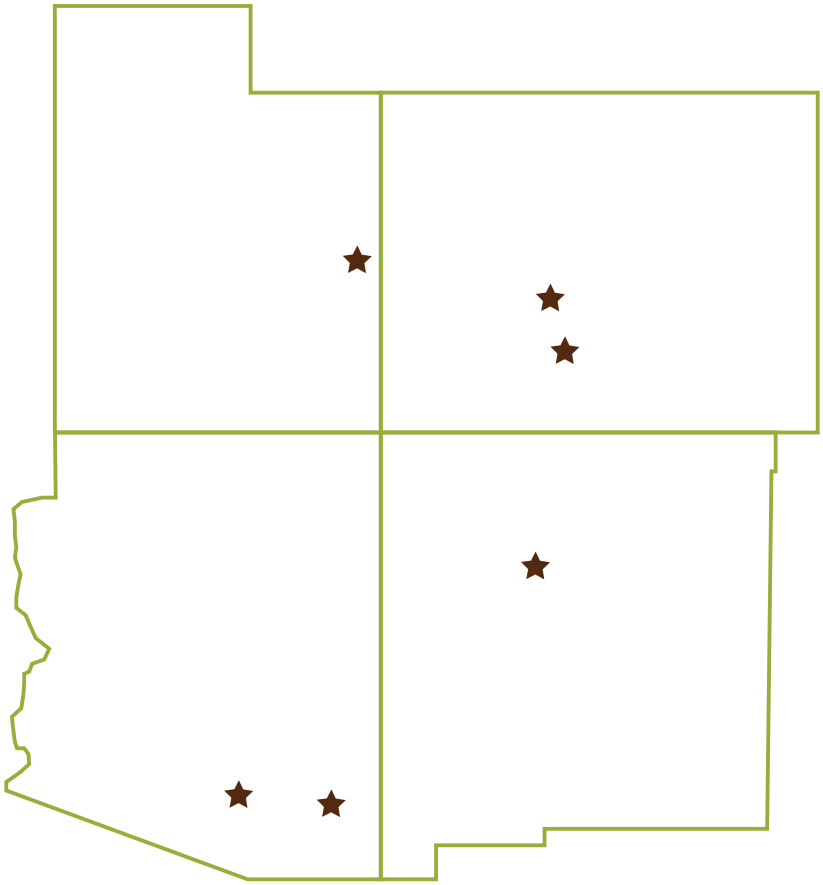
SUSTAINING FARMING in the Arid West:

Stories of young farmers, water and resilience



The National Young Farmers Coalition (NYFC) represents, mobilizes, and engages young farmers to ensure their success. We are a national network of farmers and ranchers who support practices and policies that will sustain young, independent and prosperous farmers now and in the future. NYFC encourages all farmers, ranchers and anyone who loves good food to support our efforts by becoming a member today.
Visit youngfarmers.org or contact kate@youngfarmers.org for more information.

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Colorado River Basin
Map courtesy of U.S. Bureau of Reclamation

The West is defined by water—or lack thereof. A continental waterline is marked by an invisible geographic boundary known as the 100th meridian. To the east of this longitude, from the Midwest to the Atlantic coast, annual precipitation averages above twenty inches; to the West, some of the most productive farmland in Arizona and California average a mere three. For this reason the 100th meridian also marks the boundary between those lands that require irrigation and those that do not.

Hence the modern West was built on projects that channel, store, and deliver water. Take the Colorado River Basin, a network of rivers, tributaries and engineered diversions that marry seven western states, two countries and over 36 million people. Yet in practice the river spans the entire country: it irrigates 15% of U.S. produce and 80% of our winter vegetables, meaning wherever we live, we eat from the Colorado River.

Yet we increasingly tax the capacity of this river to provide for the land. Toss extended drought, a growing population and climate change together and suddenly water becomes as scarce and precious as gold—and agriculture increasingly tenuous.

But many western producers, such as the ones whose stories are told here - who farm both within and beyond the Colorado River Basin - are stepping up to the plate. They adapt business models to drier times; build soil for healthy land and water; increase irrigation efficiencies and technology; promote habitat and diversity; and invest in their communities. These farmers exemplify the adaptability and creativity from which farming was born and from which we will find solutions for a sustainable future.

