Helping Farmers Find Profit and Sustainability

A Case Study of MFA Inc. Shows How Conservation Can Support the Bottom Line

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OPINIONS AND COMMENTS
The opinions or comments expressed in this report are not necessarily endorsed by organizations mentioned or individuals interviewed. Errors of fact or interpretation remain exclusively with the authors. We welcome comments and suggestions.

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Contents

Acronyms

CFM	Conservation Federation of Missouri
COVID	Corona Virus Disease 2019
CSP	Conservation Stewardship Program
DNR	Missouri Department of Natural Resources
EQIP	Environmental Quality Incentives Program
MDC	Missouri Department of Conservation
MFA	MFA Incorporated (formerly Missouri Farmers Association)
NRCS	Natural Resources Conservation Service
SWCD	Soil and Water Conservation District
TSP	Technical Service Provider
USDA	United States Department of Agriculture

Introduction

Farmers are natural stewards, valuing few things as highly as the land they farm. Yet farming is an enterprise full of complexity, uncertainty, and trade-offs. Farmers are at the mercy of many forces beyond their control, including weather. Some of the same tools that enable modern agriculture to produce impressive yields—such as monocropping, chemical fertilizers, pesticides and herbicides—can also contribute to soil erosion and damage water quality, reducing the ability of the land to produce abundantly in the future. Too often, farmers feel they have to choose between a successful harvest today and their farm's long-term sustainability.

This Missouri case study demonstrates that farm profit versus environmental sustainability is not a choice farmers should have to make. It describes an innovative public-private partnership that helps farmers adopt practices that protect soil and water as well as their bottom line. The partners are three state conservation agencies and MFA Incorporated,[1] a farmer-owned agricultural retail cooperative. Their shared goal is to help farmers and ranchers adopt practices that enhance present and future profits, even as they reduce soil erosion, protect water quality, and enhance biodiversity and wildlife habitat.

Three factors helped set the stage for this innovative collaboration. First is vulnerability. Missouri has a great deal of rolling terrain, with hills and valleys making the land prone to soil erosion. Some soils can be rocky and degraded, especially in the highly weathered Ozarks region in the southwestern portion of the state, where much grazing land has been converted away from native grasses that provided natural conservation benefits to the soil, water, and wildlife. In addition, Missouri has always been plagued by another vulnerability: extreme weather events, including high-intensity rains, drought, heat waves and cold waves, ice storms, windstorms, and tornadoes.[2] Some of these appear to be worsening with the changing climate. An increasing threat to agriculture are intense rain events that cause flooding, soil erosion, and decreased water quality from nutrient runoff.

The second factor that helped set the stage is that, when it comes to conservation, Missouri is a partnership state. Its conservation agencies have long collaborated with each other, and with organizations in health, economic development, and other fields. A large citizens' organization, the Conservation Federation of Missouri (CFM), dates back to 1935 and has thousands of members and more than 100 affiliate organizations.[3] The Missouri Department of Conservation (MDC) works closely with CFM and with Ducks Unlimited, Pheasants Forever, the Missouri Prairie Foundation, and many other private conservation groups.

The third factor is that Missouri has a steady funding source for conservation. In 1976, CFM led a successful effort to create a "conservation sales tax" by devoting a percentage of the state sales tax to conservation. Accordingly, the MDC receives .08% of the sales tax, a share that amounts to roughly $120 million per year.[4] In a similar arrangement, the Missouri Department of Natural Resources (DNR) receives a "parks, soils and water sales tax," or .01% of state sales tax receipts. These apportionments to conservation receive voter approval by a wide margin each time they come up for renewal. Missouri appears to be an exception among other states, most of which don't have such long-term, steady conservation funding, although in recent years somewhat similar measures have passed in a handful of other states, including Minnesota, Iowa, Georgia, Oregon, and New Jersey.[5]

Out of this unique confluence of soil and weather vulnerability, a collaborative culture, and steady funding, an innovative partnership model emerged. What's different about this collaboration is it makes possible two dedicated, full-time conservation positions at an ag retailer. This is either highly unusual or perhaps even unique. While some Missouri field offices of the USDA Natural Resources Conservation Service (NRCS) have positions created jointly with Pheasants Forever, or a state agency might occasionally do a "contribution agreement" to fund a technician's position or split a person's time, the MFA collaboration is different. It has created new positions that are neither at a conservation agency nor at a non-profit organization, but at an ag retail cooperative—a business whose chief purpose is to make farmers more profitable.

This case study describes the partnership, highlighting five key features that distinguish it as a new approach to helping farmers keep agriculture productive, sustainable and profitable.

I. A boots-in-the-field partnership

The MFA collaboration involves three government partners: the MDC, the state offices of NRCS, and a third agency that has recently joined the effort, the Missouri DNR. A brief description of the three government partners is found in Figure 1.

