MAD AGRICULTURE

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Mission

The mission of Mad Agriculture is to create a regenerative revolution in agriculture.

Purpose

The purpose of the Mad Agriculture Journal is to explore and create the new agrarian culture. It is dedicated to living the questions, trusting that in the living we will find the answers.

Mad Agriculture Press

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Founders . Philip Taylor & Nicole Brinks

Editor & Graphic Designer . Jane Cavagnero

Cover Photographs . Omar de Kok-Mercado

Contributors .

Philip Taylor, Jennifer Latham, Sophia Piña-Mc-Mahon, Omar de Kok-Mercado, Emily Payne, Elizabeth Candelario, Mary Slosson, Gregory MacGregor, Jonnah Mellenthin Perkins, Gabe Toth, Mona Esposito, Jane Cavagnero.

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CONTRIBUTORS

OMAR DE KOK-MERCARDO

Omar is a soil scientist and grazier managing silvopasture, oak savanna, and prairies in central Iowa. He formerly coordinated the Iowa State University STRIPS Team and is now working for the Savanna Institute - an organization focused on the widespread adoption of agroforestry in the Midwest.

MONA ESPOSITO

Mona Esposito, aka The Grain Lady, is an activist and advocate of restoring heritage grains to Colorado and supporting and recreating the network of farmers, millers and makers needed to make a regional grain economy thrive. Mona co-founded Noble Grain Alliance in 2016 and served as President and founding board member of The Colorado Grain Chain in 2019. She received the Slow Food USA Snailblazers Award in 2021 for Biodiversity.

JENNIFER LATHAM

Jennifer Latham is the author of 'Baking Bread with Kids' from Ten Speed Press and co-author of 'Bread Book' with Chad Robertson. She is the former Director of Bread for Tartine Bakery. She studied philosophy and journalism at UC Santa Cruz before following her love of dough into professional kitchens. Jennifer believes that healthy local food systems foster healthy people, communities and environments. She lives in Northern California, where she loves to play outside.

GREGOR MACGREGOR

Gregor MacGregor is a water attorney focused on environmental justice and agricultural land preservation. He currently serves as the Director of the Acequia Assistance Project, a pro bono legal service organization assisting traditional Hispano farmers in southern Colorado. Gregor and his daughters opened Vulcan Mine Bakery from their home during quarantine and his wife serves as chief photographer of the venture.

EMILY PAYNE

Emily is a writer focusing on the intersection of food, agriculture, health, and the environment. She's served as editor for sustainable food nonprofit Food Tank since 2015 and is currently Head of Product and Content at Manolin, a tech startup working to build more sustainable aquaculture systems. She's based in Denver, Colorado.

JONNAH MELLENTHIN PERKINS

Jonnah is a writer, photographer and farmer based in southwest Wisconsin. Her creative work focuses on the intersection of food, agriculture, climate change, and adventure. When Jonnah isn't on the farm or getting lost on faraway trails, you'll find her reporting stories in the field where natural resource management and food systems collide.

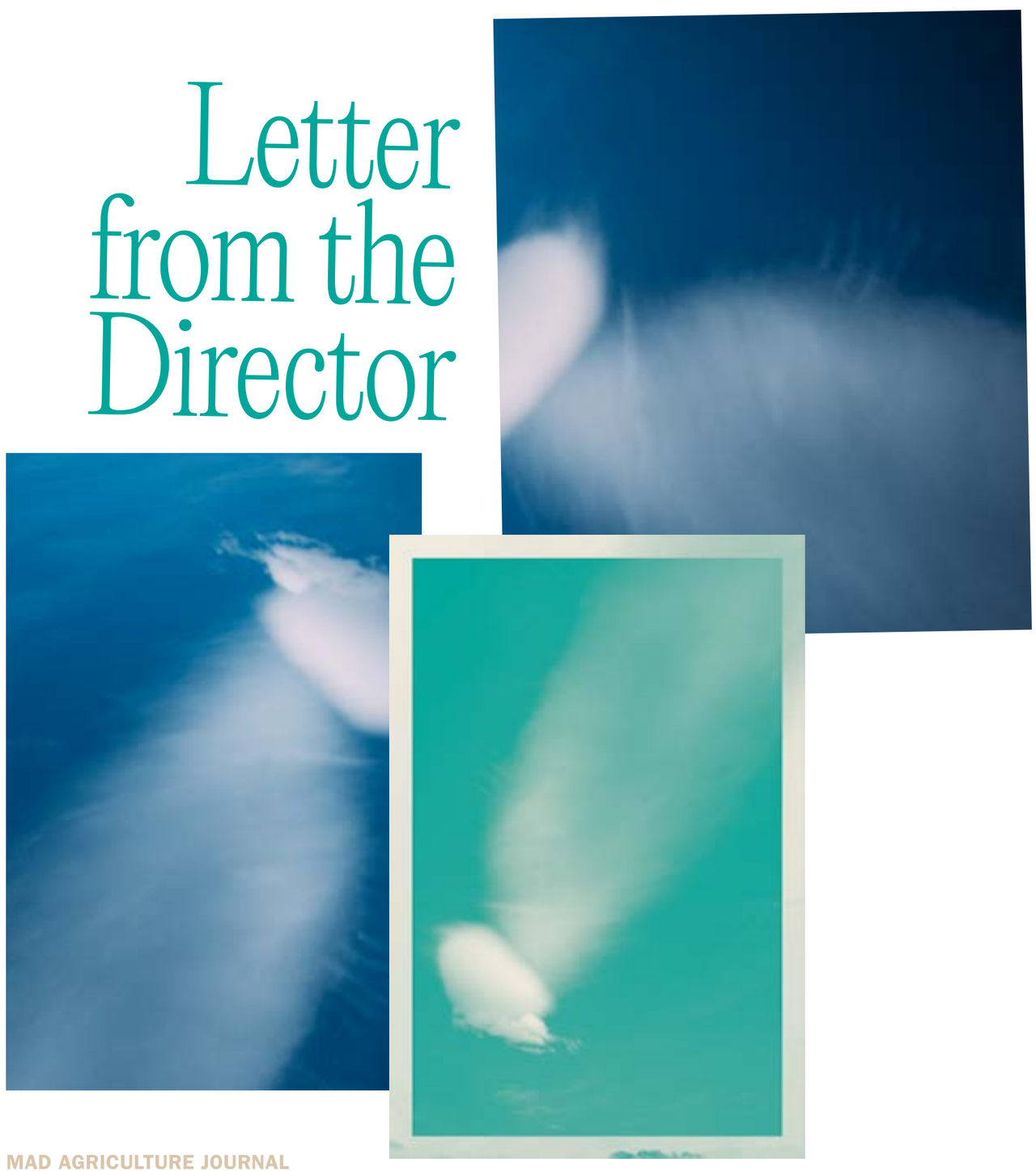
MARY SLOSSON

Mary Slosson is a law student at the University of Colorado Law School, where she is a Deputy Director of the Acequia Assistance Project, the law school's pro bono water rights project that serves farmers in the San Luis Valley. Prior to law school, Mary was a newspaper editor and a correspondent for the international newswire Reuters, where her stories regularly reached a global audience and were syndicated in publications like the New York Times, the Washington Post and the Guardian. Mary obtained a Bachelor of Arts degree in Foreign Affairs and French from the University of Virginia and a Master of Arts degree from the University of Southern California's Graduate School of Journalism.

GABE TOTH

Gabe Toth is a brewer, distiller, and journalist in northern Colorado. After a ten-year newspaper career, he moved into the craft beer world in 2010 at Santa Fe Brewing Co., subsequently moving between brewing and distilling and earning awards from the Great American Beer Festival®, World Beer Cup®, ADI and ACSA.

