

Proposed Transition Program for Boulder County GM Farmers

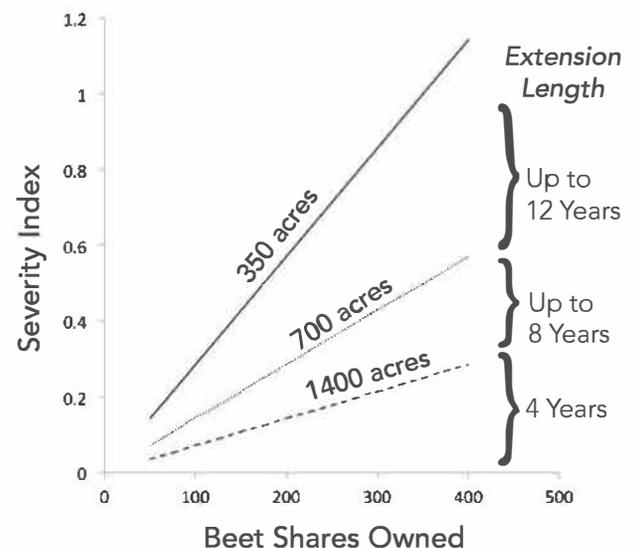
In November 2016, Boulder County decided to phase out the planting of genetically-modified (GM) crops and neonicotinoid pesticides on county-owned open space. Broad-acre open space tenant farmers in Boulder County are now faced with the challenge of transitioning away from GM corn by the end of 2019 and GM sugar beets and neonic pesticides by the end of 2021. The GM ban has caused consternation and fractured the local agricultural community. Most of the GM farmers in Boulder County are unhappy with the decision to ban GM crops from production. With pressure to transition rising, very few farmers show any signs of trying out new crops. At the same time, the County has not yet identified economically viable alternatives. The county stands to lose the stewards of the land, and the producers stand to lose the land they lease from Boulder County. To address this impasse, the County is developing a transition program that will extend the GM ban deadlines to provide more time to co-discover economically viable alternatives to GM crops for broad-acre production.

The goal of the program is to rapidly identify economically viable and regenerative alternatives to GM crops and neonic pesticides while simultaneously scaling back existing GM production acres. Regenerative production practices will be explored in field trials. Transition to organic will be offered as pathway forward, but not mandated. This transition program is for farmers who want to retain their open space leases and wholeheartedly pursue economically viable alternatives to GM crop production. This program is not an effort to “kick the can down the road” on the GM ban, but rather a roadmap to pursue viable alternatives to GM crops. Producers should not plan for the GM and neonic ban to be revoked or extended in the future. The current ban deadlines will remain in effect for farmers that do not opt-in.

Extensions for Existing Corn, Sugar Beet and Neonic Bans

The proposed program offers a four-year extension on the ban of GM corn and neonics, and a variable extension on the ban for GM sugar beets. For corn, there are economically viable non-GM corn varieties and growing practices immediately available, both organic and conventional. But, there is no obvious replacement for beets yet. Beet growers do not have a non-GM seed option or marketplace and they are obligated to fulfill their shares under contract with Western Sugar Co-op. Moreover, Boulder County Parks and Open Space (BCPOS) encouraged the purchase of sugar beet shares, further complicating matters and setting up for an “about-face” that could severely affect several farmers. They cannot retire their shares, and selling them is not an easy option given the depressed value of beet shares currently. The tenant growers that own a high number of beet shares and depend solely on access to county land will be disproportionately affected by the ban and put at significant financial risk. The ban essentially takes away their livelihood.

Mad Agriculture examined risk exposure by creating a simple “severity index” (SI), which is the ratio of acres a tenant owns in beet shares to acres they have in private land holding. In other words, it is the ratio of their obligation to grow beets for the co-op and their ability to fulfill that obligation by using their own farmland. For some, their sugar beets shares only demand 8-12% of their privately-held land, so they could fulfill their obligation with relative ease. For a couple of other farmers, the situation is grave: their sugar beet obligation requires an estimated 30% and 70% of their land annually, respectively. Because sugar beets are part of a four-year rotation, tenants cannot fulfill their beet-share obligation on their own land, and the ban exposes them to high financial risk. The figure (see right) shows the relationship between beet shares and the SI, where the lines represent scenarios of private land holdings at 350, 700 and 1400 acres.