Government conservation partners

The Missouri Department of Conservation (MDC) protects and manages the state's fish, forest, and wildlife resources. The agency has roughly 42 private land conservationists across the state, each one working in two to three counties to give technical assistance to landowners. They help row crop farmers use cover crops, for instance, or advise them in converting less productive land to buffers that increase pollinator activity and reduce runoff into nearby streams. Working with livestock producers, the land conservationists help diversify forages to build healthier soil, improve their animals' nutrition, and provide habitat for beneficial insects, quail, and other prairie wildlife.

The Missouri Natural Resources Conservation Service (NRCS) is the state level of the USDA's conservation agency, which provides extensive financial and technical assistance to farmers via several voluntary programs in the Farm Bill. As in other states, the NRCS in Missouri provides cost-sharing and technical assistance to private landowners to protect agricultural land and water resources. Its 100 field offices serve all 114 Missouri counties and are co-located with local Soil and Water Conservation Districts (SWCDs). The districts provide cost-share funds to help pay for conservation agriculture practices such as cover crops or excluding livestock from streams.

The Missouri Department of Natural Resources (DNR) protects the state's air, land, water, mineral, and energy resources, and it is in charge of state parks and historic sites. Of the state sales tax it receives, the agency spends half on the state park system, and half on the Soil and Water Conservation Program, each year putting $35-40 million into cost-share programs to help landowners adopt best management practices. DNR says its steady funding source during the past 30 years has enabled it to help landowners keep more than 175 million tons of soil from eroding into lakes and streams.[6]

In 2017, MDC's Brent Vandeloecht, Agricultural Liaison, was reflecting on how his agency could better reach farmers. "You know, our agency is full of biologists and we're good at what we do," he said. "But we're not always good at talking with farmers and telling our story." He approached some NRCS colleagues, who knew from their own field experience that many farmers, distrustful of government, will not go to an agency office for assistance. Vandeloecht felt the agencies needed a non-governmental partner with whom farmers have a trusting relationship, noting, "When a farmer has a question, (s)he will talk to an ag retailer, because they're the local experts."

Vandeloecht's NRCS contacts agreed. Working with an ag retailer, especially one that is a farmer cooperative, would vastly expand their reach. What better source of assistance to farmers than the cooperative they belong to? It could be the missing piece that would enable the agencies to "deliver more conservation."

Figure 1: Profiles of MFA's Missouri Conservation Agency Partners: MDC, NRCS, DNR. Source: Agency websites, staff interviews.

MFA Incorporated sprang to mind. MFA is a farmer-owned cooperative representing 45,000 farmers and ranchers throughout Missouri and parts of neighboring states.[7] It markets grain from its member-owners and provides farm inputs, hardware, and agronomy services. One of its distinguishing features is expertise in precision agronomy, a management approach that uses farmers' own data to understand what their crops and soil need in order to stay healthy and use inputs efficiently. Land stewardship is one of MFA's core values. With its 130 locations (see Figure 2) and expertise in precision ag, the cooperative had vast potential to promote conservation agriculture practices such as cover crops, no-till, expanded rotations, and others. The two agencies quickly concluded that MFA made an obvious partner for this conservation collaboration.

About MFA Incorporated

MFA is a regional farm supply and marketing cooperative with 1,556 employees. In its interactions with farmers, the cooperative makes clear that it considers a practice to be good stewardship only if it benefits the environment and the farmer's bottom line. Staff members emphasize that a practice will not help the environment if the farmer can't afford to keep farming. MFA's priority is neither "sales first" nor "conservation first," but "member success first." This mentality is the fundamental basis for the trust that MFA earns from its members.

MFA Incorporated

Member-Owners: 45,000 farmers and ranchers

Year Established: 1914

Territory: 130 locations throughout all of Missouri, large parts of Kansas, small parts of Iowa and Arkansas

Employees: 1,556

Annual Net Sales: *$1.1 billion

Products: Plant foods, feed, seed, crop protection, farm supply, hardware, animal health

Services: Credit and finance, crop insurance, cow/calf vaccine preconditioning, data apps, precision agronomy, markets and weather information, safety data sheets

**excluding intercompany sales*

With its precision agronomy services, the cooperative is helping farmers move away from standard guidelines for applying a given nutrient at the rate of "X units per acre." Instead, MFA's precision service, NutriTrack, enables a farmer to see where following a flat guideline would cause them to overapply in some areas and underapply in others. The service includes soil sampling on a 2.5-acre grid, which makes clear how dramatically the soil in one subfield can differ from another. If combined with similarly detailed yield data, this makes possible tailored recommendations to the precise amount of an input that each acre needs, to meet the grower's goals.

MFA has about 40 precision specialists. About 20-30% of the acres the company serves are using the precision agronomy products and services. This saves farmers money, boosts yields, and keeps nutrients in the ground and in the crop instead of running off into streams and rivers.

