ANNUAL REPORT 2019-2020

National Cover Crop Survey
August 2020

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ABSTRACT

By nearly any account, 2019 was a brutal year for many American farmers. The year started with heavy snow cover and continued with the wettest spring on record in many areas, delaying planting across vast stretches of the country for weeks. Against a backdrop of low commodity prices, the rate of planting U.S. corn and soybeans was the slowest it has ever been.

This year's national cover crop survey by USDA's Sustainable Agriculture Research and Education (SARE) program, Conservation Technology Information Center (CTIC), and American Seed Trade Association (ASTA) explored farmers' experiences with cover crops in those especially challenging circumstances. Through the responses of 1,172 farmers from across the country, we found that cover crop users are committed to the practice and believe cover crops deliver a wide range of benefits.

Among respondents to the 2019-2020 national survey, 78.6% reported that wet weather had delayed planting in their county. It was interesting to see that 78% of the cover crop users did not have a prevent plant claim - reflecting failure to seed a cash crop before a final planting date specified by crop insurance rules - despite the challenging growing season. Among those who did, 36% said prevent plant was more common in conventionally managed fields compared to cover cropped fields, 55% said the incidence of prevent-plant was equal regardless of whether the field was cover cropped, and just 9% felt prevent plant was less common in conventional fields.

This year, we dug deep into "planting green," the practice of seeding a cash crop into a live cover crop and letting both grow simultaneously for a length of time. About half (52.5%) reported that they had planted green somewhere on their operation, which may have been motivated in part by an effort to better manage wet spring soils. Of the farmers planting green, 68% reported better soil moisture management.

In fact, despite the crippling spring rains of 2019, 54.3% of respondents said they were able to plant cash crops sooner in their green-planted fields than in fields where cover crops were either terminated early or were not present, versus 9.7% who had delayed planting; 36% reported that they seeded green-planted fields and other fields at about the same time. It is possible that growing cover crops were actively transpiring moisture from wet soils at planting time, a benefit that the dead biomass of a terminated cover crop could not deliver.

In addition, 70.5% of the respondents said planting green improved their weed control. The vast majority said levels of early season diseases, slugs, and voles—often feared as the potential downsides of planting green into cover crops—were about the same or better after planting green into cover crops. Though many farmers noted that they did not have problems with voles, several pointed out challenges with cutworms when planting green—something worthwhile to note as more people explore the practice.

While the drought year of 2012 showed the biggest yield increases from cover crops, farmers in 2019 still reported modest boosts in soybean, corn and wheat yields of 5.0%, 2.0% and 2.6%, respectively. While farmers appreciate the yield benefits of cover crops, additional questions in the survey clearly indicate that they are also motivated by cover crops' abilities to deliver other benefits, like weed control, soil health, erosion control, livestock grazing and so many others.

Besides the slight revenue boost from modest yield increases, cover crops can help pay for themselves in other ways, such as reduced input costs. In terms of fertilizer savings, 49% of corn producers reported reduced fertilizer costs, as did 41% of soybean producers, 43% of wheat farmers, and 53% of cotton producers.

A similar pattern emerged with herbicide savings, with reduced herbicide costs in soybeans (38.7% of producers), corn (39%), wheat (31.9% of producers) and cotton (70.6%). Among the farmers who did not report a cut in herbicide applications or costs, a majority still reported improved weed control from cover crops.

A new line of questions explored the crop insurance investments made by cover crop users. Three out of four respondents covered at least a portion of their crop with some form of federally subsidized crop insurance, with 53% of the total respondent pool covering 100% of their 2019 crop acres. Revenue Protection was the choice of 64.8%, while Revenue Protection with Harvest Price Exclusion (RPHPE) was employed by another 19.6%. Understanding the insurance preferences of cover crop users can help guide the further evolution of federally subsidized crop insurance programs to better accommodate cover crop practices.

Horticulture users of cover crops represented 19.2% of the respondents to the survey, representing fruit, nut and vegetable operations around the country.

Among the primary motivations for planting cover crops, 94% of the horticulture producers identified improved soil structure or soil health, 81% cited improved weed management, 71% sought to reduce erosion and 63% aimed for improved water infiltration. A majority of the horticulture crop producers also reported economic benefits from cover crops. Of the producers with cover crops, 34.8% reported a 5%-or-greater increase in net profit and 23.4% said their profits increased 2 to 4% due to cover crops. Only 3.8% said their profits were reduced by cover crops.

A detailed look at those answers and more, the insight shared by 1,172 farmers, provides perspective on a wide range of cover crop issues and, we hope, serves as a tool for farmers, crop advisers, conservation field staff, researchers and extension personnel, agribusiness leaders, communicators, and policy makers seeking to improve sustainable production through the expanded use of cover crops.

FOREWORD

Despite several years of historically low commodity prices and adverse planting conditions, American farmers increased their cover crop acreage by approximately 50 percent between the U.S. Department of Agriculture's 2012 and 2017 Ag Census, a jump from roughly 10 million acres on 133,500 farms to more than 15 million acres on 153,400 farms.

Since 2012, the U.S. Department of Agriculture's Sustainable Agriculture Research and Education (SARE) program and the Conservation Technology Information Center (CTIC) have been surveying farmers about their cover crop practices, as well as their opinions about cover crops. In 2015, the American Seed Trade Association (ASTA) joined the effort. Over the years, these surveys have provided insight that has helped guide research into the science of cover crops, signaled the impacts of policy decisions, helped communicators hone their messages to address farmer questions and concerns, aided seed growers and ag retailers in assessing the market for conservation, and shined a light for farmers and their crop consultants on what other producers are trying. Results from these surveys have been published in farm and conservation media, written into academic papers, and even cited in testimony to Congress.

This survey is a collection not just of figures and statistics, but also reflects farmers' excitement, concerns and enthusiasm regarding cover crops. It is the sum total of the insights shared with SARE, CTIC and ASTA by more than 1,000 farmers from around the country who generously spent the time to share their opinions and count up their acres.

Our partners at SARE—led by Dr. Rob Myers in Missouri—and ASTA, represented by Jane DeMarchi and Bethany Shively, have also demonstrated commitment above and beyond the call of this project. We worked closely to conceive of questions that allow this year's survey to expand our understanding of cover crop trends while also giving us an opportunity to make general comparisons with previous surveys. This committee honed the language and tested the mechanisms, publicized the survey and delved into the data to understand its messages.

At CTIC, Callie Cleveland and Sue Tull worked tirelessly at the massive task of cleaning and analyzing the data, while Steve Werblow turned the numbers into words that we can now share with a global audience. Joe LaRose at University of Missouri also contributed to the data analysis efforts. Designer Kim Davis turned mounds of words and data into the report you see here, encouraging readers to explore the lessons farmers shared in their answers.

We would also like to call out the generous financial support of ASTA member companies whose contributions made this project possible: Agassiz Seed, Ampac Seed Company, Beck's Hybrids, Grassland Oregon, Green Cover Seed, La Crosse Seeds, Mountain View Seeds, ProHarvest Seeds and Seedway.

We present this report to you in hopes that it helps shine a light on the advances in cover crop adoption that have occurred since this survey program began; identify opportunities for improvement in the science, policy and marketing of cover crops; and point the way to further growth of these important conservation systems.

Mike Smith
Project Director, CTIC

INTRODUCTION

The 2020 planting season was marked not just by massive uncertainty caused by the COVID-19 pandemic, but by commodity markets that had spent the prior several years anemic or worse and were rocked by the devastation of the national and global economy. Food service markets were decimated by shelter-in-place and lockdown orders, livestock prices cratered as processing plants shut down due to the spread of the coronavirus among workers, and corn suffered as ethanol markets dried up.

Rainy weeks around the country, drought extending from the Northwest through Colorado and into Kansas, and wintry cold snaps in the northern states made planting season a mixed bag for many farmers. Corn and soybean planting started surprisingly early in some regions, only to see emergence slowed or threatened by late frosts and further planting delayed.

Amid the chaos, 1,172 farmers across the U.S. took the time to complete the online 2020 National Cover Crop Survey, which was open on SurveyMonkey from March 26 to April 12, 2020.

This year's survey, the sixth since 2012-2013, was supported by the USDA's Sustainable Agriculture Research and Education (SARE) program and the American Seed Trade Association (ASTA), and administered by the Conservation Technology Information Center (CTIC). The questionnaire queried respondents on their cover cropping practices, their motivations, and their concerns. To stay current with challenges on the ground and continuing to advance the state of knowledge on cover crop practices, this year's survey delved deeper than previous surveys into planting green—seeding directly into a live cover crop—and the impact of cover crops on delayed planting in the wet spring of 2019.

Unlike previous years' surveys, the project did not have a media partner this year to distribute links to the survey instrument to a large audience of both users and non-users of cover crops. Instead, the promotion effort focused on participants in past cover crop surveys and drew on email lists and newsletter articles from CTIC, SARE, ASTA and partners in other agricultural groups. A flurry of tweets and Facebook posts as well as press releases to farm media—mostly online—rounded out the effort.

Respondents in the 2020 survey were exclusively farmers and significantly more likely (93%) to use cover crops than farmers in past survey cohorts, which ranged from roughly half of the participants reporting the use of cover crops in the past three years in 2012-2013 to 75% cover croppers in 2013-2014 to 88% in 2016-2017. Part of that growth in cover crop experience may be attributable to the expanding popularity of the practice, but it is fair to assume that a significant factor was that the survey links went out to audiences with a strong conservation bent.

The likely involvement of participants from previous surveys in the 2019-2020 poll enhances the chance that the same respondents have participated in two or more of our national cover crop surveys. However, we still cannot compare data from one survey in the series to another because we cannot ensure that both pools of respondents are exactly the same and neither were the questions. As a result, this report may note results from previous surveys, but good statistical practice prevents us from making direct comparisons, along the lines of, "between 2012 and 2020, surveyed farmers planted X% more...."

We hope this survey shines a light on the increased adoption of cover crops in both field crop and horticultural operations, as well as the motivations and opportunities that exist behind those decisions. With that insight, our goal is to continue providing the tools and directional markers that help guide the development of research, education, communication and policy that will not only encourage greater adoption of cover crops, but even better results for the farmers who use them.

More information from this survey is available at
https://www.ctic.org/data/Cover_Crops_Research_and_Demonstration_Cover_Crop_Survey.

METHOD

The 2019-2020 National Cover Crop Survey was developed by SARE, CTIC and ASTA. The 81-question instrument included some questions that have been asked on previous surveys as well as new questions that allowed this year's questionnaire to delve deeper into the practice of "planting green" into live cover crops, the timing of interseeding cover crops into standing cash crops, and any possible relationships between cover crops and prevent-plant acres during the wet spring of 2019.

Data were collected anonymously via SurveyMonkey between March 26 and April 12, 2020.

Promotion of the survey link was conducted via several avenues, including:

- Emails to previous SARE/CTIC national cover crop survey respondents;
- Emails to participants in CTIC cover crop programs, watershed projects, and Conservation in Action tours;
- Contacts gathered by SARE and ASTA;
- Members of regional cover crop councils;
- Newsletters distributed by CTIC, SARE and a wide range of partner associations;
- Press releases to agricultural media;
- Tweets and social media posts by CTIC, SARE and ASTA.

In all, 1,172 respondents completed the survey. Most of the data are presented just as collected. The exception is the yield data, where farmers had to type in a number as opposed to making a selection from a multiple-choice list. Some data entry errors were believed to have occurred in a small number of cases, so, as in past years, we removed outliers, which allowed us to base the analysis on a statistically sound data set. We also only used yield data from farmers who reported yield both with and without cover crops.

To ensure that data were not skewed by non-farming respondents, participants in the survey were first asked whether they were farmers; if they answered "no," they were thanked for their time and led out of the survey. Respondents were separated into separate tracks for cover crop users and non-users with distinctly different questions. Within the user track, several questions led down smaller tracks to gather more information about a particular crop or practice. Non-users of cover crops were asked a different, smaller set of questions than users of cover crops.

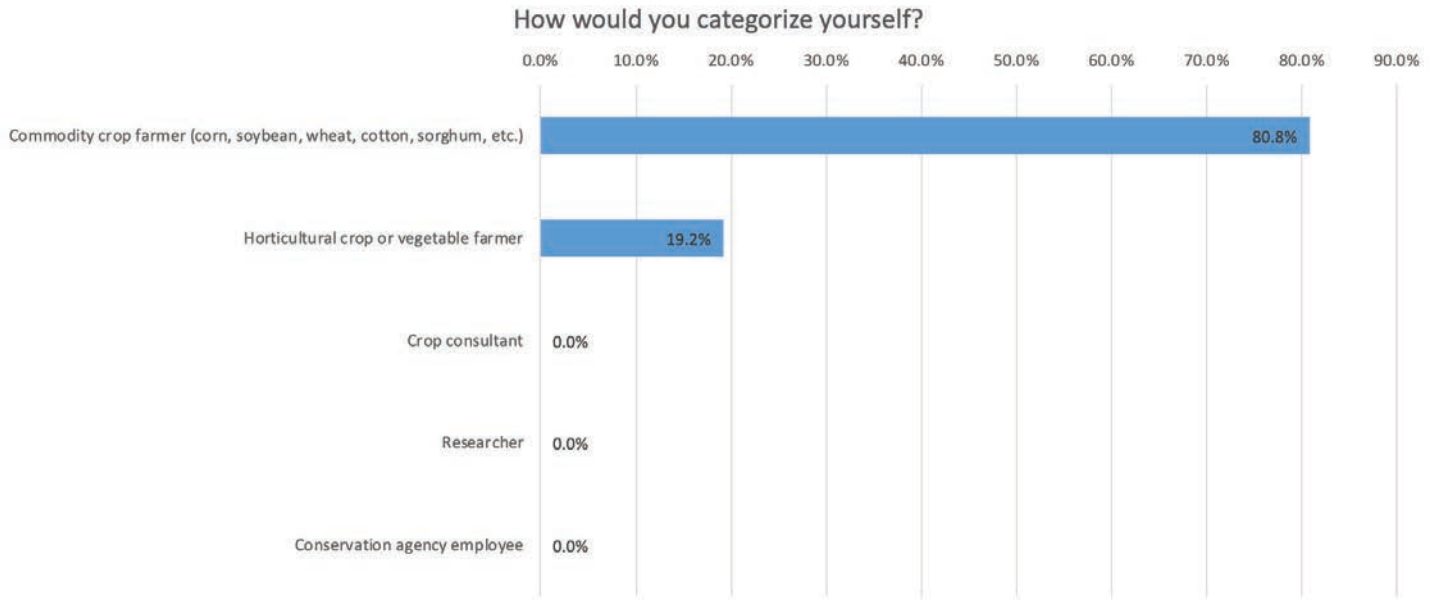
Some respondents did not answer every question in the tracks their surveys presented. We have captured data from all responses including surveys that were partially completed in order to gather as much useful information as possible. The data in this report are accompanied by an "n" value that identifies the number of answers we received for each question.

Because neither the survey participants nor many of the questions have been the same from year to year, the data cannot be linked in direct comparisons of the "the surveyed farmers have expanded their cover crop acreage by X percent" sort. Instead, we must be careful to note that some respondents were likely different in each survey, so any trends may only be described in rough form.

RESPONDENTS

The first question of the survey established that all respondents who completed the survey identified themselves as farmers (Figure 1): 80.8% (947 of 1,172) reported that they farmed commodity crops such as corn, soybeans, wheat, cotton, sorghum, etc., and 19.2% (225) said they farm horticultural or vegetable crops.

Figure 1

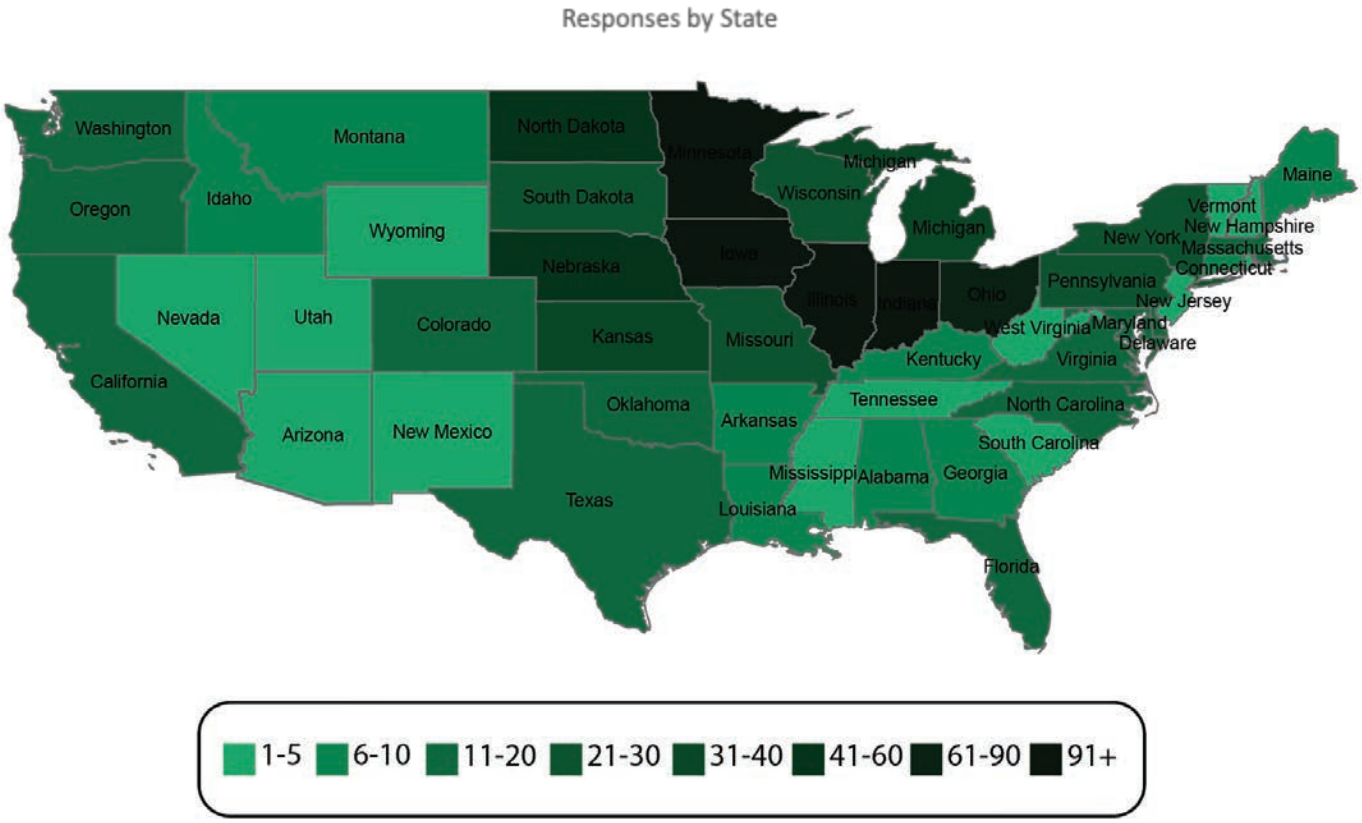


n=1,172

That is almost exactly the same ratio—80/20—as in the most recent previous survey, the 2016-2017 Cover Crop Survey.

Respondents represented all 50 states. Iowa had the highest representation, with 120 of the 1,172 respondents (10.2%), followed by Indiana (104 responses, or 8.8%), Illinois (98, 8.3%) and Minnesota (91, 7.7%), and Ohio (87, or 7.4%). California and Florida, arguably the most likely states to include horticultural crops, accounted for 20 and 14 respondents (1.7% and 1.1%), respectively. Twenty-six states each contributed fewer than 1% of the responses (fewer than 12).

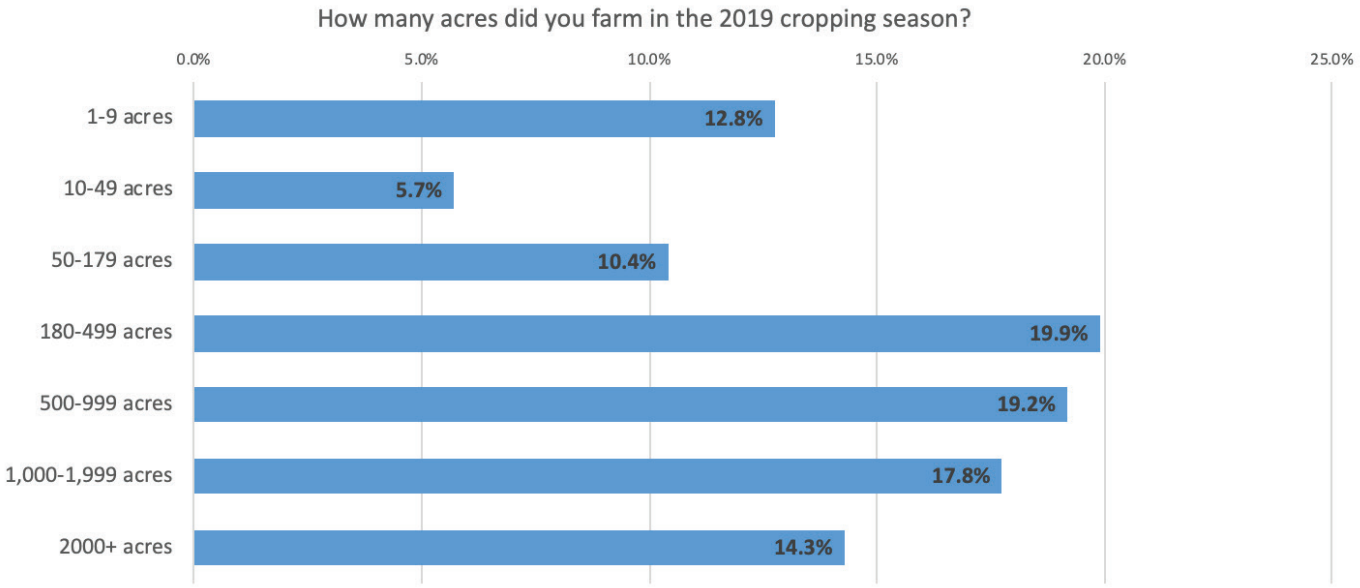
Figure 2



n=1,172

Acreage farmed in 2019 reflected a wide range of farm sizes represented in the respondent pool (Figure 3). Nearly 19% (182 of 981 respondents to the question) farmed 49 acres or fewer the prior season. Another 19.9% (195) farmed between 180 and 499 acres, while 19.2% (188) reported farming 500 to 999 acres, 17.8% (174) farmed 1,000 to 1,999 acres, and 14.3% (140) farmed more than 2,000 acres. The remainder, 10.2% (102) farmed 50 to 179 acres.

Figure 3

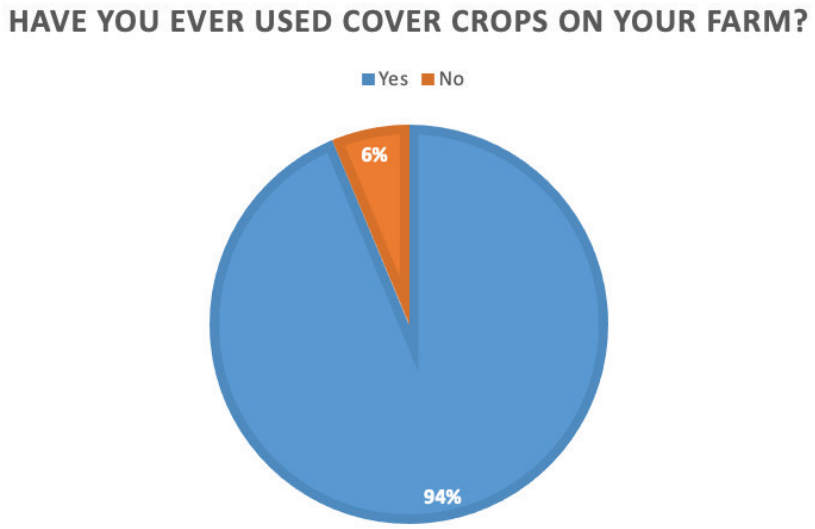


n=981

Not surprisingly for a group with a strong interest in a powerful soil health building practice such as cover crops, no-till was the dominant residue management practice among respondents (Figure 4). The most popular answer to "what tillage practice do you use most on your farm?" was continuous no-till, practiced by 48% (466 of 981) of the respondents, while rotational no-till was employed by another 14% (138), for a total of 600 farmers (62%) practicing some sort of no-till.

Reduced tillage was reported by 19% (188), strip till by 7% (65), vertical tillage by (4%) and conventional full-width tillage by 9% (91) of the respondents.

Figure 4



n=981

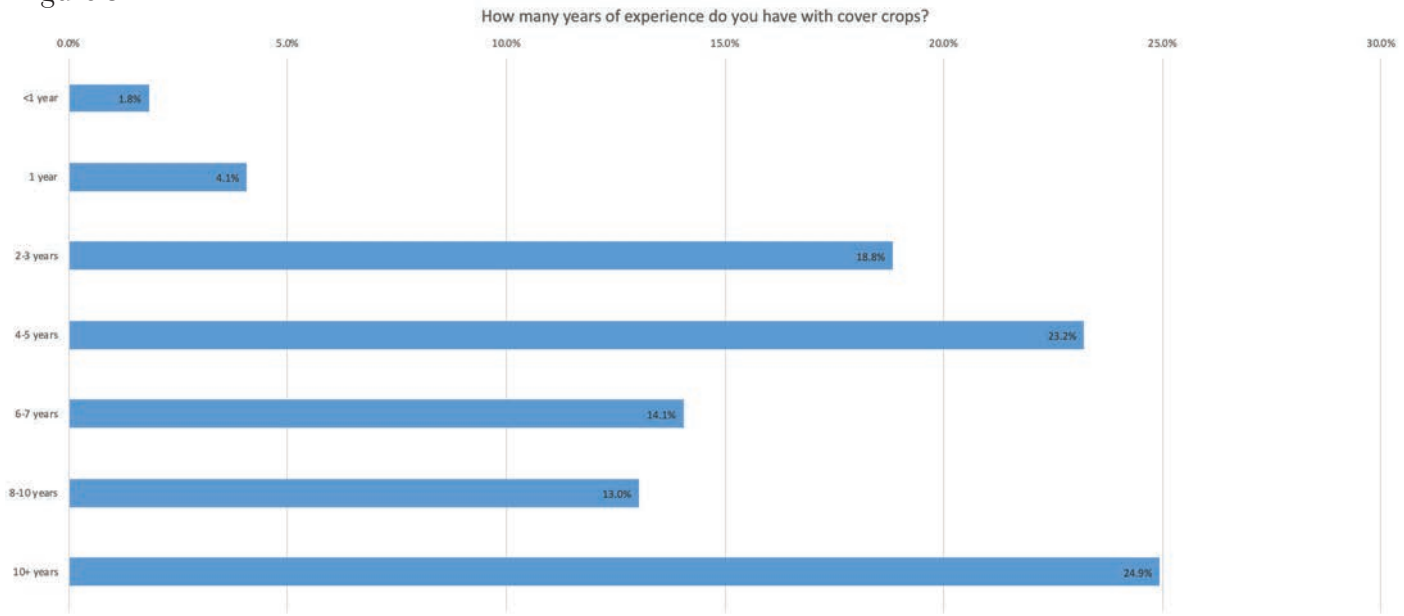
Experience with Cover Crops

Of the respondents who began the survey, 93% (1,090) reported using cover crops, while 7% (82) reported that they had never used them.