A four-year extension on beets is proposed for farmers scoring at or below an SI of 0.25. Up to an eight-year extension on beets is proposed for farmers scoring between 0.25-0.50. Up to a 12-year extension on beets is offered to farmers scoring above 0.50. To participate in the transition program, farmers share their information on beet share ownership and private land acreage holdings, which would be kept confidential. These additional extensions would be accompanied by aggressive efforts by the County, in partnership with the tenant, to sell off remaining beet shares, if need be, and replace that farm revenue through alternative crops. The length of the additional extension would be the minimum necessary to achieve that goal.

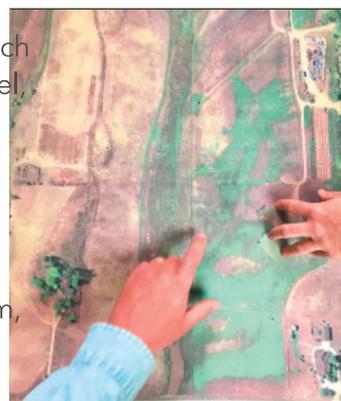
In terms of dates, for farmers participating in the transition program, the ban deadline for GM corn and neonics would be moved to the end of 2023 and for sugar beets to the end of 2025. Farmers who want to participate in the program and use the new deadline extensions would need to sign a new lease contract with the County by the end of 2019. The program requires participating farmers to simultaneously scale back GM crops while scaling up non-GM alternatives. Beginning two years ahead of the revised ban for corn and beets, farmers will be required to scale back 25% of their GM crop acreage, based on 10-year historical average planting acreage. This ratcheting down of GM acreage prevents a "production and market cliff" ahead of the revised ban and facilitates active exploration of GM alternatives.

Part 1: Farm Vision & Field Trial Action Plan (April 2019 - April 2020)

Farm Vision for Individual Farms

The transition program will be offered on a farm-by-farm basis because each farmer has a different farm (acreage, soil type, etc.), vision, enterprise model, infrastructure, equipment and appetite for change. The Mad Agriculture process begins with a Farm Vision (Year 1). It is critical to go through this process so we can best understand how new non-GM crops and practices fit within the management and enterprise models of the farm now and into the future.

In this phase, we spend ample time with individual producers to listen, learn, and work on-farm to understand the history of their operation, vision for the farm, exchanging stories and ideas, building trust and camaraderie, and a deep sense for their current enterprise models. By the end of Year 1, we will develop an action plan for research trials. Our process is an effort to collectively discover what crops and practices hold the most promise for economic and ecological win-wins on a farm-by-farm basis. If farmers want to transition some or all of their land to organic, Mad Agriculture can also help guide that process. While field trials for new crops and practices are the focus of 2020 and 2021, we will implement practices as early as fall of 2019 to accelerate learning.



Year 1 will focus on developing farm by farm transition plans and field trials to discover economically-viable, non-GM crops.

Barriers to Non-GM Crop Adoption

During the Farm Vision process, we will conduct a barrier analysis to non-GM crop adoption. Change is hard for most farmers because margins are tight, capital is limited and markets are tightly defined. Moreover, the modern agricultural economy and culture is woven tightly by corporate and governmental interests that control the supply and pricing of inputs (i.e., seeds and chemicals) and outputs (i.e., commodity pricing), as well as insurance and subsidy programs. Though many farmers are frustrated and exhausted by the current system, there is limited flexibility to try something new because of major barriers to adopting new products, practices and/or markets.

For each farm, we will provide a systematic review of barriers on production and market access using a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis. Production barriers include everything from equipment needs, access to knowledge and funding (i.e., Natural Resources Conservation Service (NRCS), municipal and grant monies) to de-risk new practices. Market barriers would include an analysis of potential product offtakes and missing elements to build new supply chains (e.g., alternative grain elevator or regional malting facility for craft beer). Mad Ag will work to develop offtake and distribution for non-GM crops, such as developing forward-contracts at attractive pricing to increase the economic viability of non-GM crops. Market access may also depend on new infrastructure, and we will evaluate strategic investments into grain

storage, equipment for harvesting and post-processing, a regional malting house, and other support mechanisms, such as a dedicated source for technical advice for new crops, and more.

Technical Assistance: Workshops & Field Days with Producers & Buyers

Mad Agriculture will run a series of workshops to support broad-acre farmers in the transition to new crops and unfamiliar markets. Workshops provide a deep dive into specific topics, problems and opportunities, and will be industry-only (offered to GM tenants and regional farmers) to create a judgement-free environment for detailed discussion. These workshops are not about "going back to farm school," but rather exposure to new crops, techniques and markets emerging on the Great Plains, yet currently outside our community. Producers are required to attend at least eight of the offered workshops and field days in 2019-2021.