Letter from the Director



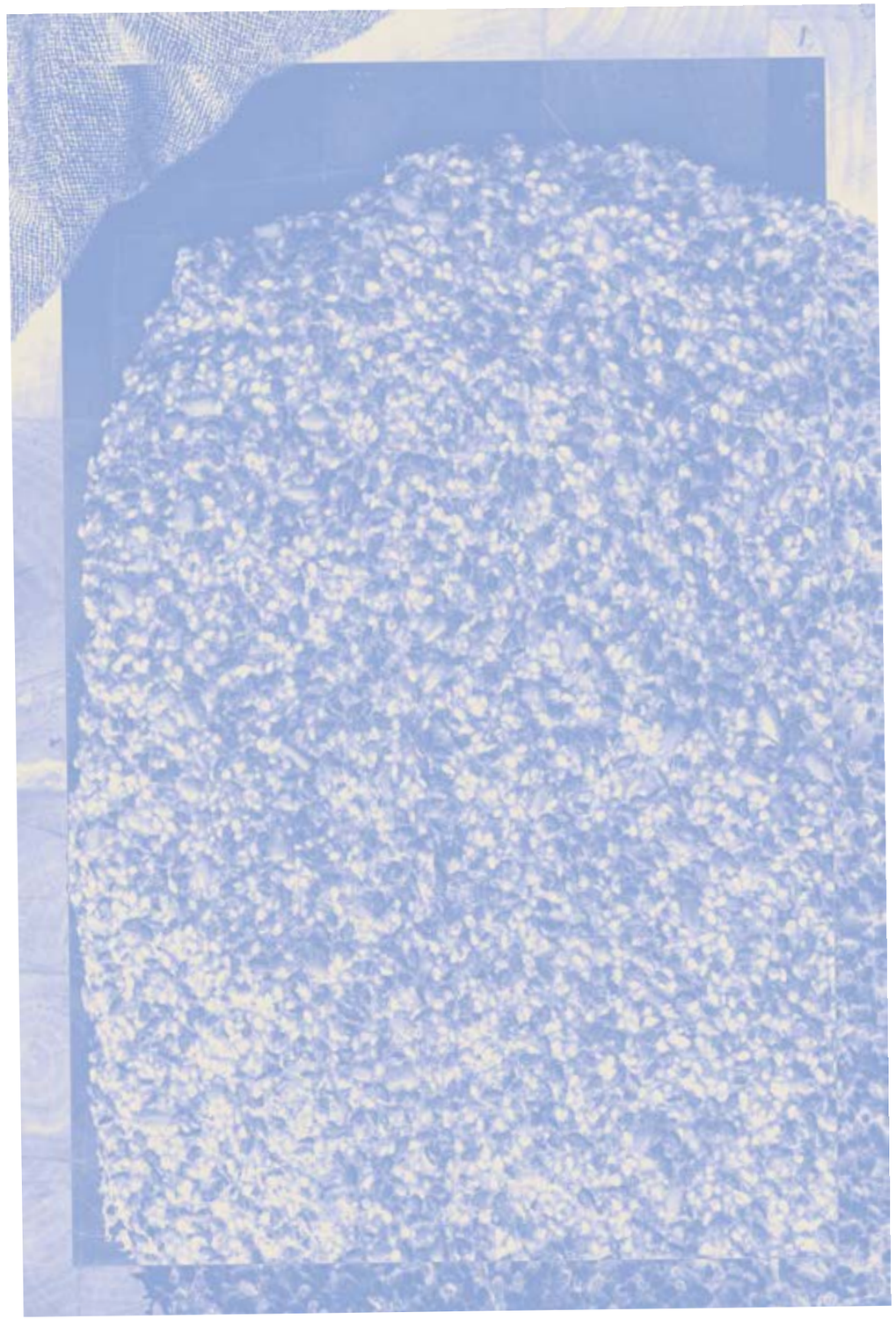
Dear Reader,

You might notice that the journal looks and feels different. Mad Agriculture is undergoing a bit of an internal revolution. Over the past few years, we've been discovering ourselves and how we serve both land and farmers. What has become clear is our purpose, vision and mission, theory of change and our core value offerings of equitable financing, land and business technical assistance, and access to values-aligned markets. Our work has evolved a lot over the past four years, and with that we have noticed that our brand and story don't fully reflect the energy, tone, ambition and radicalism of the movement we are trying to build. In short, we want to be louder, push the margins, fracture the conventional system, overturn more tables, love more deeply, collaborate wildly, and just be a little more boisterous and playful.

Change comes from the margins. Margins are messy, mutable, and alive. Margins are ecotones, rich ecological wonder zones where collisions happen. Ecotones are where ideas and cultures meet, conflict, merge, and reconcile. We are working through a rebrand that leans into this wildness, and transmits such madness in our voice, aesthetic, and story. The madness comes in part from the anger and rage for the social and ecological devastations that we long to heal. In part, it's a madness of insanity. In Wendell's words, 'I am done with apologies. If contrariness is my inheritance and destiny, so be it. If it is my mission to go in at exits and come out at entrances, so be it.' The world that we are striving to create is so vastly different from the world that is, that nearly everything that we do bears certain madness. Our madness is countercultural. We will not sacrifice compassion, kindness and our approach of non-judgement in our approach to being louder and leaning into the uncomfortable areas of the work.

Regeneration is action — work in motion. Regeneration is real; the good, the bad and the ugly. Regeneration is a rebellion against convention. Regeneration embraces the different, the outcast, the wild and the weird. Regeneration stretches the imagination. Regeneration is experimentation, trying new things, combining the new and old, testing, living, learning, repeating, or not repeating. Regeneration brings new-found calm, fills your lungs with grain dust, bombards your senses with earth smell, tastes like sweat and tears, and feels like the quickening of your heart. You know regeneration by the feeling of resonance with things within you and beyond you, conscious and often unconscious. You know regeneration when discomfort and fulfillment are the paradox of living. This is the energy of the movement, and where we're taking our voice and brand. If the regenerative revolution is alive, messy, and mutable, then so are we.

Onward,
Phil



Baking with Kernza®

JENNIFER LATHAM WITH PHOTOS BY SOPHIA PIÑA-MCMAHON

The first time that I got to bake with Kernza, I could immediately tell that it was different from the other wheats that I was used to baking bread with.

At the time, I was a bread baker at Bar Tartine, a restaurant in San Francisco. The signature bread there was a large, crusty loaf with a light, open, craggy, custardy crumb. Known as "country bread", these loaves need a particular type of high-gluten wheat to create their distinctive, lacy interiors.

While I was working at Bar Tartine, my boss Chad Robertson was doing a lot of traveling and grain sourcing in Scandinavia and other parts of the world. In these places, the grains that have been traditionally grown for millennia don't have the stretchy, strong gluten character necessary to make a fluffy loaf of bread. They do, however, have exceptional flavor profiles and nutritional value, and the baking traditions that have co-evolved with those grains tend to maximize those qualities. Each time he returned from his travels, Chad brought back wheats like Øland and other grains like rye – and some new friends and recipes to go along with them.

When I first got a hold of Kernza and realized it wasn't ideal for country bread, I started trying to learn more about the qualities that it did have so that I could reverse-engineer some recipes to optimize it. Baking this way involves acting a lot more like a chef than a baker. A baker usually starts with a recipe, then seeks out specific ingredients to execute it. But a chef will often start at a market. They'll see a particular piece of produce that inspires them, maybe an heirloom melon or some unusual field greens. That item is then the springboard for a dish. The flavor of that one thing leads into the flavor of another, and eventually the form of the dish emerges.

One of the first things I noticed about Kernza is that it scalds nicely. Scalding grain is an old technique, used in the Tangzhong method for Japanese milk bread and in Eastern European baking traditions. What those traditions have in common is grains that don't form long, strong gluten chains, either because they are low-protein (like soft Japanese wheat) or because the character of the gluten is shorter or more friable (like

rye.) I also noticed that when you cook whole-grain Kernza flour with water, it becomes beautifully glossy and shiny and sets up firmly when cooled. When I added Kernza porridge to a country bread dough, the cooked grain added great texture and flavor to the bread.

One of the other great baking traditions that evolved around low-protein flours is crispbreads and crackers. Rye crispbreads go so far back in Northern and Eastern Europe that the origins are lost to time. Traditionally, crispbreads have a hole in the middle, which was used for stringing them up above the fire, where they kept for months and fed families through long, cold, food-scarce winters. Crackers are still an incredible way to store a lot of nutrition (and flavor) in a very stable, portable way. As long as I have crackers, I never go hungry.

Two of those ideas, the scalded grain and crispbreads, were the inspiration for these seeded Kernza crackers.

Kernza is a relatively new grain and doesn't have the generations of baking trial-and-error to inform its best use. But that's the exciting thing–the possibilities are endless. We know Kernza is delicious, healthful and incredibly beneficial for the environment. That's a great starting point. As bakers, it's now up to us to decide where we go with it from here.

Recipe

SEEDED KERNZA CRACKERS

These crackers are packed full of flavor and nutrition. Hemp seed and Kernza load these up with protein and energy. They come together in a matter of minutes and bake low and slow, filling the kitchen with toasty, grassy, seedy-smelling goodness.

70g flax seeds
55g hemp seeds
55g sesame seeds
55g pumpkin seeds
55g sunflower seeds
60g whole grain Kernza flour
40g corn starch
5g sea salt
50g olive oil
300ml boiling water

1. Mix all the dry ingredients together.

2. Pour the olive oil over the dry ingredients and stir well to combine.

3. Pour the boiling water over all the other ingredients and stir just to combine.

4. Let sit for 10 minutes. Preheat the oven to 250°F.

5. Use a spatula dipped in hot water to spread the cracker dough out on two lined sheet pans. The dough should spread thinly, covering the sheet pan.

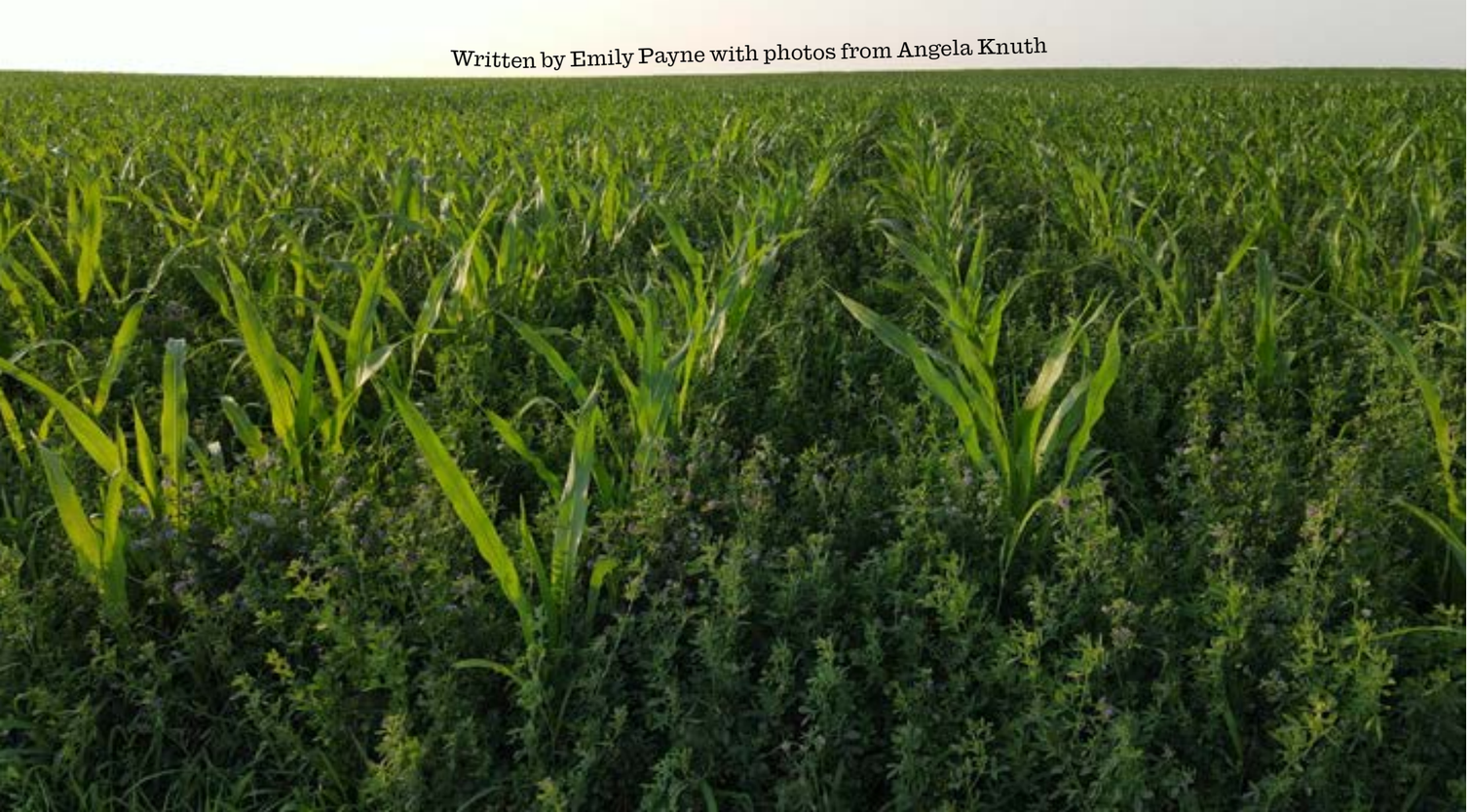
6. Bake the crackers for one hour, then rotate the sheet pans in the oven so that they bake evenly. Bake for an additional 30-40 minutes, until golden brown and fragrant.

