



CERTIFIED Organic

THE SOIL COULD SAVE US

Mitigating Climate Change on the Farm



Get to Know a Few Future Organic Farmers
COFFA Signed into Law!
MyCCOF Upgrade: User Dashboard

THE SOIL COULD SAVE US

A man wearing a light-colored hat, a blue and white checkered shirt, and blue jeans stands in a field of dry, yellowish-brown grass. He is looking down and to the right. The background shows rolling hills under a clear blue sky.

Mitigating Climate Change on the Farm

WRITTEN BY Ellen Vessels

Rosie Burroughs is worried about the pines. Each time she drives from her family's dairy to their pack station in the Minarets, she notices more and more dead trees, the lush green landscape withering into a brown, twiggy boneyard. The Forest Service tells her the pines have been wiped out by a beetle that would normally die off in the cold season, but because the winters have been so mild, the beetle has proliferated, meaning devastation for the trees.

This is disconcerting not only for the forest, but also because the snow melt in the Sierra Nevada Mountains is a major source of California's water. An ecological imbalance in the Sierras could portend disaster for the entire state.

Burroughs has noticed other changes too, at her family's farms and at her neighbors'. Warm winters are confusing the plants, which bud and bloom out of season. Farmers who purchase water face skyrocketing prices. Others neighbors have had their water cut off before their crops could ripen.

For the agriculture industry, the effects of climate change have become undeniable, especially in the drought-prone state of California. Farmers, whose livelihoods are utterly dependent upon the cycles of nature, are on the front lines of the battle, taking the first and hardest blows. So while others may anxiously await for yet undiscovered technologies to thwart climate change, organic farmers are already adapting. Better yet, they are creating solutions that we can use immediately.

As organic agriculture has proven time and time again, management practices that benefit the environment also make farms more resilient. The healthy, water-retaining soils of organic farms are less likely to flood and will withstand drought. On biodiverse farms with habitat corridors, hedgerows, and intercropping, predator species will keep pests in check as warm winters lengthen their life cycles. And as fossil fuels become increasingly precious resources, organic farmers will be less vulnerable to the instability of market prices since their farms use an estimated 30 to 50 percent less energy than conventional farms.

But organic management can do more than just prepare farms for unpredictable conditions—it can actually mitigate, and possibly even reverse climate change. Farmers carry a heavy responsibility to do whatever they can to turn the tide, and luckily, organic farmers are already using techniques that benefit not only their crops, but the Earth's atmosphere as well.

Organic management of soil, and the resulting carbon sequestration, could very well be the most feasible, affordable, and immediate short-term solution to address our climate crisis.

Less Fossil Fuel Means Lower Emissions

Organic farms are already setting an example for their conventional counterparts by emitting less greenhouse gases, largely by opting out of the use of synthetic fertilizers, pesticides, and herbicides. The fossil fuel used in the manufacturing of these amendments emits a tremendous amount of greenhouse gases. The problems don't stop after these products leave the factory—application of nitrogen-based fertilizers releases the greenhouse gas nitrous oxide (N₂O) into the atmosphere. Fertilizers continue to give off N₂O as they leach out of the soil and pollute nearby waterways. Organic farmers abstain from using these heavy emitters, instead feeding the soil with compost and nitrogen-fixing cover crops, and controlling pests by intercropping or creating wildlife corridors to attract predator species instead of using toxic pesticides.

Organic farmers are also finding energy solutions that forgo fossil fuels, including solar and wind power systems. Some farms are even recycling agricultural byproducts to generate electricity or power farm vehicles with biofuel. These renewable energy sources save farmers money and lower overall greenhouse gas emissions. Some farmers even earn additional income by selling excess wind or solar power back to the grid.

Reducing greenhouse gas emissions is helpful, but is it enough? Many experts fear that we may have irreparably altered our atmosphere, and that even if we slow down our greenhouse gas emissions now, it may be too little too late.

Luckily, reducing greenhouse gas emissions is not the only available response to global climate change. There is another solution, one that many organic farmers are already accomplishing whether they realize it or not.

The Soil Could Save Us

Excess carbon dioxide (CO₂) in the atmosphere is a major contributor to climate change. However, the atmosphere is not the only thing absorbing carbon emissions—it shares the burden with the ocean, geological formations, plants, and soil. And while the ocean becomes acidified when it takes in excess atmospheric gas, endangering marine ecosystems, the soil is like a sponge that can afford to safely absorb significantly more carbon.

The process is called soil carbon sequestration, and it's a direct result of photosynthesis. Plants convert CO₂ into carbon, storing it in soil organic matter, an aggregate of root masses, minerals, decomposing plants, and microbial life. This carbon either remains stabilized in the soil or is released once again into the atmosphere, depending on a number of conditions.

As you might have guessed, organic soil management creates conditions that encourage carbon sequestration, and that carbon stays in the soil for years—even decades—at a variety of depths. Soil carbon in turn improves the health of the soil, making it more productive. Yet again, organic practices are a win-win for both our atmosphere and for farmers.

A 27-year study by the Rodale Institute found that organic systems significantly increase soil carbon sequestration when compared to conventional systems. In fact, the researchers took their data one step further, scaling up their findings to predict what might happen if all of our planet's farmland were converted to organic. Their data suggests that, using organic soil management, we could sequester more than 100 percent of current yearly CO₂ emissions, significantly slowing the effects of greenhouse gas and climate change.