Possible workshops topics and subject matter experts to host in 2019-2021.

Workshop 1. The Future of Pulses from Garbanzos to Field Peas with Steve Tucker (Agriforce Seed).

Workshop 2. Profitable transition from GM corn with John Kempf.

Workshop 3. Access non-GMO corn markets in the High Plains (Ranchway, Curt Sayles).

Workshop 4. Large-scale Crop and Livestock Integration with John Haarman.

Workshop 5. Specialty Grain Markets with Ardent Mills.

Workshop 6. Specialty Pulses Markets with David Oien (Timeless Seeds).

Workshop 7. The Risk, Rewards and How-To of Hemp Markets for CBD.

Workshop 8. Cover Crops on Western Dry and Irrigated Land with Meagan Schipanski (CSU).

Workshop 9. Profitable Organic Grain Production with Roy Pfaltzgraff.



Workshops and Field Days (see Part 2) are important for collective learning among project stakeholders. Field days will be provided so tenant farmers can see, learn and adopt successful practices and crops. Collective learning is much more powerful than isolated experimentation. The Boulder County tenant farmers are already a strong community, so it will be easy to host field days across individual farming operations.

Mad Agriculture Deliverables

1A: Written Farm Vision for each farm, including barrier analysis and research trial action plans.

2A: Organize and execute at least 12 workshops to provide technical support for new crops and practices.

3A: Steering committee and stakeholder meetings to guide design of field trials.

Boulder County Commitment - Provide space for and participate in workshops and steering committee meetings and co-design field trials.

Producer Commitment - Each producer must attend at least eight of the workshops offered in 2019–2021, and agree to work with Mad Agriculture to create farm vision and design field trials.

Part 2: Field Trials & Farm Plans (January 2020 - March 2023)

The goal of Year 2 and 3 is to test new crops and practices. Promising crops include non-GM corn, forage, pulses (e.g., lentils and dry beans), hemp, ancient/heritage/specialty grains, malting barley, and alfalfa, as well as opportunities for livestock - crop integration, and more. Crop options will be determined on a farm-by-farm basis by the farmer with the help of Colorado State University (CSU) Extension, BCPOS and Mad Agriculture. The field trials will be designed to optimize economic and ecological returns.

This project will cover the costs of seed, inputs, and post-processing for the field trials up to \$400/acre/year, whereas the farmer will need to cover the cost of equipment use, labor and water. The figure of \$400/ac/yr is roughly 75% of the average direct cost for irrigated and non-irrigated agriculture in Colorado, based on enterprise budgets developed by CSU Extension. We believe that a significant cost-share for field trials is warranted because there are different risk profiles for different crops and there is risk of total loss in experimentation.



Field trials will explore crop suitability for production and market utility, including spec tests to determine offtake value.

What does success look like in three years? Our goal is to discover economically viable, non-GM crops grown with regenerative practices. In Years 2 and 3, we will compare the economic and ecological outcomes of GM corn and sugar beets to alternative crop systems, developing enterprise budgets for each crop. Full transparency and monitoring of the per acre costs and revenues on existing GM crops are required by farmers for an accurate analysis. The Key Performance Indicators will be costs and revenues, including gross and net economic margin per acre. The most important metric is the net economic return per acre, as opposed to maximum crop yield per acre, which is often prioritized. We will look to reduce costs while improving revenues through access to new markets. Ecological outcomes will be measured as improvements in soil health, as measured by the Cornell University Comprehensive Soil Test and water infiltration.

In Year 1, field trials will be initiated with fall crops like winter wheat and cover crops, with up to three acres of cost-share available per farmer. In Year 2, each producer will be required to plant at least three non-GMO crops with at least three acres dedicated to each crop. In Year 3, each producer will be required to plant at least 10 acres of two non-GMO crop options. During Years 2, 3 and 4, we will organize at least three field days per year for farmers to visit other farms to learn about what crops and practices are working, or not. In Year 4, for those farmers that decide to transition some acreage to organic, we will ensure organic purchase agreements (see Market Development).

By Year 5, GM-producers will fully transition from corn, beets and neonic pesticides. For those with a severity index above 0.25 and 0.50, GM-beets and neonic pesticides will be allowed for up to 4 to 8 years, respectively. The field trials conducted during Years 1, 2 and 3 are aimed to replace both GM corn and beets, as well as neonic pesticides. It will be the responsibility of the BCPOS staff to ensure continued learning after Year 4 to help these farmers transition from beets before the extended bans on GM beets and neonics.

