

Marketing Conservation Agronomy: Cover Crops from Two Practitioners' Points of View

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The creation of the Soil and Water Conservation Society 75 years ago came during a period of immense loss of the natural resource base upon which US agriculture had developed. The Society's overarching goal was to bring together professionals to better foster the science and art of conservation practices. Early practitioners focused predominantly on edge-of-field practices or built natural infrastructure to reduce soil losses from a field. Practices like terraces and erosion control structures were key to reducing soil erosion. In a sense, the Society's role was to perform the function of an advocacy organization for conservation and better environmental stewardship. Today many conservation professionals are realizing that to reach every acre our focus must double down at the intersection of conservation and agronomic production. We feel the same urgency to be promoters of practices that benefit the natural resources that agriculture depends on, but from an agroecological lens. Why can't we create an agriculture that does not just benefit from a strong natural resource base but that improves it?

Our work as professionals at Practical Farmers of Iowa (PFI) is focused on the intersection of conservation and agronomy. We tackle the forbidden, tricky space of pushing the dominant cropping system to do better, for example focusing on practices in the field like cover crops, managed grazing, and diverse crop rotation. PFI exists to advocate on the behalf of agriculture as a solution to many of our natural resource and conservation challenges. The

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recent history of cover crop adoption in Iowa shows a similar change in message from conservation professionals over time toward a more agroecological focus that can impact natural resource stewardship at scale.

“Cover crops for water quality” was the main mantra of farmers, the US Department of Agriculture Natural Resources Conservation Service, and conservation professionals as the soil health and regenerative agriculture movement reached Iowa around 2010. Presentations focused on the nitrate-reducing benefits of cover crops, the soil erosion reductions from cover crops, and the overall idea of better soil health. Studies at the Iowa State University agronomy farm showed increases in organic matter from long-term cover cropping in a corn and soybean system. These messages reinforced the idea that natural resource stewardship could occur in the dominant agricultural system, but little attention was made as to how these practices also improved agronomic production.

Many early adopter farmers began experimenting with these practices of greater continuous living cover. They tried the famous cover crop radish and sometimes grew radish tubers as big as a small child. They seeded legumes from planes and tried to co-seed cover crops into standing corn. They may have even grown big summer cover crops after harvesting small grains for cover crop seed in July and then brought cows to graze those summer covers. These early adopters learned that in a corn–soybean system in Iowa there are only a couple of cover crop options that will consistently work—cereal rye is king. Our message and farmers’ message focused on how cover crops benefited natural resources and not much else. After initial rapid growth from 4,047 to 101,171 ha (10,000 to 250,000 ac) from 2010 to 2013, cover crop adoption slowed to around 40,469 additional ha (100,000 additional ac) annually, falling short of Iowa’s 9 million ha (23 million ac) of corn and soybean production. PFI staff started seeing farmers conducting research around ways cover crops could benefit more than natural resources. In the late 2000s, farmers who had used cover crops for four to five years began to notice improved weed control from a cover crop. Some farmers growing a diverse crop rotation with a legume cover crop saw that they could cut their nitrogen (N) use by 100 kg ha⁻¹ (90 lb ac⁻¹) and yield the same amount of corn. Others with cattle in feedlots noticed that if those animals left the feedlot and winter grazed cornstalks with an oat and cereal rye cover crop mix they could save on expensive stored-feed costs. All of these projects resulted in PFI and farmers shifting the message to ways the stewardship of natural resources benefitted agricultural production.

Today at meetings around the state of Iowa and beyond, PFI staff and farmers are using slightly different rally cries, including “cover crops for better weed control,” “cover crops for less nitrogen,” and “cover crops for

grazing cattle.” The message is now about ways that cover crops, diverse crop rotations, and managed grazing can benefit farmers’ pocketbooks in the short term while benefits to natural resources accrue. These messages are more enticing for farmers in the middle adopter group who are less interested in joining the soil health movement. One central Iowa farmer who has used cover crops and no-till for six years commented that two of his neighbors who use full width tillage and don’t use cover crops asked him how he was able to harvest his 2019 crop on time. The neighbors’ combines were constantly stuck in the mud forcing them to delay harvest. The continuous living-cover farmer remarked that his soil structure must have changed. He shared with his neighbors that cover crops and no-till over the past few years were allowing his combine tires to stay up out of the mud and able to run. His story was not the only one shared at meetings and on social media during the falls of 2018 and 2019 across the Midwest.