Respondents in this year's survey represent significant experience with cover crops. Just 5.9% (58) of the 982 farmers who reported on their number of years of experience with cover crops had one year or less of experience with the practice, while 24.9% (245, the most popular answer) reported having more than 10 years of experience.

In all, 75.2% of the respondents to this question had 4 or more years of experience with cover crops (Figure 5). Receiving answers from a largely experienced group of respondents, who have presumably seen cover crops in a variety of conditions, suggests that this survey captured well-grounded insights. However, it is worth noting that 113 of the respondents to this question (11.5%) have moved from no cover crop acres to some cover crops sometime between 2015 and 2019, so there is a significant number of recent adopters in this year's sample. That group provides an important perspective on cover crop adoption.

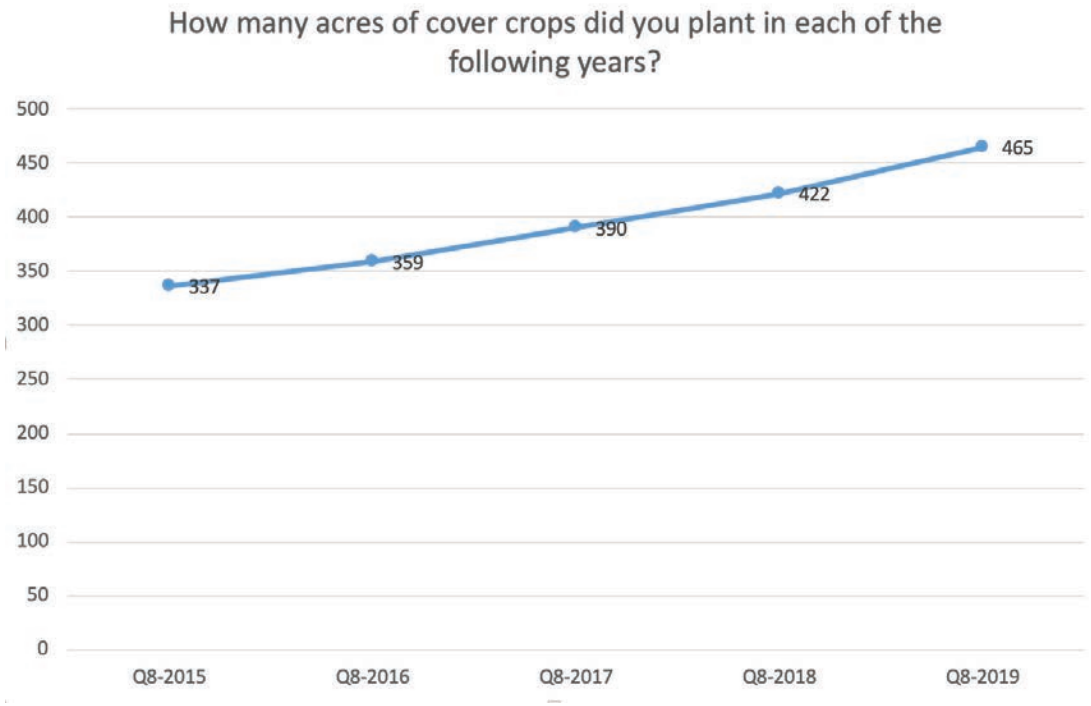
Figure 5



n=982

The average acreage planted to cover crops by participants in the 2019 survey (Figure 6) has steadily increased over the past 5 growing seasons, from an average of 337 acres in 2015 to the 2019 average of 465 acres, an increase of nearly 40%.

Figure 6

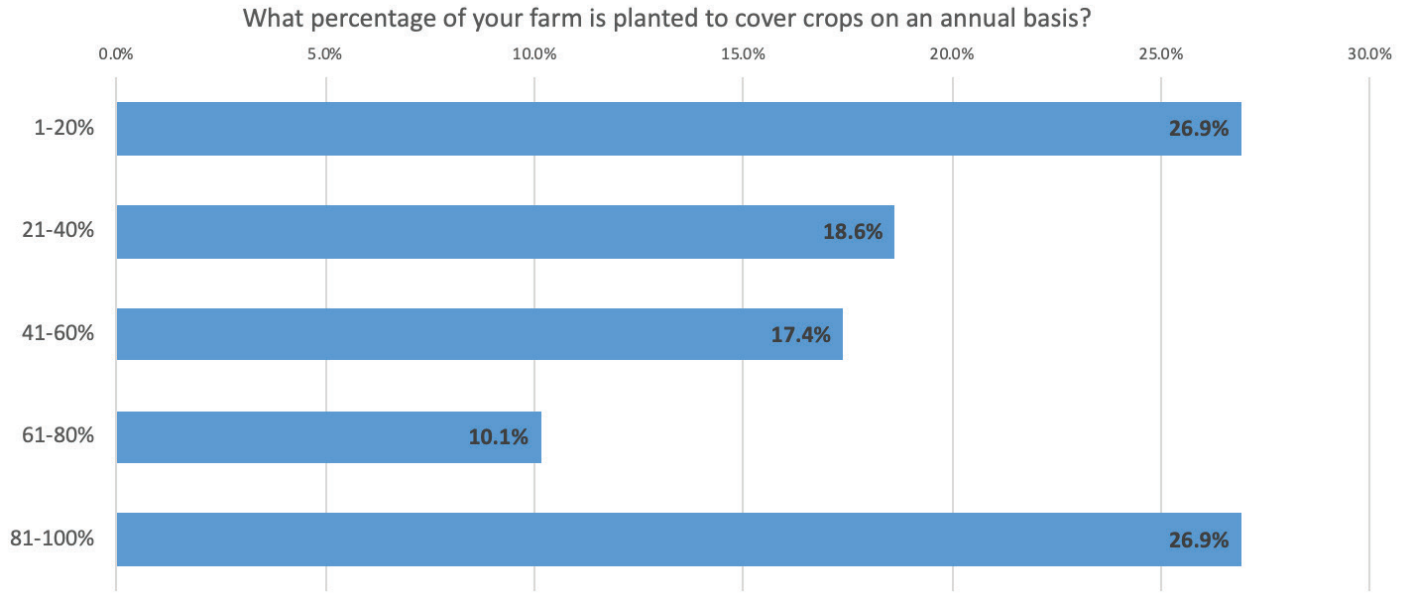


2015: n=837
2016: n=856
2017: n=914
2018: n=936
2019: n=950

Respondents reported their intention to plant an average of 476 acres of cover crops in the summer or fall of 2020, a continued increase over 2019. Past versions of this national cover crop survey have found a continued year-over-year increase in cover crop acres dating back to 2008. (Cover crop acreage data on years prior to 2008 have not been collected through the SARE/CTIC national cover crop survey program.)

Asked about the percentage of their farmed acreage planted to cover crops (Figure 7), half of the respondents fell into either the top or bottom categories: 26.9 percent (260) of 966 farmers reported planting 0 to 20% of their farmed acres to cover crops on an annual basis, while another 26.9% (260) committed 81 to 100% of their farmed acres to cover crops. The remaining categories were 18.6% (180) who planted 21 to 40% of their farmed acres to covers, 17.4% (168) committing 41 to 60% and 10.1% (98) dedicating 61 to 80% of their acres.

Figure 7



n=966

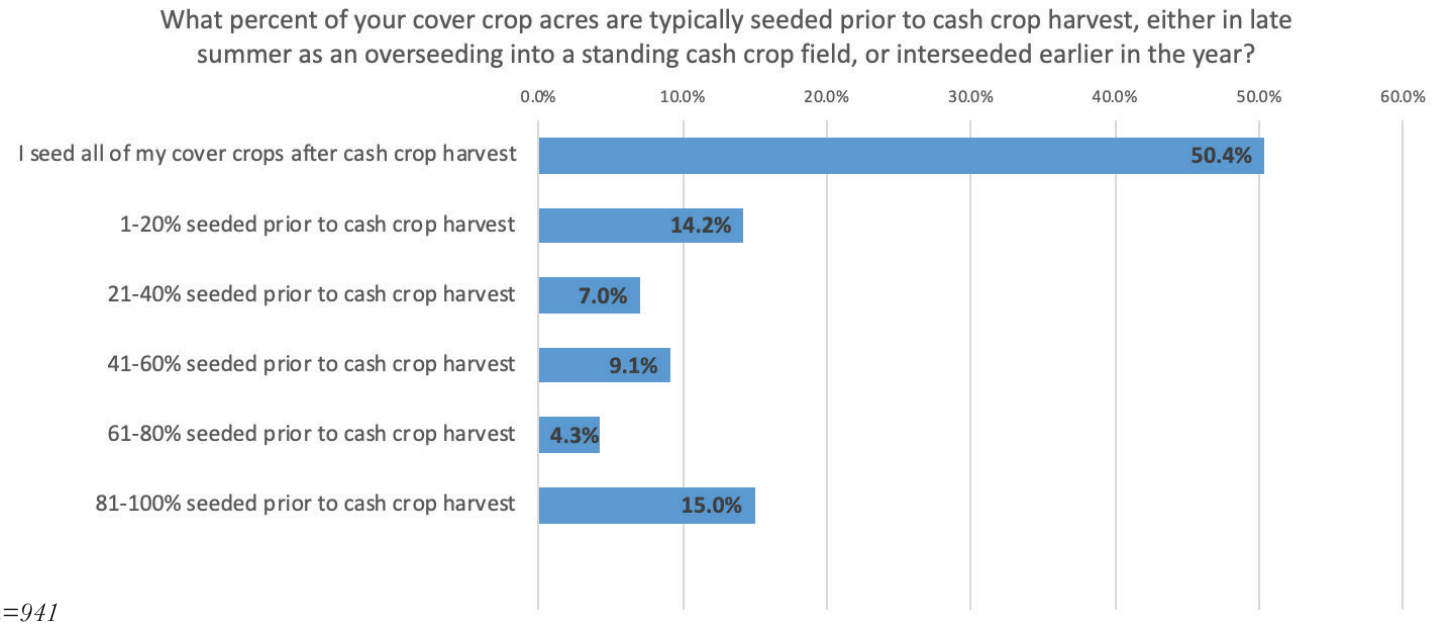
Timing of Cover Crop Planting

The timing of cover crop planting has become an important topic of discussion in recent years. Many farmers feel as if they are in a race against time to establish their cover crops, particularly in northern areas where the period between cash crop harvest and autumn frosts is short. Innovative growers and interested researchers are experimenting with a range of tactics and timings for seeding cover crops. In this year's survey, we asked several questions about the timing of cover crop seeding.

Half of the respondents (50.4%, or 474 of 941 farmers who answered the question) reported seeding all of their cover crops after cash crop harvest (Figure 8). In contrast, 15% (141) seeded 81 to 100% of their cover crops prior to cash crop harvest, while 14.2% (134) said they seeded up to 20% of their cover crops prior to harvesting their cash crops.

Between those groups, 7% (66) of the respondents seeded 21 to 40% of their cover crops prior to cash crop harvest, 9.1% (86) seeded 41 to 60% of their covers into standing cash crops, and 4.3% (40) seeded 61 to 80% before cash crops were harvested.

Figure 8



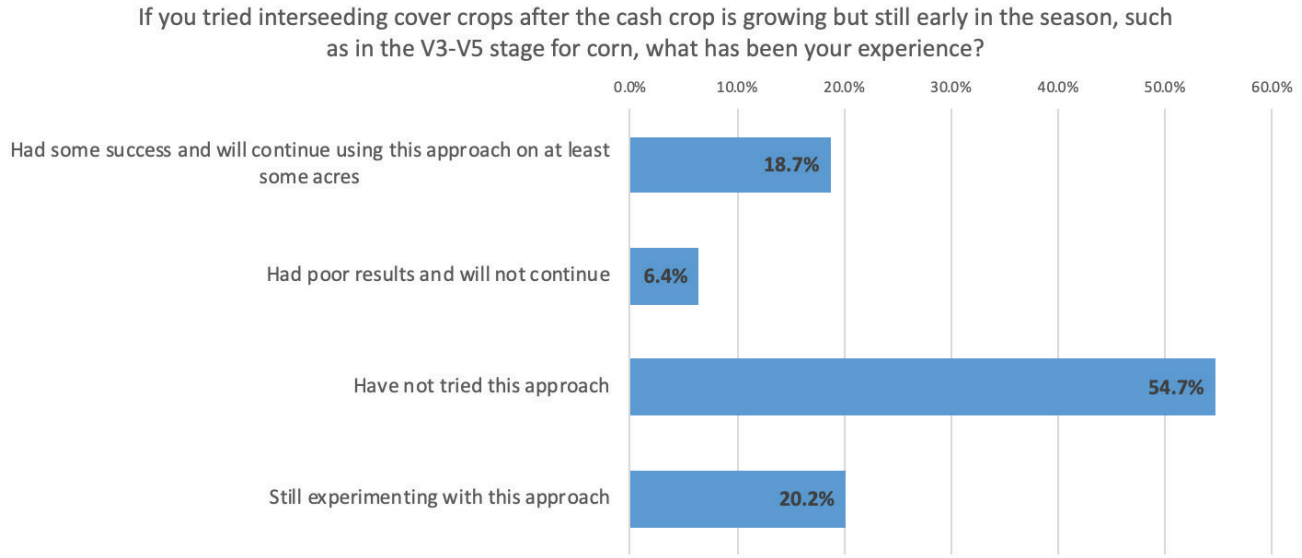
n=941

Interseeding cover crops into standing cash crops early in the season—for instance, into corn between the V3 and V5 growth stages—is starting to show promise among growers, though the numbers are still small.

Among the 481 farmers who reported establishing a cover crop before harvesting their cash crop, 45.3% (218) reported having tried interseeding a cover crop into corn between V3 and V5 (Figure 9). Almost 19% (90) said they had experienced some success with the approach and would continue using it on at least some acres, and 20.2% (97) said they were still experimenting with it. Only 6.4% (31) reported having poor results and choosing not to continue early interseeding, and 54.7% (263) said they had not tried it.

Such innovations will be very interesting to watch, and as farmers find ways to make them work, they could make cover crops more viable than ever in areas with shorter growing seasons, particularly in the northern Corn Belt.

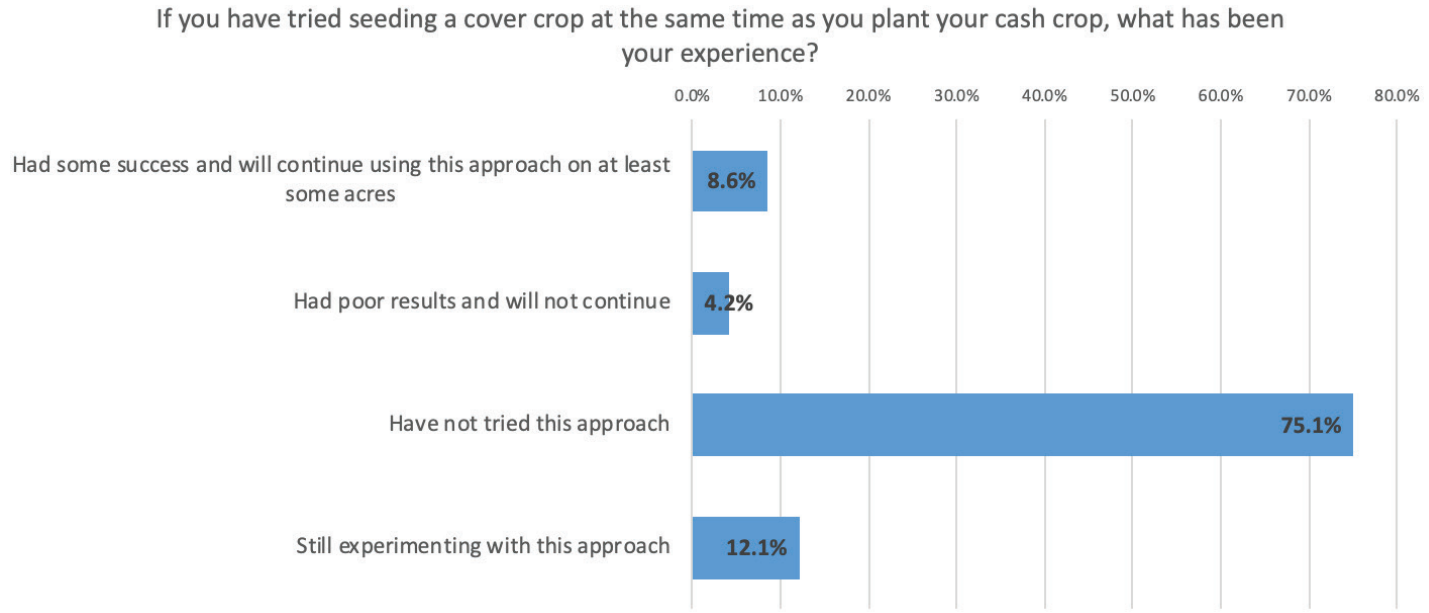
Figure 9



n=481

Seeding cover crops at the same time as cash crops is frequently employed in Brazil, and has been the subject of experimentation in North America. However, it is still the purview of only the most innovative growers. In this survey, 478 farmers responded to a question about the practice, and 75.1% (359) reported that they had not tried it (Figure 10). Twelve percent (58) said they were still in the experimental stages with it, 8.6% (41) reported having some success and planning to continue seeding a cover crop and cash crop simultaneously, and 4.2% (20) said they would not continue the practice due to poor results.

Figure 10



n=478

Herbicide Resistant Weeds and Cover Crops

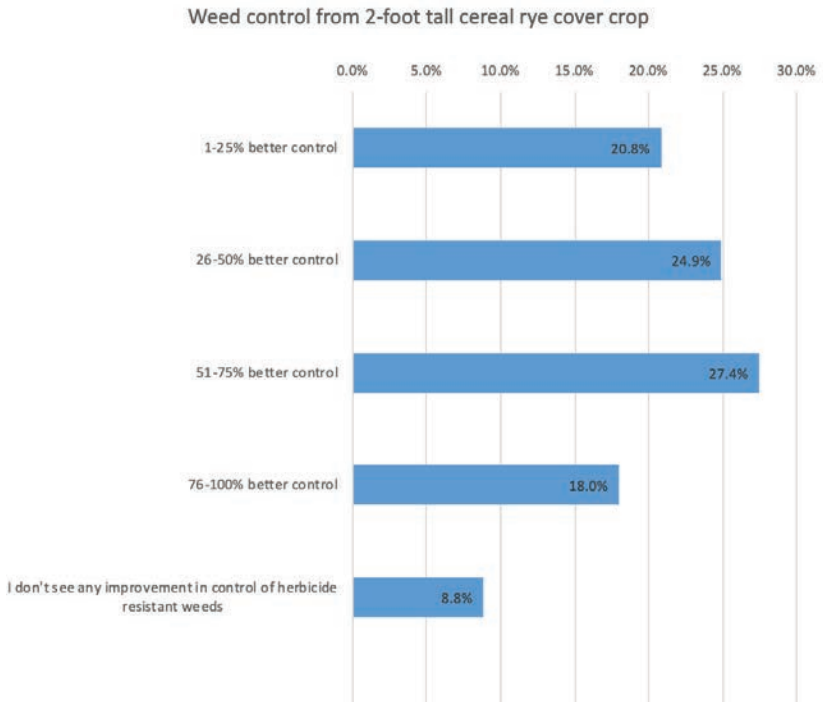
Herbicide-resistant weeds are a global challenge, and may be a significant driver of cover crop adoption in many parts of the U.S.

Of 869 respondents, 63.6% (553) reported that they have herbicide-resistant weeds on their farms, while 36.4% (316) said they did not.

We asked how much of an improvement in weed control farmers observed following a solid stand of cereal rye cover crop at least 2 feet tall at the time of termination, and a massive 91.2% (289 of 317) reported seeing an improvement (Figure 11). Of the 317 respondents, 27.4% (87) estimated the improvement in weed control—which was defined in the question as both weed numbers and weed biomass—at 51 to 75%; 24.9% (79) figured it to be 26 to 50% better. Another 20.8% (83) said a dense, 2-foot-tall cereal rye cover crop seemed to improve weed control by 1 to 25% and 18% (57) reported the weed control increase at 76 to 100%.

Just 8.8% (28) said they didn't see any improvement in weed control.

Figure 11



n=317

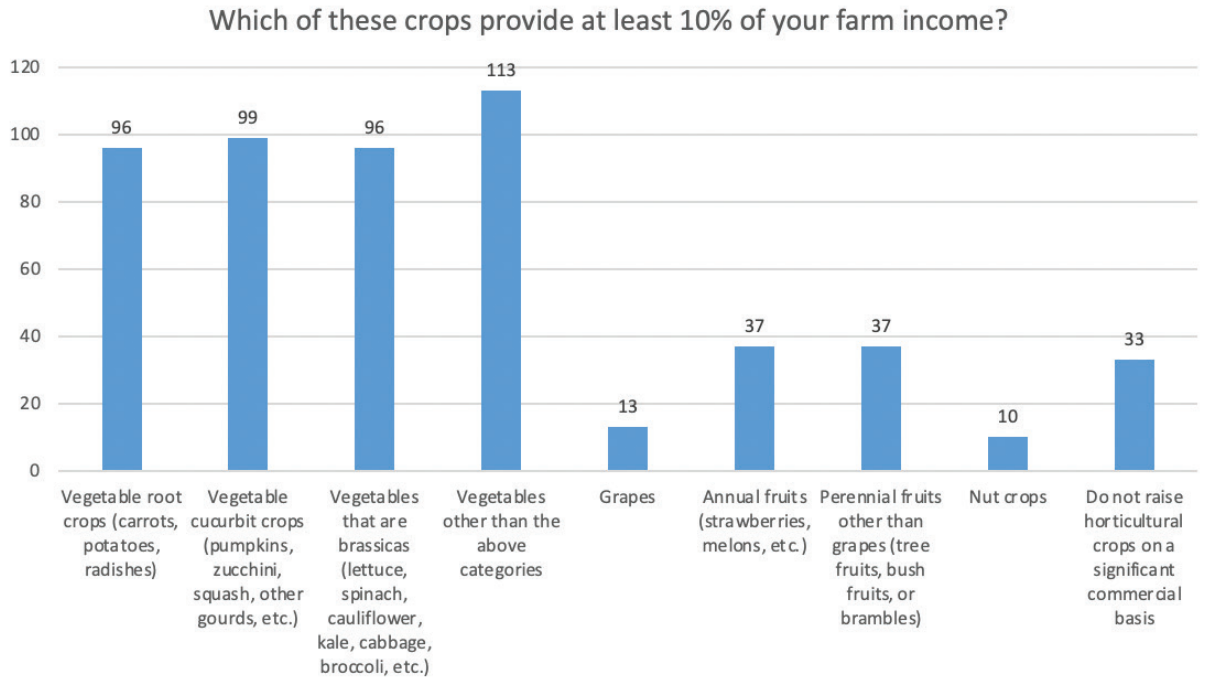
Horticultural Production and Cover Crops

In addition to appreciating the far-reaching benefits of cover crops such as improving soil quality, reducing erosion and outcompeting weeds, farmers of horticultural crops—vegetables, fruits and nuts—may find different benefits, challenges and uses in cover crops than their field crop-growing peers do. The permanent systems and high traffic of orchards and vineyards may call for unique cover crop mixes and management. Vegetable growers have learned to use cover crops aggressively to manage nematodes and soil pathogens that threaten their cash crops, and often employ significantly different tillage practices than commodity crop producers.

This survey included a set of questions specifically for respondents who identified themselves as producers of vegetables and horticulture crops. In all, 235 farmers were guided to those five questions.

Vegetable crops were the most common horticultural enterprise among the producers responding to the survey who reported horticulture crops contributing at least 10% of their farm income (Figure 12). Cucurbits such as pumpkins, zucchini, squash and other gourds were reported by 99 growers; 96 growers said they grew root crops such as potatoes, carrots and radishes; the same number reported producing brassicas such as lettuce, spinach, cabbage, broccoli and others; and 113 said they grew vegetables other than those categories. Thirty-seven growers reported producing annual fruits such as strawberries and melons, while the same number said they produced perennial fruits other than grapes. Thirteen growers identified themselves as growing grapes and 10 as nut growers.