A Focus on Regenerative Agriculture

An emphasis will be placed on regenerative agriculture, which focuses on using crops and practices to restore and sustain soil health, which in turn protects and enhances both natural resources and farming communities. Practices of regenerative agriculture can help reduce long-term input costs and restore the soil resource base of Boulder County open space. According to Gabe Brown, an international leader in the broad-acre regenerative agriculture movement, the five guiding principles of regenerative agriculture are:

- 1) Minimize Disturbance.
- 2) Leave No Bare Soil.
- 3) Maximize Diversity.
- 4) Keep a Living Root in the Soil for as Long as Possible.
- 5) Livestock Integration.

Many of the Boulder County open space tenants are using regenerative practices such as no-till, crop rotations, livestock integration, minimizing chemical use and actively managing residue. There is, however, much to be learned and enhanced (see right). Wind erosion and limited water infiltration are indicators that soil health can be improved. This project provides a perfect opportunity to test crops and additional regenerative practices, including companion cropping, polycultures, cover crops, compost and manure applications, pasture cropping and more.



These photos of Boulder County open space in April 2018 illustrate the vulnerability of land to wind and water erosion due to current practices of agriculture. While many of the tenant farmers use no-till and other conservation practices, there is always room to improve. Part of the goal of this transition program is develop systems that restore soil health, which can help improve fertility, water holding capacity and increase long-term financial viability. In both pictures, valuable resources are being lost, affecting the health of the land and profitability of the farm.

Market Development: Premium Offtake for Specialty Crops

The industrial farm economy is grim: farm income is at an 18-year low and commodity prices are bottomed-out. Yet, there are a variety of bright spots in the marketplace to pursue, including specialty crops, organic certified production, and direct offtake to brands that seek direct connections with farmers. For example, the demand for organic small grains and corn has seen double-digit growth year-on-year for the past decade, with 200-400% premiums. Shifting to organic is a big transition, and Mad Agriculture can help guide that process for interested farmers. Mad Agriculture is also deeply connected to natural and organic food brands working to regenerate their supply chains and pay premiums. We are actively connecting brands directly to farmers, and we will offer these market connections to Boulder County farmers on a farm-by-farm and crop-by-crop basis.

Farm Plans to Ensure Success Beyond Project

By the end of Year 3, each farmer will be equipped to transition away from non-GM corn. Mad Agriculture will develop a farm plan with each tenant producer, outlining how non-GM cropping and conservation practices fit within the larger farm system. We will map crops and practices in space (i.e., mapping) and time (i.e., 3-5 year action plan with Gantt chart). In Year 4, the project will enter the Implementation and Adaptive Management phase. The work of Mad Agriculture will begin to wind down, and further guidance on non-GM crops and production practices will shift to the BCPOS staff. This transition will be natural, as BCPOS will be intimately involved in this project every step of the way. In Year 4, Mad Agriculture will reduce, yet maintain engagement to provide guidance on farm-by-farm basis to help solve issues that emerge across the non-GM supply chain from soil to market-offtake.

Developing Access to NRCS Support

There are a variety of technical and financial resources potentially available through the NRCS to provide further support for this project (Years 1-4) and beyond. Farm Plans we develop are designed using the NRCS Conservation Planning model, a process developed by the USDA to help farmers solve their resource concerns by educating, designing and cost-sharing (~50%) the implementation of regenerative conservation practices. The NRCS has a wide portfolio of conservation practices proven to enhance soil health and sequester carbon, like cover crops, compost application, conservation tillage, prescribed grazing, irrigation improvement, contour buffer strips, and more. Most broad-acre farmers are familiar with the NRCS and have used EQIP funds to install irrigation equipment. Field trials will be designed to activate existing technical and financial resources to de-risk the implementation of regenerative practices. The NRCS can also help guide and pay for the transition from conventional to organic production if a producer would like to explore this option. Mad Agriculture will work closely with NRCS Planner Sylvia Hickenlooper to create Conservation Plans that serve as Farm Plans (mentioned above) so farmers can access NRCS cost-sharing on the implementation of regenerative agriculture on a farm-by-farm basis.

In parallel with this project, Mad Agriculture is also working with Boulder County, City of Boulder, CSU Extension and the NRCS to pursue additional funding from other USDA programs, namely the Conservation Innovation Grants (CIG) and Targeted Conservation Program (TCP). Both CIG and TCP opportunities represent additional financial and technical resources to supplement and enhance support for this project, providing additional cost-share to expand field trials beyond what is outlined here.

