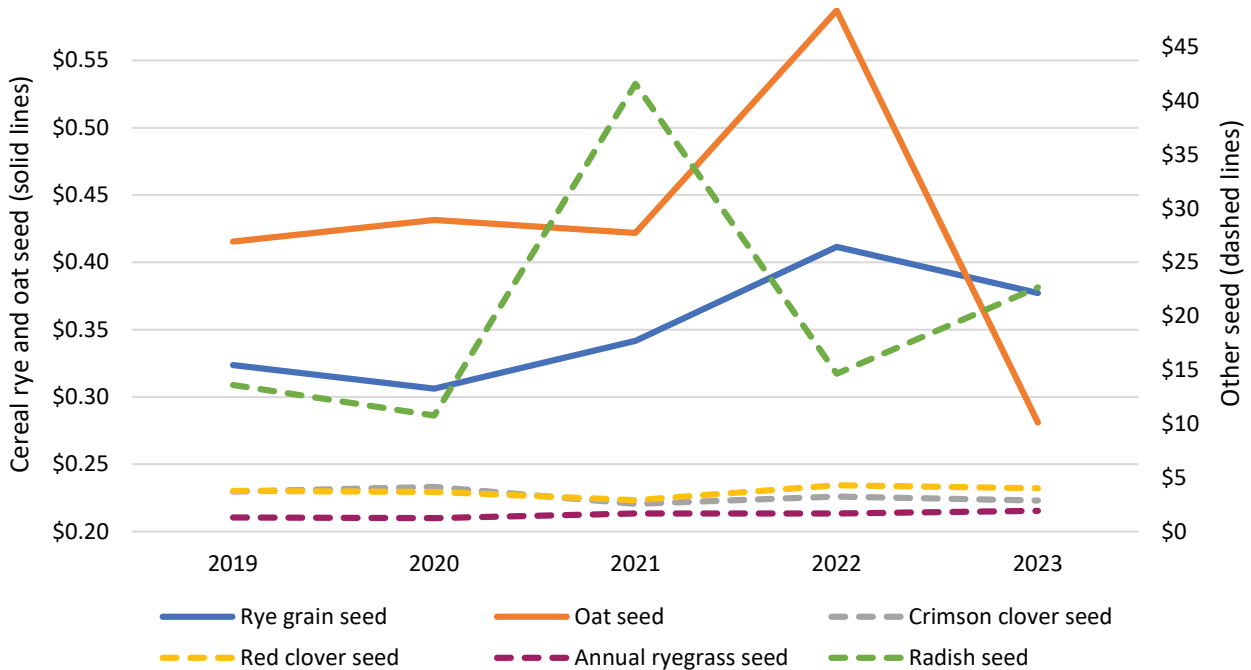


Figure 2. U.S. seed import average price (U.S. dollars) per kilogram. (Source: U.S. Census Bureau)

Cover crop seed suppliers and industry structure

Production cycle

Producing cover crop seed

Cover crop seed is produced by growing plant material, harvesting the seed, processing the seed, and checking the seed for viability and purity, followed by distribution and sales, with seed stored at various points along the way before ultimately reaching farmers. Processing cover crop seed involves cleaning it of excess plant material by running it through machines that remove undesired seeds, plant parts and foreign material. This cleaning allows producers to more easily sow seeds through mechanical planters, while also reducing risk of fungal or bacterial infection (White 2014). State seed laws and seed certification agencies oversee genetic purity standards to ensure that seed is accurately labeled (White 2014).

Seed distribution and storage

Transportation and storage are important considerations for the cover crop seed industry (Martins et al. 2021). Cover crop seed is often produced in areas or regions far from where the seed will ultimately be planted as a cover crop. In addition, some cover crop seed is not harvested in time for farmers to plant it the same year the seed is produced. Therefore, cover crop seed companies must invest in long-term storage facilities, which puts them in competition with cash crop seed storage needs. Finally, cover crop seed companies often prefer to store high-value seed rather than seed that has a low volume-to-price ratio. This preference could impact

the type of seed species selected to be grown for cover crop seed.