MFA's membership mirrors the state's agricultural profile. Row crops throughout the state are dominated by soybeans and corn. Livestock operations are numerous—Missouri ranks third in US beef cattle production[8]—and they are located largely in the southwestern part of the state. In addition to serving row-crop members, MFA specialists also advise livestock producers on precision nutrient management of pastureland. Many ranchers seek MFA's help in understanding the different parts of their land, and how to manage each acre optimally for the health of their animals, the soil, and their bottom line.

In 2017, representatives from MDC, NRCS, and MFA came together for a series of conversations.[9] It was clear that a collaboration could create important synergies to ensure that Missouri farmers are fully aware of the MDC's private land conservationist network and of the NRCS's federal technical assistance and cost-share programs. It would help farmers connect with the soil and water districts via the shared offices these entities have in every Missouri county. But this would surely require the level of effort to go well beyond previous collaborations, some of which were limited to one-time events such as workshops or farm tours.

Instead, what if the partners were to share the costs of creating a dedicated staff position at MFA, to work directly with member-owners on conservation solutions?

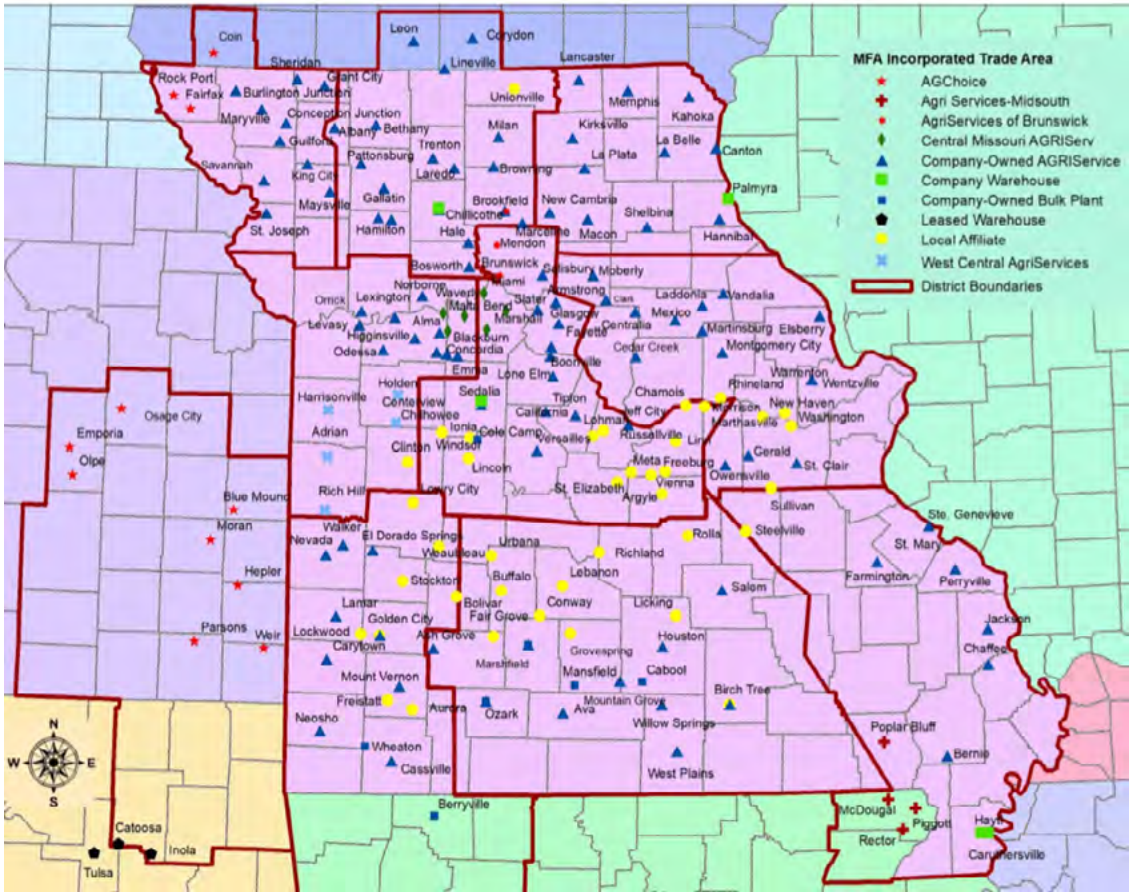


Figure 2: Map of MFA Incorporated Locations, Source: MFA Incorporated.

Conservation Specialist

The partnership, formalized in early 2018, established a three-way cost-share to create the full-time Conservation Specialist position at MFA. The post is now occupied by Adam Jones, a self-described "farm kid" with a professional background in wildlife. He works with growers all over the state, helping them use conservation agriculture practices successfully.