7. Let cool completely on the pans, at least one hour. Remove the crackers and break into serving-size pieces. If the crackers stick, use a metal spatula to gently remove them. Serve with hummus, spinach dip, cheese, or simply enjoy as is. Store in an airtight container for up to 10 days.

Measuring regenerative practices with true cost accounting

A CONVERSATION WITH ANGELA KNUTH, KNUTH FARMS

Written by Emily Payne with photos from Angela Knuth



One of Angela and Kerry Knuth's farm consultants calls it "more-on" farming: putting more and more inputs on the ground to combat ever-evolving pests and diseases.

"We have to get away from living off inputs. They're not our friend," Angela says.

Angela and Kerry have been farming Knuth Farms in Mead, Nebraska, for more than 30 years. They're the fourth generation to farm the land, and since 2009, they have been slowly transitioning to regenerative and organic practices. This has been a boon for soil health and environmental sustainability, but that's not what drew the Knuths to this way of farming.

"People come to regenerative for many different reasons," Angela says. "For us, it was an economic thing."

The Knuths have always been a data-oriented family. Angela didn't grow up around farming, but she brought her longtime love of computers and analysis to Knuth Farms. And after she began scouting in the fields, she noticed some inefficiencies.

"I had started questioning why we were tilling so much when we were also spraying. Those are two operations that aren't free," Angela says. "So, Kerry and I started talking."

With the guidance of experts like Indiana farmer Rick Clark, Angela and Kerry learned about how to use techniques like no-till and cover crops to grow their own nutrients and naturally suppress weeds. Clark led Angela and Kerry—to their neighbor's shock—to plant corn directly into a field of living alfalfa.

"Our neighbors asked, 'Do you think you're going to get any corn off that?'" Angela remembers. "We said, 'Well, we hope so!'"

The field produced the highest return on investment that year. While it wasn't the highest-yielding crop, it had no input cost. And later, when "terrific floods" during the planting season led the Knuths to become fully no-till, to their surprise, their crops performed even better.

Angela and Kerry saw potential in these new practices—now, they needed financial support to pursue them further.

"Regenerative farming is about soil, but it's also about regenerating this whole system of how you farm," Angela says. "We can't be regenerative if we can't pay for it. We have to make money."

Angela contacted the University of Nebraska to partner on a regenerative grazing study. The University brought and cared for some cattle on the Knuths' land, and the Knuths planted cereal rye cover crops. The soil was tested for water infiltration rates, weed suppression, and more. But the Knuths didn't need to wait for lab results, the impact was clear.

"Digging in the soil was like a warm knife through butter, just perfect," Angela says.

Over the years of testing these practices, Angela has found that cover crops don't

deplete the water stored in their soil, as she had initially expected. In fact, using cover crops increased the soil's infiltration and water-holding capacity. And smart grazing techniques allowed the Knuths to still get planters in at the right seed depth, despite cattle trampling the ground. Roots and microbes were thriving in healthier, flocculated soil.

"Planting into that tall cereal rye was an eye-opener. There's such a fibrous root system ... Whereas before, we were tilling it clean," Angela says.

But she emphasizes that this transition to regenerative and organic farming has had a steep learning curve—and that it will be a continual learning process.

"Moving from conventional to regenerative and organic is very stressful for me, personally. You're walking in uncharted territory for yourself and your farm, and you're going to make mistakes. And that's scary," Angela says.

Tracking the true cost of farm production has been critical to staying financially sustainable, according to Angela. This means being realistic about what is and isn't possible with these new practices. For example, if she and Kerry are deciding whether to buy a 40-foot or 30-foot drill, they consider costs like additional labor or new tractors, rather than simply the equipment's sticker price.

And true cost accounting is especially important when it comes to soil organic matter, which takes years to build.

"If we've got cattle guys that want our old corn stalks ... what is the true cost of taking that residue off the field? How many nutrients are we taking off

that field? How much will it cost to replace that? Those are questions that we have the ability to track," Angela says.

The Knuths saw clear improvements as they studied and tested different regenerative practices. But still, the financials weren't stacking up well.

"The financial institutions aren't too keen about the transition years for this type of agriculture. You lose money," Angela says. "We were having difficulty."

Regenerative farming requires continual adjustments. A farmer might need to add new crops to combat weeds or fix certain nutrients, instead of simply tilling or spraying the fields. In other words, the most profitable crop this season isn't always the best crop for long-term profitability. This is especially true for farmers transitioning from conventional practices.

"There need to be programs, policies that help you get through those years when maybe you're in a small grain that there's no market for, but your soil needs it," Angela says. "Right now, there's just nothing out there to help the farmer do this."

The Knuths connected with Mad Agriculture and learned about the Perennial Fund, which offered an alternative funding model for their transition to regenerative and organic. The program mirrored the Knuths' philosophy of true cost accounting: Perennial Fund loans cover all aspects of production cost, from crop insurance to diesel cost, labor, and more.

The Perennial Fund's long-term and flexible loans include the option to defer loans to account for weather variability and volatile crop markets. This way, the Knuths could use capital to reinvest in soil health, rather than worry about an overbearing repayment while they're still transitioning.

Meanwhile, Angela actively searches for other ways to turn their sustainable farm management into revenue.

Knuth Farms recently got verified by Nori, a carbon removal marketplace that helps farmers sell carbon credits for their regenerative practices. Using production information that the Knuths have tracked for more than two decades, Nori converted farm data into monetary value—a small but easy source of additional revenue.

"To me, if they want to pay us for farming sustainability, that's just one more way that helps us afford to make the transition," Angela says.

Looking ahead, she has more ideas for how the Knuths' farm data can be converted into valuable management tools.

"Right now, we can see the financials on a spreadsheet. Boring," Angela says. "I want visualization ... So we can look and see, historically, we're either on a good trend or we're on

a bad trend. Then ask, how are we going to deal with it?"

Tracking these trends helps the Knuths understand where to focus their attention as they transition, but Angela knows that regenerative and organic farming requires constant iteration, even after full certification. It has redefined how the Knuths operate, and in many ways, it's been a leap of faith.

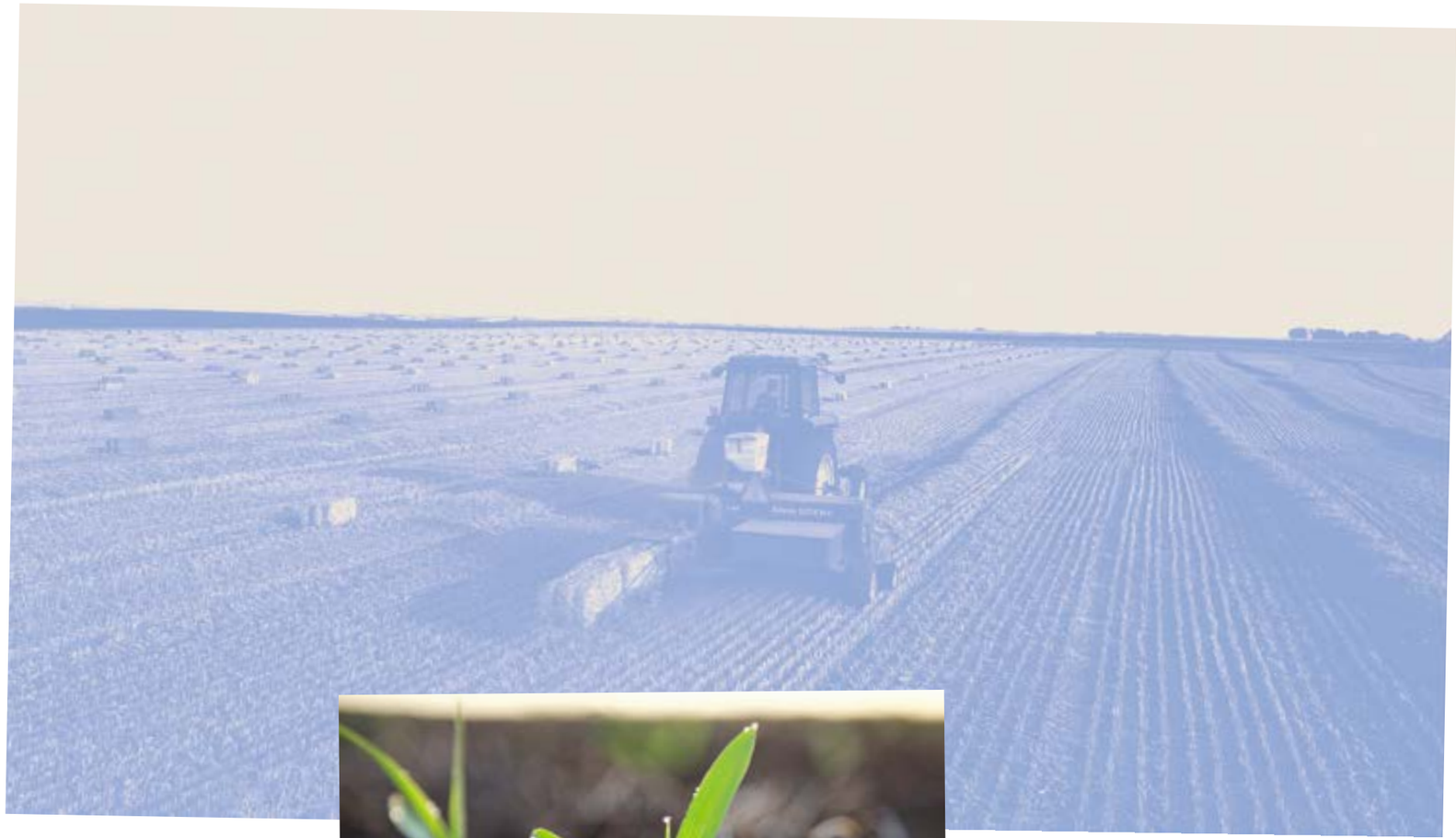
"We don't know how to farm like this, and I don't think our neighbors do, either," Angela says.