Castle Valley, Utah

CASTLE VALLEY FARM

Mixed vegetables, grain, fruit

Along red rock formations and the winding Colorado River, Jerry Harris leads a tour of a dozen young farmers through his orchard in Utah's Castle Valley. It is early April, just approaching the start of the hot season and the peach and apple trees are blossomed out. The tractor trailer hauling the tour pulls into the packing shed where Harris sells his fruits and vegetables to local customers who leave their money in a tin can in exchange for food. This is a place where the honor system still works: often Harris comes out better from the generosity of his customers.

In a place like Castle Valley, a landscape as beautiful and extreme in its climate as any in the West, farming is made easier with a good community. But at the heart of it all is water. Harris has lived in this valley a long time and counts water as a main concern. "Drought has been ongoing," he says, a steep challenge when growing not only produce but grain and alfalfa for market on more than 200 acres. And the drought certainly doesn't seem to be going away. What Harris faces is becoming the norm across the West: how will farmers continue to feed their communities under increased pressure for water?

To address this, Harris looked at how he could improve his on-farm irrigation to become more resilient. His previous irrigation system was leaky so he installed efficient drip irrigation on the field crops, greenhouses and orchards. The farm was also installed two center pivots and a wheel line for grain crops, technology which minimizes water loss. Improvements in technology have allowed Castle Valley to put water only where it's needed and when it's needed, resulting in greater knowledge of where water goes on the farm and improved application efficiency.

Harris also looked at his irrigation system off-farm to see where improvements could be made. In western states like Utah, more often than not water is transported in an open ditch system. These earthen canals were dug with the settling of the West and in many places have not changed since. With water crunches growing more frequent, lining or piping ditches is, in many places, a way of saving water. By reducing the amount of water that infiltrates or evaporates while on its way to helping a crop grow, irrigators are able to become more efficient with the water they put on their crops.

This is what Castle Valley Farms chose to do and there were funds there to help them. Prior to being awarded a Natural Resources Conservation Service (NRCS) grant, the farm was running all its irrigation through an open ditch along with some well irrigation. The grant allowed them to pipe their ditch from their main irrigation source, Castle and La Sal Creeks—which feed into the Colorado—to the

farm, reducing not only unusable seepage and evaporation but also cutting overall pumping costs due to the gravity-fed pipe. Harris says they received the funding because of the "conservation of water over that 3 mile ditch." Having gained better control over his irrigation system, Harris now has another tool in his toolkit to face the challenges ahead.

And the challenges are many. The Colorado River system, of which Harris is a part, is managed by a long-standing, complex series of legal arrangements which determine who gets water and how much. But as pressures increase on the river, including its tributaries and its snowpack, the challenges rush down first onto farmers. Farmers like Harris are first in line to deal with issues when they arise, and to anticipate them before they do.

Like most farmers, Harris is not only thinking about the future of his farm in terms of water, but also in terms of the young people who will inherit the opportunities and responsibilities of growing food. Since 1970, Castle Valley Farms has worked in conjunction with Daystar Adventist Academy to give high school students a chance to gain an agricultural education. Students work on the farm pruning tomatoes, harvesting asparagus or laying irrigation, among other tasks. Harris says that farm work and learning about agriculture are "a part of [the students'] education, helping to build work ethic." So while the farm is managed as a business that turns a profit, at its core it is about leaving something for the next generation.

These efforts put Castle Valley Farms in a position to better withstand future drought challenges, while demonstrating a system that aims for sustainability through everything from smart water-use to youth education. As Harris notes, for the farmers willing to seek assistance, there are funds available to make the responsible shifts toward sustainability as many farmers around the country are doing.

Back at the farm, the farmers hop off the tractor trailer and stroll into the packing shed where Harris gifts the group bunches of spring asparagus. Forest green and fresh from the field, it is clearer than ever that these nutritious bundles are not just made up of soil and nutrients; that, perhaps even more so, they are made of Utah's rivers and snow.

RESOURCES

Castle Valley Farm
www.daystaraa.wix.com/cvfarm

Castle Valley Farms in the Colorado River Project
www.youtube.com/watch?v=H3CtHLjNyuI

National Resource Conservation Service
www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/

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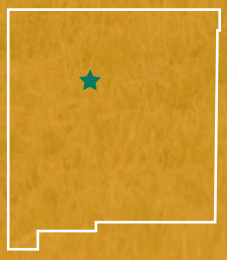

Bosque Farms, New Mexico

DE SMET DAIRY

Grass-fed Organic Raw Dairy

Mike De Smet is known for his friendly disposition, his inability to say no to a challenge, and a deeply ingrained love of dairy farming. De Smet grew up on the 125-acre dairy farm he now manages. But this is not his father's dairy—he and his wife, Erica, have embarked on an ambitious and pioneering effort to build New Mexico's first, and only, USDA certified organic, raw, grass fed dairy farm.