Figure 12



n=228

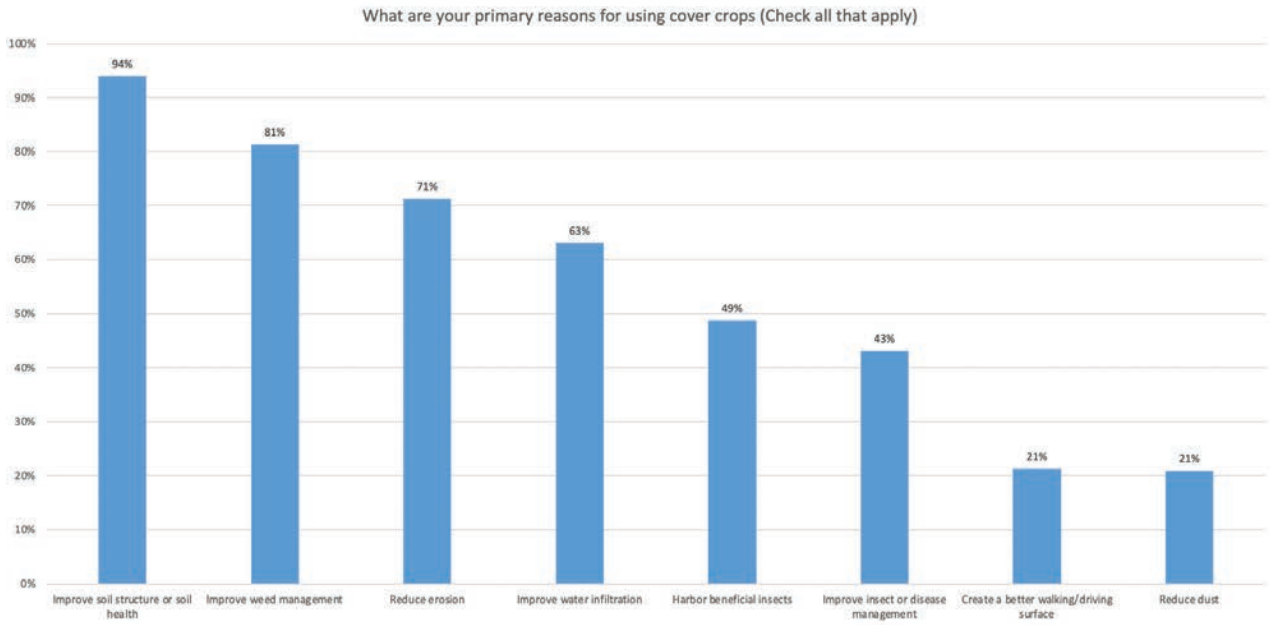
Asked their primary reasons for using cover crops—and given the opportunity to check all answers that applied—the leading motivation was to improve soil structure or soil health (selected 216 times by the 230 respondents, or 94%; see Figure 13). Improving weed management took second place, with 187 responses (81%); reducing erosion was chosen 164 times (71%), and improving water infiltration gathered 145 responses (63%).

Lower-scoring motivations included harboring beneficial insects (112, or 49%), improving insect or disease control (99/43%), creating a better walking or driving surface (49/21%) or reducing dust (48/21%).

In the "Other" category, 9 respondents mentioned livestock as a key driver of cover crops on their farms. Reducing compaction (2), breaking rotation (2) and aesthetics (1) also were notable in pointing out the broad diversity in motivations.

Several farmers took advantage of the opportunity to share thoughts about their motivations in the "Other" category. Among the comments were, "much better to use than plastic or landscaping fabric," and—compellingly— "watching my neighbors' (who do not use cover crops) topsoil blow away by the tons in the last 45 days. A wonderful reinforcement for doing it my way."

Figure 13



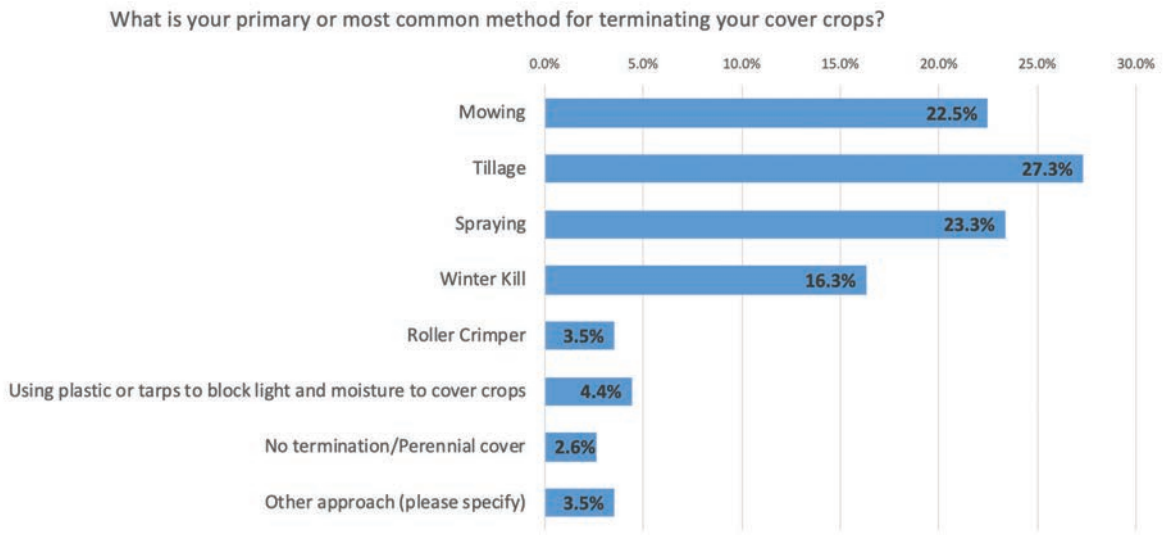
n=230

Terminating cover crops can be managed differently in horticulture systems (Figure 14). Asked to identify the primary method of terminating their cover crops, 25.6% of the horticulture producers (55 of 215 respondents to the question) named tillage, followed closely by an equal share of spraying (51, or 23.7%) and mowing. Allowing the cover crops to winter kill was employed by 16.3% (35), plastic or tarps to block light and moisture (4.7%, or 10 farmers), and a roller/crimper by 3.7% (8).

Just over 2% (5 respondents) said they maintain a permanent cover crop, so they do not terminate it, and 7.9% (17) reported another method of termination. Of those who chose to describe "other," livestock represented the most significant method of termination, with grazing or silage harvest accounting for 5 (2%) and 1 response, respectively.

Open responses indicated some flexibility in termination approach based on the maturity of the cover crop, the nature of the cash crop that follows it, or whether seed can be harvested before termination.

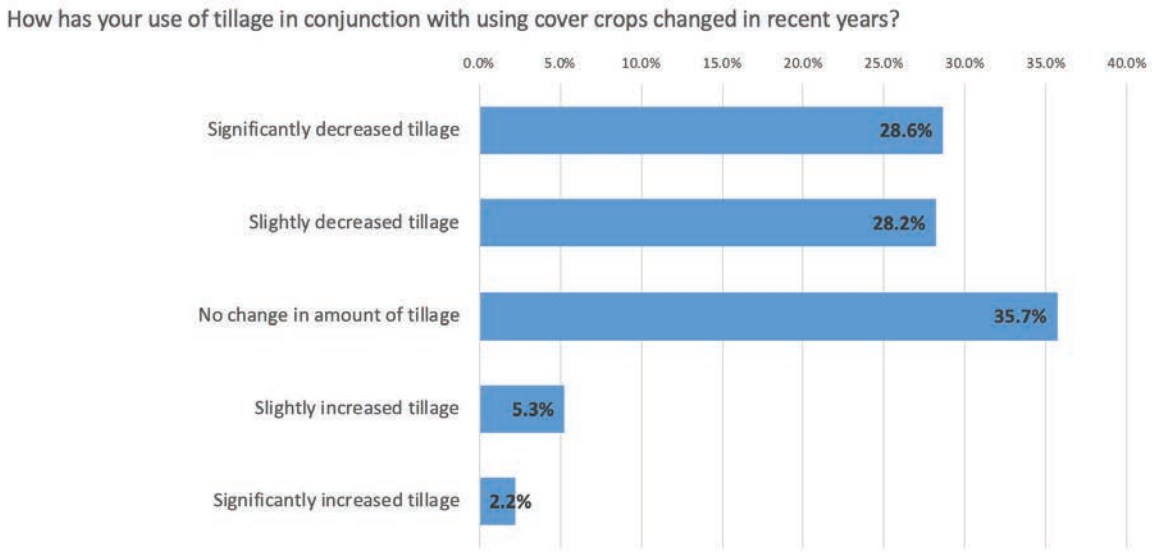
Figure 14



n=215

More than half of the horticulture producers who participated in the survey reported decreasing tillage in conjunction with cover crops—28.6% (65) of the 227 respondents to the question "How has your use of tillage in conjunction with using cover crops changed in recent years?" said they significantly decreased tillage, and an almost equal number (64, or 28.2%) said they slightly decreased tillage (Figure 15). A small number reported significantly increasing (2.2%, or 5 respondents) or slightly increasing (5.3%, or 12) their tillage, and 35.7% (81) reported no change in their tillage practices in conjunction with their cover crops.

Figure 15



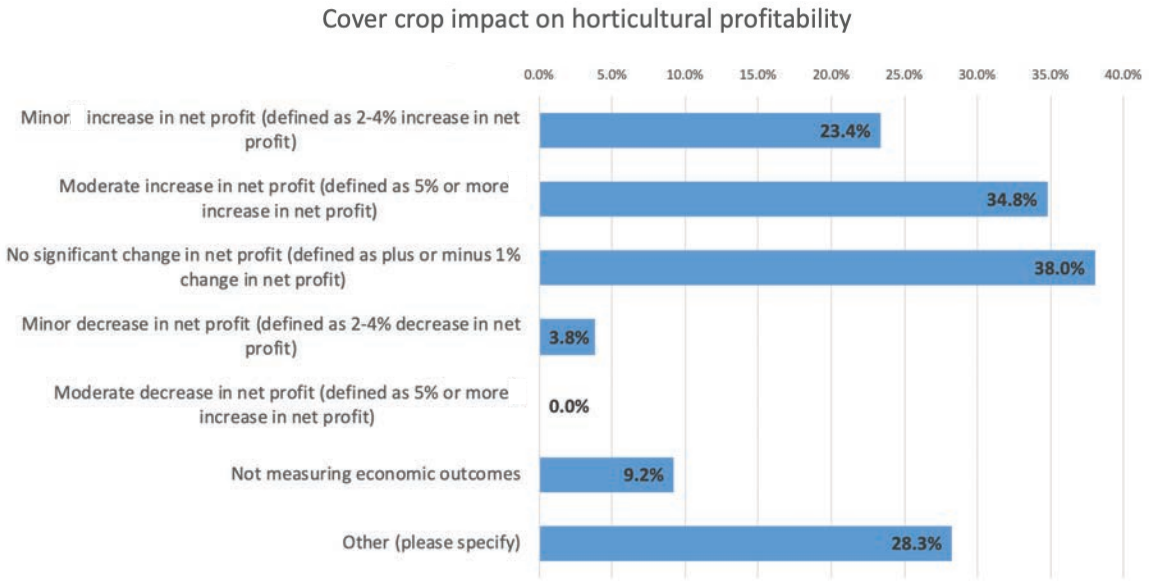
n=227

More than half of the horticulture crop producers attributed an increase in profitability to their cover crops (Figure 16). Of 184 farmers who answered the question, 34.8% (64) reported a moderate increase in net profit—defined in the question as an increase of 5% or more—and 23.4% (43) reported a minor increase of 2 to 4% in net profit. Thirty-eight percent (70) respondents said they experienced no significant change in net profit (plus or minus 1% in profitability) and 3.8% (7) said they experienced a minor decrease (2 to 4%) in net profit. No farmers reported a moderate or greater decrease.

More than 28% (52) of the respondents chose "Other." Seventeen of those farmers (9.2% of the entire group responding to the question) reported that they didn't know or track the economic impact of their cover crops, and 6 (3.2%) said it was "too early to tell." Five horticulture crop farmers (2.7%) reported an increase in yields, 4 more (2.1%) logged an unspecified increase in profit, and one noted—quite significantly—that cover crops reduced his cattle feed costs by 15 to 20%.

Also significant is the faith farmers have that their cover crops deliver an economic return, even if they don't have the figures to assign numbers to the value. Said one, "I don't think my poorly drained, clayey land would remain productive for annual vegetables without aggregation provided by cover crops." Another farmer noted, "This is very hard to quantify this way. But in an organic setting, fixed N is a huge cost savings and soil improvements, soil carbon, etc. are all very valuable and drive our entire farming system."

Figure 16



n=184

Corn and Cover Crops

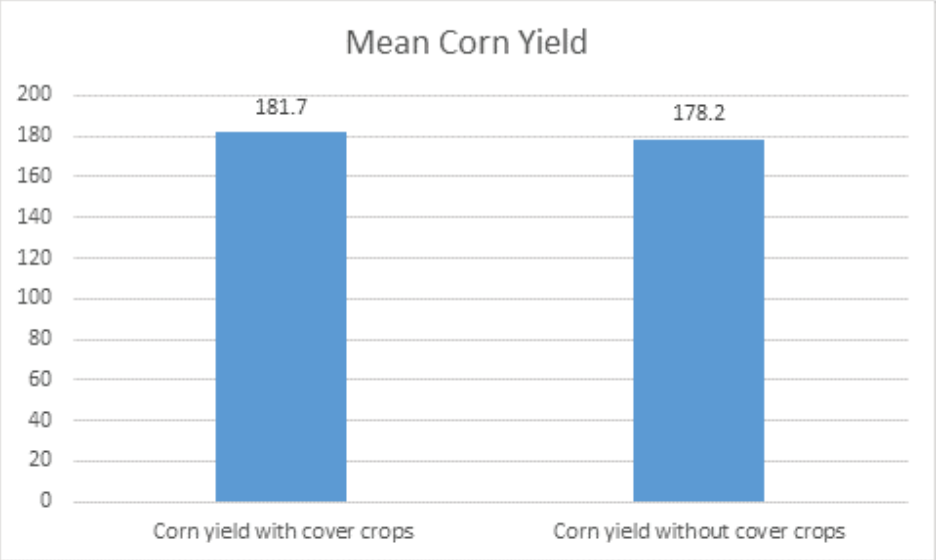
Of 966 respondents who answered the question, "Did you plant corn on your farm in 2019?" 71.5% (691) replied "yes" and 28.5% (275) said "no."

Asked to compare corn crops in similar soils with similar varieties and planting dates, survey participants reported that cover crops modestly increased 2019 corn yields (Figure 17). The average field represented by answers to this question had been in cover crops for 5 consecutive years.

Narrowing the pool of respondents to those who reported corn yields both with and without cover crops, we arrived at an average 2019 corn yield of 181.7 bushels per acre following cover crops. Among 323 reports of corn yields without cover crops, the mean was 178.2 bushels per acre, a difference of 3.5 bushels per acre (2.0%).

Though this is clearly not a major yield advantage in corn, the modest improvement indicates that growers can enjoy the profitable benefits of cover crops—including healthier soils, improved weed control and other advantages identified in this survey—without losing yield.

Figure 17



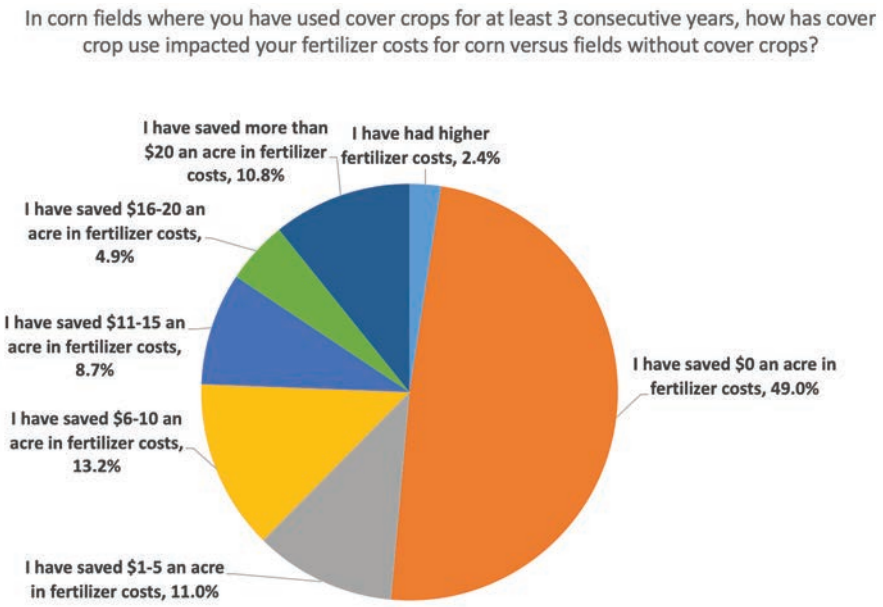
n=323

Among the benefits of cover crops that nearly half the respondents (239 of 492, or 49%) reported is a savings in fertilizer costs in their corn crop after using cover crops for at least 3 consecutive years (Figure 18).

Though the largest number of respondents (65, or 13.2%) reported a $6 to $10-per-acre fertilizer cost savings, the responses ranged from 4.9% (24) of farmers reporting $16 to $20 in savings to 11% (54) reporting benefits of $1 to $5 per acre and 10.8% (53) more than $20 per acre. Another 8.7% (43) calculated their savings in the $11 to $15 range.

Forty-nine percent (241) of the respondents said they had neither a fertilizer savings nor an extra cost, and only 2.4% (12) reported higher fertilizer costs in corn as a result of cover crops.

Figure 18



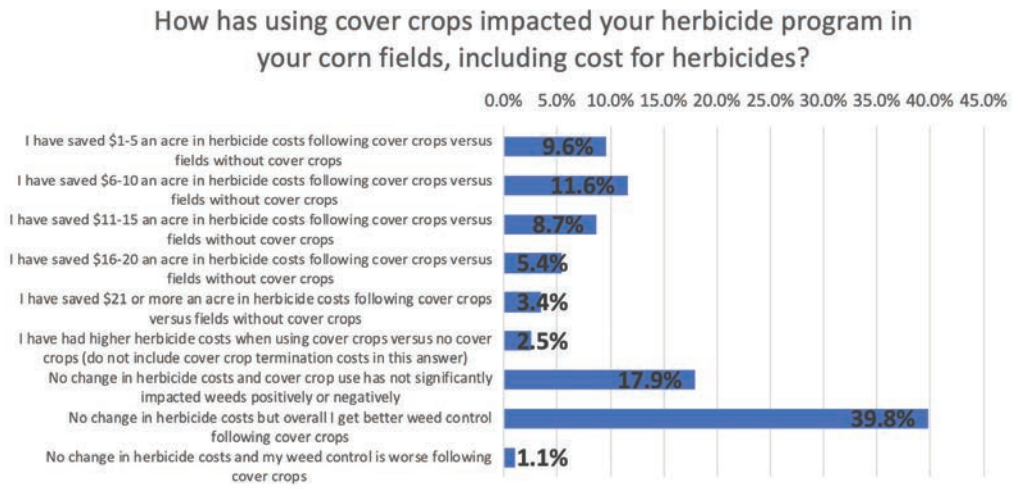
n=492

Many corn producers also experienced some savings in herbicide costs from using cover crops.

In all, 38.7% of 553 cover crop users said they have saved money on herbicides on corn following cover crops compared to fields without cover crops. Savings ranged from $1 to $5 per acre (53, or 9.6%) to $21 or more (19, or 3.4%), with the highest number tallying up herbicide savings of $6 to $10 per acre (64, or 11.6%). While 8.7% (48) said they saved $11 to $15 per acre on herbicide in corn following cover crops, 5.4% (30) calculated their savings at $16 to $20 per acre (Figure 19).

Another 39.8% (220) of the farmers who answered this question noted that their herbicide bills did not change, but they saw better weed control following cover crops, while 18.1% (99) saw no change in either herbicide cost or weed control. Just 1.1% (6) reported that costs were similar but weed control was worse, and 2.5% (14) said their herbicide bills increased.

Figure 19



n=553

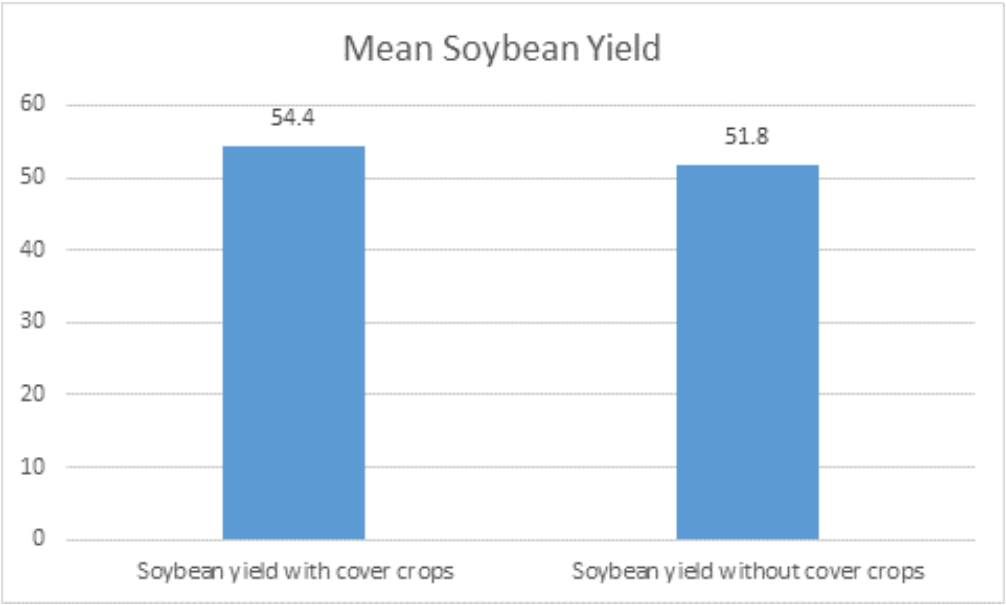
Soybeans and Cover Crops

Two-thirds (608) of 915 respondents reported growing soybeans in 2019.

Like corn, soybean yields benefitted from cover crops. Among responses to this question, fields spent a mean of 4.3 years in cover crops.

As with the corn data, we calculated yield impact by removing outliers and analyzed data only from soybean growers who reported yields both with and without cover crops. Among 329 respondents, 2019 soybean yields with cover crops averaged 54.4 bushels per acre following cover crops, while yields without cover crops averaged 51.8 bushels, a difference of 2.6 bushels per acre, a difference of 5.0% (Figure 20).

Figure 20



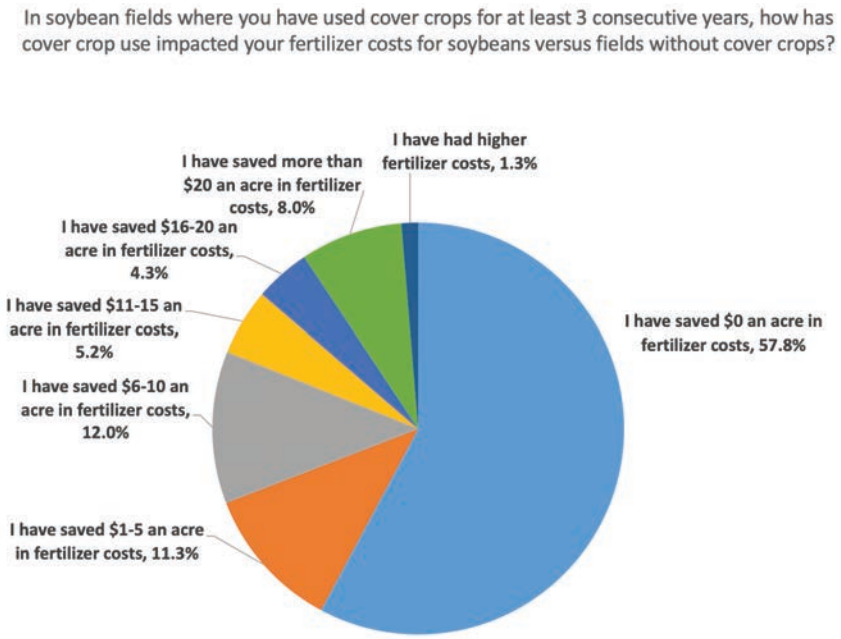
n=329

Fertilizer—particularly P, K and some micronutrients—can be a significant cost in soybeans. Of 460 responses to a question on the impact of cover crops on fertilizer costs in soybeans, 188 (40.8%) reported reductions in their soybean fertilizer bills following cover crops (Figure 21).

The largest number of farmers (55, or 12%) said they saved $6 to $10 per acre on fertilizer after at least 3 consecutive years of cover crops, while 52 (11.3%) saved $1 to $5 per acre, 24 (5.2%) saved $11 to $15, and 20 (4.3%) reported saving $16 to $20 per acre. Eight percent (37) said they saved $21 or more on soybean fertilizer following cover crops.

A significant majority—266 respondents, or 57.8%—reported no savings or losses in soybean fertilizer costs following soybeans, while just 6 farmers (1.3%) said their fertilizer bills increased after cover crops.

Figure 21



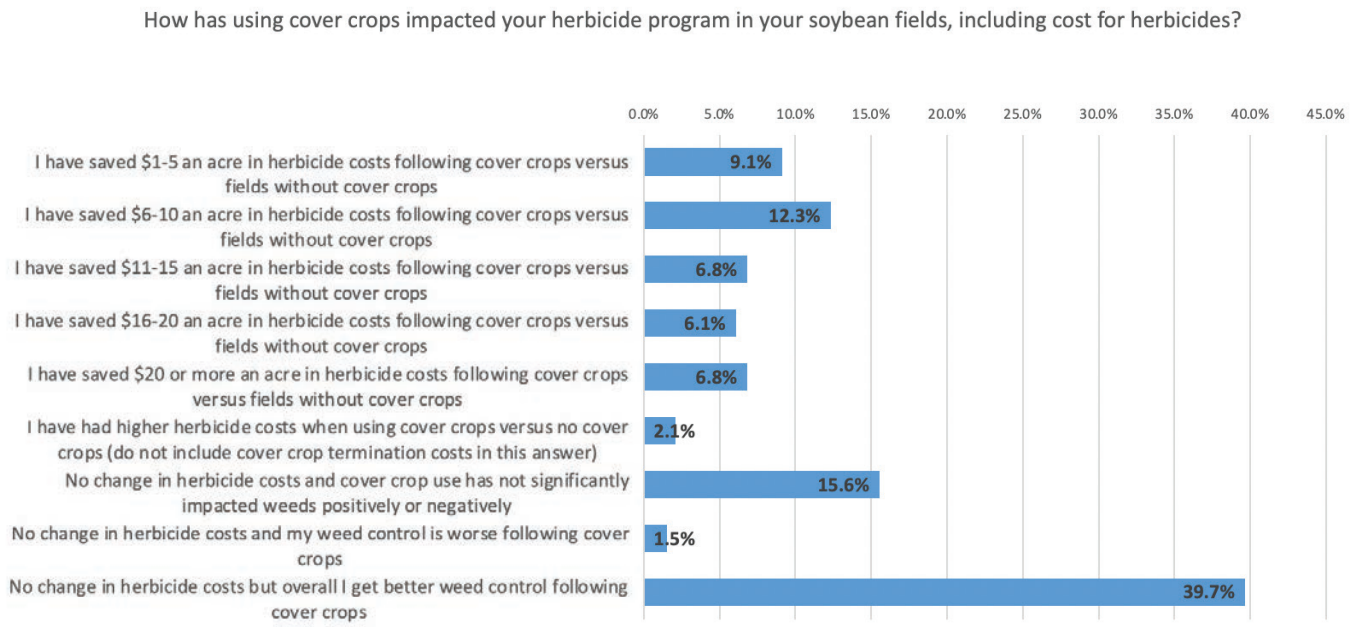
n=460

Cover crops lowered herbicide costs in soybeans for two-thirds of the respondents. Of 527 farmers, 41.1% (216) reported savings on herbicides in soybeans following cover crops, not counting the cost of herbicides used to terminate the cover crops (Figure 22).