Sourcing seed

Cover crop seed companies may grow their own seed, contract with farmers to produce seed, source seed from other companies, or buy seed on the open market through a broker. The primary source of seed purchase varies across companies. Some obtain the majority of their seed through contract production with farmers, in which case farmers must have appropriate equipment and knowledge on how to grow cover crops for seed, and must receive a cover crop seed price competitive with other crops. After seed is harvested, it must be cleaned and assessed for purity and viability. In some cases, the farmers will clean the seed, if they have appropriate equipment; otherwise, the seed company will be responsible for this cleaning process.

Types of cover crop seed suppliers

Tiers

The cover crop seed industry is a dynamic sector of the seed industry with various arrangements for production, distribution and sales of cover crop seed. Table 2 provides an overview of general characteristics of entities that sell cover crop seed in North America (based on Martins et al. 2021 and qualitative interviews).

Companies selling cover crops

Many of the major companies involved in cover crop seed production are members of the American Seed Trade Association (ASTA 2020). The ASTA website lists 71

companies that are involved in wholesaling and/or retailing cover crop seed. Of these 71 companies, many are also involved in selling seeds for cash crops. From those listed, 11 appear to sell only cover crop seed, whereas the rest sell cover crop seed in conjunction with pollinator mixes and/or environment and conservation seed. Of the 71 companies, 32 operate primarily in one to four of the seven regions of the U.S. — Northeast, Southeast, Central, North Central, South, West and Northwest. Thirty-eight companies operate in at least five regions, with many of them also operating in Canada and Mexico. Table 3 lists some of the largest cover crop seed companies by number of employees. None of the four largest proprietary seed companies are involved in cover crop seed production or distribution, to our knowledge.

Key challenges


Through qualitative interviews with representatives from companies that supply cover crop seed, we identified several key challenges facing the industry. In this section, we discuss key challenges.

Lack of policy/regulations

Policy issues vary and may be addressed at different scales. Some of these issues pertain to seed quality related to seed imports and seed sales, in particular, contaminated seed that can set back the industry as a whole. If a farmer has a bad experience with contaminated or poor-performing cover crop seeds, everyone in the supply chain is negatively affected. Some challenges pertain to protections around variety stated versus

variety not stated (VNS) seed (see fuller discussion in later section). These concerns are particularly important to seed companies that have research and development (R&D) programs. Other issues pertain to policies that impact adoption, such as incentivizing cover crop use, USDA-provided recommendations on cover crop seeds and mixtures, or policies regarding crop insurance (see next section).

The lack of quality control regulations and oversight can present issues for importers and among farmers who grow and sell seed here in the U.S. Seed company representatives described some of the farmer-to-farmer sales as a Wild West:



It's the Wild West when we talk about farmer-to-farmer sales ... If a farmer grows, say cereal rye, and it's contaminated with palmer amaranth, chances are he's not going to destroy it. He's going to sell it to an unsuspecting person in the next state over or something. He wants to receive revenue, even though he knows it's not suitable for purpose. And I don't know how we get around that regulatory part, because our current regulatory system is not staffed in such a manner that that can occur (SC-1004).

Depending on the variety, imports of cover crop seed lack requirements to label country of origin, which can also cause problems, as this representative stated:

Table 2. Tiers of cover crop seed entity sales models.

Category	Description
Tier 1	Sell cover crop seed exclusively to other companies (B2B ¹ companies) Located in key locations between seed production and distribution hubs
Tier 2	Sell cover crop seed to other companies and to farmers (B2B and B2C ²)
Tier 3	Sell cover crop seed exclusively to farmers (B2C) Private companies Includes small retailers Territory covered can vary from regional to international
Tier 4	Farmers grow cover crop seed and sell to other farmers In some cases, farmers have equipment to clean and process cover crop seed prior to sales. Some cover crop seed companies also offer a service to clean farmer-produced cover crop seeds

1. Business-to-business.

2. Business-to-consumer (business to farmers, in this case).

Sources: Tiers 1 through 3 identified in Martins et al., 2021; Tier 4 added from qualitative interviews.