De Smet started learning the dairy trade as soon as he was big enough to work in the barn. Like many children of farming families, he was encouraged to go to college and seek a career off the farm. In college in Florida, Mike found himself skipping class to go help in the dairy barns at the university. He says after several times of opting out of his collegial responsibilities to help with artificial insemination, he realized just how much he loved being a dairy farmer.

Seven years ago, the 36-year-old third generation dairy farmer decided to return home to help his father manage the family farm. De Smet conducted an informal market survey posting a pasteurized and a raw milk label through his Facebook page. When the raw milk label hit over 4000 likes and the pasteurized only several dozen, he knew what product to pursue. Undaunted by the paperwork or technical requirements he needed to navigate to become a USDA certified organic, raw milk producer, and despite skepticism of fellow dairymen and financial advisers, De Smet built a raw milk dairy. For insurance purposes, and just to be safe, he purchased a pasteurizer, which, he laughs, he still has never turned on.

Perhaps most important, De Smet saw raw dairy production as a way to develop a sustainable business that capitalized on generations of knowledge, kept his family land in production, and built healthy soil that could support farming for generations to come. In the first few years after his return, in addition to hops, De Smet grew feed crops. For the past decade, each year has been drier than the previous, and each field has yielded fewer cuttings, or no crop at all. He knew he needed to get creative to do more with less water.

Rather than export the water by way of cutting cash crops to sell to other dairies, he invested in his own herd. De Smet decided to produce all the feed for his dairy on his own farm. He prioritizes the health of his animals and the sustainability of his farm. He milks only once a day, and all his cows, including an additional dozen animals he raises for meat to feed family and friends, graze freely and are entirely grass fed.

Over the next five years, De Smet will grow his dairy to full capacity, about 100 cows. Several factors influence the future size of his herd and the operation—the number of cows he can handle and still ensure that his product is safe and clean, the land it takes to feed his cows, and of course, the water it takes to grow their food.

Most farmers in New Mexico flood irrigate with surface water managed through districts along the Rio Grande. Water availability is increasingly erratic due to very low annual snowpack in the basins that feed the river, and intense monsoons dumping unprecedented amounts of water. At the beginning of 2013, central New Mexico farmers faced the driest season in a century. In September 2013, the Middle Rio Grande saw over three inches of rain—about a third of the area's average rainfall—in less than a week. For farmers like De Smet this meant that crops went from dying of thirst to drowning in a matter of hours. This year he will try every trick in the book, and invent a few of his own, to anticipate both drought and floods.

The solution to less water is building healthy, resilient soil. Working with a forage specialist through the extension agency, De Smet has moved to no-till planting methods and has begun experimenting with cycling nutrients in his fields. Carefully dividing up the acreage, he plants some fields in cool season grasses, and others in warm season grasses, so the fields will be fully productive at different times over the course of the season, allowing him to move the herd to a new paddock every day. The key, he says, is making sure the earth is never bare. Unlike the fields he still disks, plows, and plants in a more conventional way, the no-till fields show moisture less than a half-inch below the soil's surface.

De Smet plans to double his herd size in the next year, but he hesitates, "It all depends on water." Even though his growing practices have increased the moisture, humus, and mycorrhizal levels of the soil, he knows there's only so much forage the field will produce without water. De Smet knows farming carries no guarantees, like how many days of water the river will provide, but he faces his challenges with bravery, perseverance, and laughter.

RESOURCES

Soil Quality & Nutrient Cycling
www.soilquality.org/functions/nutrient_cycling.html

New Mexico Department of Agriculture Organic Program
www.nmda.nmsu.edu/marketing/organic-program

Western SARE Crop Rotation
www.westernsare.org/Learning-Center/Books/Crop-Rotation-on-Organic-Farms

Western SARE Dairy Soil Health
www.westernsare.org/Learning-Center/Fact-Sheets/National-SARE-Fact-Sheets/Alternative-Continuous-Cover-Dairy-Forage-System-for-Profitability-Flexibility-and-Soil-Health

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Willcox, Arizona

SUNIZONA FAMILY FARMS

Organic mixed vegetables

In 1997, Byron and Janice Smith purchased 320 acres in Willcox, Arizona, and began a hydroponic tomato operation under the name of Sunizona Family Farms. Though first generation farmers, Byron Smith had spent his boyhood in British Columbia helping his father with a hobby greenhouse operation. It was Smith's love for plants, developed inside his father's wooden greenhouses, which ultimately inspired his move to California to pursue a degree in agriculture.