Consistent with MFA's philosophy, Jones looks for ways to benefit the grower—ways that can vary widely, depending on soil types, microclimate, previous management practices, and other factors. "Nobody is pointing at me and saying, 'You must push these things or those things,'" he says. "It's more that I've played with these practices enough to know what really fits the landscape, so I feel like I can make solid recommendations."

Most of Jones' time is spent on cover crops, nutrient management, and edge-of-field practices such as establishing pollinator habitat on the borders of some crop fields. "Your field border, where you're turning the equipment around, will have small production numbers anyway," Jones says. "Why not take it out of production, grow a mix of grasses?" This can improve water quality by creating a filter for surface water before it runs into streams.

Figure 3: MFA's Adam Jones, Conservation Specialist, with drone controller.

Jones also works with fellow MFA staff, many of whom are farmers themselves and, like many others, use the same practices their grandparents used. Some sales staff or precision specialists may not be as familiar as the agronomists are with certain conservation agriculture practices. Jones holds internal meetings, trainings and workshops to help his colleagues become more comfortable talking with member-owners about different conservation options.

Unfortunately, the COVID-19 pandemic has severely limited the ability to hold in-person group meetings, requiring much of this work to take place online. As a work-around, Jones offers a conservation webinar to MFA staff once each month.

David Doctorian, Area 2 Soil Health Specialist of NRCS, saw the power of how Adam is educating MFA colleagues. "I went into my local MFA location and the store manager mentioned he had just attended one of those meetings. He had never realized how important native grasses could be to improving an operation. That told me Adam's work is really effective."

Conservation Grazing Specialist

By the collaboration's second year, MFA and its partners realized it would make sense to create a second Conservation Specialist position—one that is focused on grazing livestock. Unlike Adam Jones' role, coordinating efforts statewide, this new role would work chiefly in Southwest Missouri, home to many small- to medium-sized cattle operations. The terrain is challenging, with hills, valleys, and some rocky places and thin soils, so there are abundant opportunities to help producers find profitable ways to protect their land.

In late 2019, Landry Jones (no relation to Adam Jones) came onboard as MFA's Conservation Grazing Specialist. Landry Jones has cattle of his own. He previously worked at MDC, which broadened his perspective. He finds that the word "conservation" can have a negative connotation when it comes to profitable farming, so he likes the MFA focus on stewardship as a combination of conservation and profitability. "We promoted native warm-season grasses from a wildlife and soil health standpoint, but in fact these grasses can be very profitable. If I can show a farmer that this type of forage is profitable, I know that the wildlife and soil benefits will come on the backside."

Landry Jones's passion is helping producers convert a portion of their pasture back to the native warm season grasses that naturally grew on the prairie. Dating back to the 1930s, much of Missouri pastureland was converted to a fescue variety called Kentucky 31, named for the state and year the seed came from.

Fescue is a cool-season grass. It grows well in the spring and fall, but not in the summer. To fill that summer slump, Jones encourages producers to convert some of their pastures back to native warm-season grasses, which are more adapted to the local soils and climate. They are nutritious, drought resistant, help improve water infiltration, and provide habitat for ground-nesting birds.

Jones helps producers plant different species at different times so that their pasture always has something in it for the livestock's nutrition. As a result, cow-calf operators see increased weaning weights, which translate into more pounds of beef sold, and therefore, higher profitability.

Jones's work includes helping producers successfully apply other conservation grazing practices, such as cover crops and rotational grazing. Cover crops can produce valuable forage and lengthen the grazing season even while allowing pastures time to regenerate. Providing long-term and immediate returns, cover crops nourish the land as well as the cattle. Jones helps producers select cover crops that will grow well in a particular area while meeting the herd's nutritional requirements. Every situation is different, he says, so he never goes in with pre-set solutions. "I'm not trying to sell a product or service; I'm selling a mindset, a different way of doing business to make their farm more profitable."

Everybody wins

Landowners can benefit from the collaboration's synergies. Say a landowner obtains a DNR cost-share to build a buffer near a stream bank, perhaps on a 10-year contract requiring fencing off an area to keep cattle from grazing it.

If the landowner works with MFA to design a paddock system for rotational grazing, the fence from the DNR cost-share is a head start on that system.

In this way, the landowner saves money and time, DNR amplifies the effectiveness of its cost share, and MFA improves the profit of its member-owner.

II. Five key features

The collaboration between MFA, MDC, NRCS and DNR is completing its third year. The public partners are pleased with the effectiveness of collaborating with an ag retailer. So far, according to interviews with staff at each of the partner organizations, the success of the collaboration can be attributed to at least five key elements, described below.