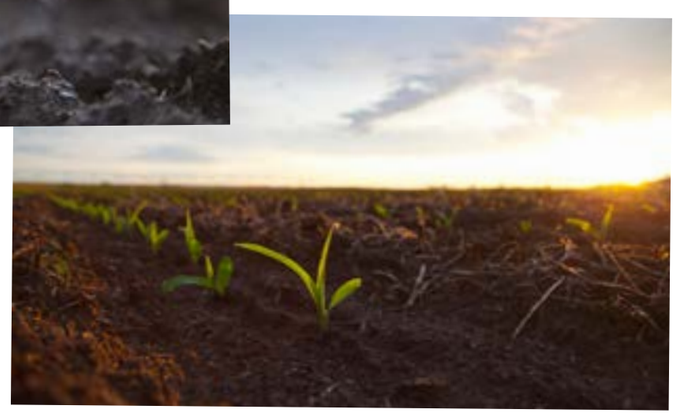
She and Kerry continue this work in order to pass a sustainable business model to the next generation: their children plan to take over the family farm some day as fifth-generation farmers.

"I don't want my sons to have to go through what we've had to go through just to make it some years," she says.

Angela knows that their hurdles represent the need for much larger changes to the U.S. farming system. But in the meantime, she and Kerry are focusing on finding ways to farm that set their sons up to thrive, both economically and ecologically.

"You will have wins and you will have losses," Angela says, "the long-term is what we need to look at."





the ESG Writing on the Wall

ELIZABETH CANDELARIO

WITH PHOTOS BY SOPHIA PIÑA-MCMAHON

A new era of ESG reporting is dawning, and it might be one of the best things to happen to regenerative agriculture.

An under-reported yet potentially game changing announcement was made at COP26 in November of 2021. Multiple stakeholders—including the United Nations, World Bank, International Monetary Fund, World Economic Forum, and an alliance of sustainability standard setters—announced the formation of the International Sustainability Standards Board (ISSB). Together, they recognized that financial markets need to assess the risks and opportunities facing companies that arise from environmental, social, and governance (ESG) issues.

The intention of the ISSB is to provide uniform, high-quality, global standards by industry sector for ESG management, communications and reporting. Why? Because the markets and savvy investors recognize the link between ESG risks and opportunities and the financial performance of companies. To make sound investment decisions, reward companies taking action to manage climate risk, and avoid those that aren't, investors need consistent and verifiable metrics. Follow the money...

A little history

More than 15 years ago, Prince Charles, financier Michael Bloomberg, and others were interested in creating a new reporting system better suited for the 21st century—moving beyond finance to provide timely, relevant information across a number of topics, including the environment and human rights. Many initiatives were started that gave rise to an alphabet soup of organizations and programs. This resulted in the development of multiple financial disclosure frameworks and a jumble of reporting standards.

One of the organizations that gained traction, the Sustainable Accounting Standards Board (SASB), was founded in 2011 to help businesses and investors develop a much needed common language around the financial impacts of sustainability. The SASB's widely adopted ESG framework provides sustainability accounting standards that help public corporations disclose material, decision-useful information to investors.

Financial reporting and ESG reporting are two sides of the same coin

It helps to think about this in the context of financial reporting. Prior to the creation of the Securities and Exchange Commission (SEC) in 1934, financial reporting was regulated at the state level to protect the public from fraud. Largely considered ineffective, it took the stock market crash in 1929 to eliminate what little public confidence was left in US markets. The SEC was created to restore public confidence, prevent fraud, and ensure a fair and level playing field. Public companies are now required to follow Generally Accepted Accounting Principles (GAAP) to ensure that their financial reporting is transparent and consistent from one

organization to another, and across states and countries. After all, without integrity and comparability, who would invest?

The announcement of the ISSB is a clear indication that the time has come to apply uniformity and universality to ESG reporting, just like we do for financial reporting. The ISSB's parent organization, the International Financial Reporting Standards (IFRS) Foundation, governs reporting standards in 166 countries. Applying the structure and uniformity of financial reporting has long been hailed as the solution to ESG reporting challenges.

But what does this have to do with agriculture?

The SASB standards, which have been absorbed into the IFRS Sustainability Disclosure Standards, outline the ESG issues most relevant to financial performance across 77 industries, including agriculture and food. Specifically, the Agriculture Products Sustainability Accounting Standard covers eight topics: (1) greenhouse gas emissions, (2) energy management, (3) water management, (4) food safety, (5) workforce health and safety, (6) environmental and social impacts of ingredient supply chains, (7) GMO management, and (8) ingredient sourcing.

Interestingly, immediately following the launch of the ISSB, Emanuel Faber – former Danone CEO and food industry hero – was appointed its Chair. Faber's leadership has long demonstrated the importance of incorporating sustainability, including on the farm, into governance and strategy decision making and sustainability reporting to the global capital markets. His influence on the ISSB will ideally result in a focus on regenerative agriculture in ESG reporting.

The SEC stance on mandatory ESG reporting

On March 21, the SEC announced proposed rule changes, due to be enacted as early as 2023, that will require publicly-traded companies, and companies seeking financing, to disclose their greenhouse gas emissions. The required reporting will likely not be confined to the GHG emissions that occur from sources they own or control (Scope 1), it will probably include emissions resulting from their energy use (Scope 2), and, most interestingly, it may include emissions arising out of their supply chains (Scope 3). In the case of food companies, this would include emissions arising from the farms from which they source their ingredients. And therein lies the opportunity for regenerative agriculture.

The Insets and Offsets of Regenerative Agriculture

Numerous studies have shown that the biggest environmental impact by food companies arises from their supply chains, which typically contribute more than 80% of total emissions. But anyone reading this article surely knows that agriculture is not only a contributor to those emissions, it can also be a powerful remedy.

Regenerative and organic farming practices can sequester carbon. Planting cover crops pulls carbon out of the air and puts it back in the ground. Low tillage or no tillage keeps it there. Protecting and enhancing biodiversity can increase soil organic carbon and provide habitat for beneficial insects and animals. Building soil

can dramatically increase its capacity to filter and store water. Incorporating livestock adds fertility and decreases or eliminates the need for petroleum-based fertilizers.

Being able to measure carbon sequestration and other ecosystem services on the farm could deliver the insets a food company needs to mitigate its emissions further up the supply chain, or provide offsets to other companies. As the recent ruling by the SEC indicates, taking responsibility for the agriculture that supplies food companies' ingredients is not only the right thing to do and the smart thing to do, it may soon be something that they are required to do. At Mad Ag, we think this promises to be a game changer to accelerate the adoption, and increase the marketplace value, of regenerative agriculture.

What's Mad Ag got to with it?

Through the Mad Markets program, Mad Agriculture connects the farms that we work with to the brands in the marketplace that are committed to sourcing from a more regenerative supply chain. We see opportunity in the recent ESG rulings by the SEC because it could be the big lever we've been looking for to "encourage" brands to support regenerative agriculture. By creating climate-smart commodity credits linked to a farm's regenerative practices as insets to the brands purchasing Mad Ag farm ingredients, or making the credits available as offsets, we can leverage ESG reporting to accelerate the regeneration of agroecosystems.

This will drive more financial reward to our regenerative farmers while healing our planet through agriculture.

We recently hired Dr. Kaitlin Kimmel and Dr. Jonathan Gelbard to our Mad Lands team— ecologists that will measure the true impact of regenerative agriculture and translate that data into meaningful reports and ecosystem market opportunities. Using a mix of on-the-ground data collection, remote sensing, and modeling, we can optimize for the appropriate balance of certainty and cost-effective methodology. Whether brands are looking to inset carbon, water, or biodiversity metrics in their ESG reporting or want to have the utmost assurance that they are restoring farm ecosystems through their purchasing. Mad Ag intends to provide exactly what they need.

Accurate and detailed impact data doesn't just help brands with ESG reporting and integrity marketing; our farmers are also invested in the impact data that reflects their commitment and hard work on their land. Our reports will validate what farmers know through observation and connection with the landscape, and inform the continued management of their regenerative operation.

After all, improving management decisions that lead to real planetary impact is the ultimate goal. With better information and honest mechanisms for market-based rewards, farm stewards and their CPG partners can join together to revolutionize agriculture and food. Here at Mad Ag, it's our mission to make that happen.

OMAR DE KOK-MERCADO

Perennial Potential

"TO ME THAT'S THE MOST EXCITING PIECE OF THIS VISION, THAT DIVERSITY ON THE LAND MEANS

Iowa was once a perennial oasis of tallgrass prairie, wetlands, and oak savannas.

Those ultra-diverse ecosystems supported abundant people and wildlife and provided essential regulation and provisioning services, such as purifying air and water, sequestering carbon, and mitigating climate. Less than a tenth of a percent of remnant prairie remains, and oak savannas are one of the most endangered ecosystems in the world.

Now, the Iowan landscape is dominated by two major monoculture crops—corn and soybeans—that grow for approximately 27% of the year. The result is we've lost ecosystem functionality in the state. Iowan soils are degraded and even after nine years of the Iowa Nutrient Reduction Strategy, water quality has not improved—and in some cases it has worsened.

Science has demonstrated that undiversified monoculture production systems do not provide robust ecosystem services and have negative effects on people, wildlife, and ecosystem functionality. In contrast, the water running off a prairie runs clear, birdsongs fill the air, and insects buzz with delight as they pollinate flowers.