After settling on the farm in Arizona, the Smiths focused on growing high-quality tomatoes, as well as carving out a wholesome, meaningful life for their young family. It was hugely important to the Smiths to find a balance between farming and raising their children. As such, they homeschooled their children, prioritized regular family meals, and maintained one day of rest each week. And as a testament to the success of their efforts, all four of their children have grown up to also pursue farm careers—something rare indeed for these times, in which farm children are leaving the agricultural sector at record numbers.

When the Smiths moved to Arizona, they were certainly aware of the unique challenges inherent in desert food production: summers were hot, the soil lacked necessary organic matter to support production, and Western water resources were declining rapidly. Though their water comes from a ground well, Sunizona Family Farms shares an aquifer with many other neighbors and water-intensive farm operations. The water table seems to have remained fairly stable over the years, but the family does worry that the aquifer might become depleted with the onset of hotter and drier seasons. And as a sign of potential future water hardships, Smith recalled that by the end of the 2013 summer season, his well sounded like it was pumping air. Needless to say, for a desert farmer, this is a worrisome sound indeed.

Sunizona Family Farms has been in a constant evolution over the past seventeen years, with the Smiths learning how to adapt their family and their farm to the realities of the Arizona desert. In what Byron Smith describes as "radical transformation" of their business, the family chose to transition their tomato operation to Certified Organic. During the transition, they converted their hydroponic system to an organic soil-based greenhouse operation, forgoing conventional fertilizers and pesticides, and cutting their water usage by nearly two-thirds.

The shift to organic production propelled the farm into the hearts of a new customer base. Restaurants and supermarkets began asking for additional produce varieties. First, the Smiths added microgreens and salad mix to their product list. Then they bought a tractor and added a few acres of field-grown vegetables. Of Sunizona's field production, Smith says, "our model is intensive, so we can create higher productivity in a smaller area."

The decision to focus on intensive production, as opposed to a large-scale row cropping system, has been consciously made out of respect for Arizona's finite water and soil resources. Additionally, the Smiths have experimented over the years with a mix of row cropping, high tunnels, and raised beds, in addition to their more traditional greenhouses.

Sunizona Family Farms has become recognized for having developed their own "veganic" method of soil-building. Instead of using animal manures, the Smiths compost all of their operational vegetable waste, including tomato leaves, vines, fruit, pecan shells, excess pumpkins, and waste from their sprouting operation. The compost becomes a medium for their raised beds. For soil fertility, they use a simple process to blend a mix of beans and alfalfa, creating high-nitrogen fertilizer pellets, which are then used to fertilize across their entire operation. The Smiths feel strongly that growing veganically limits their potential for food borne illnesses, as well as prevents exposing their customers to the antibiotics so routinely found in animal manures.

The Smiths expect to be able to continue evolving as a conservation-based farm operation, but are often limited by a lack of capital, resources, and time. They had once considered applying for NRCS funding, but did not have enough capital to make the initial up-front investment. As such, the Smiths are similar to the thousands of farmers across the West, who are dedicated to making conservation improvements as time and finances allow.

Smith says, "I see so many more opportunities to conserve water—to recycle the runoff from the greenhouses, to use less water in the field, to grow more produce in a smaller area. But at the same time, I'm just out there doing what needs to be done. My process is to see waste and say 'I don't like this waste, and we need to do something about it.'"

RESOURCES

Sunizona Family Farms
www.sunizonafamilyfarms.com

Southern Arizona Groundwater Mapping
www.azwater.gov/AzDWR/StatewidePlanning/WaterAtlas/EasternPlateau/PlanningAreaOverview/Hydrology.htm

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Paonia, Colorado

HIGH WIRE HOPS

Organically Grown Hops

In Colorado's North Fork Valley, orchards, farms and vineyards have long dominated the valley landscape. A new crop, hops, is now thriving in the area, climbing recycled rods from area gas rigs. Founded in 2011, High Wire Hops grows several varieties of hops in Paonia, Colorado. As Colorado breweries continue to boom and demand for locally-sourced ingredients surges, High Wire's organically grown mountain hops are in high demand. By formulating a farm plan that prioritizes high quality yields, irrigation efficiency, soil health, and a commitment to its community, High Wire is primed for continued success.