A trusted source with local experience

Farming is a complex undertaking full of risks, both known and unknown. Understandably, farmers often hesitate to adopt certain conservation agriculture practices out of uncertainty about the potential effects on their operation. NRCS' David Doctorian emphasizes the critical importance of technical assistance. "When I pay $50 an acre to seed a cover crop, what else have I purchased? Have I purchased a planting problem? Have I purchased an emergence problem? Have I purchased a yield reduction? And it takes some knowledgeable assistance to navigate that."

In Missouri, early efforts to promote cover crops focused primarily on cost-sharing to help farmers afford to adopt the practices, perhaps without adequate technical assistance to increase their chance of success. As a result, some growers had negative experiences, leading MFA's Adam Jones to comment, "It's almost like you want to hit the reset button on those acres." In this collaboration, technical assistance from MFA extends the conservation agencies' reach, increasing much-needed technical assistance to farmers.

Many MFA staff are themselves farmers, and they do extensive problem solving with their member owners throughout the year, together tapping a great deal of experience to understand what works best locally. These are often long-term business relationships. The significance of this steady contact, and the trust it brings, is summed up by Beau Britt, MFA's Hannibal Location Manager: "Growers are always going to need to have these conversations. This is a people business, and people are going to do business with whoever they can trust."

Nutrient management based on subfield data

Precision agronomy enables farmers to move away from a blanket approach in which nutrients are applied at a fixed rate per acre. Even within one field, every acre may have different needs, based on variability in terrain, soil types, cropping history, previous practices, and other factors. With the one-size-fits all method, farmers end up overapplying in places and underapplying in others, resulting in inefficient use of inputs, sub-optimal yields, and nutrient-laden run-off into nearby rivers, lakes and streams.

MFA provides a subfield precision approach. It begins with grid soil sampling in which a technician pulls a sample from every 2.5 acres. The soil test results provide a baseline for nitrogen, phosphorous and potassium levels and soil properties such as pH level. This enables MFA and the grower to identify any problems. If data from a yield monitor is also available, the MFA technician can tailor each zone's nutrient recommendations to the grower's own yield goals. This helps to match each zone to the appropriate rate of fertilizer.

In a low-producing area, for instance, a lower rate is recommended, to match the lower amount of that nutrient that will be removed from the field by the crop. In a high-producing area, by contrast, a higher rate of fertilizer will be needed to support the higher yield. The trick is to know the yield goal, and apply enough nutrients for it; no more, no less.

MFA's intensive soil sampling costs $9 per acre, which growers may resist at first—until they see the potential boost to efficiency and crop growth. A striking example is lime application to adjust soil pH. If a soil's pH is too high, it can tie up important minerals or make them unavailable; if too low, it can cause toxicity, inhibit microbial activity, and reduce root growth.

Applying lime can help adjust soil pH and improve soil health, but MFA finds its member-owners typically apply it at a flat rate of two tons per acre. Those who have used MFA's precision agronomy service, in contrast, have dramatically improved their efficiency. In an MFA study of over 95,000 acres in 29 locations, 84% of the growers who had used the service saved money on lime application, even accounting for the cost of the soil sampling.[10]

Although lime is the precision service's most thoroughly documented example of return on investment, there are other indications that member-owners find it profitable to focus their decision-making on the subfield. D.J. Vollrath, District Sales Manager for Region 3, says that in his territory the cooperative doubled the number of acres sampled—from 60,000 acres to 125,000—in just five years. "Put it this way, we don't have a lot of people dropping out," he says. "They definitely are seeing the benefit."

The nitrogen timing puzzle

"Nitrogen is the toughest thing we manage," says D.J. Vollrath, a District Sales Manager at MFA.

Because nitrogen is a mobile element and can easily escape into air and water, it is tricky to keep it in the plant, where it is needed. MFA encourages its member-owners to apply their nitrogen during crop growth. Although farmers may have more time to apply nitrogen out of season, it may not stay put then; a heavy spring rain or a fall frost could release it into the environment before it could bring any benefit.

MFA's Precision Agronomy Manager Thad Becker points out that weather is not the only timing challenge. Another is storage capacity. If member-owners were to limit most of their nitrogen application to in-season, MFA would then need to provide, over that 3-month period, the amount of nitrogen fertilizer it usually sells over a 6-month period. "That would involve a huge infrastructure change," says Becker. "We're moving the needle but it's going to be a gradual shift."

On-ramp from precision to conservation agriculture

One of the most powerful aspects of MFA's collaboration with Missouri's conservation agencies is that precision agronomy experts and conservation experts are learning from each other's data and expertise. While both kinds of experts contribute to sustainability, their respective contributions are amplified when they can speak each other's language fluently.