Making changes to the row crop production system is a difficult sell because row crop farmers have enormous capital investments in their equipment. The industrial infrastructure to process grain has also become a modern marvel of will and engineering, costing billions of dollars. A solution that couples agricultural production with robust ecosystem services is the strategic integration of prairie into row crop fields.

The prairie strips conservation practice was pioneered at Iowa State University and has now grown to cover 14,000+ acres in 14 states thanks to prairie strips being eligible for cost-share via the USDA Conservation Reserve Program (CRP), CP-43.

DIVERSITY IN PEOPLE...PERENNIAL DIVERSITY EQUALS RESILIENCY."

Integrating prairie where water enters and exits the field, alongside waterways, in a terrace channel, or through the field in widths that are conducive to farming equipment, provides disproportionate benefits. Studies at Iowa State demonstrated that when 10% of a no-till row crop field was transitioned to a diverse mix of native prairie grasses and forbs, it reduced soil erosion by 95%, increased bird abundance two-fold and pollinator abundance three-fold. The diversity of the prairie is reflected in the ways that prairie can benefit wildlife, people, and our society.

Prairie strips also enhance soil health, sequester carbon, reduce greenhouse gas emissions, reduce water runoff, and increase soil organic matter. The prairie strips practice can pay by converting marginal and sub-profitable row crop acres to prairie. Every farm has acres not suited to row crop production, and not investing inputs on acres that are not yielding is just business.

Thankfully, prairie strips are one of the most cost-effective conservation practices—especially when coupled with the CRP cost-share, which offers no out-of-pocket costs for installation and establishment. If you want to make a positive environmental impact, prairie has got the whole kit and kaboodle—a big bang for a little buck.

Prairie strips are also a stepping stone to habitat connectivity. The benefits to the larger community come in working together and blurring the lines between farm fields—you can connect your prairie strip to your neighbor's, and so on. Watch that prairie strip grow into a long road and disappear

into the horizon. Using prairie and other perennials—like trees and shrubs—to connect agricultural infrastructure can revolutionize how farms are laid out and designed in the Midwest, setting the stage for stacking regenerative enterprises.

Expanding on prairie strips by integrating trees mimics the oak savanna ecosystem structure —one of the most diverse ecosystems in the world. Using oak savannas as the model, the understory could produce forages for grazing livestock, and the canopy and mid-story tree crops could produce fruits, nuts, and timber while providing shade for livestock. Now, you have the building blocks for one of the most powerful agricultural strategies to mitigate climate: silvopasture.

Constructing perennial corridors that connect to existing livestock processing and packing facilities would allow for livestock to walk through the corridor rather than be loaded on trucks and transported. As livestock move through the corridor (guided by virtual fencing), they could also take temporary residence in an existing monoslope, and the manure produced could be incorporated into an anaerobic digester that produces renewable natural gas.

While the livestock are in the monoslope, they might as well graze on cover crops in adjacent row crop fields and bring along mobile solar arrays. These could collect and store water, provide shade, generate local broadband, serve as an IoT hub for remote sensing technology, and produce energy that can be stored and then tied into the grid.

The diversity of crops grown in these perennial corridors will need to mirror the diversity of expertise necessary for a complex system like this to work. To me, that's the most exciting piece of this vision—that diversity on the land means diversity in people. If the prairies and savannas of Iowa can teach us one thing, it's that perennial diversity equals resiliency, and being resilient is just good business.

Incremental change in agriculture is not enough. Monoculture fields are a blank canvas. Embrace complexity. Plant natives and integrate livestock.

In San Luis,

A VISION OF REBIRTH FOR A ONCE-BUSTLING DOWNTOWN

Mary Slosson &
Gregor MacGregor

with photos by
Sophia Piña-McMahon
and Gregor MacGregor

San Luis, Colorado – It's early May, and the snow on the Sangre de Cristo Mountains to the east has already largely receded.

We're in San Luis – the oldest town in Colorado – where the community marks the spring snowmelt by the emergence of a bird on Culebra Peak. Not an actual bird, but a snowfield that melts into the shape of a winged creature that doesn't emerge until August in good water years.

The early snowmelt feels like a harbinger of change, much like the empty storefronts that line Main Street. Once occupied by coffee shops, dance halls and bars, many of the stucco buildings that line the main thoroughfare are now crumbling, the signs advertising the bygone era now wind-worn and faded. Small, rural towns like San Luis have been uniquely impacted by a string of historical trends: younger generations leaving small towns for urban centers like Denver, the economics of farming in the valley shifting such that fewer crops can be grown profitably, and the impacts of a state wracked by drought and water scarcity that serve as an existential weight, ever-present and looming in the background.

Enter Ronda Lobato, a seventh-generation resident of San Luis. Her roots run deep in the community and in the land. Both she and her husband can find their lineage among the founding families of San Luis. She grew up swimming in the irrigation ditches of her family's ranch and catching horses to ride beneath the mountain.

"As the first settlers came in, downtown San Luis has always been the centerpoint. There were a lot more people back then. As the agricultural industry started dwindling, so did the people," Lobato said.

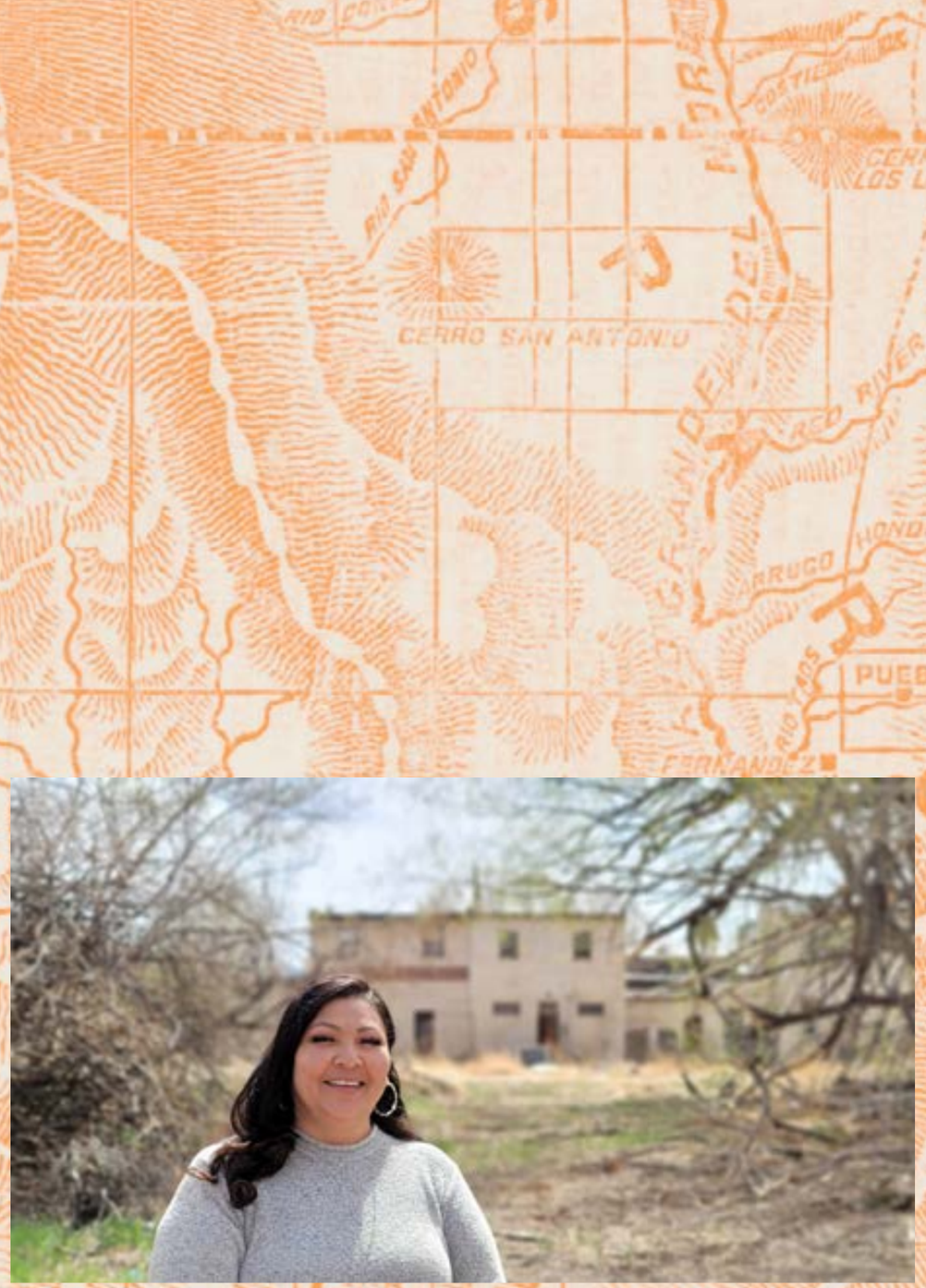
The population of San Luis and the surrounding villages used to be over 6,000 people. Now, it's roughly 600. The school used to have 100 children in a class. This year, six students are graduating from the high school. Where once Costilla County was a hub for spinach and lettuce, with thousands of acres dedicated to growing vegetables, now the primary crops grown are alfalfa and oats for cattle. The fundamental economics of agriculture have changed.

Then the COVID-19 pandemic began, and "in a paradoxical way it started to change the trajectory of the community," Lobato said. Her own daughter had been planning to leave for a big city, but the public health crisis changed her mind.

"Now, I think a lot more of our youth are wanting to stay," Lobato said. "It really made them realize what we have here in our community, and not wanting to leave. We're self-sustaining here. We don't have to worry about going to the grocery store if we absolutely don't have to. We have our farm, and the girls have been raised on the land with our water."

Her vision for revitalizing downtown San Luis is part and parcel of wanting to convince the younger generations that San Luis is a community and a town worth investing in and laying down roots.

On a recent morning, Lobato showed us the parcel of land that she acquired last year in the heart of downtown. The property was once the San Luis State Bank, the first bank in the town of San Luis. Dating back to the early 1900s, it still has the original vault with a hefty old safe inside.



The building's ceiling has collapsed, and through the windows you can see abandoned knick-knacks covered in dust, a time capsule from the town's past. The stucco facade has started to crack, revealing adobe brick underneath.