Sitting around 5,700' in Colorado's West Elk mountains, Paonia's warm days, cool nights, mountain runoff and ample sunlight combine for optimal conditions for agriculture. This unique climate was the basis for 2005-2008 hops growing trials by Colorado State University's Dr. Ed Page and Dr. Ron Godin. The trials found that several varieties of hops are well suited to grow in the area's uniquely high, arid and sunny climate.

There was opportunity in hops, and there was a niche to be filled. With CSU's promising research in hand, High Wire planted an acre of hops in 2011. With this trial planting, manager and farm partner David Warren says High Wire aimed to "track costs and assess the viability of providing high quality, organically grown hops to brewers throughout Colorado." With encouraging growing results and strong market response in this trial season, High Wire pressed onward, continuing to expand. "We are currently growing 4 varieties and will have 6 acres in production for the 2014 season," says Warren. They plan to plant an additional 2 acres this year.

Warren and the farm's other partners have sought to establish a farming system that accounts for the new set of challenges and opportunities with agriculture in the West. Hops cultivation, like every form of soil-based agriculture, requires water–a finite resource with increasing demand and waning supply. For High Wire, sound planning meant farming in an area where water could be counted on perennially, an increasingly important consideration as seasons grow hotter and drier. The North Fork of the Gunnison River, a tributary to the Colorado River that runs through Paonia, offered just that.

To fully capitalize on this prime water source, High Wire applied for and was awarded a Natural Resources Conservation Service (NRCS) grant to install their irrigation system. Warren says, "The grant covered the majority of our costs and included a settling pond, irrigation pump, all infrastructure pipe materials and installation as well as our drip irrigation system." This drip system is key to efficiency, as High Wire only applies the water required by

the crops. The farm has also invested in soil moisture content monitors, which allow them to quantify their water use and savings. As Warren says, “We put the water where we need it.”

Healthy soil is also crucial to High Wire’s sustainability. Here they use locally-sourced chicken manure compost and nitrogen-fixing crops to augment soil health, optimizing hops quality. These efforts naturally reduce input demands while creating an increasingly healthy, productive farm ecosystem for years to come. They also allow the farm to improve their application of irrigation water as the soil is better able to retain moisture and deliver it to the crop.

Location is key to High Wire’s sales and product outlet. The North Fork is just a four hour drive from Colorado’s Front Range, where the bulk of Colorado craft breweries operate. Warren notes that High Wire can harvest, process and deliver its hops all in an eighteen hour window. This quick turn-around is crucial to wet-hop beers, an increasingly popular brewing option that uses fresh from the vine, undried hops. By establishing partnerships with breweries eager to land organically-grown, fresh Colorado hops, High Wire has established a secure niche market for their unique crop.

High Wire has also established a strong relationship with Revolution Brewing, located just one half mile from the farm. Warren says Revolution’s owner and head brewer, Mike King, is “very passionate about supporting local agriculture, purchasing hops from our farm since we got started in 2011.” This community support for agriculture is the norm in Paonia. Warren notes that, “Paonia is a tight knit agricultural community and the majority of workers we employ throughout the growing season are locals.”

By partnering with the community brewery and encouraging the community to become involved in hops cultivation, a portion of High Wire’s hops remains within a local system. Here, all aspects of the beer, from the water to the brewing, occur in a one-mile radius. In addition, High Wire’s commitment to sustainability is adding to their operations’ resilience in the face of a changing climate and water scarcity. Their careful water use, soil health management and business practices are working to support their triple bottom line.

RESOURCES

High Wire Hops
www.highwirehops.com

Natural Resource Conservation Service
www.nrcs.usda.gov/wps/portal/nrcs/site/national/home

Challenges and Opportunities for Organic Hop Production in the United States
hops.msu.edu/uploads/files/aj-103-6-1645.pdf

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Center, Colorado

ROCKEY FARM

Specialty potatoes

In agriculture, the concept of hard work trumping most obstacles to success is longstanding. Today, farmers are at a new crossroads in the West: in addition to hard work, farming requires new thinking to meet the reality of even scarcer water supplies. This is the case in Colorado's San Luis Valley. For generations farmers in the valley have raised field crops—potatoes, barley—all relying on the shallow aquifer. But due to drought and over-pumping, aquifer water stores are now becoming worryingly depleted.