What are the short-term economics of continuous living-cover practices in Iowa? From data that PFI collects for our cover crop programs, farmers are spending about \$77 ha⁻¹ (\$31 ac⁻¹) on seed and application of a cover crop. The cover crop seed of choice is usually cereal rye, and the favored application method shifts between airplane, drill, or spread with fall fertilizer depending on the fall weather conditions. When there is more rain at harvest or harvest is predicted to be delayed, farmers use a plane, but when harvest is on time, they prefer the cheaper fall fertilizer or drill method. Fall fertilizer application is the fastest way to get cover crops established. Where can a farmer offset the \$77 ha⁻¹ (2019) cover crop expense to afford cover crops in the short term? On a crop-only farm, PFI farmer-researchers eliminated an entire second pass of herbicides—the postemergence application—when they achieved a good cover crop stand. That can be valued close to \$99 ha⁻¹ (\$40 ac⁻¹). Others have seen that they are yielding about 336 kg ha⁻¹ (5 bu ac⁻¹) more soybeans when following an overwintering cover crop compared to a fallow field ahead of soybeans. Other farmer-researchers are cutting some herbicides and piecing that together with reductions in tillage, which together more than cover the \$77 ha⁻¹ in cover crop expense. These changes can occur within the first three years of adding the practice as farmers become more comfortable with the changes. When livestock are present on the farm or can be contracted from a neighbor, additional profitability can be made by feeding cover crops to livestock. Cow-calf and feedlot owners have worked on improving their fall establishment by using an airplane or Hagie overseeder to get an early start on growth prior to fall harvest by overseeding the cover crop into standing corn or soybeans. Once crops are harvested, farmers are able to chase the combine with cows ready to glean grain, cornstalks, and sugary cover crops

in the field. This has allowed cattle producers to cut their stored-feed costs by \$222 ha⁻¹ (\$90 ac⁻¹) when hay costs \$136 t⁻¹ (\$150 tn⁻¹).

However, farmers are not stopping the cover crop innovation with cutting costs through less herbicides and stored feed. Farmers are paying attention to N application rates for corn and wondering if after six or more years of a cover crop holding at least 30% more N in the field and out of the tile line, that there should be some returned to the crops. Maybe purchased N could be reduced. Farmers are conducting N rate trials to see if in randomized, replicated strips 22.7 kg (50 lb) less N after repeated use of a cover crop yields the same as a control with higher rates of N. So far, on-farm data suggest that farmers can apply less than the recommended Maximum Return to Nitrogen (MRTN) values and still maintain corn yield.

Practices like cover crops, diverse rotation, and managed grazing can have clear benefits for a farmer's pocketbook when they are used strategically for production purposes. PFI's main goal is to help farmers conduct the necessary research and share those results and observations with other farmers and the wider community to help everyone in agriculture save time and money. Getting the numbers right on cover crops and its potential return is a game changer. The short-term costs of a cover crop can be almost fully offset through reduced inputs in the crop year. The long-term benefits, like reduced reliance on N fertilizer, take more commitment, but can double the economic impact of the practice and be realized after continuous cover cropping for more than five years. These new messages all work to entice middle-adopter farmers to try these practices, but the information needs to be shared more.

If we are to improve natural resources at scale, covering every acre and inspiring greater adoption of continuous living cover practices among all farmers, professionals must start working at the nexus of agriculture and conservation and shift our lens to an agroecological focus. We must use new messages like "cover crops for better weed control" to reach every acre. Fortunately, the time is right. Decreased effectiveness of inputs such as herbicides due to greater weed resistance across wide swaths of the country make practices like cover crops and diverse crop rotations affordable solutions that also happen to conserve and protect resources through reduced soil erosion and improved water quality. Tackling our natural resource concerns will take a massive change on the landscape, one that we can only afford by tying conservation to production agriculture.