Table 3. Companies with 30 or more employees selling cover crop seeds across more than four regions of North America.

Company	Number of employees*
Albert Lea Seed House	50–75
Beck’s Hybrids	>250
Caudill Seed Co	>250
DLF Pickseed	<50
Ernst Conservation Feed	75–100
Granite Seed Co	50–100
Green Cover Seed	<50
Johnny’s Selected Seeds	100–250
Keithly-Williams Seeds	>250
Smith Seed	100–250

*Estimated from location and corporate sales and employee numbers. Note that employees may include farmer-dealers.

Sources: [List of companies selling cover crop seed](https://beetterseed.org/resources/environment-and-conservation-seed-companies) (beetterseed.org/resources/environment-and-conservation-seed-companies), American Seed Trade Association. Employee ranges compiled from Reference Solutions Database.

There's been documented cases, for example, of people importing out of India sunn hemp seed ... and they imported it as a food-grade item. The USDA accepted that. It got through the country in spite of the fact that it was loaded with prohibited noxious weeds, and it was sold throughout the United States (SC-1004).

Importantly, various regulatory policies and support policies affect different cover crop seed companies in different ways. Companies that engage in R&D are concerned about regulation that can protect varieties and quality, whereas other companies may be more concerned about existing state-level policies around seed quality and issues related to seed contamination.

Navigating supply and demand

Until cover crop use is a regular practice in producers' management systems, balancing supply and demand will be challenging for companies selling cover crop seed. Farmer demand for cover crop seed can be affected by several factors — including weather patterns (e.g., drought), availability of subsidies, cost-shares, and incentive payments to support using cover crops — and their agronomist's proclivity for cover crops.

One of the biggest named challenges is being able to forecast cover crop seed demand. When contracting seed production, companies need “to plan 12 to 18 months before we even sell the product (SC-1001).”

This need not only makes it challenging to navigate supply and demand, but makes it hard to time seed production, harvesting, processing and distribution:

I guess another challenge with cover crops is a lot of the species that we use are new crops coming off in June, July, August, so that turnaround time to get things out the door can sometimes be a hurdle. Or say, like hairy vetch ... if it's getting harvested in July, it's probably not ready for sale until September, and that's actually after the prime planting season for hairy vetch in the Upper Midwest, which would be like Aug. 15 through Sept. 1 (SC-1008).

Another issue in navigating supply and demand is the variance between regions and specific types of agriculture production. For instance, one company representative also noted how it is especially challenging to meet demand for USDA Organic cover crops in particular, because “if we're wanting something sourced organic, we're having to go find a grower and contract that directly” (SC-1008).

The representative went on to explain:

And it seems like we typically don't run out of conventionally grown cover crop seed but in the organic sector, I feel like we never can keep up with the demands there. So, we're subbing a lot of seed to

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conventionally grow in non-GMO or nontreated seed when we don't have organic (SC-1008).

Another seed company representative talked about the difference between Midwest cover cropping and that taking place in the Southeast:

... when we talk about Midwest cover cropping is a little different than some of the opportunities we have in the southeast ... when you look at state of Florida, their recommendations on cover crops, they listed bahiagrass, which is a perennial grass, but for their vegetable producers, that is a cover crop (SC-1010).

Role of cost-share and incentive payments

Interviewees expressed mixed feelings on the role of cost-shares and incentive payment programs that pay farmers to use cover crops. When cover crops are incentivized through large investments — either public investments through state or federal programs, or private companies' sustainable sourcing programs that offer incentive payments to use cover crops — industry representatives worry about the “artificial market influences, because it did not grow out of somebody's desire to know if (cover crops are) going to work or not (SC-1001).” This interviewee further explained:

If we ramp up seed production to meet all this demand, then if that funding goes away, well now we

got way too much seed out there, and the price is gonna drop to very unprofitable margins (SC-1001).