Faced with this scenario and the drought stretching into its fifteenth year, Brendon Rockey, a third-generation specialty potato grower at his family's Rockey Farm, has opted to act proactively rather than gamble that precipitation patterns and dipping water table levels will return to longstanding norms. At 36 years old, Rockey, who has farmed since the age of 16 and operates the farm with his brother Sheldon, looks at things differently: What began with Rockey's uncle and continues with him today is the understanding that the foundation of quality produce lies in healthy soil. In focusing first on soil quality, produce quantity soon follows. And so do water savings.

In a valley with an average annual precipitation of seven inches, every drop counts. Most of that precipitation falls as snow on any of the dozens of peaks lining this valley at the headwaters of the Rio Grande. Spring melt sends that snowpack down-river, through streams and ditches, and underground where it replenishes the aquifer—historically, at least.

But as conditions change, farmers either get pushed to the limit, or they get creative. Rockey is opting for the latter. In light of the tenuous water supply, Rockey decided to try something new—which is in fact something quite old: he planted a cover crop. Normally he would rotate his potato crops with a cycle of barley, keeping the land in constant production year-in and year-out. But seven years ago, when it was clear the drought was not going away, he removed the traditional barley rotation and instead put in a green manure cover crop. For starters, the green manure crops use significantly less water than barley yet keep the ground covered between potato harvests, protecting it from high levels of evaporation. Rockey saw immediate gains in reduced pumping costs from his well while saving the aquifer some water, too.

This management shift was an immediate response to drought. But soon other things began to happen. The next season when Rockey planted the potato crop on that

same plot its water demands dropped, as well. The soil had developed enough porosity in that one season alone to increase the amount of water it could hold over winter, rather than lose it to deep seepage, evaporation or runoff. That water then became available to the plants, further reduced the need to pump more water, and helped keep water table levels higher. Utilizing green manure crops was not only saving Rockey money but upping the long-term resilience of his operation.

Rockey's go-to tool for promoting soil health—green manure crops—not only help save water over time but also suppress weeds, manage insects, and augment soil chemistry between potato plantings. Rockey's strategically composed combination of more than ten green manure crop varieties includes legumes that fix nitrogen; taproot crops that reduce soil compaction; and flowering plants like buckwheat that attract predatory insects to control non-beneficial insect populations.

In addition, rather than needing to incorporate liberal doses of harsh outside nitrogen fertilizers and pesticides into the soil per industry norm, Rockey has fostered an ecosystem wherein vivacious soil, beneficial insect populations and thriving plants work together to conserve resources while yielding high quality produce. With the addition of green manure crops, Rockey went from using three tons of fertilizers annually to altogether eliminating

outside nitrogen inputs in 2013. His soil has become healthy enough to provide his crops exactly what they need. "I've got to heal the soil as much as possible," between harvests, he says. "Farmers need to become biologists again."

The situation in the San Luis Valley differs slightly from other basins where irrigation depends on surface water. Namely, although Rockey is building the resilience of his own operation by conserving water and building soil, if his neighbors don't do the same the water table will continue to drop. Which means deeper wells, spiking pumping costs and scarcer reserves in times of drought.

As Rockey continues to watch the valley's water wither, making these shifts toward sustainability looks out for the farm's bottom line as well as for the community of farmers in the San Luis Valley. It is illuminating how far removed many have become from the soil that only some years ago Rocky's soil health efforts were seen as eccentric, extra work. But today others are just beginning to accept soil health as an innovative shift in management, valuable at every scale, as farmers like Rockey point the way forward.

RESOURCES

Rockey Farm
www.rockeyfarm.com

Soil Guys: Biotic Farming Systems
www.soilguys.com

Brendon Rockey: The Big Picture
www.youtube.com/watch?v=MfwbTNK829k

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Marana, Arizona

WALKER FARMS

Grain farmer

Twenty-five miles north of Tucson, Arizona, a tractor slowly pulls a dirt-moving scraper, turning an 84-acre field into a series of level basins. From the nearby road, Jason Walker watches as the tractor kicks up a long plume of dust. He laughs and says, “Some people would say that I’m absolutely crazy for doing this, but I know I’m not. I’ve seen the water savings and the conservation benefits.”