The most common level of savings was $6 to $10 per acre, reported by 65 farmers (12.3%), followed by a savings of $1 to $5 per acre reported by 48 (9.1%) of respondents. Two levels of savings received equal numbers of responses—36 farmers (6.8%) reported savings of $11 to $15 per acre, while the same number of respondents chose $20 or more in savings. The last category was close, with 32 farmers (6.1%) reporting herbicide cost reductions of $16 to $20 per acre in soybeans following cover crops.

Of the rest, 209 farmers (39.7%) reported no difference in soybean herbicide expenditures whether or not cover crops were used but experienced improved weed control following cover crops. Another 82 (15.6%) said they experienced no changes in herbicide costs or weed control. Just 8 farmers (1.5%) noted equal herbicide costs but worse weed control, and 11 respondents (2.1%) said they had higher herbicide costs in soybeans following cover crops.

Figure 22



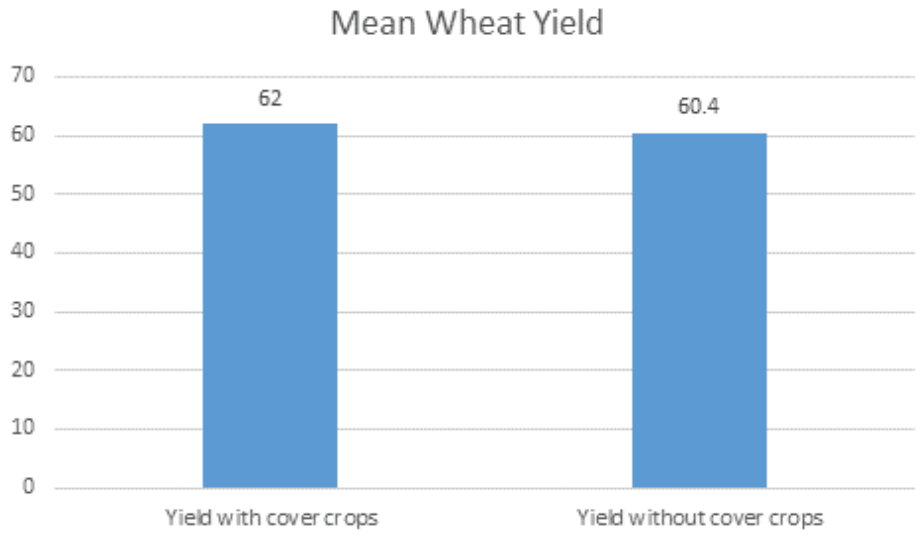
n=527

Spring Wheat and Cover Crops

Among 905 farmers who answered the question about spring wheat, 19.3% (175) planted wheat in the spring of 2019, while 80.7% (730) did not.

Farmers reported that their spring wheat fields had spent an average of 6.6 years in cover crops. Cover crops' impacts on yields were modest—a mean advantage of 2.6% (1.6 bushel per acre) following cover crops (Figure 23).

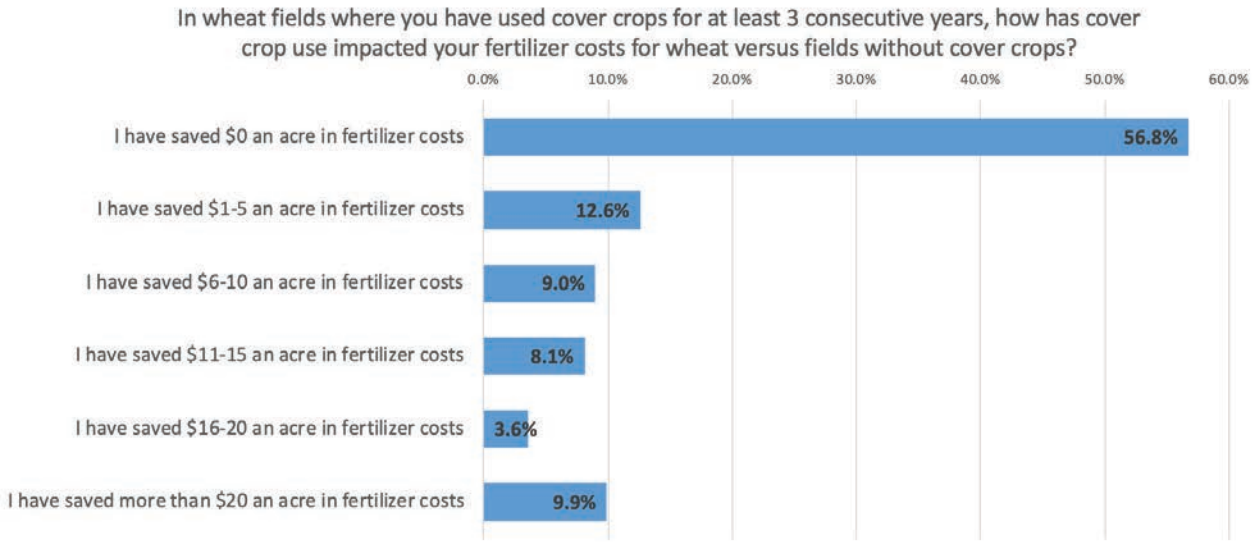
Figure 23



n=55

Of 111 growers, 63 (56.8%) reported no change in fertilizer costs in wheat on fields that had been in cover crops for at least 3 consecutive years compared to wheat without cover crops (Figure 24). However, 11 (9.9%) reported saving more than $20 per acre on fertilizer in wheat planted in fields that had been in cover crops for 3 or more years; 14 (12.6%) said they'd saved $1 to $5 per acre, 10 (9%) tallied fertilizer costs savings from $6 to $10 per acre, 9 (8.1%) calculated savings of $11 to $15, and 4 (3.6%) figured savings of $16 to $20 per acre in fertilizer costs.

Figure 24

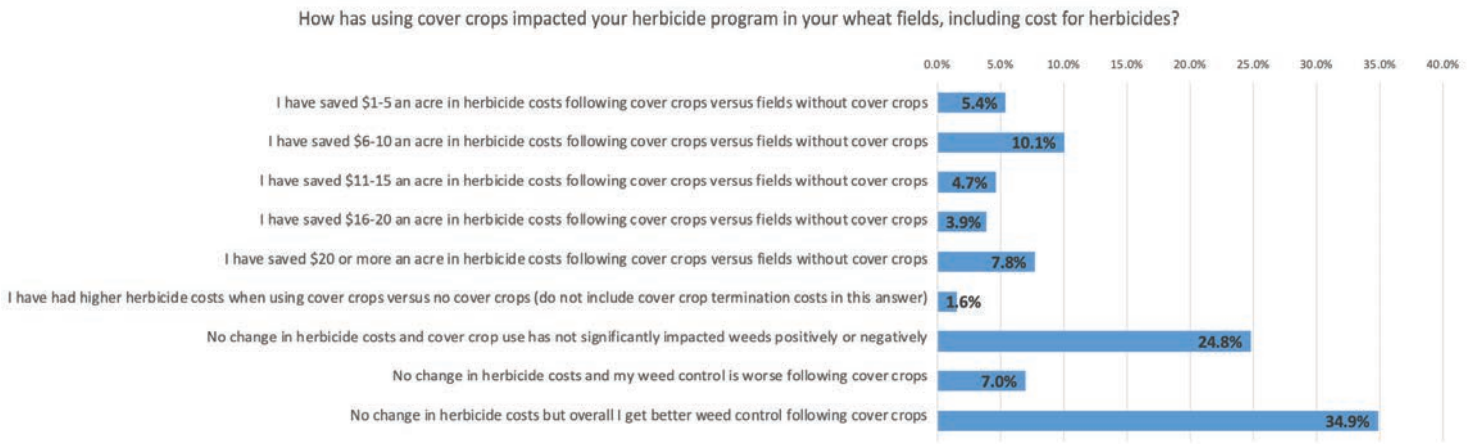


n=111

Nearly one-third of 129 wheat farmers (41, or 31.8%) reported saving money on herbicide in their wheat crop after at least 3 consecutive years of cover crops, not counting the cost of herbicides used in terminating the cover crop (Figure 25). The largest number of farmers in that category, 13 (10.1% of the respondent pool for the question), calculated herbicide savings of $6 to $10 per acre. The next-highest reported savings was $20 or more, noted by 10 growers (7.8%); 7 farmers (5.4%) figured savings of $1 to $5 per acre, 6 (4.7%) reported $11 to $15, and 5 (3.9%) checked the entry for $16 to $20 per acre.

More than one-third (45 respondents, or 34.9%) reported no cost savings on herbicide, but noted that they get better overall weed control following cover crops. Thirty-two farmers (24.8%) said they saw neither cost savings on herbicide nor a difference in weed control in wheat between cover cropped fields and non-cover cropped fields, while 9 (7%) reported similar costs and worse weed control. Just 2 (1.6%) reported higher herbicide costs.

Figure 25



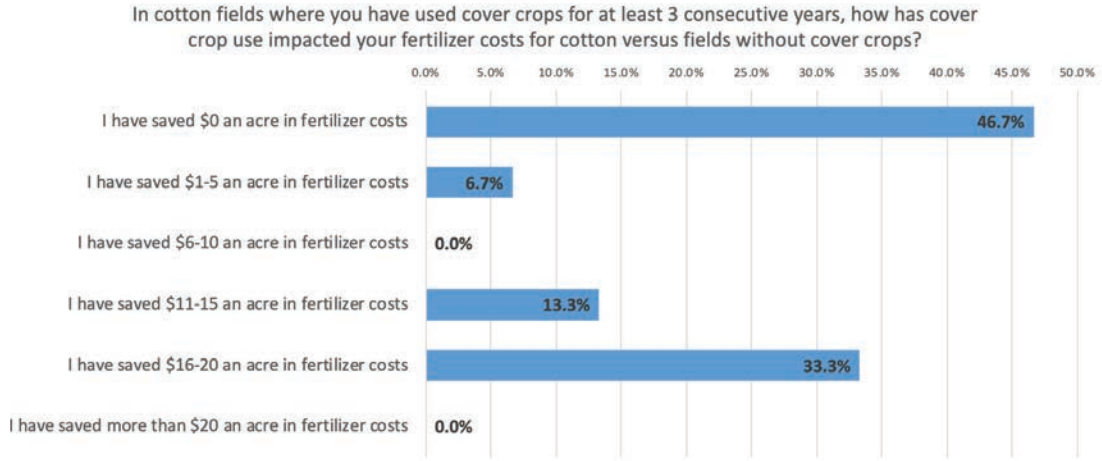
n=129

Cotton and Cover Crops

Responses to this year's survey indicated that cotton can benefit significantly from cover crops in terms of input costs but suffer yield loss, though it is important to note that the sample size was extremely small. Of 900 respondents who answered a question about planting cotton, 23 (2.6%) said they planted cotton in 2019, while 877 (97.4%) said they did not. Participating cotton farmers reported that their cover cropped fields had been in cover crops an average of 3.6 years.

Fifteen growers weighed in on the impact of at least three years' worth of cover crop use on their fertilizer costs in cotton (Figure 26). Seven of them (46.7%) said they saw no savings on fertilizer following cover crops, 5 (33.3%) said they saved $16 to $20 per acre on fertilizer, 2 (13.3%) reported savings between $11 and $15, and 1 (6.7%) noted a savings of $1 to $5 per acre.

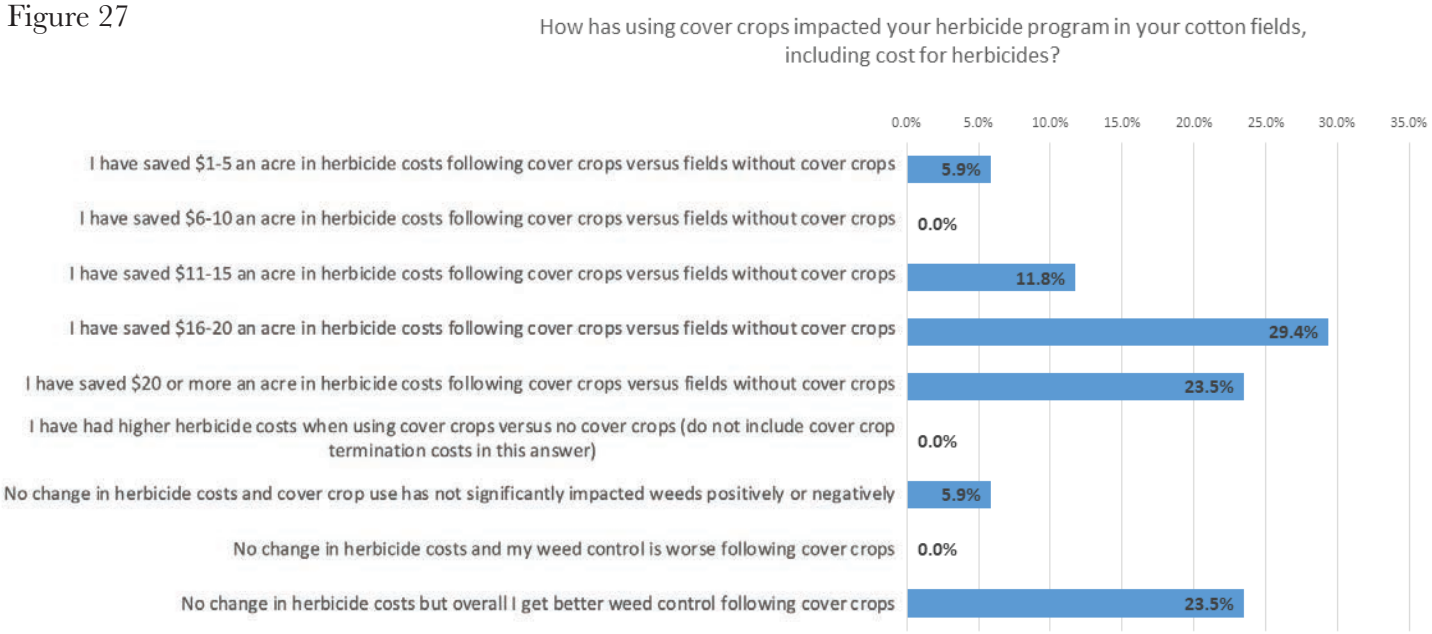
Figure 26



n=15

Cover crops' strongest benefit in cotton appeared to be weed control. Among the 17 growers who reported on the impact of cover crops on weed control in cotton, 12 of the 17 (70.6%) reported that cover crops saved them money on herbicide costs (Figure 27). More specifically, 5 (29.4%) said they saved $16 to $20 per acre on herbicides on cotton following cover crops compared to cotton without cover crops, and 4 (23.5%) estimated herbicide cost savings of $20 or more. Two growers (11.8%) calculated a cost reduction of $11 to $15 an acre, and 1 (5.9%) figured a savings of $1 to $5 per acre on herbicides. Four growers (23.5%) reported no change in herbicide costs but saw better weed control following cover crops. Just 1 grower (7.7%) saw neither a change in herbicide spending nor an impact of cover crops on weeds, and none reported that weeds got worse with cover crops or that herbicide bills rose.

Figure 27



n=17

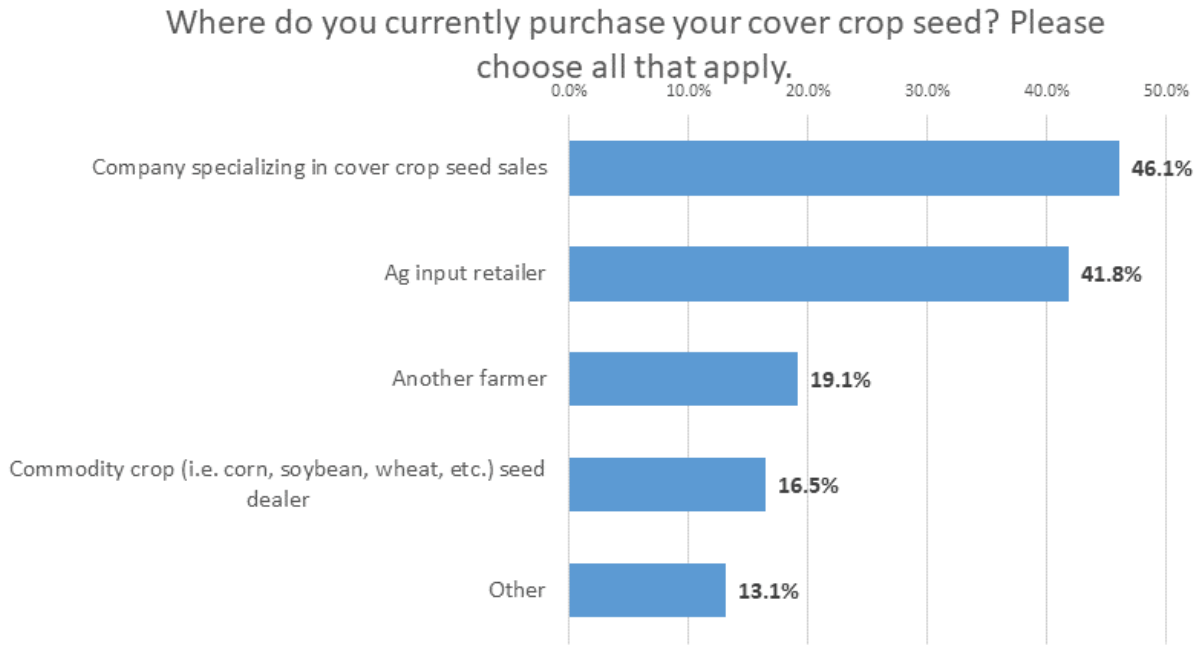
Buying Cover Crop Seed

Though more than 20 million acres are planted to cover crops in the U.S., in some respects the business of cover crop seed sales is still in its formative stages across America. Some farmers grow their own cover crop seed, while many others either purchase seed—or would like to—from companies specializing in cover crops.

The most popular source of cover crop seeds among respondents in this year's survey among 868 respondents who were allowed to select more than one answer—driving the totals over 100%—was companies specializing in cover crop seed sales, selected by 46.1% (400), followed fairly closely by 363 growers (41.8% of the total number of answers) who said they purchased cover crop seed at an ag input retailer such as a co-op or farm supply shop (Figure 28).

The third-most-popular source of cover crop seed was another farmer (166, or 19.1%), followed by a commodity crop seed dealer (143, or 16.5%). One hundred fourteen farmers (13.1%) selected "Other;" among those, 69 (7.9% of the total number of respondents to the question) indicated that they grew their own seed.

Figure 28

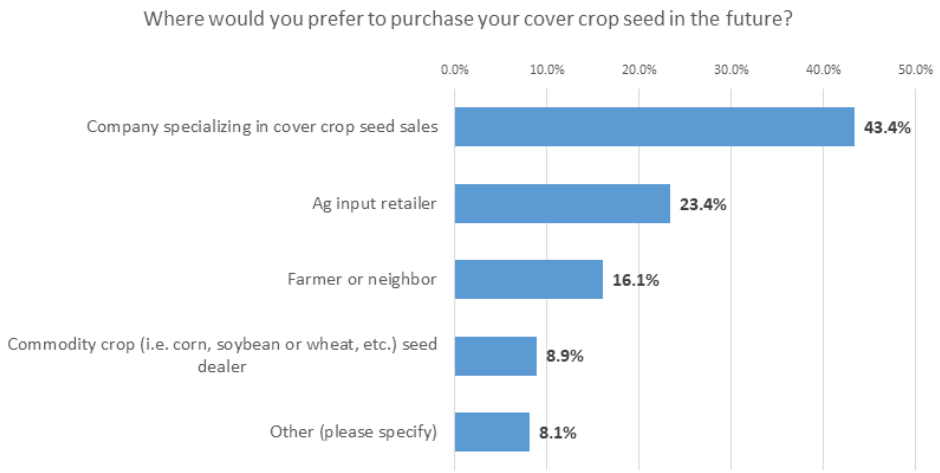


n=868

Looking ahead, 862 growers responded to the question, "Where would you prefer to purchase your cover crop seed in the future?" The replies indicate an interest in working with cover crop specialists, with 374 growers (43.4%) indicating they would like to buy from a company specializing in cover crop seed sales, 202 (23.4%) saying they would like to buy from an ag input retailer, 139 (16.1%) from another farmer or neighbor, and 77 (8.9%) from a commodity crop seed dealer (Figure 29).

Seventy growers provided feedback by selecting "other." Among those, 36 said they wanted to grow their own seed, 12 said they wanted to buy from a certified dealer, and 4 expressed no preference. It was interesting to note 8 entries specifying a local dealer as the preferred source for future cover crop seed purchases, and 6 that emphasized that they would buy from a dealer with the lowest price for seed.

Figure 29



n=862

The amount paid by survey participants for cover crop seed varied widely. Seed cost can reflect species and/or the content of seed mixes, sources, quality, and other variables, but it can also be a good indicator of how valuable farmers believe cover crops to be for their operations.

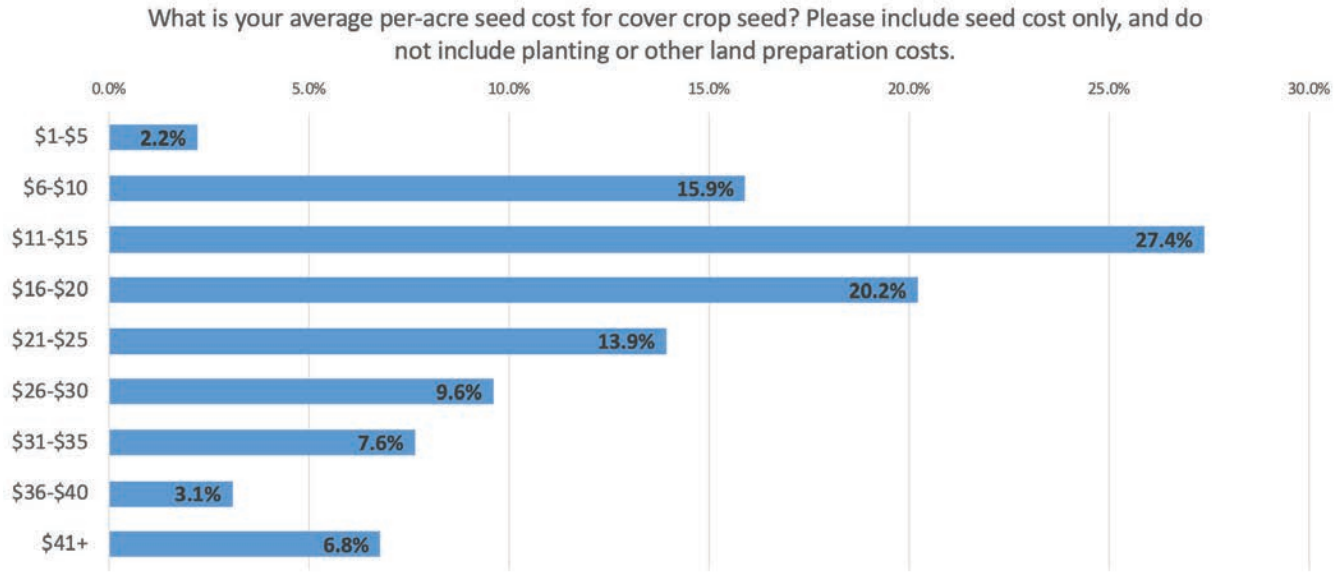
About half of the respondents' average cover crop seed costs (47.6%, or 386 of 811 responses) fell between $11 and $20 per acre, not counting planting or land preparation costs (Figure 30).

That is consistent with the prices paid by about half of the respondents in the 2016-2017 SARE/CTIC/ASTA National Cover Crop Survey, and was substantially lower than the $25-per-acre median cover crop seed costs reported by growers in earlier surveys, such as the 2012-2013 and 2013-2014 SARE/CTIC National Cover Crop Surveys. It is interesting to note that the most popular 2019 cost range also falls below the mean ($30) and median ($22) per-acre cover crop seed costs reported in the 2015-2016 National Cover Crop Survey. It will be interesting to explore trends in the cover crop seed market to determine if seed prices have fallen, seeding rates have decreased, or if species selection has shifted to less-expensive varieties of cover crops.

In the current national survey, the largest price bracket—accounting for 222 growers (27.4%)—was $11 to $15 per acre, followed by 164 growers (20.2%) paying $16 to $20 per acre, which would be considered the median value range for seed cost. Another 129 growers (15.9%) found ways to economize on seed costs, paying only $6 to $10 per acre for cover crop seed.

Fourteen percent (113 respondents) reported paying an average of $21 to $25 per acre for cover crop seed, followed by 9.6% (78) paying $26 to $30, 7.6% (62) investing $31 and $35 per acre, 3.1% (25) committing $36 to $40 per acre, and 55 (6.8%) putting $41 or more per acre into their cover crop seed.