Financial assistance programs are seen as an entry point for farmers to try out cover crops with reduced financial risk, but some interviewees wondered if farmers would continue with the practice (notably, the 2023 SARE/CTIC National Cover Crop Survey provided data showing that 90% of farmers said they would definitely or very likely continue with cover crops after incentive payments end). One representative further worried that when producers receive cost-share or incentive payments, “then they're really never going to apply the appropriate management levels to make it fit into the system the way that it needs to in order for it to really become a profitable part of what they do (SC-1001).”

Another concern regarding government cost-share programs relates to the program practice standards and guidelines. Interviewees worried that programs might lead producers to plant unsuitable varieties, either due to either a lack of or too much specificity, as is the case with some NRCS guidance on custom mixes:

I sometimes question some of their custom mixes. ... Sometimes the government (program) has very complicated calculators and pure live seed requirements (SC-1008).

Another industry representative noted how we are using American tax dollars to

provide incentives for cover crops, but those programs often rely on imported seed rather than seed grown in the U.S.:

American tax dollars are being used in programs to incentivize cover crops. And then a lot of that seed may be imported. And so you kind of go like, OK, so that's something that we need to fix. Because our growers, I mean, the growers need to be growing. I mean, it's not like we can't grow it. It's not like we don't have the capability to grow it (SIC-1005).

Lack of crop insurance

Cover crop seed, grown as a crop, is not directly included in most crop insurance programs, though partial coverage can potentially be obtained through Whole Farm Revenue Protection or the Non-insured Crop Disaster Assistance Program. This lack of risk mitigation can make farmers wary of starting to produce cover crop seed. As one interviewee said:

It's one thing for the government to come out with programs to really incentivize people to plant cover crops but ... we don't have like a big lobbyist group that is out there looking out to get the insurance or to get farmers to produce them (emphasis added, SC-1005).

Variety not stated (VNS) versus variety stated

Different from most cash crop seed, cover crop seed is often sold as variety not stated (VNS). Although state-level seed laws and certification entities provide some assurance of accurate labeling by crop and variety, VNS seeds undergo less-rigorous oversight regarding the seed's genetics. (Martins et al. 2021). Interviewees expressed mixed feelings about VNS seed versus variety stated seed.

Tier 1 companies, companies that sell to other companies who then sell to producers, felt that some of their customers prefer VNS because it removed some competition compared to if they were selling a specific variety. One interviewee explained:

We are not big on variety not stated, although we have customers that ... like to do branded products and so they may want to tag it as variety not stated. Basically, they don't want people to know what they're using (in the seed mix) ... they don't want their customer to know what it is in (the seed mix) in the event that they want to have that brand loyalty to them, so that people come in and say, 'well, I bought this product, it works ... I'm just going to count on them to supply that to me,' versus if it were one of my certified names on the tag, then somebody else in that same market might be selling the same thing (SC-1005).

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On the other hand, companies focused on research and development were irritated with the amount of VNS sold.

It's always been a pet peeve of mine. You know, I go to a lot of the research meetings, and one of the constant battles that we run into are research scientists not identifying even the species, let alone the varieties (SC-1004).

Another explained the advantages of selling named varieties for particular attributes:

If you could breed a radish to make it through the wintertime, you've got something, right? If you could breed crimson clover to get out of the ground quicker and be more winter tolerant, across the Midwest, we'd sell a lot more crimson clover (SC-1007).

The other issue regarding VNS “for all the seed industry participants is that there’s a lot of farmer-saved seed or farmer-to-farmer seed or farmer-brokered seed (SC-1002),” which can be good for meeting the objective of getting cover crops on more acres; however, this participant went on to explain that VNS also affects the ability to forecast supply and demand:

... because as long as we're getting a seed produced, and it's getting quality tested, and we're not spreading noxious weeds around, yada, yada, now, that's a

good thing. But it also kind of puts another wrinkle in the demand forecast, because that farmer that that dealer sold to a year ago, may decide 'Well, I'm just going to get my seed, you know, locally, or what have you' (SC-1002).