MFA's collaborative data platform for its precision services—accessible via mobile app to the grower, agronomist, and sales staff—creates a natural on-ramp to conservation agriculture. Grid sampling helps identify areas that may have been fertilized for years but still perform poorly, indicating that they are limited by something other than fertility. Perhaps the soil has been abused in the past, for instance, and it's now lacking adequate topsoil. It could be put to more profitable use than growing the current crop—such as to provide forage for livestock, or create wildlife habitat to lease to hunters.

Thad Becker, Precision Agronomy Manager at MFA, notes that the Conservation Specialist (Adam Jones) is encouraging staff to share knowledge and data that can help promote conservation agriculture practices. "Adam has pushed us in the last year to evaluate those low-producing areas. 'Let's have an honest conversation with our growers. Does it even make sense to row-crop that piece? Maybe it makes sense to move it into forage or a conservation program.'"

One example of how precision nutrient management and conservation practices have come together for an MFA member-owner is Back 40 Bison, a livestock operation that raises bison in Southwestern Missouri. The ranch has worked closely with MDC and NRCS to establish native prairie varieties for pasture. Now Audubon-certified as a conservation ranch, it has a lengthy habitat management plan that includes native prairie grasses, cover crops, and rotational grazing.

MFA's precision agronomy services play a critical role for Back 40 Bison. "Our observation is that the soils and the grasses all look a lot healthier," says co-owner John Roller. "But it's the scientific facts that tell us exactly what the land and the animals need." After doing variable rate nutrient application for four years, Roller and his partners are pleased with the results of their recent soil fertility test, which shows that their variable rate applications and their conservation agriculture practices are working as intended. On average, phosphorous and potassium levels in the sampled zones (every 2.5 acres) have gone from deficient levels to optimum range in a surprisingly short period (see textbox).

Back 40 Bison: Precision nutrient management

MFA Precision Agronomy Specialist Brandon Hebbert notes that management practices help account for the ranch's success in taking very low phosphorous levels up to the optimum range. "These are southwest Missouri soils. I know people that have ground that has tested low in phosphorous for 20 years, and they just can't get it built up."

Soil Fertility Test Results (averages for all zones)

2017	2020	Optimum Range
P=6.9	P=31.35	22-27
K=91.97	K=160	150-160

All measures are in parts per million (ppm) P=phosphorus K=potassium

Crimson clover (useful as cover crop) growing in a test plot at University of Missouri Extension Bradford Research Center. Photo courtesy of SARE Cover Crop Image Library.

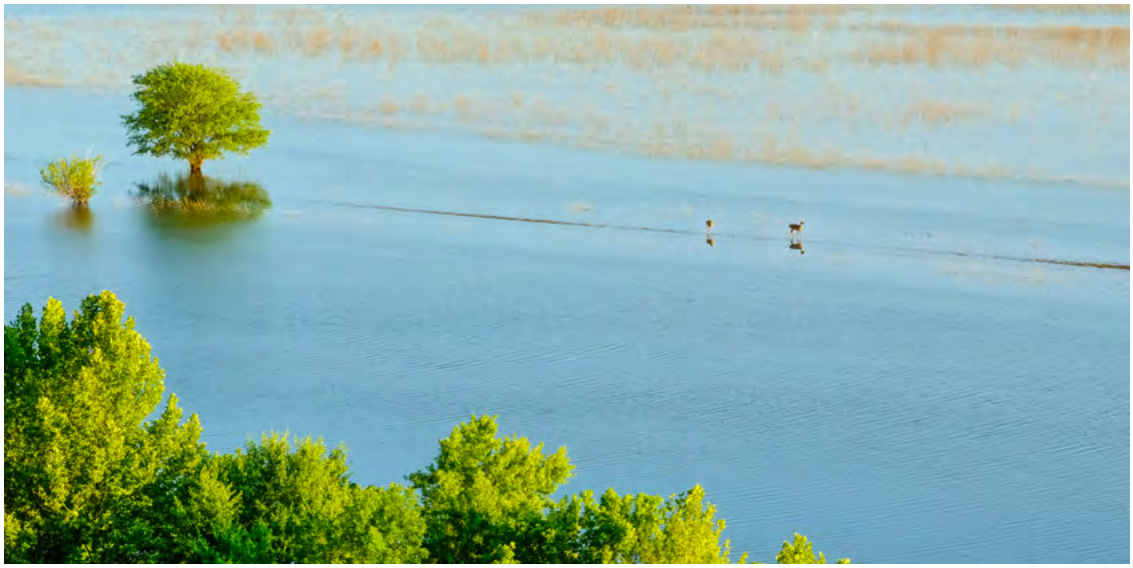
Increased understanding between production agriculture and conservation

The collaboration has enabled MFA and its conservation agency partners to learn from each other's perspective, creating a greater understanding of the challenges to making a profit while protecting the environment.