Figure 30



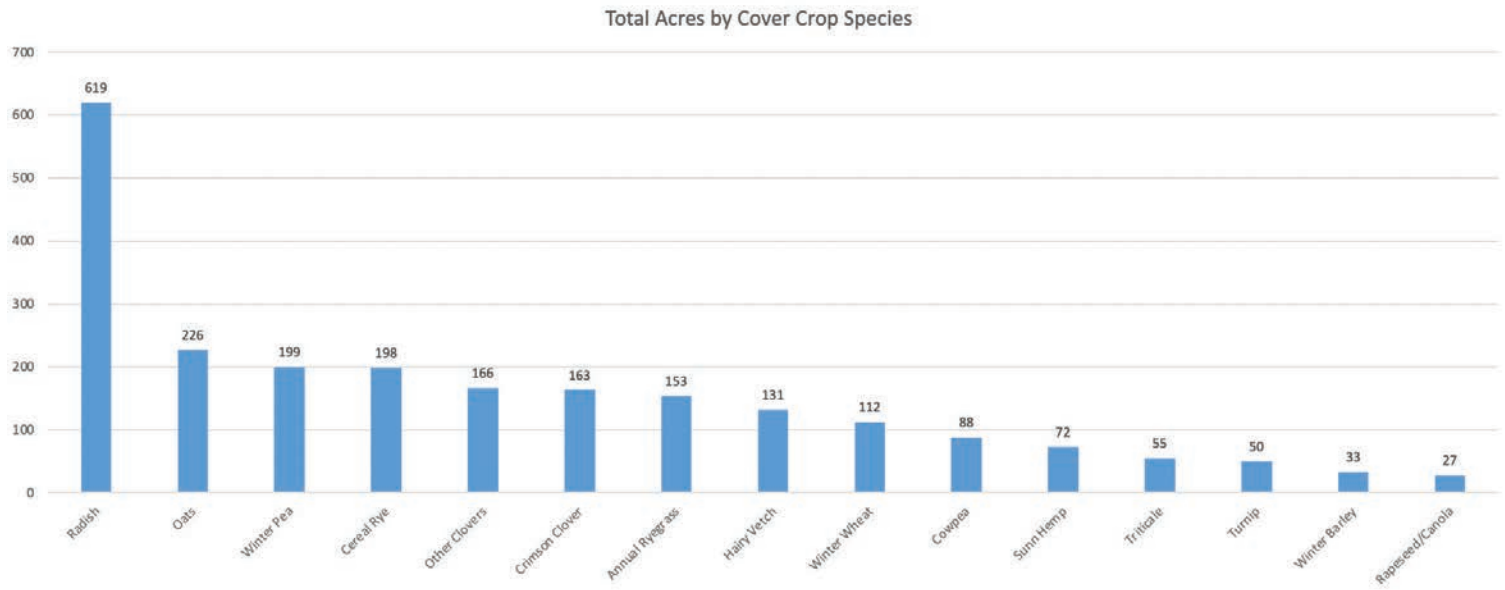
n=811

Typically, the highest value ranges of seed costs would likely represent cover crop mixes, particularly with more expensive legumes. It is interesting to note that 26.5% of the 151 horticulture producers responding to this question reported paying $41 or more per acre of cover crop seed; in fact, 68% of the horticulture respondents to this question paid more than the median range for seed (Figure 31).

Analyzing the data for insights into the reasons for the high investment by horticulture producers, we noted that radish was by far the leading species of cover crop planted by the horticulture respondents, with 619 acres compared to 226 for oats, 199 for winter pea and 198 for cereal rye. Other clovers totaled 166 and crimson clover added up to 163 acres on horticulture operations.

The small number of acres in cover crop species implied that many horticulture producers have both a small acreage to plant to cover crops and a willingness to invest in costlier seeds like radish, winter pea and clovers. That assumption was supported by the acreage data from respondents who described themselves as horticulture crop producers—68% (119) of the 175 horticulture respondents farmed 9 acres or fewer in 2019 and only 6% farmed more than 180 acres.

Figure 31

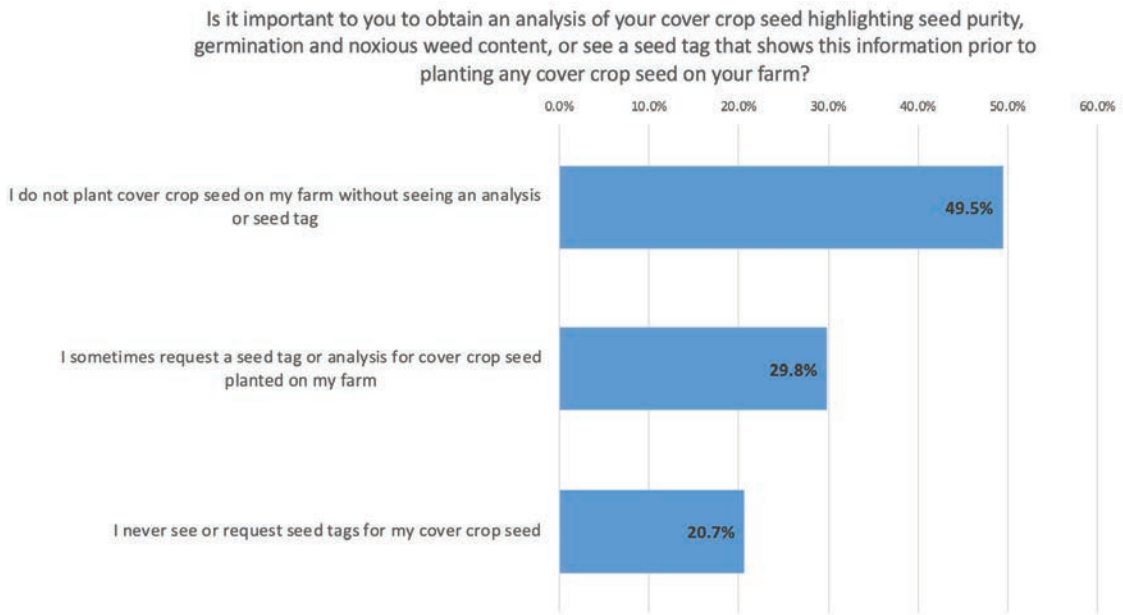


As with cash crop seed, cover crop seed from the most reliable sources is accompanied by a seed tag that details seed purity, germination, and noxious weed content. Seed tags are required for every package of commercial crop seed sold in the U.S., from a unit of corn to a packet of vegetable seed.

Half of the farmers who answered a question on seed tags on cover crop seed (426 of 861, or 49.5%) said they do not plant cover crop seed without seeing an analysis or seed tag, while 257 growers (29.8%) said they sometimes request a seed tag or analysis of the cover crop seed they plant on their farm (Figure 32). The rest, 178 growers (20.7%), reported that they never see or request seed tags for their cover crop seed.

Those figures represent a small shift toward recognizing the value of seed tags in cover crop seed compared to the 2016-2017 SARE/CTIC/ASTA National Cover Crop Survey. In that survey, 48% of respondents reported always requesting a seed tag, 28% said they requested one sometimes, and 24% said they never looked for a seed tag on cover crop seed.

Figure 32



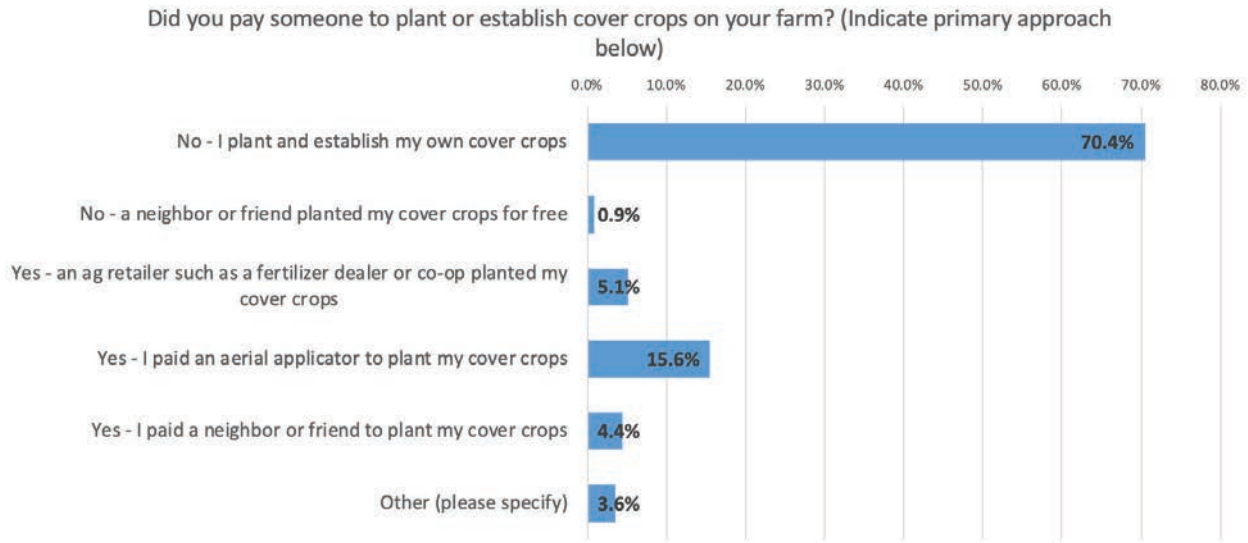
n=861

For many farmers, seed is just part of the cost of cover cropping. Seeding cover crops can also be a significant expense, though 70.4% of the respondents (624 of 886) who reported on the cost of establishment in this year's survey planted their own cover crops (Figure 33). Among those who paid someone else for planting/establishment, 138 (15.6%) hired an aerial applicator, 45 (5.1%) paid an agricultural retailer such as a fertilizer dealer or co-op, and 39 (4.4%) paid a neighbor or friend. Eight growers (0.9%) said a neighbor or friend planted their cover crops for free.

Another 32 growers (3.6%) chose "other." Among them, 6 noted that they engaged in a mix of planting their own cover crops and paying someone else to do it, while 1 had the work done by the local conservation district.

We cannot chart trends among past cover crop surveys with any statistical validity, but it is interesting to note that this year's results are very consistent with what we saw in the past. In 2016-2017, 74% of the respondents planted their own cover crops; in our 2015-2016 survey, 68% did the same. In our 2014-2015 report, 70% of the farmers reported planting their own cover crops and 71% offered that answer in 2013-2014. In each of those surveys, aerial applicators were the top choice for paid seeding services.

Figure 33

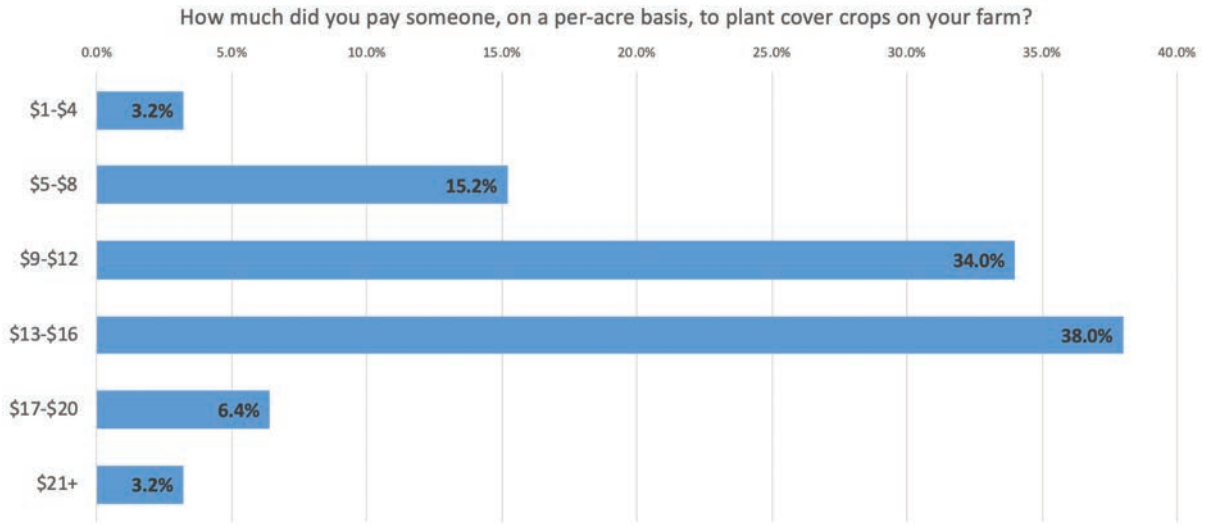


n=912

Among those farmers who paid someone to seed their cover crops, the most popular price range (with 95 of 250 respondents, or 38%) was $13 to $16 per acre, followed closely by $9 to $12 (85, or 34%; see Figure 34). A much smaller number of growers, 38 (15.2%), paid $5 to $8 per acre, while 16 (6.4%) paid $17 to $20, 8 (3.2%) paid $21 or more per acre, and another 8 (3.2%) paid $1 to $4.

In our 2015-2016 survey, the mean cost of planting/establishment was $16.60; in 2013-2014, growers reported a mean cost of seeding of $25.37 and a median of $12 per acre among farmers paying for establishment.

Figure 34



n=250

Cover Crop Species

As several previous answers have indicated, farmers plant cover crops for a wide range of reasons and can choose individual species or mixes of species to accomplish their goals. Deep-rooted grasses prevent erosion and can sequester nutrients leaching far into the soil profile, legumes fix nitrogen in the soil to nourish stands, and tap-rooted cover crops can break up hardpans. Many overwintering cover crops can be grazed in late fall or early spring, and some cover crops can be seeded for summer cover. The list is long and the opportunities to tailor a cover crop mix for a specific site and operation are plentiful. Through this survey, SARE, CTIC and ASTA have been eager to understand the trends in species choice and explore drivers of those decisions.

The survey asked respondents to indicate how many acres of each crop species they planted ahead of their 2019 cash crop, either alone or as part of a mix.

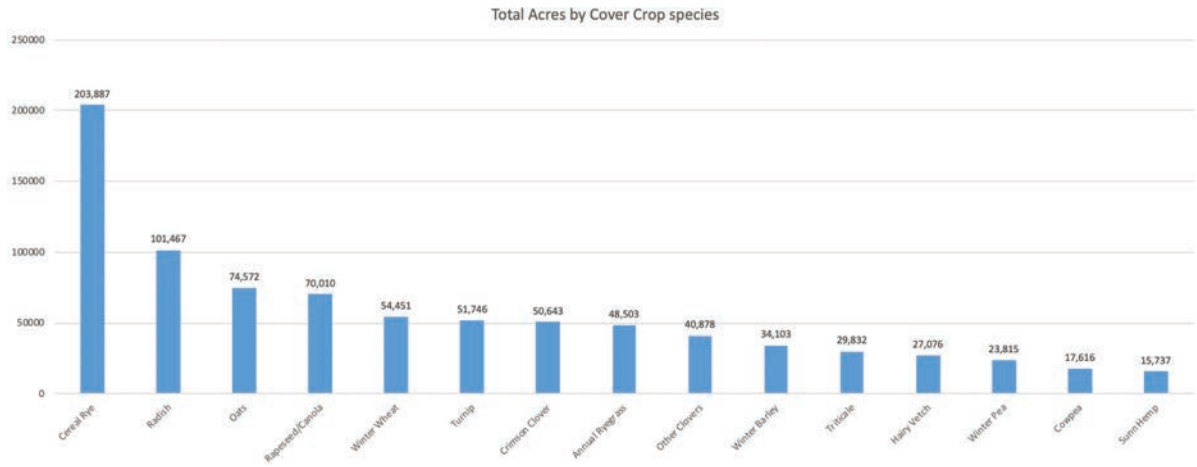
Data on cover crop mixes should be viewed with the understanding that there is a wide range of approaches to mixing cover crops. Because farmers may use different mixes on different fields or try species or combinations in certain areas, patterns with mixes may be difficult to ascertain from individual answers.

In terms of total acres planted to each species, alone or in a mix, by respondents to this year's national survey, cereal rye dominates, with 203,887 acres. Radish species are the second-most-popular species, with 101,467 acres, followed by oats with 74,572 (Figure 35).

Rapeseed or canola were planted on 70,010 acres by this year's respondents; winter wheat accounted for 54,451 acres, followed by turnip (51,746). Crimson clover was planted on 50,643 acres while other clovers were seeded on 40,878. Among grasses, annual ryegrass covered 48,503 acres; winter barley 34,103 and triticale 29,832. Legumes including hairy vetch (27.076 acres), winter pea (23,815), cowpea (17,616) and sunn hemp (15,737) rounded out the list.

The dominance of cereal rye is consistent with results from the 2016-2017 National Cover Crop Survey; that year, oat acreage exceeded radish acreage among the top three species, a pattern that flipped in 2019. The cereal rye > radish > oats pattern seen this year was also noted in the 2015-2016 National Cover Crop Survey.

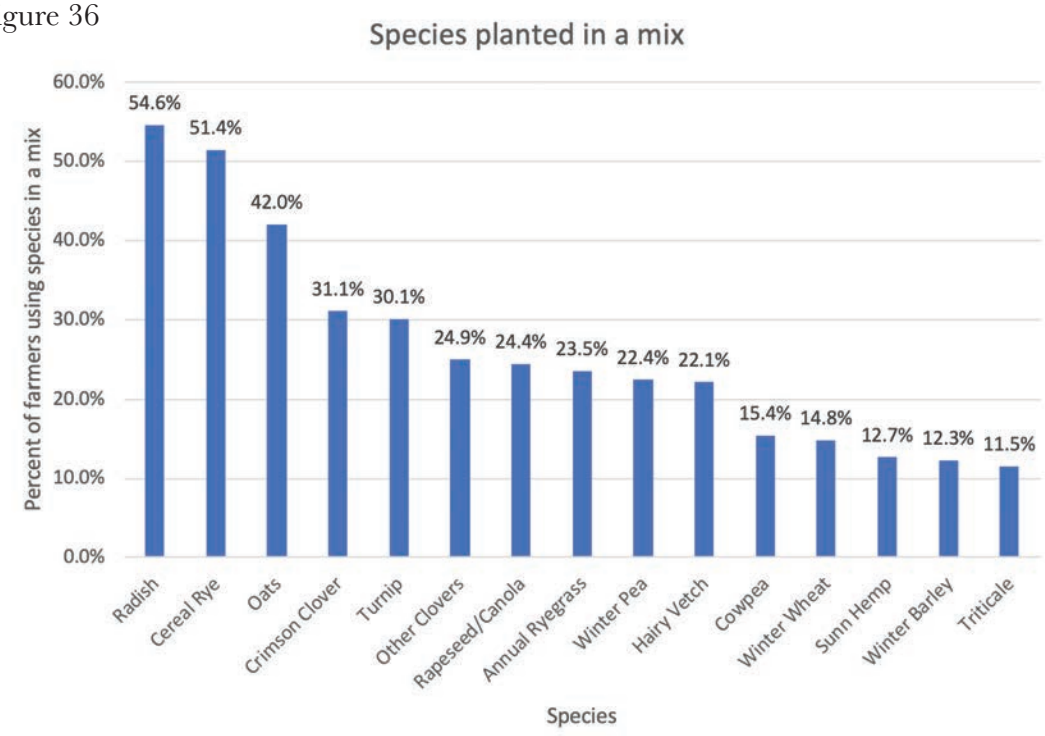
Figure 35



n=870

Looking specifically at cover crop mixes, radish (selected by 381 respondents, or 54.6%), cereal rye (51.4%, or 361) and oats (42%, or 295) were by far the most popular species in blends (Figure 36). Crimson clover (31.1%, or 218) and turnip (30.1%/211) formed the next tier of popularity; other clovers (24.9%/174), rapeseed/canola (24.4%/171), annual ryegrass (23.5%/167), winter pea (22.4%/156) and hairy vetch (22.1%/155) were also noted by a significant number of respondents. Clearly, there is quite a bit of diversity in cover crop mixes.

Figure 36

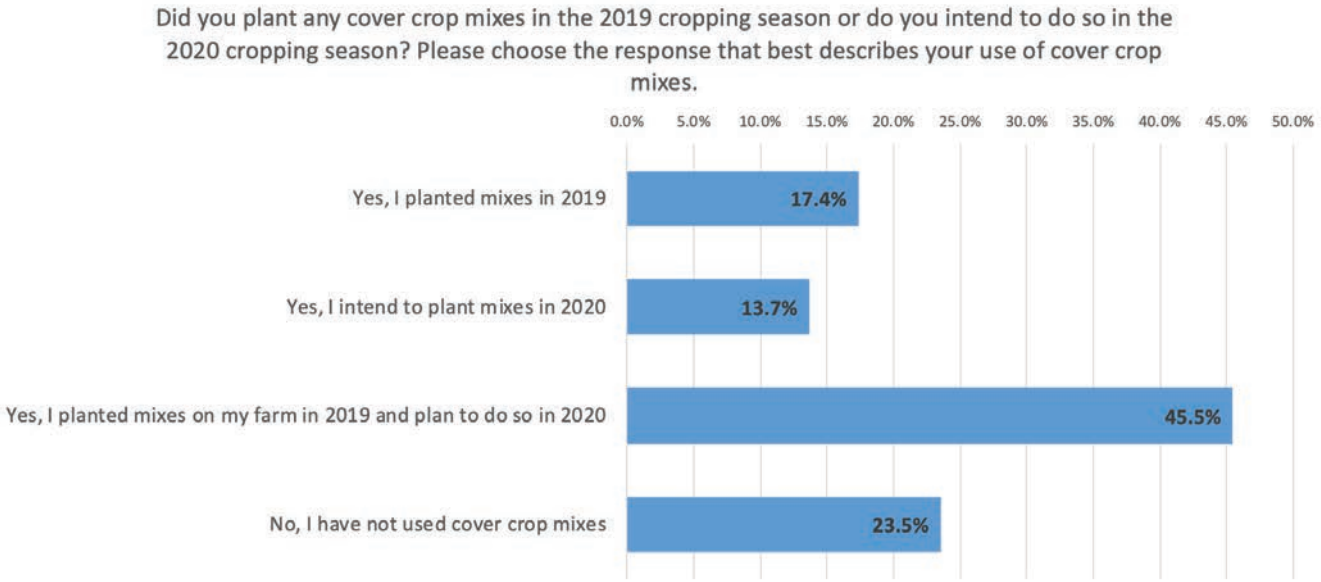


n=702

Cover crop mixes are quite popular—in this year's survey, only 23.5% (210 of 893 respondents) said they have not used them (Figure 37). Nearly half of the producers who answered this question (45.5%, or 406) said they planted cover crop mixes on their farms in 2019 and planned to use them in 2020, a figure that echoes the results from 2016-2017 and earlier surveys. Meanwhile, 17.4% (155 growers) reported using cover crop mixes in 2019 and 13.7% (122) said they plan to use them in 2020.

In fact, the total percentage of respondents in this year's survey who say they have planted mixes—62.9%—is equal to the combined percentage of growers who reported planting mixes in our first survey in 2013 (63%), revealing a steady interest in cover crop blends over nearly a decade.

Figure 37

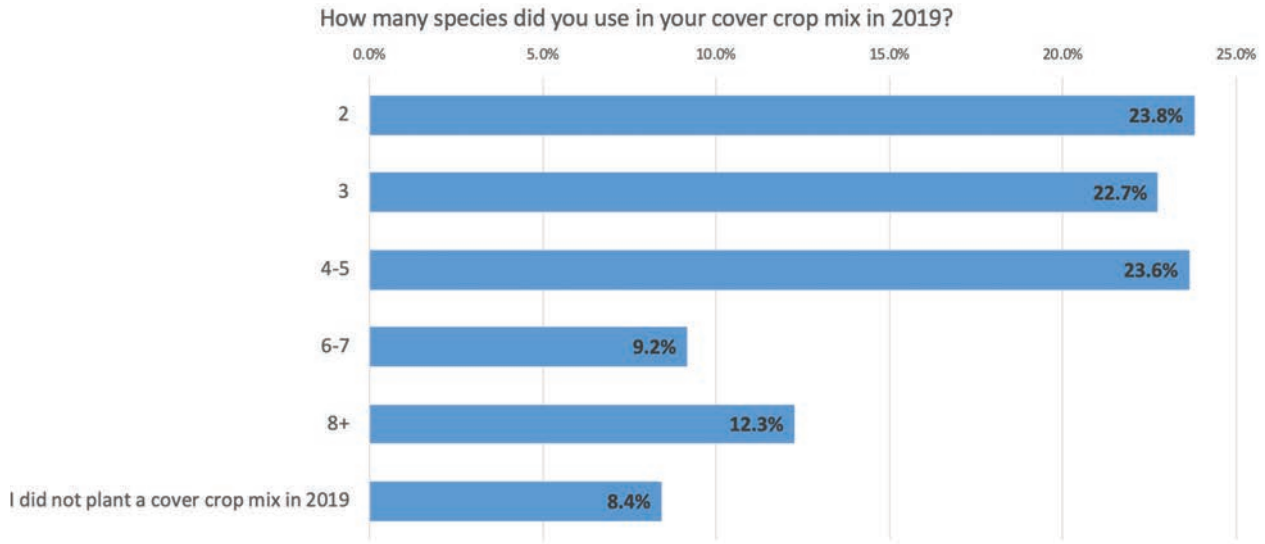


n=893

Cover crop mixes can range from a simple blend of two species to complex recipes of a wide range of plants (Figure 38). Among 677 respondents, 161 (23.8%) used 2-species blends in 2019, 154 (22.7%) mixed 3 species, and 160 (23.6%) blended 4 species, accounting for three out of four farmers who answered the question.

Nine percent of the farmers (62) reported mixing 6 or 7 species, and 12.3% (83) said they combined 8 or more species in their cover crop mixes. Another 57 farmers (8.4%) said they did not plant a cover crop mix in 2019.