Need for knowledgeable and trained agronomists

Knowledgeable and trained agronomists are required in both industry and government to help farmers with cover crop management. Ag retailers connected with agronomists play a major role in increasing cover crop adoption and therefore play a role in generating demand for cover crop seed. For Tier 1 and Tier 2 companies that sell to ag retailers who then sell to farmers, an agronomist that understands cover crop selection, management practices and environmental/ financial benefits of cover crops is necessary to stimulate cover crop sales. In government agencies, interviewees described the difference between working with someone who knows about cover crops verses someone who isn't familiar with them:

We worked with some great district conservationists through NRCS that have just been super at promoting it in their areas. And you know, very communicative about, you know, 'Here's what we want.' I love working with both my customer and their NRCS agent, and, in fact, I request that. I say, 'If we want to make any changes, let's get your NRCS guy looped in. I want to

suggest these changes, but let's make sure they approve it so it still meets your program.' And most of them [NRCS] are very willing to do that. And then there's some that just they don't understand, they don't get it. They just want to build terraces, because that's what they know how to do. And so, it really boils down to the person (SIC-1001).

Because producers commonly get farming advice from their ag retailer agronomist, the agronomist's role is also seen as important in providing guidance on what kind of cover crops to plant and best management practices. One interviewee explained:

We believe that the farmers buy seed and buy their inputs from their agronomists that they trust, which is usually that person (at the ag retailer) (SIC-1006).

Need for better data

There is need for more and better-quality data on cover crops and the cover crop seed industry. To start, more empirical data on the impacts of using cover crops at the farm level is needed. More evidence of the benefits of using cover crops in different contexts may help level out demand rather than farmers just chasing the dollars for program payments (e.g., cost-shares), as reflected by the following interviewee comments:

I think, number one, for wider spread adoption ... we need more confidence and data to show that

it is profitable, especially profitable apart from government incentives, because again, they may do it for a few years. But you know, once they don't get their 20 bucks an acre or whatever, are they still going to do it? Well, they might, if they're convinced that the agronomic benefits are there apart from the subsidies (SIC-1001)

So, the measuring success, I think, would be one thing that would help with retention. So, if we could show a producer that you know, yes, he got reimbursed for seeding this, but then also if we could, we could do a pre- and post-sample of some sort to show the benefit of that, you know, you produce x amount of nitrogen, you increase your organic matter by this percentage, which leads to water retention (SIC-1010).

In addition to increasing research on cover crops usage, data that could help with predictability of demand is also needed. In particular, two types of data are desired from USDA: solid reporting of cover crop acreages as is done for row crops, and advance notice of federal incentive programs to be offered and their requirements.

But just report acres, just like we have to report corn, soybeans, wheat. ... It's very simple. If you go to report your acres in the spring, just what did you plant as a cover

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crop the previous fall? I mean, it's that simple (SIC-1007).

This respondent acknowledged that although some data is available through USDA Environmental Quality Incentives Program (EQIP) and other programs, not every farmer uses those programs, so comprehensive data is difficult to come by. They went on to say:

One of the biggest challenges is lack of pre-planning (on the part of farmers) ... so last year we sold 20 loads of triticale. This year we expect to sell 20 to 25 loads of triticale. But if no one plans, if I don't have orders in, then what I do, go ahead and commit to that 25? ... Or do we commit to 22 ... and then hope that we can find the other three to fill in? ... That's probably from a sales standpoint ... and purchasing, that's an enormous challenge (SIC-1010).

Future considerations

As U.S. producers are increasingly incentivized to adopt cover crops, addressing these various challenges will be crucial. In this section, we highlight key considerations for the evolution of the cover crop seed industry.