At age 31, Jason Walker is certainly turning the heads of his neighbors. A third generation farmer, Walker now farms a total of 2,850 acres. Most of his acreage is leased land located in Marana, Arizona, and is farmed in partnership with his father. Walker’s approach is similar to that of many open-minded young farmers—a strategic blending of age-old farming knowledge with the aid of new research and technologies. Thus, he consults elder farmers for advice, but also uses cell phone apps to track his fertilizing, pest management, and crop yields by GPS.

Over the past four years, Walker has been cultivating a strong partnership with the Natural Resources Conservation Service. The NRCS was essential in helping Walker develop and fund his conservation plans, providing a financial assistance opportunity through the Environmental Quality Incentives Program (EQIP). As a beginning farmer, Walker qualified for a 90% reimbursement rate for his implementation of approved conservation practices. The funding not only allowed Walker to replace badly-damaged concrete lined irrigation ditches, but also to precision level the adjoining fields. Through this process, Walker was able to successfully transition his first 175 acres to a level basin surface irrigation system.

Chris Haynes, NRCS Soil Conservationist, estimates that Walker’s new level basin system is 20-30% more water efficient than the graded surface system that preceded it. Additionally, Walker’s new concrete ditches are 10% more water efficient than the old damaged ones.

“The water fills up each basin like in a bathtub, as opposed to running off, so there are huge water savings,” Haynes says of a level basin system, “It’s also much less labor intensive and produces more consistent crop yields, because each square foot is getting the same amount of water. It’s a win-win.”

The partnership with the NRCS has had a huge impact on Walker’s overall operation. NRCS representatives visit Walker’s operation regularly, and have helped him to learn the technical and mathematical skills necessary for land leveling. Having seen such a huge difference in water and labor savings in the first year alone, Walker has set out to level 450 additional acres, this time on his own dime and without any funding through NRCS.

NRCS has also helped Walker secure funding in order to experiment with reduced tillage and residue management. For the first time this year, Walker will not till in his wheat fields after the harvest, instead leaving the stalks and stubble to prevent wind erosion, evaporation and a loss of valuable top-soil. Because Walker's property lies in such close proximity to the I-10 freeway, Haynes considers reduced tillage to be a responsible and necessary air quality conservation practice. The practice provides a tangible way for farmers to reduce the level of harmful particulate matter in the air, as well as to do their part in the prevention of dangerous dust storms, which cause fatal traffic accidents and safety issues each year.

Even though this area of Arizona is historically known for its cotton production, Walker is intentionally shifting his focus away from cotton. Jason Walker's decision to move away from high-input cotton comes after poor region-wide cotton yields in 2013. Walker attributes the lower yields to changing weather patterns, which have meant extreme temperatures, destructive winds, and an increase in pest problems—all of which can spell catastrophe for growers.

"If a hard year came through again, I could absolutely not stay in business," Walker says. Though he plans to continue growing a small amount of cotton this year, his focus for 2014 is Durham Wheat, which is shipped to Italy for pasta production.

Looking towards the future, the cost and volatility of water is of primary concern for Walker. His fields are irrigated through a combination of ground wells and water from the Central Arizona Project, which pipes water from the Colorado River to feed Arizona's cities and farms. As the Colorado River and its tributaries continue to recede at alarming rates, Walker expects less available water and an increase in irrigation costs. But land costs remain fixed, leaving farmers with a smaller opportunity to generate a profit.

From a financial and environmental perspective, Walker thinks that farmers might be forced to consider less water-intensive, less risky crops. Indeed, the challenges around water and climate change have Walker rethinking cotton as this region's primary agricultural commodity.

"I'm just a guy who knows our world needs us to take care of it," Jason Walker says, "But it's absolutely our responsibility to conserve our finite resources. Farming takes everyone. We are all in this together, and we have to protect the opportunity for the future."

RESOURCES

Details on Irrigation Efficiency
www.cprl.ars.usda.gov/pdfs/Howell-Irrig%20Efficiency-Ency%20Water%20Sci.pdf

Residue and Tillage Management
www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1245425.pdf

Cotton and Climate Change
www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=0CDMQFjAB&url=http%3A%2F%2Fwww.intracen.org%2Fcotton-and-climate-change.pdf%2F&ei=t3d-U5KcJOHIsATFrICoBQ&usg=AFQjCNERrABSIXJJilyeiXywEeog8TJaJQ&sig2=LB5aw2nUDJsxiLHWKKDW-A&bvm=bv.67229260,d.cWc

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