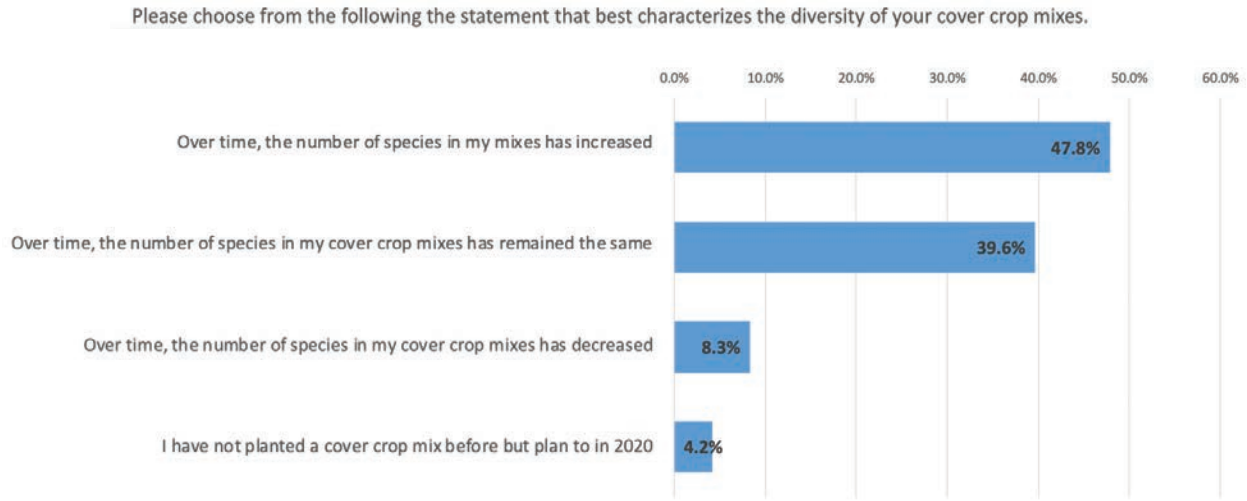
Figure 38



n=677

Almost half of the respondents to a question about trends in cover crop diversity (47.8%, or 321 of 671) reported that the number of species in their cover crop mixes has increased over time, and another 39.6% (266) said the number of species has remained the same (Figure 39). Just 8.3% (56) said they have decreased the number of species in their cover crop mixes over time, and 4.2% (28) reported that they had not planted a cover crop mix before, but planned to in 2020.

Figure 39



n=671

Incentives for Cover Crop Programs

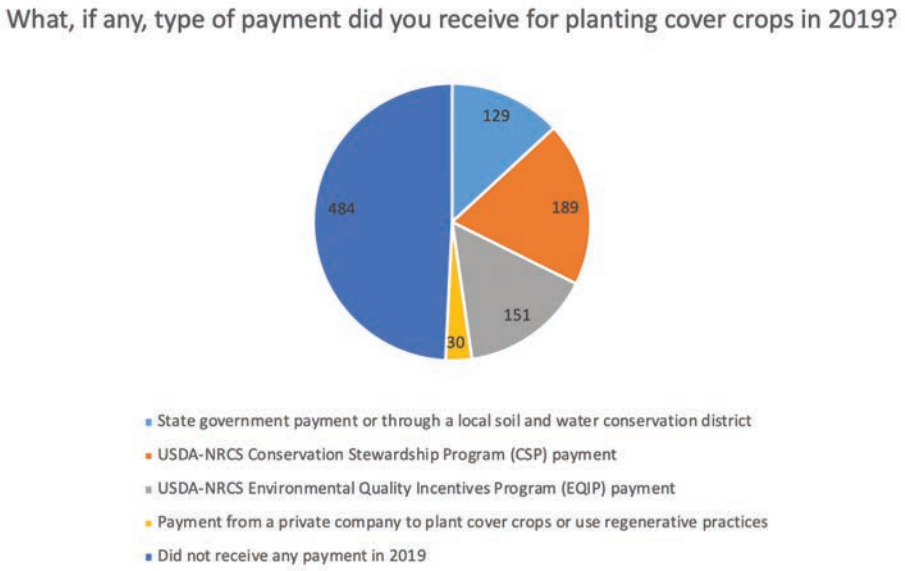
There is a wide range of public and private incentive programs to encourage farmers to plant cover crops, ranging from USDA's Environmental Quality Incentives Program (EQIP) to commodity customers like Unilever encouraging production practices that align with consumer preferences. Federal responses to the wet planting season of 2019 and the impacts of the trade war with China were designed specifically to allow payments for cover crops on prevent plant acres, adding even more funding to the pot of incentives.

We asked, "What, if any, type of payment did you receive for planting cover crops in 2019?" and allowed respondents to check all answers that applied to their situation (Figure 40).

Nearly half of the responses (484 of 1,005, or 48.1%) were "did not receive any payment in 2019." Far below that, in second place with 19% (189), were Conservation Stewardship Program (CSP) payments from the USDA Natural Resources Conservation Service (USDA-NRCS). Fifteen percent (151) received payments through USDA-NRCS's Environmental Quality Incentives Program (EQIP), 13% received payment through a state government or local soil and water conservation district, and 3% (30) received payment from a private company to plant cover crops or use regenerative practices. There were 22 responses in the "Other" category, which primarily referred to crop insurance or prevent-plant programs, especially a $5 credit from Iowa.

In 2015, the last time SARE, CTIC and ASTA asked about receiving payments for cover crops, 59% of the cover crop users said they had never received cost-share or incentive payments for planting cover crops, and in 2014, 63% reported never receiving cost-share or incentives for cover crops. Further exploration of the growing adoption of payments for cover crops—whether driven by the availability of more incentive funds, tie-ins with other conservation practices and incentives, or several years of low commodity prices—could yield interesting and important insight.

Figure 40



n=785

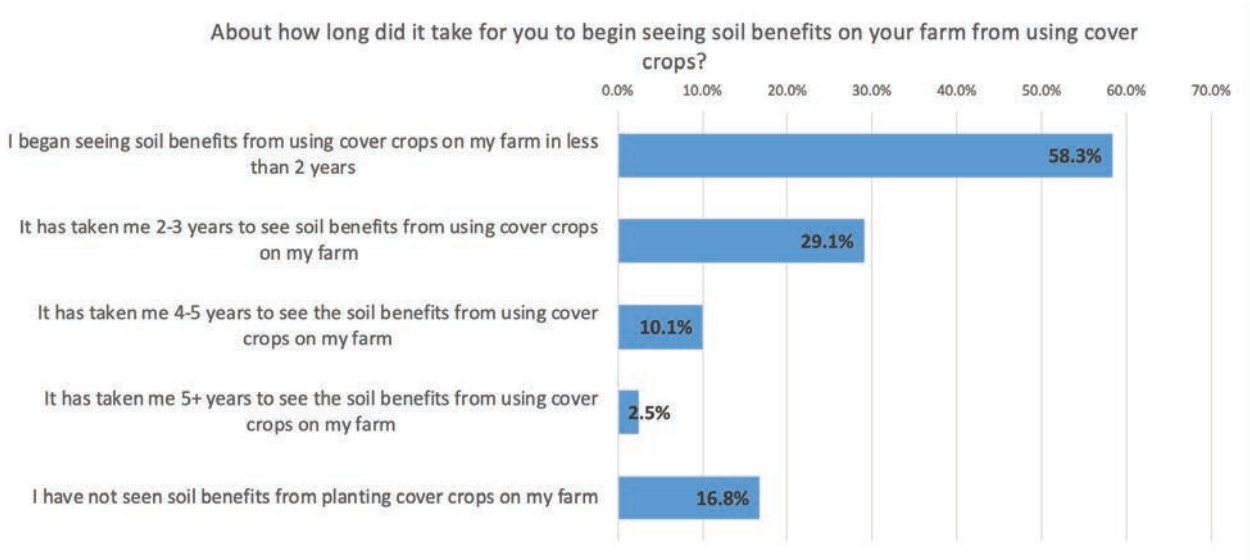
Several growers provided written responses, ranging from "it doesn't cover the costs but every little bit helps," to "I refuse to put the burden on the taxpayers. If my farm cannot make a profit, I should not be farming." It is interesting to note that several respondents specified that they received payments through livestock programs, a government grazing study, or specific state or county grants.

Seeing the Benefits of Cover Crops

Changing the health and structure of the soil can be a slow process that takes place well out of sight. Proponents of no-till and other soil-building systems have learned that the early years of adopting new practices can be more of a test of faith than an exercise in feeling accomplished. However, well over half of 746 respondents (58.3%, or 435 farmers) reported that they began seeing the benefits of cover crops in less than 2 years (Figure 41).

The next-largest group—217 farmers, or 29.1%—said they began witnessing soil benefits from cover crops after 2 to 3 years. Ten percent (75) growers said the changes became evident after 4 to 5 years, and 2.5% (19) saw improvements after five or more years. Another 125 growers (16.8%) said they had not yet seen soil benefits from cover crops on their farms.

Figure 41



n=746

We dug deeper into the answers from the 125 growers who reported that they had not seen soil benefits from cover crops on their farm to determine if those respondents had fewer years of experience with cover crops. In fact, 59% (74) of those farmers reported having 3 years or less of experience with cover crops. Just 10.4% (13) of them had 10 years or more of cover crop experience, and 17.6% (22) had 4 to 5 years. Our expectation, and hope, is that those farmers will enjoy soil health and structure benefits as they continue planting cover crops on their farms in the years to come.

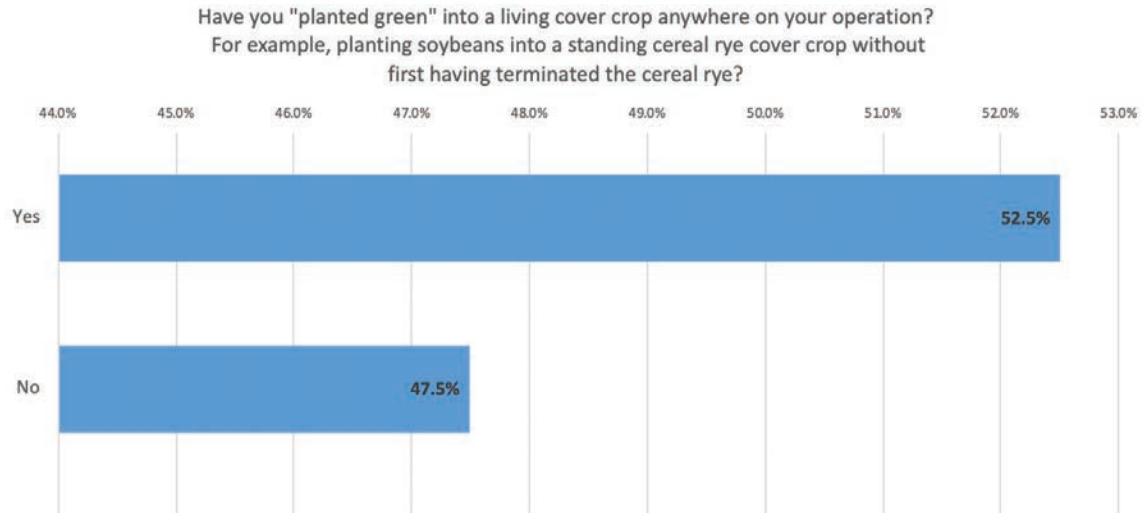
Planting Green

Planting green—seeding a cash crop directly into a green, growing cover crop and letting both crops grow for some period of time—is attracting a great deal of interest among cover crop users. Proponents point to benefits ranging from better moisture management in the spring, reduced soil erosion, the ability to graze cover crops right up to cash crop planting, or the chance to build more root biomass in the soil.

In this year's survey, we delved into planting green practices and attitudes to shed light on the adoption of the system.

Of 878 growers, 461 (52.5%) reported that they had planted green somewhere on their operation, while 417 (47.5%) said they had not (Figure 42).

Figure 42

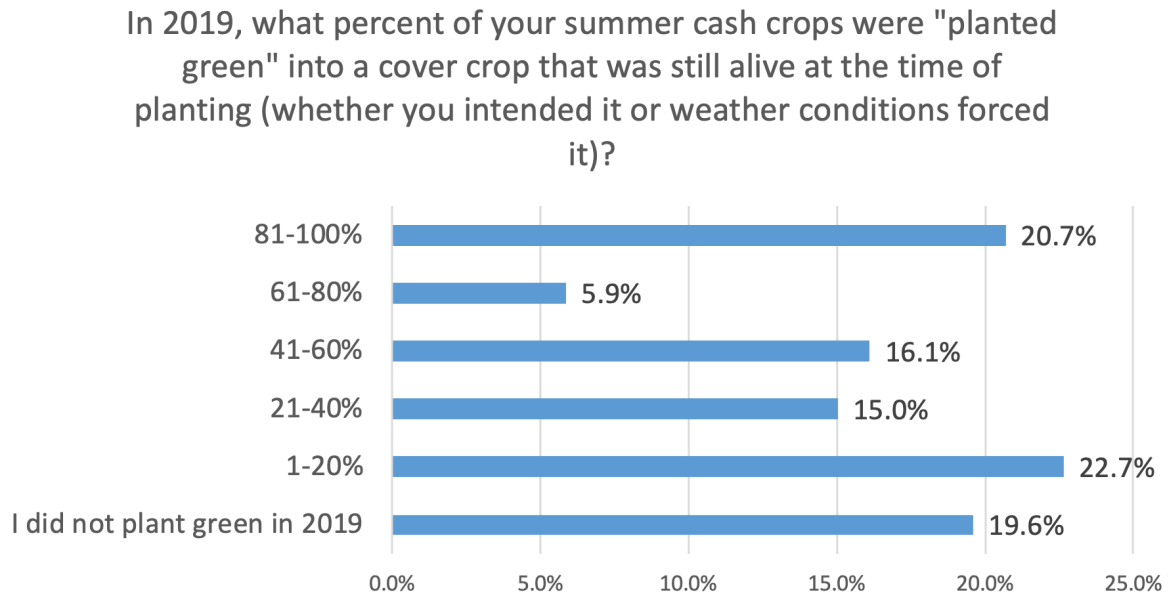


n=858

It is important to note that the extremely wet spring of 2019 may have increased the incidence of planting green by interfering with cover crop termination and forcing growers to hurry to plant their cash crops when soils were even close to dry enough. In several questions, we acknowledged that situation by adding the phrase "whether you intended it or weather conditions forced it." Whether the practice was proactive or reactive, there is plenty to learn about its impacts and growers' attitudes towards it.

The percentage of producers' cash crops that were planted green varied significantly (Figure 43), with the largest values in the 1 to 20% range (22.7%, or 104 of 459 growers) and the 81to100% range (20.7%, or 95 respondents). Fifteen percent (69) planted 21 to 40% of their cash crops green, 16.1% (74) used the practice with 41 to 60% of their cash crops, and 5.9% (27) planted green with 61 to 80%. Of the 459 respondents to this question, 19.6% said they did not plant green in 2019.

Figure 43

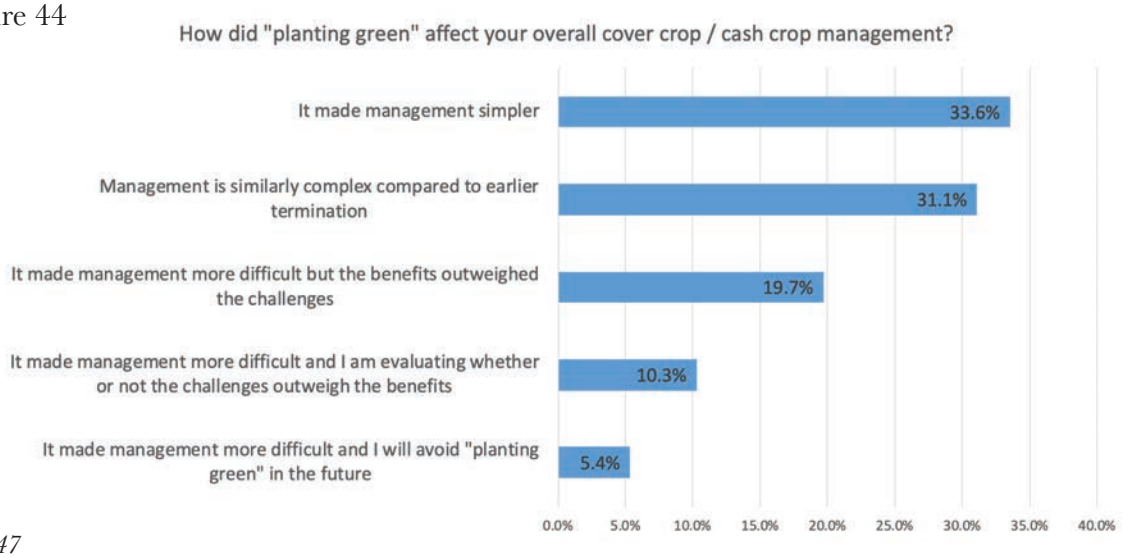


n=459

Six out of 10 respondents (289 of 447) said planting green was simpler or similar in complexity in terms of cover crop and cash crop management compared to terminating cover crops earlier (Figure 44). Breaking down that total, the largest number—150 (33.6%)—said planting green made management simpler, and 139 (31.1%) said the practice was "similarly complex compared to earlier termination."

For 88 growers (19.7%), planting green made management more difficult, but the benefits outweighed the challenges. Another 46 growers (10.3%) said planting green made management more difficult and they are still evaluating whether the challenges outweighed the benefits. Only 24 growers (5.4%) said the added management difficulty was not worthwhile, and they did not intend to plant green in the future.

Figure 44



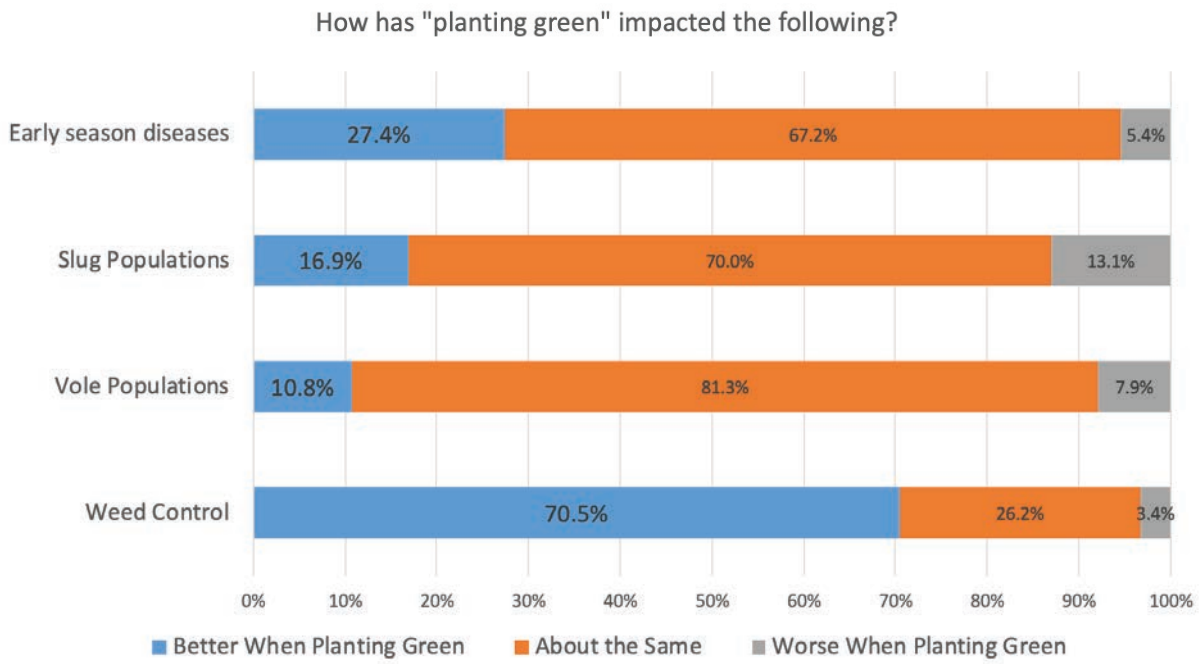
n=447

Fans of planting green tout benefits including better weed control from the still-growing cover crop, while fears around the practice revolve around the possibility that the green cover crop could harbor pests or disease. Survey respondents indicated that weed control was better by a wide margin—70.5% of 447 growers noted that weed control was better when planting green, and 26.2% said it was about the same, leaving just 3.4% to say weed control was worse (Figure 45).

Early season diseases were also noted to be the same or better in a planting green system, with 27.4% of 405 responses saying it was better than with a conventionally managed cover crop and 67.2% saying it was about the same, while 5.4% reported that early season diseases were worse. Vole populations were seen as about the same by 81.3% of 390 respondents, while 10.8% saw an improvement and 7.9% said voles were worse in fields that were planted green. Of the pests and problems explored in this question, slugs showed the closest relationship between better (16.9%) and worse (13.1%), with 70.0% of 390 growers saying slug pressure was about the same.

In the free-response blank, many growers said voles and slugs weren't their big worry (though a few others said they had trouble with them), but quite a few highlighted challenges with cutworms when planting green. A few growers named specific benefits from planting green, such as a more uniform seedbed for their cash crops, less mud or soil moisture at planting, and better emergence of the cash crops. One noted that the extra biomass from planting green reduced weed pressure and also increased the carbon/nitrogen ratio in the soil, helping residue last longer. Another simply wrote, "pleasantly surprised." Of course, though the vast number of comments were very positive, one grower said, "disaster is a better description."

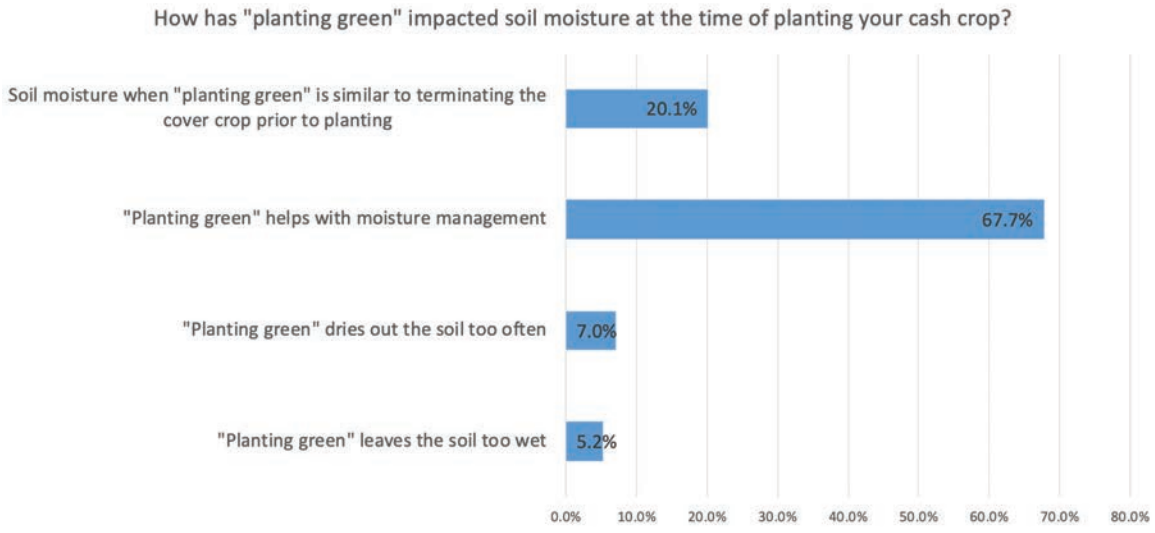
Figure 45



n=447 (diseases), 390 (slugs and voles), and 447 (weeds)

A major—and widely seen—benefit of planting green was soil moisture management, a property that was surely put to the test during the wet 2019 planting season. Seven out of 10 growers (67.7%, or 300 out of 443) said planting green helps with soil moisture management (Figure 46). Twenty percent (89) said soil moisture when planting green is similar to when cover crops are terminated prior to cash crop planting. Seven percent (31) said planting green dries out the soil too often, and only 5.2% (23) said planting green leaves the soil too wet.

Figure 46

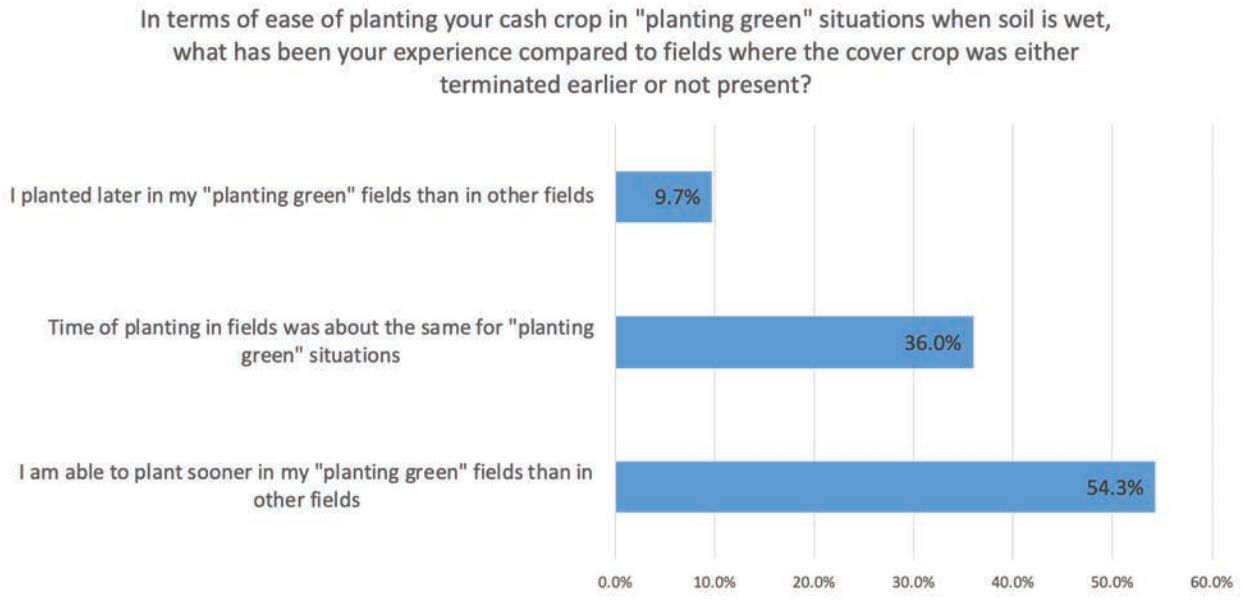


n=442

The ability of planting green to reduce soil moisture was evident in the responses to a question about the timing of cash crop seeding when planting green (Figure 47). Despite the crippling spring rains of 2019, 54.3% of respondents (240 of 442) said they were able to plant cash crops sooner in their planting green fields than in fields where cover crops were either terminated early or were not present, while just 9.7% (43) reported that they planted cash crops later in their planting green fields. One explanation for earlier cash crop seeding in green-planted fields could be that the growing cover crop actively pulled moisture from the soil at planting time through transpiration.

For 36% of the growers (159), the timing of cash crop planting was about the same in fields that were planted green.