But Lobato has a vision of what this property could be, and is determined to use it to help revitalize downtown San Luis. In her mind are blueprints for a cluster of new ventures that could breathe new life into the block. Where the bank once operated, she wants to open a speakeasy called The Vault, incorporating the massive metal vault that gleams in the back of the building, now partially obscured by collapsed beams from the ceiling. The speakeasy would incorporate the historical story of San Luis.

After completing a community needs assessment, Lobato also plans on bringing a bakery, a community space for youth, and affordable housing to the parcel.

"Our community has very limited social spaces, and that really takes a toll on our mental health. We're not socializing, we're not communicating, we're not together as a community, and it's really separated people in our community," Lobato said. A community space would harken back to the town's heyday, when it had a movie theater and other communal spaces that helped everyone stay connected.

A broader community of bakers and farmers have volunteered their expertise to establish the local economy Ronda envisions. The Bread Bakers Guild of America and the Colorado Grain Chain have both donated memberships to connect Ronda with like-minded restaurateurs and farmers. Andy Clark, the heritage grain and artisan bread aficionado of Moxie Bread Company has offered to help with the physical layout of the bakery, while The Culinary Institute of America has provided a partial scholarship to attend one of their bread baking boot camps.

Lobato formed an LLC called Lupine Luna with her daughters to make the vision a reality. They have a business plan and a convincing vision. Now they just need money and time to make it happen.

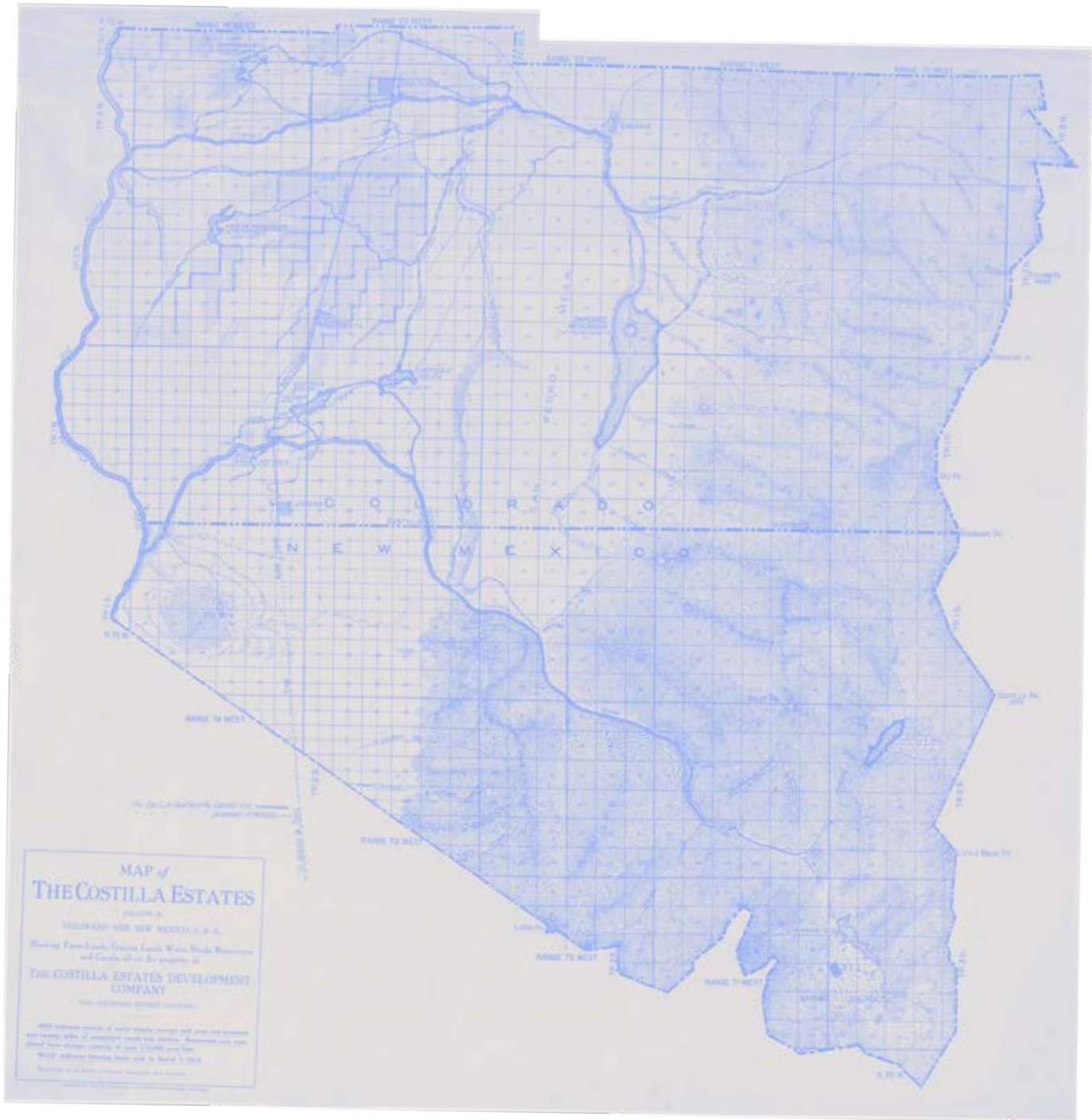
A town defined by water

San Luis is a community shaped by the unique agricultural system imported by Spanish and Mexican settlers to the Southwest, centered around irrigation ditches called 'acequias.' But acequias are more than just a water delivery system, they represent a culture and form of governance rooted in equity and fairness, expressed in the requirement that labor on the ditch is shared and in the ability of each family to cast a single vote, regardless of the amount of land or water they use. While the situation on each acequia today may be different from the historical mold, the core importance of community remains.

Equitable governance was born out of the similarly arid climate in Spain and North Africa – the word acequia is Arabic for 'water bearer' – and played a crucial role in the establishment of cities like Santa Fe, Taos, and San Luis. In the countryside, each irrigator in a newly established community received land in the form of a vara strip, a stretch of land roughly 50 yards wide by 2 miles long. Each vara strip provides access to a stream or the acequia, space for growing irrigated crops, land for a home, and space for a small cattle holding. The strips were arrayed to maximize the return flow of water to other parciantes on the ditch and promote communal self-sufficiency on the frontier.

Acequias were also crucial for new town residents, as town ditches supplied the water for gardens, orchards, and domestic use. The Montez Ditch serves this purpose in San Luis and residents see its revitalization paired with the revitalization of the town itself.

For the last eight years, the Montez has



been working with the Acequia Assistance Project at the University of Colorado Law School to reestablish its role at the heart of the town. Students and attorneys worked with members of the Montez' comisión to draft bylaws, incorporate the ditch, and examine who owned rights on the ditch and where water had historically been used. The work is necessary because as the town has grown, portions of the ditch were paved over and getting water to all of the parciantes became increasingly difficult.

Members of the Montez, including Ronda, see the full reestablishment and beautification of the ditch as a way to proudly display the town's acequia heritage and provide a classic western amenity: flowing water.

Charlie Jacquez, who served as a member of the Montez comisión and can recount the town's history from memory, noted that the ditch once crossed main street from the east to the west side of town before it was paved over in the 1930s when main street became state highway 159. Jacquez and others would love to see the free-flowing ditch come back to life, harkening back to San Luis' vibrant past self.

"San Luis was made out of dirt in those days. Now it's pavement and concrete, so the distribution is tougher," Jacquez said. "We'll figure out a way to get water to that other side of town. I think that would be cool. Go to Gunnison, you'll see ditches running right through town. It's really neat... It's kinda magic."

Looking Forward

These days, Lobato is simultaneously reaching into the past and looking towards the future. She's personally witnessed the town shrink and storefronts shut down as the younger generation abandons rural life for bigger cities. Because of this, her next steps are planned with her daughters and their future in mind – by pulling on a string from her past.

After graduating high school, Lobato started her own baking company, where she decorated wedding cakes. Years later, during the height of the COVID-19 pandemic, she shared her love of baking with her three daughters Faleen, 24, Feliciana, 19, and Josephina, 13. And now, she wants to help create a future in San Luis where her daughters are not driven to leave in order to have economic and employment opportunities.

"I want my family to stay here and live that legacy that our founding fathers brought," Lobato said.

Lupine Luna has garnered technical and financial support from the Colorado Housing and Finance Authority Small-Scale Housing Technical Assistance pilot program, the Costilla County Economic Development Council, the San Luis Valley Small Business Development Center, the San Luis Valley Housing Coalition, the Costilla County Department of Social Services, and the Rocky Mountain Service Employment Redevelopment, among others. To donate expertise or assist Lupine Luna in making their vision a reality, contact lupinelunallc@gmail.com.

Farming with Water, not Against it

JONNAH MELLENTHIN PERKINS

with photos by
Jonnah Mellenthin Perkins
& Jesse Perkins

Water always wins, eventually. Moving water, holding water, stopping water, and redirecting water is an integral part of agriculture.

Humans have shaped their lives around their capacity to control water. In my region of the Midwest, the challenge is both too much water and not enough – often in the same growing season.

When I first moved to rural southwest Wisconsin in 2007 to work on my boyfriend's family farm, I had no concept of what I now know as resource management – the moving and shaping of land, water, minerals, plants, animals and wind. One of my first jobs was harvesting watercress from the farm's wetland for our Spring CSA delivery. Knee deep in muck, I reached out my clean hand to hold fistfuls of bright green cress that I sliced with my knived hand. This seemed like a quaint job for a fast-paced, high volume, community supported agriculture farm, and I loved everything about it. Vermont Valley Community Farm was one of the largest CSAs in the nation, delivering solely what was grown on the farm to thousands of families in the Madison area. As a 24 year-old with no experience in agriculture, harvesting wild food adjacent to fields where I had transplanted broccoli that same day was completely lost on me. It didn't occur to me until years later, what an incredible service the wetland was providing the farm.

Our farm has transitioned away from CSA work, and we now focus on organic seed potato production, bringing what had been a side business to the forefront of our work with our new farm name, Mythic Farm. On the eastern edge of the Driftless Region – the roughly 24,000 square mile tract of unglaciated land at the intersection of Wisconsin, Iowa, Minnesota, and Illinois – we are at the confluence of multiple ecosystems: oak savannah, eastern tallgrass prairie,

wooded wetlands beneath valley slopes with rich silty loam soil. Water that bubbles up from the limestone bedrock upstream flows through our farm on its way to the Wisconsin River before emptying into the Mississippi and then into the Gulf of Mexico.