MFA provides the agencies feedback on the design of their programs, potentially spotting obstacles that may have been unwittingly included. Landry Jones gives an example. "Some government cost-share programs to establish warm season grasses don't allow grazing or haying. Or, if they do, they have certain dates of the year it is allowed. But the forage is too mature and has very little nutritional value at that time." Jones says that working one-on-one with producers (and being farmers themselves) allows him and his colleagues to point out such unintended consequences, helping the agencies design programs more in line with producers' needs, without compromising environmental benefits.

As in any good partnership, the learning works both ways. MFA annually publishes an agronomy guide for producers, a valuable resource that NRCS' David Doctorian uses on his own farm. For last year's edition, when MFA decided to include a section on soil health and cover crops, Doctorian helped develop the material. Similarly, when NRCS partners are working on their own content, they reach out to Adam Jones, the Conservation Specialist, for input from those directly involved in production agriculture.

At least 20 MFA staff members have become certified by NRCS as Technical Service Providers (TSPs). As TSPs, they use their expertise to write nutrient management plans for member-owners who apply for financial assistance via the federal Environmental Quality Incentives Program (EQIP). In a more recent development, MFA is helping DNR ensure that its cost-share programs emphasize the precision-oriented "4 Rs," something that MFA staff promote every time they go out in the field.[11] The DNR anticipates that MFA will help do the required soil testing, write plans, and help landowners follow them. This joint effort will soon pilot in four or five Missouri counties.



View of field and trees flooded by Missouri River and two deer walking through.

Strategies for adapting to weather extremes

Now more than ever, MFA's technical assistance is crucial to help its member-owners successfully adopt practices to increase resilience to a changing climate and the weather extremes it produces.

Much of the Midwest, including Missouri, is experiencing wetter springs and more frequent high-intensity rainfall events in recent years.[12] A growing share of annual precipitation is falling in a few intense rainstorms. Over the past half century, most of the Midwest has seen a 35% increase in rainfall during the four wettest days of the year.[13] A case in point for Missouri is 2019. According to Pat Guinan, State Climatologist, May of 2019 was Missouri's wettest May ever, based on statewide average precipitation.[14]

Adam Jones is all too familiar with the consequences of this dramatic change in rainfall pattern. "Everybody's out trying to get crops planted, and we have four, five, six-inch rains at a time of year when our soils and nutrient applications are vulnerable because we don't have canopy cover… And then it shuts off, and we have hot, dry summers."

The concentrated nature of the rainfall vastly compounds the weather challenges already faced by member-owners. "We've got to be able to max-infiltrate those kinds of rains and be able to store it within the soil profile for use over the next six, eight weeks," says Jones. "That's a big deal that folks maybe don't pay attention to."

Worse, heavy rainfall and flooding in the beginning of the season can prevent farmers from planting crops at all. In the soggy spring of 2019, Missouri farmers were unable to plant crops on 1.4 million acres (a figure that, across the whole United States, was 19.6 million acres).[15] On these "prevented plant" acres, the USDA supports planting cover crops to prevent soil erosion and protect water quality. Whether planted in rotation with cash crops or as an emergency replacement, cover crops help farmers maintain resilience in the face of increasingly frequent weather extremes.

III. Looking ahead

The partnership has made a strong start. Each of the four entities is pleased that it is working as intended. Farmers are getting improved access to technical assistance and government programs, while the advisors are becoming more effective thanks to the ongoing education process. The COVID-19 pandemic has been disruptive, in that it is more difficult to convene people in groups for workshops or meetings. Yet much of the contact that MFA has with farmers is one-on-one contact, outdoors on the farm, so that work is continuing safely without much disruption. The collaboration will continue to grow and innovate. Below are two ways in which the two dedicated MFA conservationist positions anticipate continuing to increase their future impact.

Reaching other agriculture stakeholders

MFA and its government partners intend to keep their main focus on the farmers they work with, yet there is also vast potential in reaching out to others in the sector. MFA staff often see the need to educate entities whose decisions affect their member-owners. For instance, Landry Jones noted that by building relationships with researchers in universities and government agencies, he hopes to help focus the study of native warm season grasses in ways most relevant to the challenges producers face. Jones also anticipates working with producer-based organizations, such as the Missouri Cattlemen's Association, to share conservation techniques and their benefits to a wider array of audiences.

One critical influence in the agriculture sector is the role of non-operating landowners. Adam Jones and his colleagues note that many of today's landowners left farming one, two, or more generations ago, and so are less tied to the land and its stewardship than those who are still farming. Unfortunately, such landowners may not fully appreciate the importance of soil health, erosion control or other benefits, since farmland value is based on historical yields, not on these crucial long-term benefits. If non-operating landowners better understood the beneficial effects of conservation agriculture on their land, Jones reasons, they would be likelier to support their farmer tenants in adopting the practices. Jones has held meetings in St. Louis and other cities to help educate non-operating landowners. Although the meetings were not as well attended as hoped, MFA and its partners intend to follow up on, and expand, this work.