Industry structure and innovation

Growth in cover crop use may yield new, innovative structures for cover crop seed

production and distribution. For example, KWS Seed offers hybrid rye varieties in the U.S. Hybrid rye production has increased in the U.S. and is used primarily for animal feed, milling and distilling applications. As noted on the KWS website, a new program is now being offered that allows the grain harvested from KWS hybrid rye varieties to be sold to KWS authorized partners and used as a cover crop in a soil protection program (KWS n.d.). KWS Cover +™ will require harvested hybrid rye grain to be sold to a licensed partner and common seed to be marketed through an authorized seller. The seed must be terminated, although use in mixes and grazing will be allowed. The program is not designed for a farmer to grow seed and clean it for their own use or sales to neighbors.

Engagement of big ag companies

Today's cover crop seed industry is dynamic and innovative with several smaller, regionally based seed companies active in the industry. This industry contrasts sharply with the soybean, corn and cotton seed markets in the United States, where the top two seed firms typically provide 65% to 71% of the sales.² With policies promoting the increased use of cover crops on commodity crop farms, these larger seed firms may take more interest in the cover crop seed market. Certainly, standardizing varieties, mixes and recommendations could lead to larger economies of scale, making the industry attractive to large seed companies. However, given the current desire for context-specific

² According to [the latest data from Farm Action](https://farmaction.us/concentrationdata) (farmaction.us/concentrationdata), the CR4 for soybean seed is 70% (CR2=66%), for corn seed is 80% (CR2=72%), and for cotton seed is 90% (CR2=66%).

cover crops, there are opportunities for firms that are more regionally oriented to continue to predominate.

Policy considerations for the future

In the future, U.S. energy and tax policy may also play a significant role in cover crop adoption and therefore in the cover crop seed industry. The Inflation Reduction Act was passed in 2022 and, among many provisions, established a tax credit for Sustainable Aviation Fuel (40B)³ produced before Jan. 1, 2025, and a Clean Fuel Production tax credit (45Z)⁴ beginning Jan. 1, 2025. The U.S. Treasury has yet to establish final rules for the Clean Fuel Production Credit under 45Z but has provided final guidance for section 40B. In general, the sustainable aviation fuel (SAF) provisions provide a federal tax credit for SAF that reduces greenhouse gas emissions by at least 50%. The final guidance from the U.S. Treasury (n-24-37 issued April 2024) established a safe harbor for using climate-smart agriculture crops cultivated pursuant to the USDA CSA Pilot Program. Under these provisions, SAF produced from corn or soybeans that bundled required climate-smart practices such as using cover crops were eligible for an additional proxy reduction in calculating the emissions-reduction percentage. It is anticipated that climate-smart agricultural practices such as cover crop use will also play a role in future guidelines for

the Clean Fuel Production tax credit and may provide economic incentives for increased use of cover crops.

Conclusion

The increased support for U.S. farmers to use cover crops represents a pivotal opportunity to have more climate-smart practices on U.S. farmland, but creating an environment that facilitates adoption is clearly going to take some work. As with other industries in the same growth trajectory, the cover crop seed industry has key challenges to address. Cover crop seed company representatives worry that the lack of policy and regulation undermines seed quality, which can lead to farmers having bad experiences using cover crops. The predominance of variety not stated (VNS) cover crop seed was also identified as an issue by some representative, but for others, this was the preferred option. Other policy issues to address include the lack of crop insurance for producers growing cover crop seed.

Another key issue for seed companies is the challenge of navigating supply and demand for cover crop seed, which is impacted by varying farmer demand year to year. Varied demand in itself can be the result of both weather impacts and sporadically shifting levels of investment through policy and other incentive programs. This issue reflects the

³ [Sustainable aviation fuel credit](https://irs.gov/credits-deductions/businesses/sustainable-aviation-fuel-credit) (irs.gov/credits-deductions/businesses/sustainable-aviation-fuel-credit)

⁴ [Frequently asked questions about applying for registration for the Clean Fuel Production Credit under § 45Z](https://irs.gov/newsroom/frequently-asked-questions-about-applying-for-registration-for-the-clean-fuel-production-credit-under-ss-45z) (irs.gov/newsroom/frequently-asked-questions-about-applying-for-registration-for-the-clean-fuel-production-credit-under-ss-45z)

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important role that cost-shares and incentive programs currently play in facilitating the use of cover crops. Although these can be positive influences for cover crop adoption, they can also create a false sense of demand, further complicating cover crop seed companies' ability to balance supply and demand. Ag retailers and agronomists can also influence farmer interest in trying and succeeding with cover crops, pointing to the need to increase farmers' knowledge and provide more training.