Vermont Valley Community Farm had fully integrated the 32 acre wetland into field planning long before I became involved in the farm, but it took me years to fully understand the scale of its importance. While I like to give most farmers the benefit of the doubt about putting conservation first, every decision needs to be made in financial reality. Farming is a speculative enterprise that is based mostly on variables outside of the farmer's control. Our wetland is a financial stopgap first, and an altruistic work of conservation beyond that.

A history of tilling, filling and felling

European settlers began farming in this area after the Civil War, bringing with them land management techniques that caused decades, if not generations, of acute challenges. Over the years hillsides were cleared for grazing and wetlands were drained and filled to create more fields. These changes turned "unproductive land" into usable agricultural land, but at a high cost. Removing the wetlands and overgrazing hillsides took away the natural defenses of an already flood prone area.

In the Driftless region, the prairie root structures, deciduous forest, and wetlands that held soil, water, and wildlife habitat for millenia were folded and crumpled up into a slurry of destruction in the name of agricultural engineering. In the ecological game of rock, paper, scissors that is played out in farming innovation around the world, water always comes in to show where food can really be grown.

Water is never far away

Our first child was born in December of 2011 — perfect timing for a vegetable farm baby. The winter was full of days that crossed into nights that crossed back into days rocking my son Paavo next to the wood burning stove. By spring we were

ready to emerge from our cozy warren to work in the greenhouse. By summer, it was clear that we were in a drought year. If you are a midwest farmer and have been in this business for at least a decade, then you will remember 2012, the year that ended so many small farms across the region.

The Driftless has no natural lakes, water is either moving or it is underground. Underlying sandstone and limestone geology give way to thousands of springs that pop up when the water table is high. When water is low, it is still sitting right below the surface, and in our case, flowing just next to our fields. My husband Jesse slept about as much as I did that summer, setting 2am alarms to move irrigation systems. The gift of farming at the edge of water is having it close by when it's needed. The challenge is

that you can't take it away. But what I learned from our wetland is that she holds the water when there's too much, for when there's not enough.

Sharing with fauna

Our wetland is home to waterfowl, beavers, sandhill cranes, raccoons and deer. The territory of these creatures doesn't stop at the banks of the marsh grass, it extends into our fields. Deer fencing doesn't keep out cranes and scarecrows don't scare away racoons. Losses to animals have never been catastrophic and we have learned to share the stories of our rich biodiversity. Afterall, the farm passes through the wetland, not the other way around.

Wetland as flood mitigation

In June 2016, water from the Blue Mounds Creek, the small river that serpentines through our wetland, swelled over the road. The muddy water roared just inches from the underside of the bridge that connects us to fields across the wetland. The challenge for us wasn't watching crops go underwater, it was getting to the field to harvest. Driving the 20 minute detour on highway roads was a real logistic to manage with a crew in the open bed of a pick up truck, but we had been saved by the expansive capacity of the wetland.

Too much rain isn't a good thing on our farm. It puts field work on hold, it creates conditions for disease, mosquitos hatch, and humidity is uncomfortable. But farming next to a living sponge has given us the ability to keep our farm above water while the region faces crop loss at a ballooning rate.

Farmers are at the forefront of our changing climate. In the geological blink of an eye, we have moved into an epoch where much of our agricultural land will shift into no longer being productive. This is where farming with water is so important. And in some regions, learning to farm with less.

A Dive into the Colorado Grainshed

for the craft beer & spirits industries.

GABE TOTH WITH PHOTOS BY SOPHIA PIÑA-MCMAHON

Colorado is home to a rich agricultural community and maintains a prominent position in the heavily grain-dependent craft beer and craft spirits industries. However, there is a profound disconnect.

The vast majority of the state's craft-scale beverage alcohol producers rely on raw grain and malted barley that comes out of the international commodity grain and commodity malt systems, while small growers, once the cornerstone of the American food system, continue to struggle in an agricultural model that undercuts their profitability at every turn.

An overwhelming proportion of the malt used by Colorado brewers and distillers is sourced from maltsters in the Midwest who, in turn, rely on crops from Idaho, Montana, the Pacific Northwest, Canada, and even Europe. Raw grains such as corn, wheat, and rye are consolidated at grain elevators from countless small farmers based on analytical factors, such as starch and protein content, and subsequently moved around the country and between continents to meet demand.

This approach to farming, a race to the economic bottom, is relentless and almost systematic in pushing small farmers out of business. According to Time magazine, more than 100,000 farms were shuttered from 2011 to 2018, and more than half of all farmers have lost money every year from 2013 to 2018 (Semuels 2019). A report on regenerative farming commissioned by Patagonia states that median farm income rose slightly from -$1,735 in 2018 to -$1,383 in 2019 and was projected to fall to -$1,840 in 2020. "In recent years, roughly half of farm households have had negative farm income each year and, as a result, many of these households rely on off-farm income to make ends meet," the report states (O'Connor 2017, 34).

These agricultural methods are also reliant on an extraction-based approach to farming that is propped up by chemical inputs to maintain soil fertility and keep pests at bay. A report issued in 2020 by the United Nations, titled the "State of Knowledge of Soil Biodiversity", notes that "soils are one of the main global reservoirs of biodiversity, more than 40% of living organisms in terrestrial ecosystems are associated during their life-cycle directly with soils" (FAO, ITPS, GSBI, SCBD and EC 2020, 2). These soil organisms both provide direct nutrients for plant growth and also transform soil nutrients to become available for plants. However, modern carbon-intensive farming methods are contributing to issues as microscopic as decreased soil biodiversity and as large as the annual dead zone created by the accumulated nitrogen and phosphorus fertilizer runoff where the once-fertile Mississippi River Basin flows into the Gulf of Mexico.

Localization offers an opportunity to push back on these trends. Brewers, distillers, and maltsters can help local farmers earn a more sustainable bottom line and pursue more sustainable farm management practices. As Craft Beer and Brewing Magazine noted in their fall 2021 Brewing Industry Guide, "Decentralizing production and shortening supply chains is another way to support local agriculture while reducing some of the negative factors driving the climate crisis" (Keene 2021, 78).

In 2021 we took a deep dive into the Colorado grain supply chain to create an end-to-end picture that was not previously available, identifying a wide variety of quantifiable and unquantifiable factors that impact the choice of commodity versus local grain. The project pulled together data from the USDA, the Brewers Association, the American Malting Barley Association, state reporting on the Federal Excise Tax on distillers, self-reporting from local maltsters, farmer interviews, and a wide variety of additional reference materials.

The report identified a number of hurdles and opportunities that present themselves in any effort to increase

localization of grain usage. The ultimate goal of this work is to produce a roadmap for growing the statewide network of farmers, maltsters, brewers, and distillers who source locally, and to identify needs for further research. By more directly supporting local agriculture, brewers and distillers can push back on the longstanding trends of consolidation and commoditization in American agriculture, which continue to erode the environment, reduce diversity in our food systems, and undermine the profitability of small farms around the country.

The data showed that the supply of corn for distilling in Colorado is abundant, but malting-quality barley — necessary for beer and many types of whiskey — is inadequate for increasing local malt supply much beyond current demand. The overwhelming majority of malting barley grown in Colorado is done on contract for the Coors malthouse using their proprietary Moravian barley variety ("Barley Variety Survey - 2020," 2020). In addition, storage capacity was identified as a limiting factor, and cleaning/bagging grain is a potential near-term constraint as the market grows.

One of the biggest takeaways from the project was a comparison of in-state malting capacity — the amount of barley able to be converted into malt by the state's maltsters — versus demand for malt from the craft beer market. The three craft maltsters that currently focus on sourcing, operating, and selling primarily in Colorado are all operating at or near capacity, but in sum have a maximum production capacity of less than five percent of the demand from the state's craft beer sector. (This accounting does not take distilled spirits into account because a breakdown of specific grain types — corn, rye, wheat, and malted barley — is not available, but there is additional demand from craft distillers.)

While this capacity constraint represents a potential near-future bottleneck in local supply, the underlying driver to grow the market — demand — remains lacking. A more fragmented and more local supply chain will, in most cases, lead to higher grain costs. For malt in particular, the small scale of local processing increases prices above commodity malt. Small brewers, who often operate on razor-thin margins, remain very sensitive to these increased prices, though a similar increase in materials costs is often accepted in stride if it comes from an ingredient with more cachet, such as hops.

A number of potential benefits to localization of grain sourcing were also identified that could begin to sway opinions in the brewery, the distillery, and in the customer's mind. Quantifiable community benefits include the financial resources redirected to local businesses and local jobs, as well as the reduction of the brewer's or distiller's carbon footprint due to decreased travel requirements for heavy, bulky raw materials. Among the unquantifiable benefits are the ability of the brewer or distiller to pursue local or unique grain varietals, an increased level of engagement as part of the local community, the ability to support better stewardship of the land through direct support for local farmers, and the opportunity to tell a better story in marketing the brand.

In sum, there are slight cost increases to a more localized supply chain, but my research shows how small these potential increases are on a per-unit basis or when compared side-by-side with the potential benefits. Thoughtful companies that have a broader vision, looking beyond their immediate profit and loss statement, will examine the entirety of their supply chain and their community and recognize benefits that broadly impact all members of their network. This is an inherent part of the holistic concept of a thoughtful, conscious business, "that all stakeholders are interdependent and that the best way to optimize long-term profits and long-term shareholder value is to simultaneously create value for the other stakeholders too" (Mackey and Sisodia 2014, 109).

The ultimate driver in any effort to grow the local grainshed will be consumer demand. In any supply chain, the only source of new revenue is the consumer; all other transactions between supply

chain partners are merely fund transfers for value-added services such as transport, cleaning, storage, or processing. Therefore, to truly push localization forward, more effort is needed to educate customers and bring them on board. The current supply of craft malt from Colorado is, in part, a reflection of the demand from brewers, which in turn reflects customer requests. To inspire more customer demand and help change the underlying conversation with ingredients, brewers and distillers need to do more to tell the story of their materials, using the farm and the grain as differentiating factors, tying their product back to its agricultural roots.