Innovating for resilience

Continued changes in climate are anticipated to pose worsening challenges to agriculture. Along with what is most obvious—threats to crop and livestock production from more intense floods and droughts—farmers will also face increased pressure from pests, weeds, and diseases.[16] MFA's D.J. Vollrath notes that farmers are eager to receive more targeted recommendations. Unlike nutrient management, variable rates for applying insecticides, herbicides, and fungicides are not yet well developed. With its expertise in precision agronomy and its focus on the subfield, MFA would be a valuable participant in future efforts to tap into this potential.

Further opportunities for farmers lie in an emerging marketplace for ecosystem services. Cover crops, buffers, filters and other conservation agriculture practices can contribute to clean water, flood mitigation, wildlife habitat, healthy soil and other valuable eco-services. If these are monetized, farmers can be paid for environmental benefits that accrue beyond the farmgate, to benefit society. A growing number of startups, corporations, governments, and non-profit organizations are working to establish ecosystem services markets.

As growers and livestock producers gain access to ecosystem services markets, quantifying and verifying high-quality environmental results will be the key to tapping the potential financial rewards. It may also be an opportunity for MFA to harness its grid sampling, collaborative data platforms and subfield focus to diversify its member-owners' revenue.

Conclusion

This case study has described an unusual partnership that enables state conservation agencies in Missouri to expand and enhance their assistance to farmers. By creating two full-time Conservation Specialist positions at an ag retail co-operative—an institution that lives at the heart of production agriculture—the partners harness the power of what are often farmers' most trusted business relationships.

In this case study, the ag retailer's two newly created Conservation Specialists work to educate not just member-owners, but also their fellow staff members. In this way, the whole ag retail organization is better positioned to make farmers aware of the many options for using conservation agriculture practices effectively and profitably.

How replicable is the MFA-conservation-agency collaboration in other states? It is likely that no state lacks potential partners. Each state has its conservation agencies as well as soil and water conservation districts, all focusing on protecting land and water resources. For agencies interested in jointly funding dedicated positions at an ag retail co-op, there are nearly 2,000 farmer co-ops nationwide, many of which provide ag retail services. Since most US farmers belong to at least one co-op,[17] conservation positions based at co-ops would directly reach an extraordinarily large number of farmers.

Of course, finding adequate funding to create dedicated positions presents a challenge. Missouri is unusual in its generous financial support of conservation efforts via the state sales tax. States' fish and wildlife agencies are typically funded chiefly through fishing and hunting permits and licenses. A compelling argument can be made for states to go further by also directing a percentage of their sales tax to conservation, especially in states where wildlife tourism (fishing, hunting, and birdwatching) comprise a significant portion of the state economy.[18]

Further support for conservation-ag-retailer partnerships could also come from private funding sources. Large corporations in the agriculture supply chain, especially those that market directly to consumers, could find that this boots-in-the-field approach is an effective investment to improve the sustainability of their suppliers.

For this and future collaborations to help farmers improve their decision making, data at the subfield level is indispensable. Much remains to be learned. As technology advances and methods to measure soil health become more calibrated and affordable, these improvements can be harnessed to help farmers stay profitable, stay in farming, and pass down healthy soil and water capable of feeding future generations.

Notes

[1]MFA was the former acronym for Missouri Farmers Association, an entity now officially named MFA Incorporated.

[2]Decker, "Climate of Missouri."

[3]Conservation Federation of Missouri, "What Is CFM?"

[4]MDC, "Annual Review."

[5]Congressional Sportsmen's Foundation, "Conservation Sales Tax."

[6]Missouri DNR, "Soil and Water Conservation History."

[7]MFA Incorporated, "MFA Incorporated Profile."

[8]Missouri Department of Agriculture, "Missouri Ag Highlights."

[9]DNR was brought into the collaboration in 2019. The agency makes an ideal partner because of its established workforce in all Missouri counties, via the local soil and water conservation districts—whose leaders are elected by local landowners.

[10]Henry, "Lime Study." Personal communication with MFA Incorporated.

[11]The 4 Rs refer to a nutrient management approach that emphasizes applying the right nutrient source at the right rate, right time, and right place.

[12]USGCRP, "Chapter 21."

[13]EPA, "What Climate Change Means for Missouri."

[14]University of Missouri, "Weed Management Issues Related to the Flooding and Wet Conditions in Missouri."

[15]Farm Service Agency, "2019 Acreage Data As Of January 1, 2020."

[16]USGCRP, "Chapter 10."

[17]NCFC, "National Cooperative Statistics."

[18]Datu Research, "Wildlife Tourism and the Gulf Coast Economy." In the US Gulf Coast region, for instance, wildlife tourism annually generates over $19 billion in spending, and over $5 billion in federal, state and local tax revenues.

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