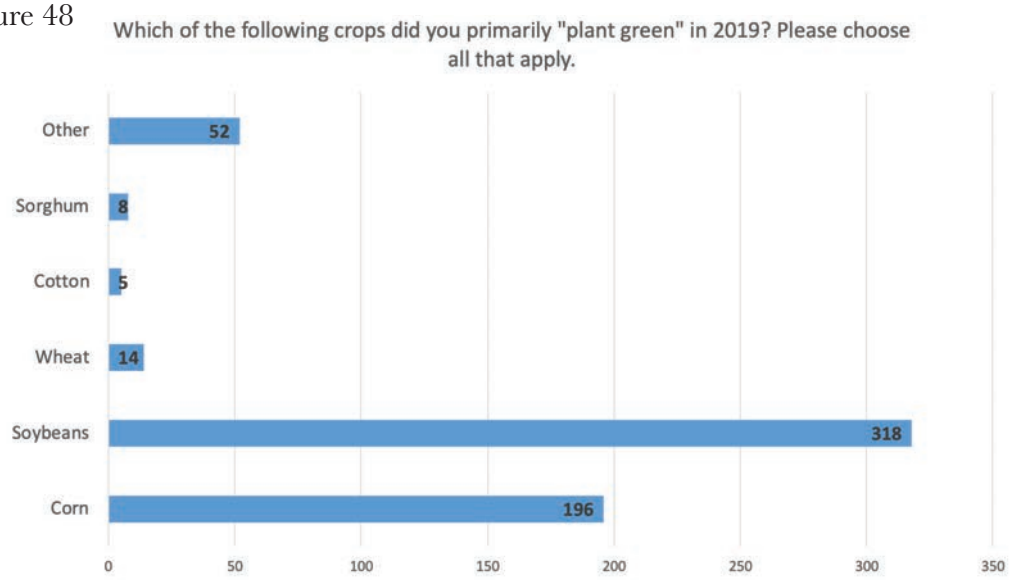
Figure 47



n=442

Though a comparable number of corn and soybean growers reported employing the practice, soybeans were by far the most popular crop to plant green, with 318 of the 417 total responses (Figure 48), significantly outweighing corn (196), wheat (14), sorghum (8) and cotton (5). "Other" was selected by 52 growers, and included 15 instances of vegetables or melons, 4 notes of hay or forage, 2 cannabis/hemp and 2 barley, and other crops such as beans, fruit, oats, and even 3 reports of planting cover crops into standing cover crops. Respondents were asked to choose as many answers as applied to their operation.

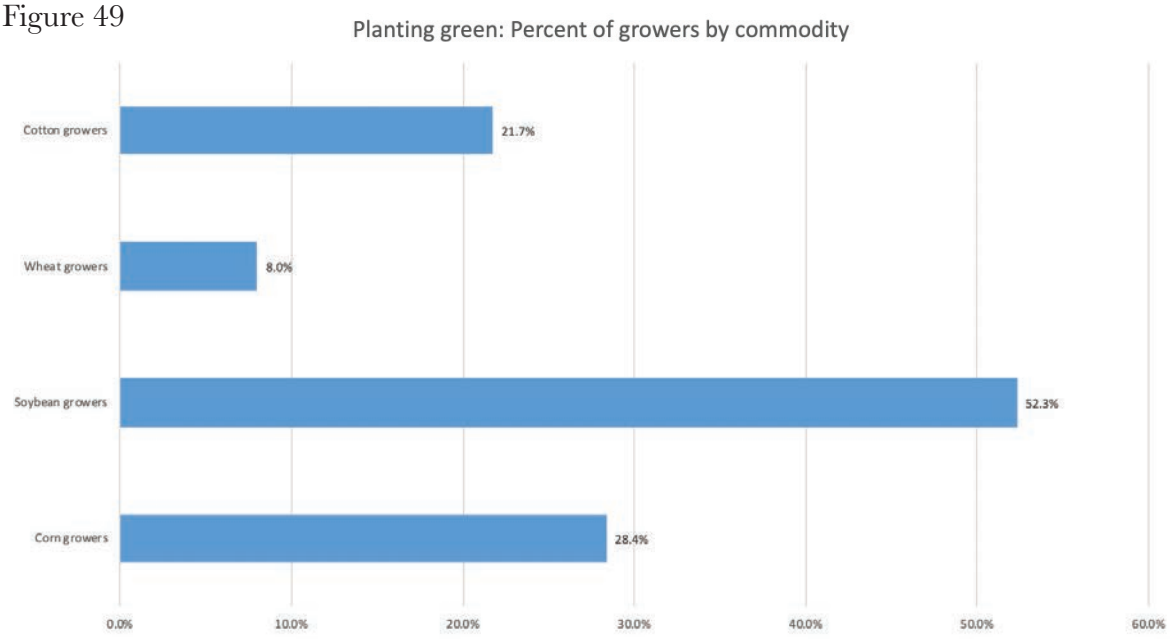
Figure 48



n=417

Seen as a percentage of commodity growers planting green, the data appear a bit different. Though the small number of cotton growers participating in the survey yielded a figure that made it appear that not much cotton was planted green, 21.7% of the cotton growers responding to the question seeded cotton into a living cover crop (Figure 49). More than half of the soybean growers (52.3%) replying to the question planted soybeans green; 28.4% of the corn growers planted that crop into unterminated cover crops, while 8% of wheat growers responding to the question did the same.

Figure 49



n=533

Cover Crops in the Record Rains of 2019

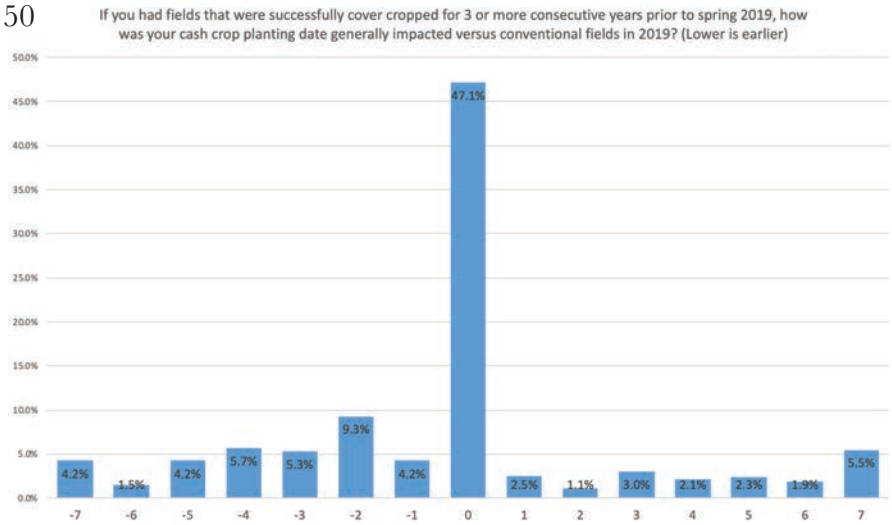
The 2019 planting season was one for the record books—literally. According to USDA, the period between May 2018 and April 2019 was the wettest 12 months on record in the U.S. Corn and soybean planting were the slowest in history, with just 67% of the corn and 39% of the soybeans planted by June 2, 2019. Barge traffic throughout the Midwest was halted and floods covered thousands of acres of farmland. USDA estimated that flooding delayed or prevented planting on 19 million acres of cropland in 2019.

Among respondents to the 2019-2020 survey, 78.6% (685 of 871) reported that wet weather delayed planting of cash crops in their county, while 21.4% said it did not (Figure 50).

Because of those delays, 2019 was a proving ground for cover crops. We asked farmers, "If you had fields that were successfully cover cropped for 3 or more consecutive years prior to spring 2019, how was your cash crop planting date generally impacted versus conventional fields in 2019?" and provided a slider whose left side read "7 or more days earlier," center was marked "About the same," and right side was marked "7 or more days later."

Of 473 respondents to the question, 223 (47.1%) chose "About the same," or a value of 0. Other than the zero/"same" value, there was a cluster of popular answers showing cash crop planting 2 to 5 days earlier following cover crops: 44 growers chose a value of -2, 25 (5.3%) chose -3, and 27 (5.7%) selected -4, and 20 (4.2%) selected -5. It is also worth noting that although there were few selections on most of the "later" side of the slider, 26 growers (5.5%) chose a value of +7, representing 7 days or more later.

Figure 50



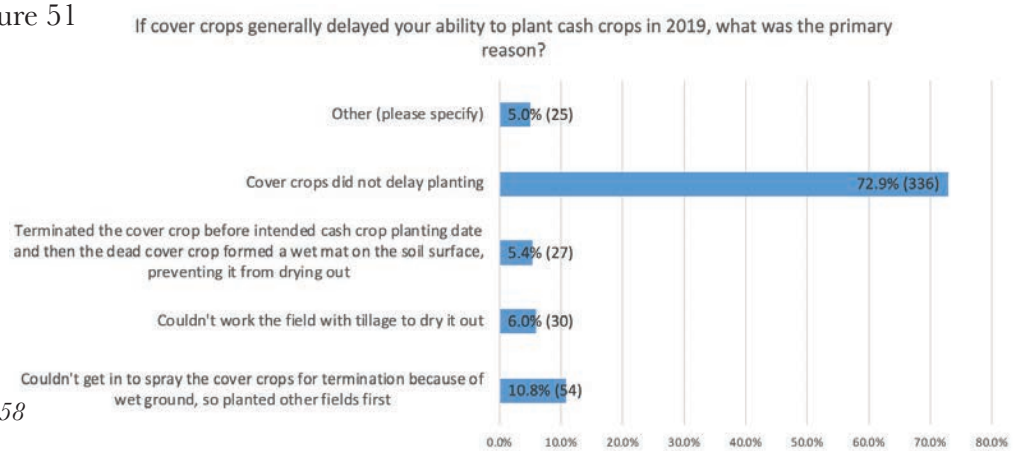
n=473

Asked, "If cover crops generally helped you plant earlier in wet conditions during 2019, what do you feel was the primary reason?" 19.5% (109 of 558 growers) chose better soil structure and drainage on cover cropped fields, 12.4% (69) agreed with the statement that cover crops helped dry out the soil by transpiring soil moisture, and 34.2% (191) said both of those reasons seemed to apply to their cover crop fields (Figure 51). Thirty-one percent (173) said cover crops did not help them plant earlier.

From the 2.9% (16) who responded, "other" and provided a written answer, several attributed the earlier planting to their no-till practices on their cover cropped fields. One respondent pointed out that cover cropped fields were his or her prevent plant fields.

It is worth noting here that responses to this question included farmers who planted green into living cover crops and those who terminated their cover crops earlier. While farmers planting green skewed significantly toward planting earlier (54.3%) vs. later (9.7%), the overall trend among *all* cover crop users was not quite as strong in the direction of planting earlier, though almost twice as many cover crop users overall planted earlier than were delayed (34.3% vs. 18.4%). This may reflect the effects of a living cover crop helping dry the soil through continued transpiration as opposed to a wet mat of dead residue—or other issues that could delay planting—from a cover crop terminated prior to late rains during the wet spring of 2019.

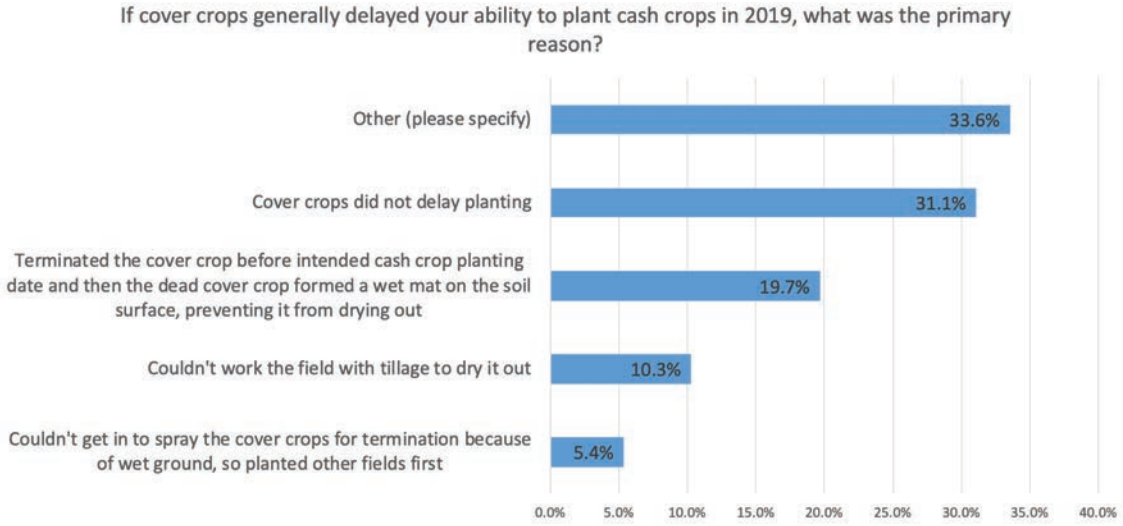
Figure 51



n=558

One of our questions directly probed the issue of potential delays in planting after cover crops (Figure 52). Though 72.9% of the 502 respondents (336) reported that cover crops did not delay planting that year, 10.8% (54) noted that they could not get into wet fields to spray cover crops for termination, so they planted other fields first. Another 5.4% (27) said the terminated cover crop biomass formed a wet mat on the soil surface, preventing it from drying out, and 6% (30) said they could not work their fields with tillage to dry them out. Five percent (25) selected "Other," mainly noting regrowth of the cover crop or delayed breakdown of biomass due to the weather conditions.

Figure 52



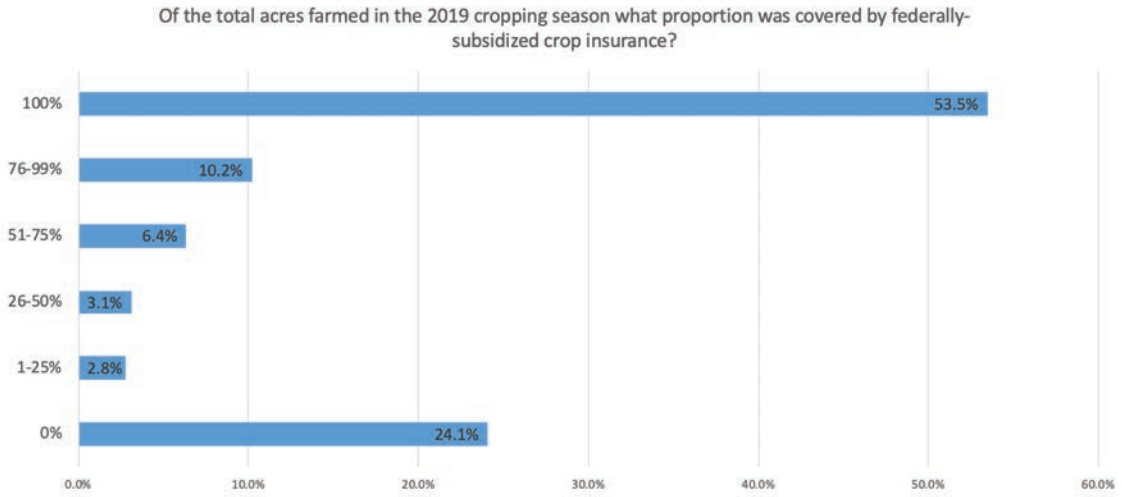
n=502

Crop Insurance

Federally subsidized crop insurance programs have been evolving over the past several years to account for cover crops. In the 2019-2020 survey, we asked several questions to get a better idea of how cover crop users employ insurance programs, and how they fit with cover cropping systems.

For three out of four of the respondents, federally subsidized crop insurance was an all-or-nothing solution—53.5% (362 of 677) insured 100% of their total farmed acres in 2019, while 24.1% (163) insured none of their farmed acres (Figure 53). Another 10.2% (69) insured 76 to 99% of their farmed acres, 6.4% (43) insured 51 to 75%, 3.1% (21) insured 26 to 50%, and 2.8% (19) insured 1 to 25% of their cropland.

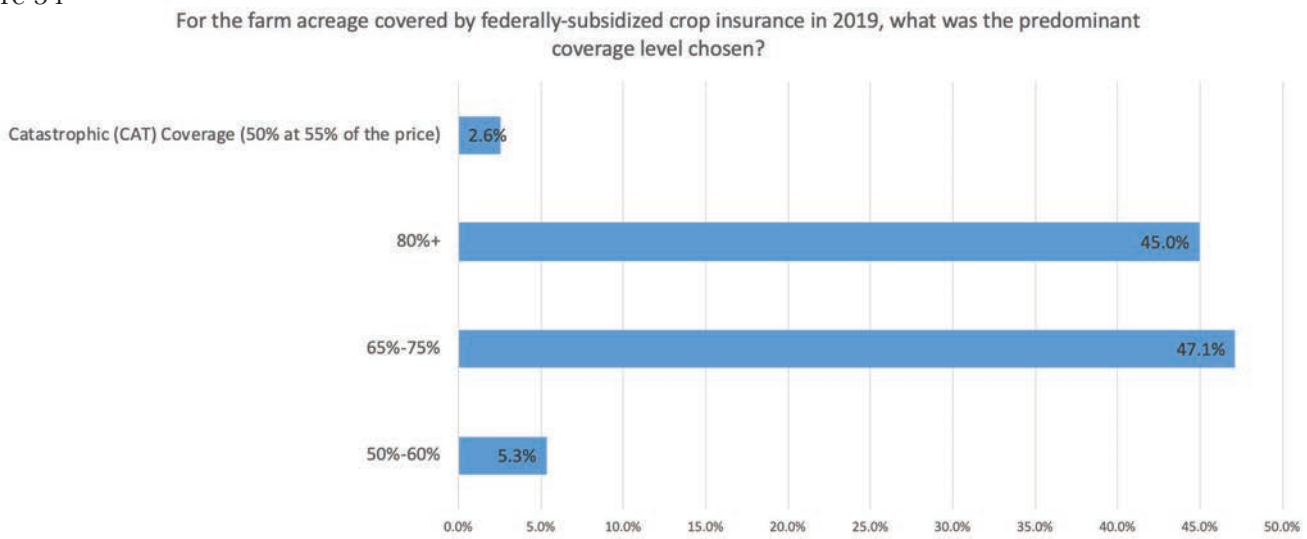
Figure 53



n=677

For those purchasing crop insurance, the level of protection was closely split between 65 to 75% coverage—the choice of 47.1% (239 of 507)—and 80+ percent coverage, which was selected by 45% (228) of the respondents (Figure 54). The 50 to 60% coverage level was preferred by 5.3% (27) farmers, and 2.6% (13) bought catastrophic (CAT) coverage, 50% coverage at 55% of the price.

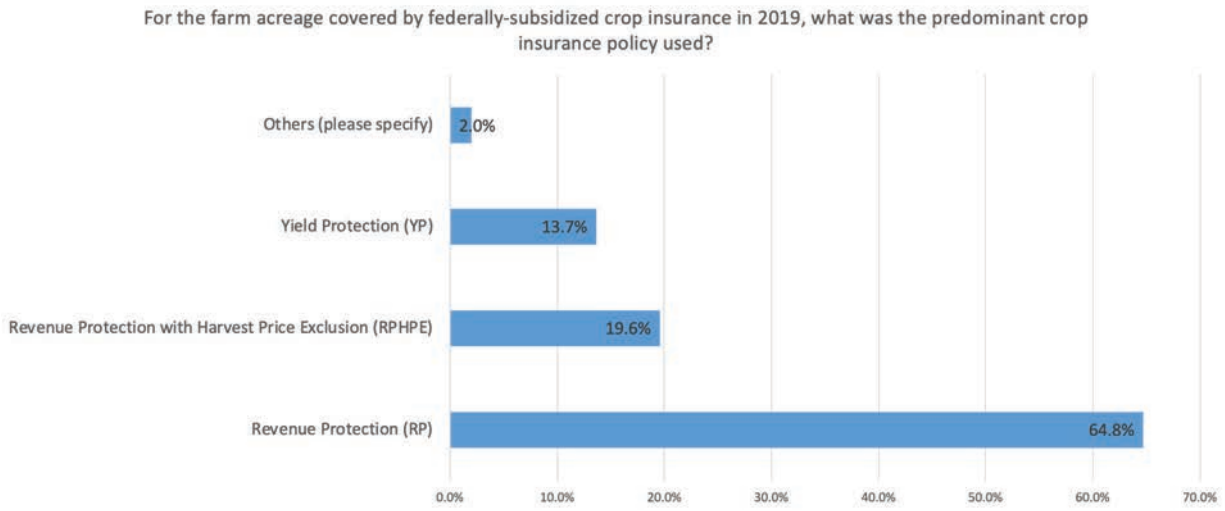
Figure 54



n=507

Among survey respondents, Revenue Protection was by far the most popular type of policy, chosen by 64.8% (327 of 505; see Figure 55). Revenue Protection with Harvest Price Exclusion (RPHPE) was the choice of 19.6% (99), while 13.7% (69) bought Yield Protection, and 2% (10) bought another type of policy.

Figure 55

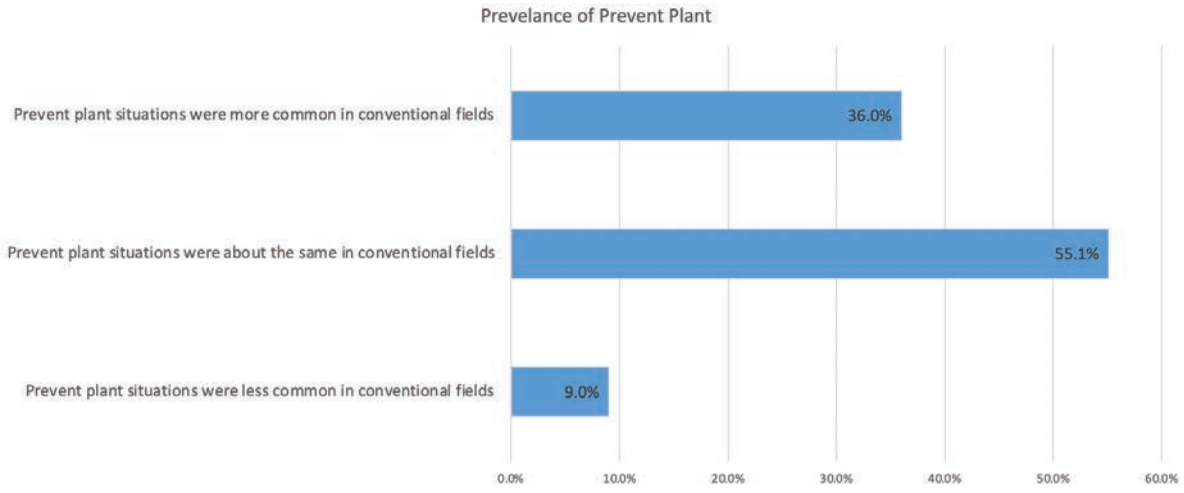


n=505

Despite the dramatic delays throughout the planting season, just 28% (190) of the respondents reported that they declared any fields as prevent plant for crop insurance purposes in 2019, while 72% (488) said they had no fields declared prevent plant (Figure 56).

Among the instances of prevent plant crops, 36% (96 of 267 respondents) noted that in 2019, prevent plant situations were more common in conventional fields—described in the question as full-width tillage and no cover crops—than in fields that had at least 3 years of consecutive cover crops and no-till or very minimum tillage. Nine percent (24) reported that prevent plant was less common in conventional fields, and 55.1% (147) said prevent plant situations were about the same in either cover cropped or conventionally managed fields.

Figure 56



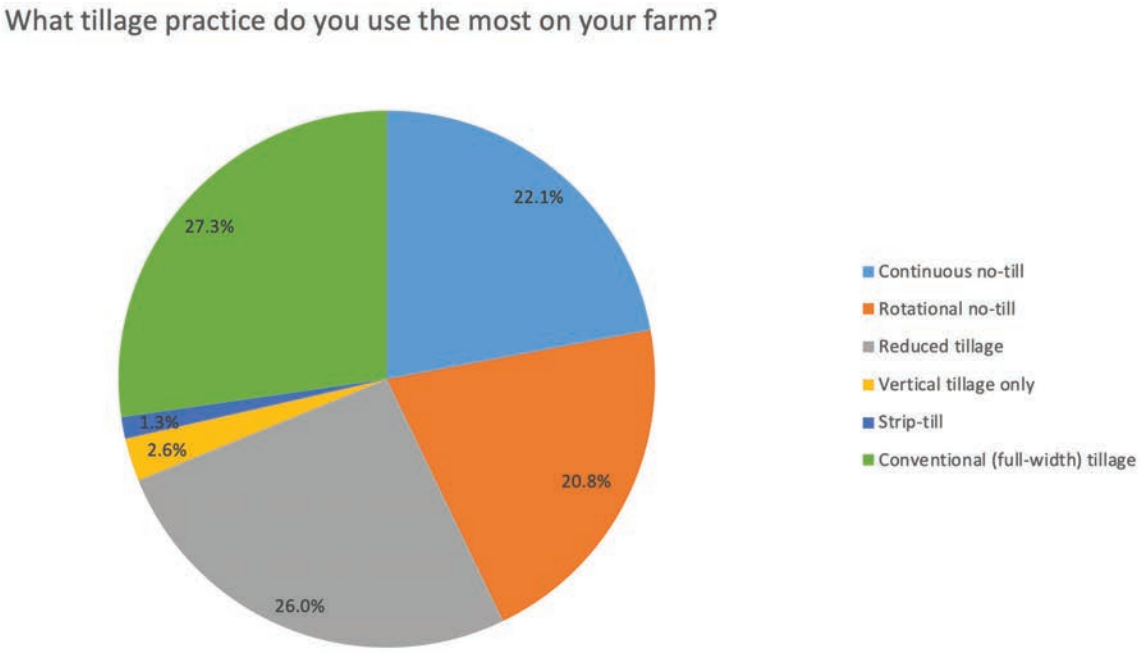
n=267

Cover Crop Non-Users

Of course, the insights of cover crop users are the heart of this survey series. However, the lessons we learn from non-users of cover crops can be equally important, as they shed light on the thought process that leads farmers to choose cover crops or avoid them. With that perspective, advocates for cover crops can test their assumptions in a commercial, real-world context and explore what may be needed from science, education, policy, and communications to make cover crops a better, more attractive fit for more growers.
Seventy-seven respondents reported early in the survey that they had never used cover crops but answered questions on their operations and on their attitudes about the practice. Asked whether they had considered using cover crops on their farms, 79.2% (61 of 77) said "yes" and 16 (20.8%) said "no."

