Covering the ground: A transformative approach to scientific learning for greater cover crop adaptation in Iowa

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What will it take to see a more widespread adoption of cover crops in the state?

The PIs interacted directly with farmers and provided them with the latest information about cover crops agronomic and economic performance. In turn, they received feedback that will shape future research and other efforts.

Background

The project explores the potential for a data-driven intervention that will lead to wider farmer adoption of cover crops in Iowa. The PIs theorized that the data produced by synthesizing long-term research, agro-economic modeling activities and on-farm trials will yield a compelling informational tool. When presented to farmers, it will facilitate feedback and comprehensive consideration of long-term costs and benefits of cover crop adoption in ways that counter short-term adoption concerns. Although much prior research has focused on analyzing factors that help predict cover crop use on farms, there is limited research on how farmers navigate and overcome field-level (e.g., proper planting of a cover crop) and structural (or institutional) barriers (e.g., market forces) associated with the use of cover crops.

The objectives for the project were to:

- via farmer focus group discussions, provide farmers with a unique synthesis of empirical and simulated agro-economic cover crop information to expand understanding of the pros and cons of cover crop adoption; and
- evaluate the effect of this information on the behavioral intentions of farmers with regard to cover crop adoption.

Approach and methods

The researchers recruited 29 farmer participants from four distinct Iowa geographic regions: Northeast, Southeast, Northwest and Southwest. Sixty-nine percent of the farmer participants utilized only a corn-soybean rotation; 31 percent had a third/fourth crop and/or pasture in addition to their corn-soybean rotation; and 50 percent incorporated livestock in their operations. Focus group participants generally were similar to other corn and soybean producers in the state. However, these participants were unique in that all but two previously had experimented with cover crops with varying experience levels, ranging from one to 10 years or more, and all but three intended to use cover crops in fall 2014. Farmers reported that they were experimenting with cereal rye cover crops in addition to different mixes of cover crops, typically including brassicas (e.g., tillage radish), legumes, or other grass species.
Participants’ farm sizes ranged from 16-600 hectares, with a median of 120 hectares, slightly smaller than the average size of farms in Iowa, which is 140 hectares. This is according to the NASS definition of a farm as “any place from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the year,” a definition that has remained the same since 1974. Government payments are included in sales total. Ranches, institutional farms, experimental and research farms, and Indian Reservations are included as farms. Places with the entire acreage enrolled in the Conservation Reserve Program (CRP), Wetlands Reserve Program (WRP), or other government programs also are counted as farms.

Results and discussion

The project results suggest that there is a complex relationship between farmers’ individual management decisions and the broader regional agricultural contexts that constrain their decisions. Many of those who joined the focus groups have found ways to overcome barriers and successfully integrate cover crops into their cropping systems. In particular, most participants were not immediately interested in the synthesized results presented during the formal part of the presentation, but instead preferred to discuss their successes and challenges with cover crop use within the focus group conversations.

The project findings illustrate how both structural and field-level barriers constrain individual actions. It is not simply the basic agronomic considerations (such as seeding and terminating cover crops) that pose a challenge to their use, but also the broader economic and market drivers that exist in agriculturally intensive systems. Additionally, farmers expressed a desire to learn new and different information than what was presented. These farmers highlighted the need for additional research on cover crops including topics such as: measuring the value of soil and capturing the economic benefits of soil health and erosion control; research on alternative species other than cereal rye; impacts of cereal rye cover crops on corn yields; the changes to fertilizer management that integration of a cover crop presents; and finally, a need for more complex systems experiments with cover crops. The study also showed that networks of familiarity with other farmers are very helpful for sharing information. This includes knowledge gained from observing those who have successfully integrated cover crops into their operation.

Conclusions

The initial aim of the project was to evaluate the behavioral intentions of farmers after presenting a diverse array of information on long-term cover crop impacts. From the focus group discussions, the researchers found that farmers wanted to discuss their own challenges with cover crops adoption and how they have overcome them, and in some cases were able to more effectively integrate cover crops in their operation.

Farmers raised important questions regarding needed research on additional cover crop species: 1) from an ecosystem services perspective, the value of adopting cover crops (e.g., soil erosion and soil health benefits to the bottom line) and 2) better data on fertilizer needs following a cover crop. Additionally, these discussions highlighted
strong connections between structural barriers (e.g., emphasis on corn production via markets, equipment, infrastructure) and field-level barriers such as how to insert cover crops (from planting to termination) into a continuous corn or corn-soybean rotation. Identifying both field-level and structural barriers provides guidance for policy interventions. In order to encourage greater adoption of cover crops, more efforts should be made to assist farmers in integrating them in their current systems or finding viable ways to modify the current system (e.g., including a third rotation or integrating livestock).

The focus group discussions regarding successful strategies for adoption further suggest, as illustrated by “innovative farmers” in the focus groups, that cover crops are not a “quick fix” practice. Indeed, those producers who shared their strategies for successfully incorporating cover crops in their operations showed that it requires intentional management and a whole-system mindset to managing a farm operation. Future outreach efforts should adopt a realistic approach to the risks that farmers face and emphasis should be placed on promoting farmer networks in order to assist farmers in successful experimentation with cover crops. Further research also is needed on the soil health benefits of cover crops as well as improved economic valuation of soil ecosystem services, such as erosion prevention. Additionally, many of the early adopter farmers in the focus groups expressed skepticism that cover crop adoption would be scaled up beyond the minimal adoption rates currently seen across the region without stronger economic incentives or an improved regulatory regime.

Many scientists are calling for a more diverse and multifunctional agricultural system of production across Iowa and much of the Corn Belt, which would incorporate a more complete array of ecosystem services with a focus on reducing soil loss and other negative environmental externalities associated with current production in the region. Cover crops may be one way that greater field and landscape-scale diversification is enhanced across the region, particularly because cover crops often are found to be a complementary practice to extended rotations and crop and livestock integration. Greater efforts should be made to enable farmers to overcome field-level and systemic barriers in order to achieve adoption across a larger extent of the landscape.

**Impact of results**

Participants in the focus groups received a great deal of information and the ensuing discussions highlighted the complex barriers to cover crop adoption faced by farmers. The conversations also focused on showing how innovative farmers are implementing cover crops within their operations. This information can be used by Iowans interested in promoting conservation practices such as cover crops, as it adds an important nuance to the conversation of scaling up such practices. Farmers need continued support to address the structural barriers which may require improved policy interventions.
Education and outreach

Scientific publication

ISU Extension publication

Oral presentations
• ASA-CCSA-SSSA Annual Meetings, Minneapolis, MN. November 2015.
• Midwest Sociological Society Annual Conference, Kansas City, MO, March 2015.
• National Wildlife Federation Cover Crops Messaging Summit, Des Moines, IA, February 2015.

Poster presentations
• Soil Water Conservation Society and Midwest Cover Crop Council meeting, West Des Moines, IA, February 2015.
• American Geophysical Union fall meeting, San Francisco, CA, December 2014.
• Corn-based Cropping Systems Coordinated Agricultural Project annual conference (sustainablecorn.org), Ames, IA, August 2014.

Leveraged funds
The main project that emerged as a follow-up to this one is a USDA-SARE project led by Alejandro Plastina and Fernando Miguez: “Economic Evaluation of Cover Crops in Midwest Row Crop Farming,” ($183,969).

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