This is a commitment not just from the brewers and distillers themselves, but also from the financial side of the business in recognizing the potential benefits that will accompany higher overhead, and the sales and marketing teams, who can tell the story of the farm as part of the story of the distillery or brewery. Among other possibilities, this may include business support ("We support X number of local jobs by sourcing locally"), supply chain engagement and visibility ("We've walked the land with the farmers who grow our grain"), or environmental concerns ("We've eliminated X pounds of greenhouse gasses through our shorter supply chain").

The environmental aspect noted above also points to another need: further research into a variety of related topics. There is room to more precisely calculate the reduction in carbon emissions. Some distillers/researchers have identified varietal-dependent flavor differences ("The Rye Study: Variety Determines Flavor" 2021) as well as a statistically significant impact of the combination of flavor and varietal (Arnold 2021) and (Kyraleou 2020), indicating the potential for a producer to pursue a true sense of local flavor – terroir. However, this research is only the tip of the iceberg. There is a whole world of novel flavor exploration to be done. There is also a whole field of research regarding the economic impact of localizing the supply chain that is ripe for examination.

Overall, there is a path forward, but it requires greater engagement. Engagement between the brewer/distiller and the farmer, engagement between the customer and the brewer/distiller, and engagement between the supply chain and the academic research world. The members of the local grainshed have a great story to tell and a compelling case to make for localization, but it's of little value if that story doesn't reach the consumer.

To read this report in full, please visit the Mad Agriculture website. Gabe Toth was a 2021-2022 Mad Agriculture Fellow. He continues to be a lead distiller at The Family Jones Distillery.

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100% Whole Grain

FERMENTED PIE DOUGH

Mona Esposito
with photos by
Sophia Piña-McMahon

Summer is here with all of its bounty. Pies and galettes are a great way to stay on top of your fruits and veggies and this pastry dough recipe can be used for both savory and sweet!

Pie dough is also a great introduction to using whole grains in your pantry. Simply substitute whole wheat flour for pastry flour- Sonoran White is a great choice. You can also play around a bit with flavors and blend two flours with Sonoran being the main player and something like Einkorn or Emmer – which add extra flavor – being secondary. Try 2/3 Sonoran and 1/3 your choice!

If you are a baker or have a friend that is, try adding discarded sourdough starter from your feeds (kept in the fridge). It will add a depth of flavor and increase the digestibility of the wheat.

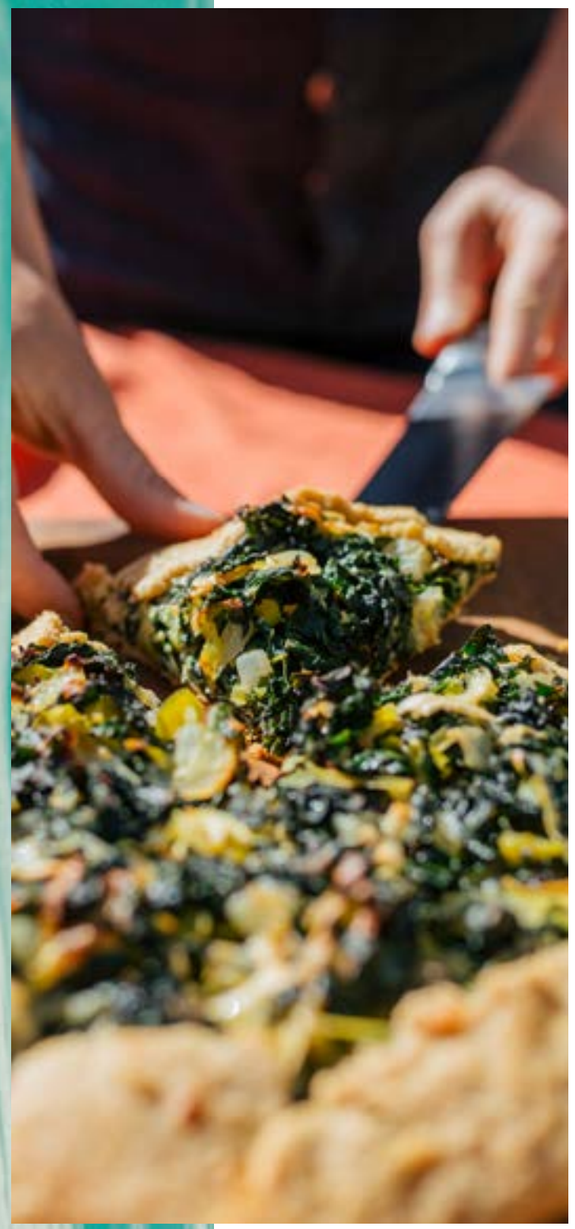
Enjoy!

300g	Sonoran White flour
8 0z	butter
60g	sourdough starter discard
1	teaspoon salt
½ cup	water

Makes 2, 12 inch pie crusts

Freeze the butter. Grate butter into flour and salt mixture and distribute evenly. Mix the starter with the water. Add starter to flour butter mixture mixing by hand, until dough comes together.

Divide in two and wrap in plastic in the shape of a disc and refrigerate overnight (up to 24 hours) before use.



Savory Leek Galette

INGREDIENTS

2 bunches kale, stems stripped
2 bunches chard, stems stripped
2 eggs, beaten
1 leek, chopped
1 onion, chopped
1 ½ cup Gruyere, grated
salt and pepper
nutmeg

DIRECTIONS

Blanch greens in boiling salted water, drain, cool and squeeze out water. Chop greens. Saute leek and onions in olive oil or butter until translucent and soft. Let cool. Combine greens, leeks and onions. Add eggs and seasonings to taste. Mix in cheese. Roll out pie crust to ¼ inch thickness, add filling and fold edges over filling. Bake at 350 for 45 minutes or until golden.

Makes enough filling for 2!

Whole Grain Flour Sources:

Aspen Moon Farm, Moxie Feed & Seed, Dry Storage Mill

Recommended Listening:

Modernist Bread Crumbs, Heritage Radio Network
Eat this Podcast: Our Daily Bread (July 26-August 24, 2018) Jeremy Cherfas

Recommended Reading:

The Whole Grain Connection, Monica Spiller
Grain of Truth, Stephen Yafa

Team

MAD AGRICULTURE

Philip Taylor
Co-Founder & Executive Director

Nicole Brinks
Co-Founder & Community Leader

Jane Cavagnero
Marketing

Sophia Piña-McMahon
Executive & Marketing Coordinator

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Jonathan Gelbard
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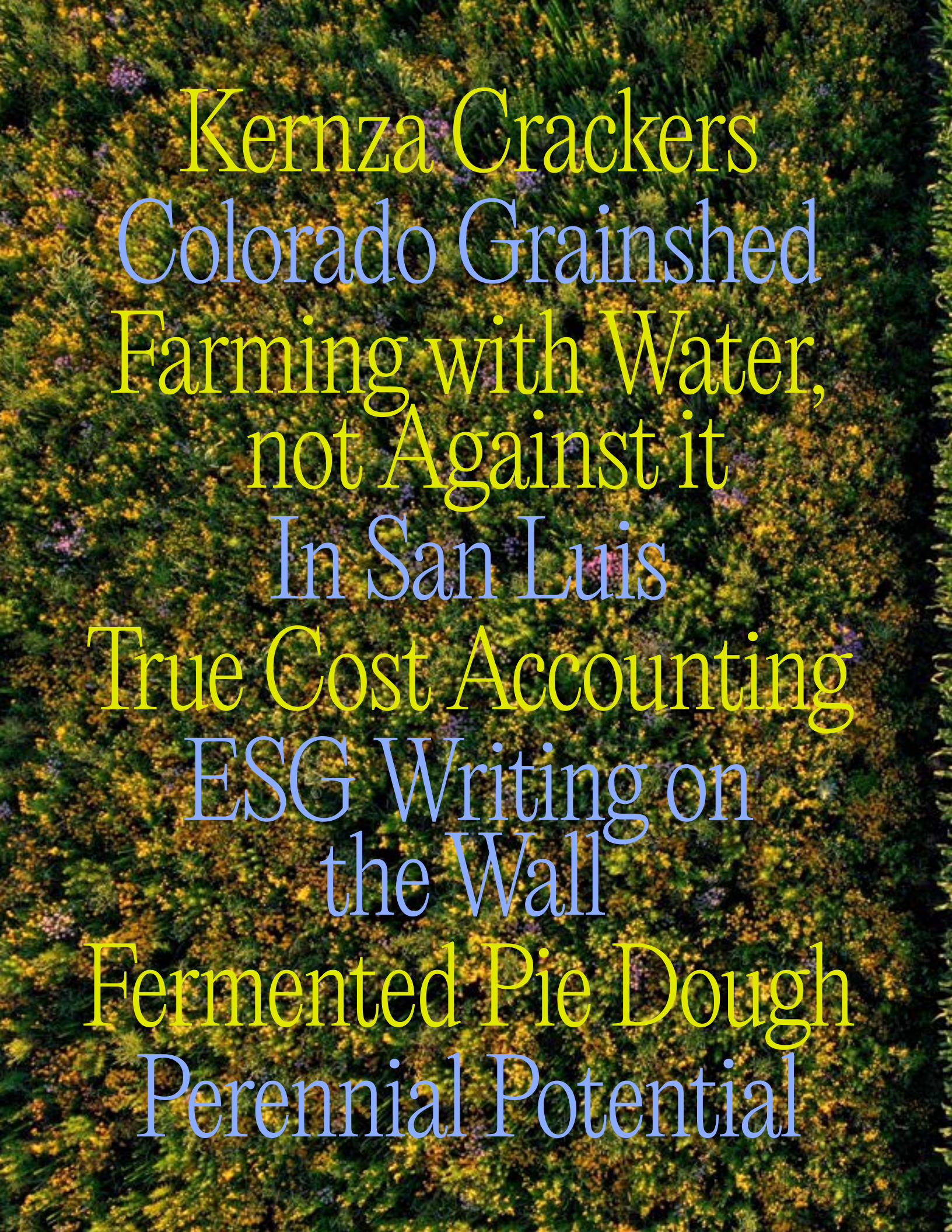
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