Though they have not used cover crops, a large majority (56 of 77, or 72.8%) of the farmers in this portion of the survey still employ other important conservation practices (Figure 57). Nearly half of the farmers were no-tillers: 17 of the respondents (22.1%) practiced continuous no-till and 16 (20.8%) employed rotational no-till. Twenty growers (26%) do reduced tillage, which was not explicitly defined in the question and 2 (2.6%) did vertical tillage only—a practice that minimizes disturbance to surface residue. One farmer (1.3%) practiced strip till. On the contrasting side, 21 cover crop non-users (27.3%) reported performing conventional, full-width tillage.

Figure 57

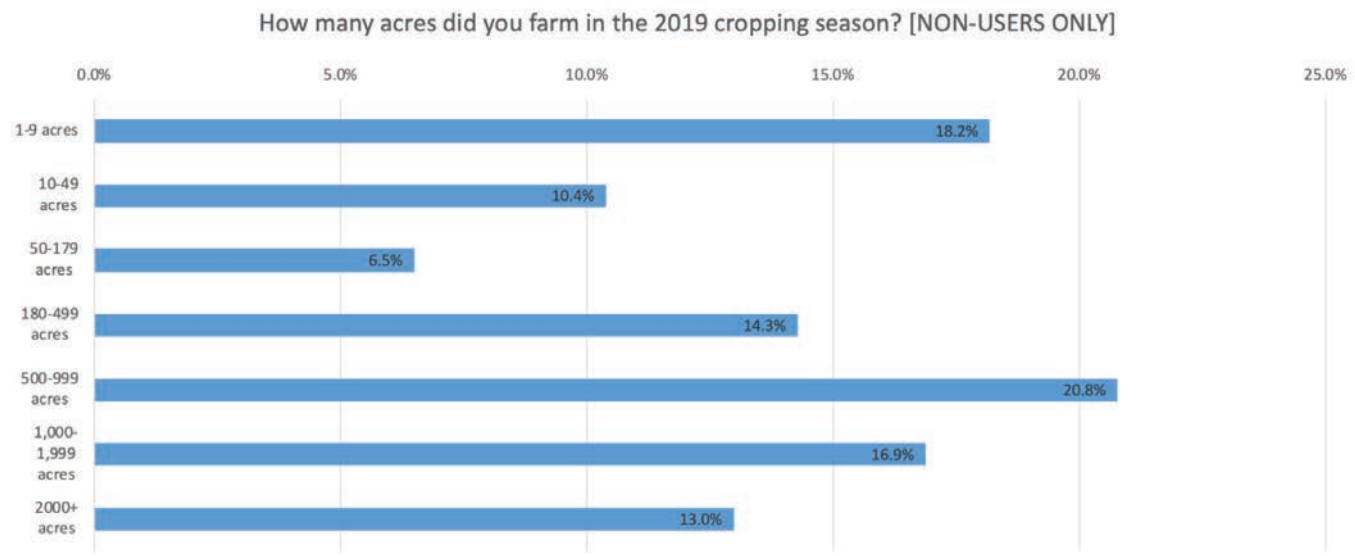


n=77

The farmers who followed through on the non-user track were relatively well distributed across the spectrum of operation size (Figure 58). The largest single answer was 500 to 999 acres (16 of 77, or 20.8%), followed closely by 1 to 9 acres (14, or 18.2%) and 1,000 to 1,999 acres (13, or 16.9%). Ten respondents (13%) farmed 2,000 acres or more, 8 (10.4%) farmed 10 to 49 acres, and 5 (6.5%) reported farming 50 to 179 acres.

In all, half of the non-user respondents (39, or 50.7%) farmed more than 500 acres.

Figure 58

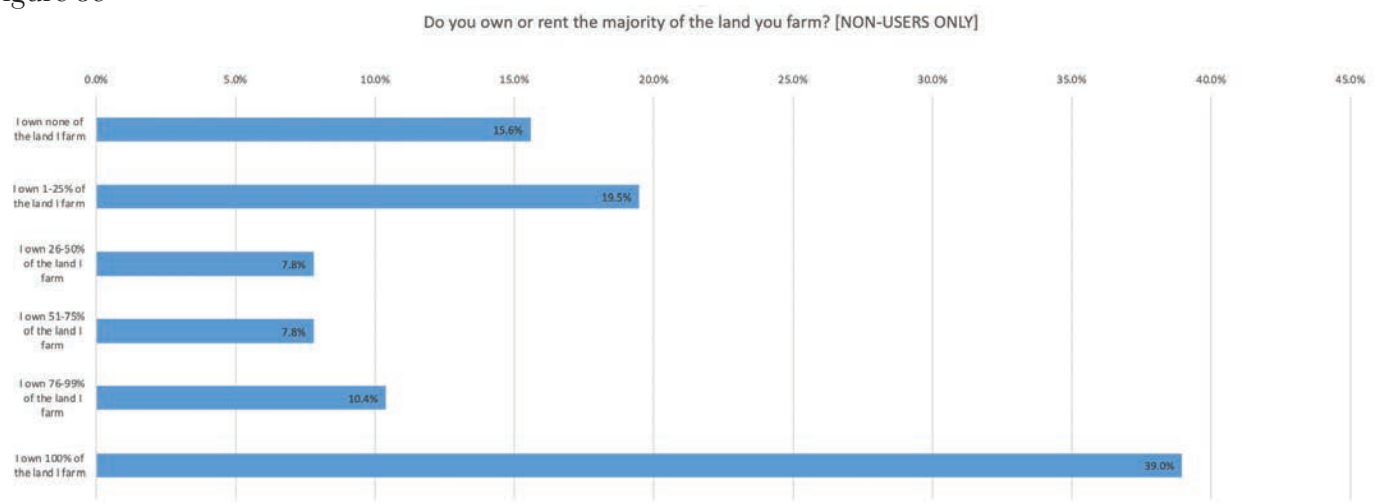


n=77

Similarly, non-user respondents spanned the spectrum in terms of land ownership (Figure 59). It is interesting to note than nearly 4 in 10 (30 respondents, or 39%) own all of the land they farm, and even more interesting to note that 18 of them—more than half—farm fewer than 50 acres. One of the common barriers to cover crop use we often hear is that the farmer does not own the ground, and therefore either cannot get permission to plant cover crops or chooses not to because he or she cannot count on receiving the long-term benefits of the practice. That is clearly not the challenge for these growers, though it is very important to note that the fully owned farms skew quite small compared to the survey average.

It could be a hurdle for the 12 (15.6%) of respondents who reported that they own none of the land that they farm, or the 15 (19.5%) who own 1 to 25%, though it is interesting to note that we will see below that the statement "it does not make sense for me to use cover crops on land that I rent" was perceived neutrally by most of the non-users in this year's survey and strongly agreed with by just 10%. At 6 growers (7.8%) each, 26 to 50% and 51 to 75% ownership were equal in the survey. Eight growers (10.4%) said they owned 76 to 99% of the land they farm.

Figure 59



n=77

Understanding the concerns that have prevented or dissuaded farmers from adopting cover crops has long been an important focus of this survey. We asked non-users to rate their level of concern about a list of negative perceptions of cover crops (Figure 60). Sixty-six responded.

Time and labor required to plant and manage cover crops—cited by 38 respondents (49%) as a major concern and 16 (21%) as a minor one—led the list of concerns about using cover crops. Thirty-two farmers (42%) identified "no measurable economic return" as a major concern and 21 (27%) called it a minor concern, making economics the second biggest worry, followed closely by fears of a yield reduction in the following crop (identified by 30 growers, or 39%, as a major concern).

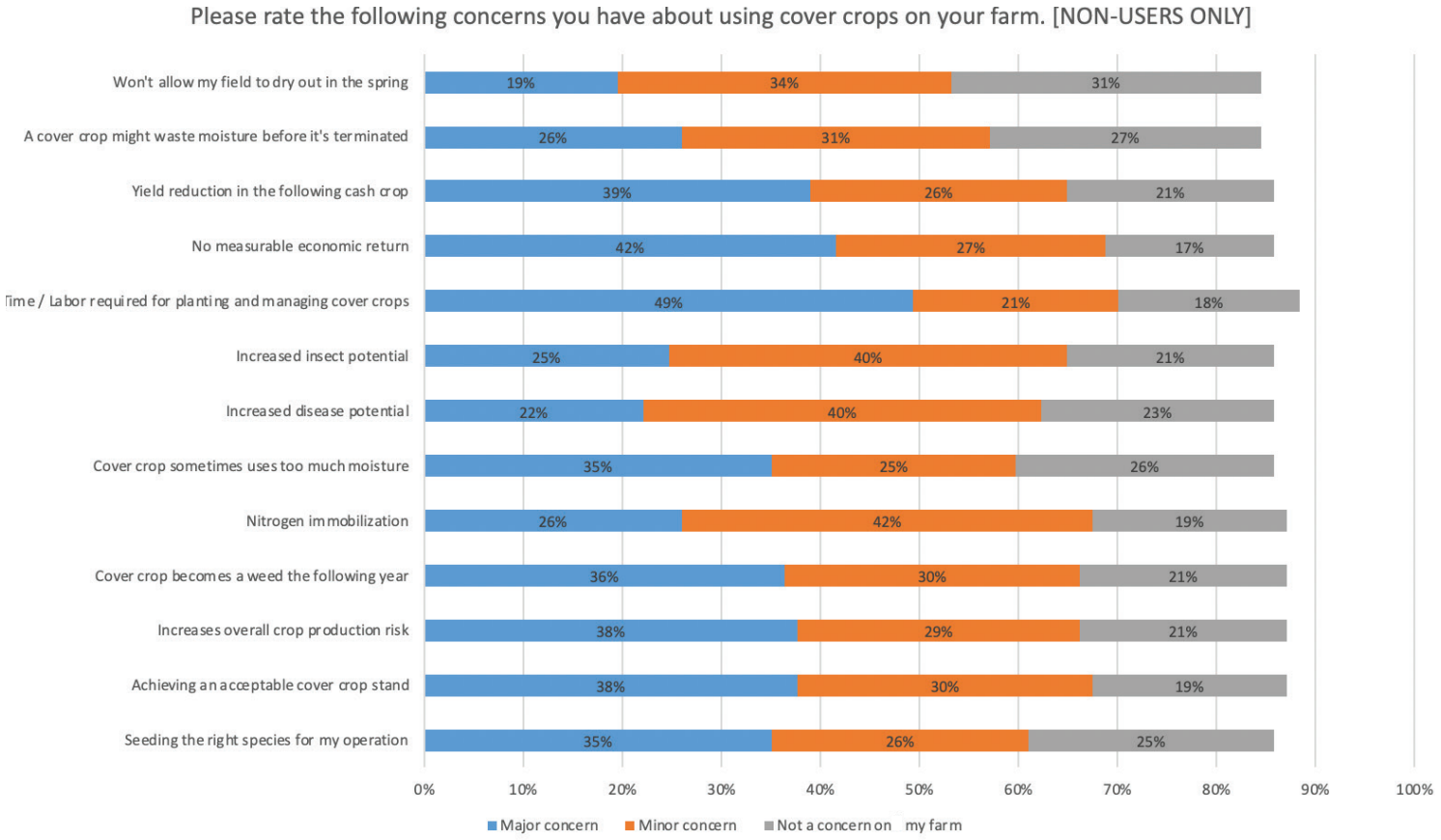
Other perceptions that were identified as major concerns in almost equal numbers included increasing overall crop production risk (38%), creating a weed problem next year (36%), seeding the right species (35%) and using too much moisture (26%).

As noted, time and labor for planting and management ranked top among the concerns of cover crop non-users, with 54% rating it a major or minor concern. It is interesting to note that 32% of cover crop users relied primarily on someone else to seed their cover crops, suggesting that hiring out the work can be a viable method for alleviating the potential time crunch.

Clearly, communication remains vital to increasing cover crop use. Concerns about management time and lack of technical knowledge have been reported consistently in past national cover crop surveys. Many non-users of cover crops also want to know how cover cropping can benefit their individual operations. As CTIC and Purdue University learned in their 2017 assessment of the USDA-NRCS National Water Quality Initiative, having a strong local advocate for conservation is vital to encouraging adoption.

These results serve as a challenge to cover crop advocates to engage in more education and better communication about the successful use of cover crops. Despite years of success among many growers in many areas and cropping systems, fundamental worries have a stubborn hold among many other farmers. Demonstrating the more positive outcomes and helping new cover crop users succeed will be vital in overcoming these barriers.

Figure 60



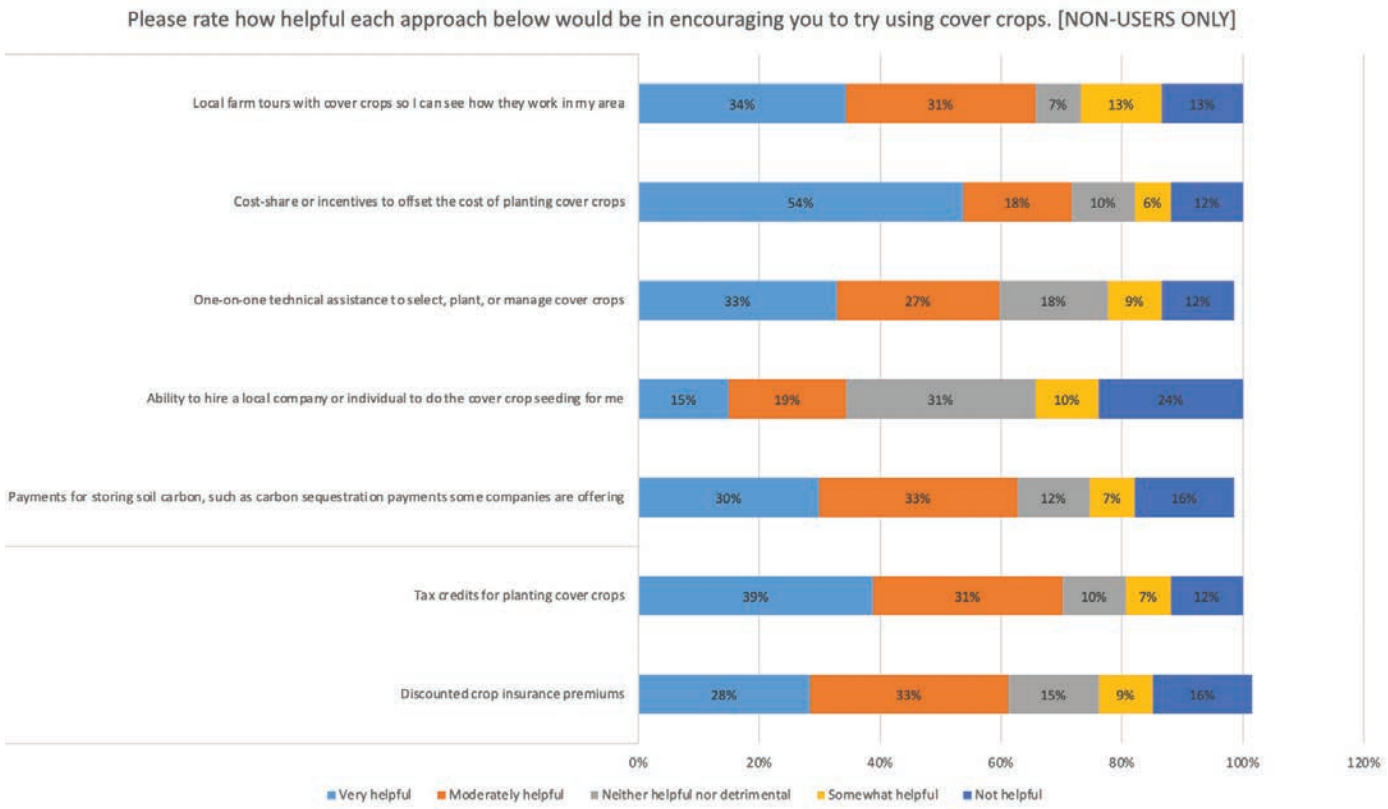
n=66

However, it is clear from answers to the next question that demonstration is only part of the equation. Asked how helpful a list of approaches would be in encouraging them to try using cover crops, local farm tours to see how cover crops work was rated "very helpful" by 34% of the respondents and "moderately helpful" by 31%, a total of 65% positive answers (Figure 61).

The more popular choices revolved around financial incentives. Cost share or incentives to offset the costs of cover crop planting were rated "very helpful" or "moderately helpful" by 72%, making it the most compelling approach, followed by tax credits for planting cover crops (70% very or moderately helpful). Demonstration—in the form of local farm tours—came in third, with 65% very or moderately helpful, followed by carbon storage payments at 63%.

One-on-one technical help (60%) was rated very or moderately helpful by 60% of the respondents.

Figure 61



n=66

Another way to gauge concerns among non-users is to rate their level of agreement with a series of statements. Not all the statements in this year's survey were negative toward cover crops, and the respondents' attitudes about them provide reason for optimism about their likelihood of exploring cover cropping in the future.

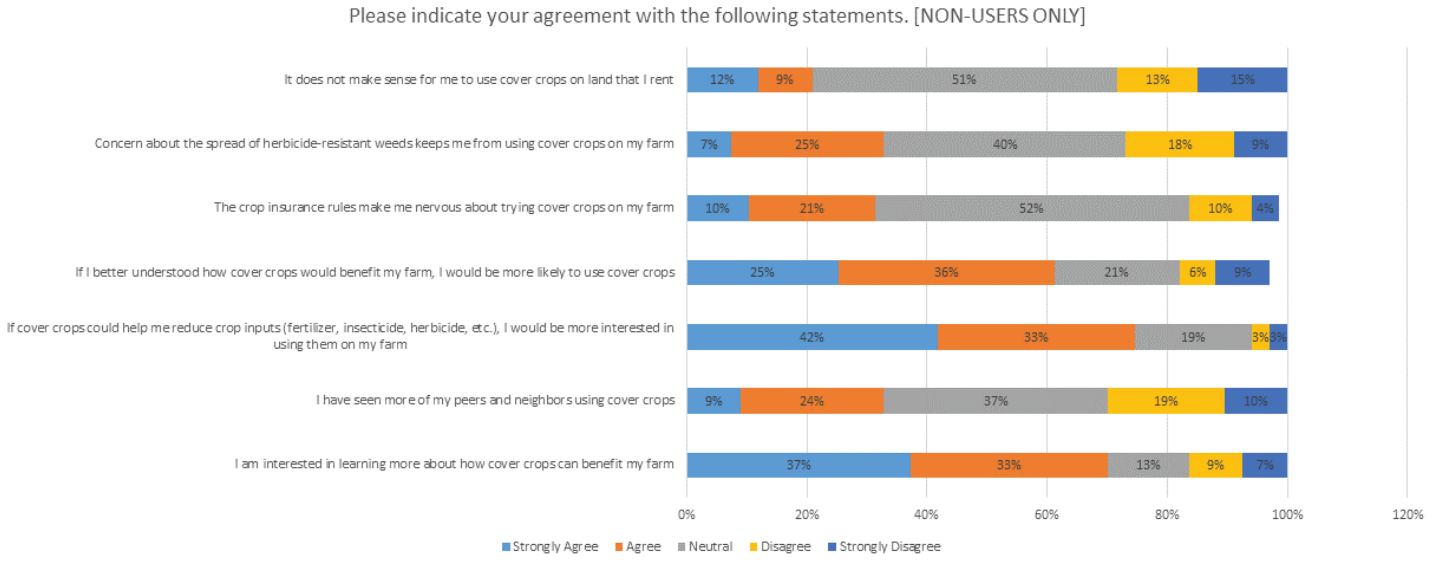
The highest percentage of respondents (42%, or 28 farmers) to strongly agree with a statement were reacting to "If cover crops could help me reduce crop inputs (fertilizer, insecticide, herbicide, etc.), I would be more interested in using them on my farm" (Figure 62). Another 22 respondents (33%) said they agreed with the statement, for a total agreement of 75%. Just 4 (6%) said they disagreed or strongly disagreed with it.

The second most positively received statement—strongly agreed to by 25 respondents (37%) and agreed to by 22 (33%), or 68% agreement—was "I am interested in learning about how cover crops can benefit my farm." More than half of the farmers (61%) agreed or strongly agreed with the statement, "If I better understood how cover crops would benefit my farm, I would be more likely to use cover crops."

More neutral feedback greeted statements on concerns about using cover crops on rented land (12% strongly agree, 9% agree, 51% neutral), worries about crop insurance rules (10% strongly agree, 21% agree, 52% neutral), and fears of spreading herbicide-resistant weeds (7% strongly agree, 25% agree, 40% neutral, and—encouragingly—27% disagreeing).

Concerns remain, but these farmers are open to the possibilities.

Figure 62



n=66

Trusted Information Sources

With an imperative to communicate the realities of cover crop use and an audience interested in learning more, understanding who farmers turn to for insight on cover crops is vital.

For years, we have asked national cover crop survey participants—users and non-users—where they get their information on cover crops. Adopting cover crops, even on a small portion of a farm, is a significant step, a commitment of management effort, money, and time. In order to make that commitment, farmers must be at least optimistic about the chances that they will benefit from their investment, so the information that they trust for inspiration and information must be perceived as accurate and well-intentioned.

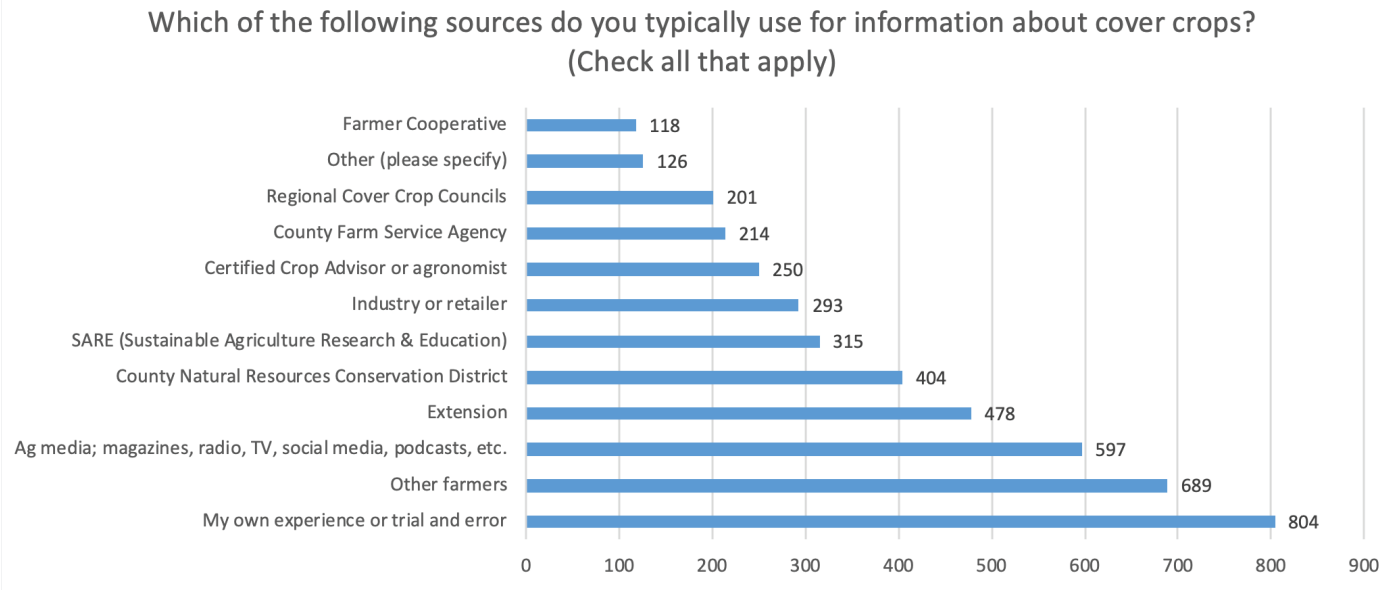
Understanding the information channels trusted by users and prospective users of cover crops is vital in delivering inspiration, research results and best practices to farmers.

Respondents were asked to check all answers that applied to them when asked, "Which of the following sources do you typically use for information?" 1,172 farmers—both cover crop users and non-users—replied. The top answer, with 804 responses, was "My own experience or trial and error," which was followed by "Other farmers," garnering 689 responses (Figure 63).

The leading answer for outside sources, with 597 responses, was "Ag media," which was accompanied by a list that included magazines, radio, TV, podcasts and social media. Among the 126 open responses associated with this question, farmers singled out several social media channels including YouTube, Facebook, and Twitter. Extension and universities accounted for 478 responses, followed by county Natural Resources Conservation District (404), SARE (315), industry or retailer sources (293), Certified Crop Adviser or agronomist (250), county Farm Service Agency staff (214), regional cover crop councils (201), and farmer co-ops (118).

Several specific organizations were identified in the write-in box, including Practical Farmers of Iowa, which was recognized by 13 farmers; No-Till on the Plains (3); ATTRA (3); Soil Health Partnership (2); and others.

Figure 63



n=1172

CONCLUSION

The 2019 season put farmers, and their cover crops, through a grueling test, and both showed their mettle. In the face of relentless spring rain, cover crops helped many respondents to this year's survey plant earlier than they would have been able on conventionally managed fields. Though they did not garner as much of a yield benefit as would have been expected in a dry year, cover crop users still reported statistically significant yield increases in corn, wheat and soybeans, allaying concerns that the cover crops might drag yields down in a wet season. The soybean yield response was particularly notable at a 5% increase.

Growers of commodity and horticulture crops reported using cover crops for a wide range of reasons in 2019, and they clearly appreciate the contributions they attribute to cover crops in healthier soils, lower herbicide and fertilizer costs, reduced erosion, and improved weed control, among others. In fact, they appreciate the benefits enough to invest substantially in cover crop seed, and about one in three cover crop users pays for application as well.

Also notable was the fact that more than half of the horticulture respondents reported that cover crops increased their profitability.

Eager for information from trusted neighbors, agricultural media, and expert sources like SARE, NRCS, conservation district staff, and others, cover crop users are also extremely independent and willing to experiment on their own farms.

The resources available to farmers to help them begin experimenting with cover crops or learning how to use them more effectively are growing each year. For more information on cover crops, visit:
https://www.sare.org/resources/cover-crops/
https://www.ctic.org/projects/CTIC_Projects/CoverCropMath

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