In addition to the challenges faced by the cover crop seed industry, there are opportunities for the industry to innovate in terms of how it evolves and structures itself. We have yet to see many of the largest commodity crop seed companies get involved with cover crop seed in a major way, and perhaps the interest in having context-specific varieties will allow for more regionally based small and mid-sized companies to benefit from cover crop seed demand. Finally, with increased attention on both mitigation and climate change adaptation strategies, there are increased avenues for farmers to be supported in adopting cover crops as a climate-smart practice. Bolstering an expanded U.S. cover crop seed industry will help achieve many benefits for farmers, seed companies, and consumers.

References

- ASTA. 2020. "Environment and Conservation Seed Companies" ([betterseed.org](https://betterseed.org/resources/environment-and-conservation-seed-companies))
- ASTA. 2020. "Environment and Conservation Seed Companies" ([betterseed.org](https://betterseed.org/resources/environment-and-conservation-seed-companies))
- Clark, Andy. 2015. Cover Crops for Sustainable Crop Rotations. SARE.
- CTIC and SARE. 2020. 2019-2020 Cover Crop Survey Report. Conservation Technology Information Center (CTIC), Sustainable Agriculture Research & Education (SARE).
- Greenhouse Gas Protocol. 2024. "Greenhouse Gas Protocol" (ghgprotocol.org). Retrieved August 26, 2024.
- KWS. n.d. "KWS COVER+TM" (kws.com/us/en/products/coverplus/coverplus-sell) KWS SAAT SE & Co. Retrieved August 30, 2024.
- Marston, Jennifer. 2022. "As Regenerative Agriculture Takes Root, Let's Hold Corporates Accountable." AgFunderNews, March 17.
- Martins, Lais Bastos, Roderick M. Rejesus, Chris Reberg-Horton, and Robert L. Myers. 2021. "Understanding the Market for Cover Crop Seeds in the United States: Background and Potential Policy Directions." *Journal of Soil and Water Conservation* 76(5):83A-88A.
- SARE, ASTA, and CTIC. 2020. National Cover Crop Survey; Annual Report 2019-2020. West Lafayette, Indiana: Conservation Technology Information Center.
- SARE, CTIC, and ASTA. 2023. "SARE/ASTA/CTIC Cover Crop Surveys" (ctic.org/data/Cover_Crops_Research_and_Demonstration_Cover_Crop_Survey). Retrieved August 30, 2024.
- Science Based Targets initiative (SBTi). 2024. "Science Based Targets: Driving Ambitious Corporate Climate Action" (sciencebasedtargets.org). Science Based

- Targets Initiative. Retrieved August 26, 2024.
- Treadwell, Danielle, Waldemar Klassen, Michael Alligood, and Stephanie Shewey. 2012. Annual Cover Crops in Florida Vegetable Systems Part 3. Buying and Sourcing. HS 1142. Florida: University of Florida.
- U.S. Securities and Exchange Commission. 2024. "SEC Adopts Rules to Enhance and Standardize Climate-Related Disclosures for Investors." SEC.gov, March 6.
- USDA. 2024. "Partnerships for Climate-Smart Commodities" (usda.gov/climate-solutions/climate-smart-commodities).
- U.S. Department of Agriculture. Retrieved August 30, 2024.
- USDA National Agricultural Statistics Service. 2022. 2022 Census of Agriculture.
- White, P. A. 2014. The Growing Business of Cover Crops. National Wildlife Federation.