Mad Agriculture Deliverables

- 2A: Implementation of Field Trials in Year 1, 2 and 3. Project management from start to finish, designing and co-managing the field trials with producers, and managing the budget for field trials, including distributing the cost-share on a farm-by-farm basis for the field trials.
- 2B: Organize nine farm field days for producers to visit other farmers and research plots.
- 2C: Develop market offtake with each farmer for non-GM crops in Years 3 and 4.
- 2D: Develop enterprise budgets to examine the cost-competitiveness of non-GM crop systems.
- 2E: Measure the regenerative outcomes of field trials (soil health and water infiltration).
- 2F: Develop Farm Plans outlining a 3-5 year action plan for growing and selling non-GM crops beyond Year 4.

Boulder County Commitment - Help guide the implementation of the field trials, including assistance on choosing crops and practices. Provide support and promote the On-Farm Field Days. Assist in developing Farm Plans for success in GM transition after Year 4.

Producer Commitment – Wholeheartedly and financially participate in field trial design and implementation, farm field days and workshops, and share cost and revenue information for enterprise budget determination.

Team Roles and Responsibilities

Philip Taylor, Ph.D. (Project Lead) - Project Coordination, Lead on Farm Vision, Steering Committee engagement.

Tanner Starbard (Project Manager) - Lead on Field Trial Implementation, Enterprise Budget Development and Farm Planning, and Project Management.

Clark Harshbarger (Soil Health Expert) - Lead on Field Trial Design, Monitoring Regenerative Outcomes.

Brandon Welch (Market Development) – Lead on Market Development and SWOT analysis.

Boulder County Park & Open Space / CSU Extension

Vanessa McCracken - Assist in communication, workshop logistics, field days, design and evaluation of field trials with non-GM crops, and stakeholder representative for NRCS CIG and TCP opportunities.

Blake Cooper, Ph.D. - Assist in choosing future crops and practices, field implementation including planning, planting, monitoring, harvest, post-processing and offtake development.

Adrian Card - Educational and technical resource advice and design on field trials enterprise evaluation.

Steering Committee - A small advisory Steering Committee, composed of subject matter experts, an affected tenant and a county representative, will be formed to provide feedback and recommendations to the overall effort.

Paul Schlagel (Farmer) - Representative for Boulder County tenant farmers affected by the ban.

Meagan Schipanski, Ph.D. (Asst. Professor) - Focus on water use efficiency, cover crops, soil health.

Gene Kelly, Ph.D. (Dep. Dir. Colorado Agricultural Experiment Station, Associate Dean for Extension) - Focus on bringing state-level resources (i.e., technical, market and financial) to the project.

Sylvia Hickenlooper (NRCS, Soil Conservationist and Conservation Planner) - Focus on NRCS support.

Mark Easter, Ph.D. (Natural Resources Ecology Laboratory, CSU) - Guidance on carbon-beneficial practices.

Blake Cooper, Ph.D. (BCPOS Ag Division Manager) – Representative for BCPOS.

Project Budget & Evaluation

The total budget of this four-year project is \$823,900. Each line item includes the funding requirement to support the deliverable referred to in the proposal. Toward the conclusion of each year, we propose an all-stakeholder meeting and a meeting between Mad Agriculture and the Boulder County Commissioners to review progress before financing the next year of work.

Part 1: Farm Vision & Field Trial Action Plan (2019)

1A: Written Farm Vision and Field Trial Design with Action Plan (On-Farm Meetings, Design, Staff Support)	\$177,900
2A: Workshops & Travel (Guest Stipends, Travel, Lodging, Food and Staff Support)	\$26,000
3A: Steering Committee and Stakeholder Meetings	\$12,000

Part 2: Field Trials & Farm Plans (2020-2023)

2A: Field Trial Implementation (On-farm Activity, Management, Monitoring, and Staff Support)	\$192,000
2B: Field Trial Cost-Share to Research Trials	
Year 1: Up to 30 acres of field trials (\$400/acre cost-share)	\$12,000
Year 2: Up to 90 acres of field trials (\$400/acre cost-share)	\$36,000
Year 3: Up to 200 acres of fields trials (\$400/acre cost-share)	\$80,000
Monitor Regenerative Outcomes and Crop Quality Testing	\$20,000
2C: Nine Farm Field Days (Three in Years 2, 3 and 4).	\$6,000
2D: Developing Market Offtake for each Farm (Years 2 - 4)	\$76,000
2E: Develop Enterprise Budgets for non-GM/GM crops (Years 3 and 4).	\$65,000
2F: Farm Plans for non-GM Action Plan Beyond Year 4	\$121,000