Organic management of soil, and the resulting carbon sequestration, could very well be the most feasible, affordable, and immediate short-term solution to address our climate crisis.

For more examples of the organic practices that can help slow climate change, we turn to the farmers themselves.

Morris Grassfed Beef: Holistic Grazing for Soil Carbon Sequestration

Morris Grassfed Beef raises cattle organically for their own direct-market business and for several other purveyors. Their thousands of cattle roam vast rangeland and do not require any commercially-produced feed.

You might assume that Morris Grassfed uses rotational grazing, but rancher Joe Morris prefers not to use the word "rotational"—he says it implies a "mechanical approach." His management style, inspired by ecologist Allan Savory's Holistic Management framework, considers the entire ecosystem and the ways that grassland plants and ruminants co-evolved.

Long before humans tamed livestock, ruminants grazed huddled together for protection against predators. Once their manure had fouled one grazing area, they would move on to the next area, leaving ample time for grasslands to regenerate their perennial plant growth and for the soil to reinvigorate with microbial life. Joe Morris manages the grazing of his cattle to simulate this ancient process.

Whereas feedlots rely on fossil fuel-intensive feeds and other ranchers continuously graze animals in the same location, depleting the soil and plants, the Morrises' style of grazing actually sequesters carbon into the soil, decreasing the ranch's overall carbon footprint. Rather than being munched



on continuously, perennial plants are allowed to reestablish, giving them plenty of time to photosynthesize and convert atmospheric CO₂ into soil organic carbon. Their large perennial root systems and healthy, microbe-rich soil absorb that carbon and hold it there.

Morris Grassfed Beef participates in the Soil Carbon Coalition, an organization collecting data about management practices and carbon sequestration. From 2011 to 2015, even under drought conditions, soil carbon increased in the Morrises' most intensively-grazed rangeland by 7 percent in the top 10 centimeters of soil, by 11 percent in the next 15 centimeters, and by 5 percent another 15 centimeters deep.

Besides managing their grazing to maximize carbon sequestration, Joe and Julie Morris also contribute to the struggle against climate change by engaging other ranchers and their local community. Says Joe Morris, "We can't really thrive, or maybe even survive, if our communities fall apart." Borrowing a phrase from their tech industry neighbors in the Silicon Valley, they call Morris Grassfed an "open source" company, meaning they'll gladly share their tricks of the trade with other ranchers. Joe Morris is an advisor to the California Climate and Agriculture Network, and also founded Rancher to Rancher, an organization that helps ranchers share information about "how to create the best possible future" for California's beef market and its ecosystems.

Burroughs Family Farms: Grass Farmers, First and Foremost

When people ask the Burroughs family what they grow, they answer, "we're grass farmers." That's because, according to the Burroughses, the health of the pasture is vital to the health of their dairy cows and the ecosystem as a whole.

Like Joe Morris, when the Burroughses plan the grazing schedules for their animals, they carefully consider the interconnected lifecycles of the cows, the pasture, and the soil. Their system, called Managed Intensive Grazing, allows

perennial grasses to regrow, and also times calving with the regrowth of pastures so that newborns receive maximum nutrition from their mothers' milk.

The Burroughses use a diversity of grassland plants to increase soil carbon sequestration. They are working with local nurseries to continuously add native plants. A variety of plants with different root depths pull up nutrients from all parts of the soil to feed the pasture. What's more, the varied root depths of the Burroughses' diverse pastures also help the soil sequester carbon at different levels.

For the Burroughses, "the key to the future is building soil." When their pastures need a boost, they plant new grasses by overseeding, a practice that requires only very light tillage, thus preserving the integrity of the topsoil. The Burroughses eschew the use of synthetic fertilizers and pesticides because these amendments destroy the microbial life of the soil that is so crucial for carbon sequestration.

Instead, they nourish the soil with compost made from manure and plant residue, which has the added benefit of reducing the amount of waste that would otherwise be sent to a landfill. On the Burroughses' almond and olive farms, cover crops are planted between the rows, likewise adding nutrients to the soil and sequestering carbon.

Rosie Burroughs can't stop her plants from budding early, but she can protect her farm from the worst effects of drought. Cover cropping, composting, and careful pasture management are all practices that not only build soil health and allow for soil carbon sequestration, but also help the soil retain moisture through drought periods. When rain hits bare, lifeless soil, it bounces off, causing flooding and soil erosion. On the other hand, when it rains on the Burroughses' farms, the healthy, cover-cropped soil absorbs and retains water, replenishing the aquifer. The Burroughses also conserve rainwater through a system of French drains that funnel rain and irrigation runoff into holding ponds that double as habitats for beneficial predators and migratory birds. Once again, organic practices benefit both the environment and the farmers.



Fetzer Vineyards: Beyond Sustainability

For Fetzer Vineyards, makers of Bonterra Vineyards organic wines, every stage of production, from seed to bottle, is an opportunity to make a positive impact. According to their Director of Regenerative Development Josh Prigge, the company would like to move “beyond sustainability” –not just maintaining their farm and ecosystem, but enhancing it. Always looking to the future, Fetzer Vineyards would like to become a “net positive” company by 2030, meaning that their operation not only neutralizes its negative impacts, but creates positive changes. They’d like to add more water to the aquifer than they take, and sequester more carbon than they emit.

With their commitment to environmentally-conscious practices and a number of cutting-edge technologies, they are well on their way to this goal. In 2005, Fetzer became the first winery to publicly report their greenhouse gas emissions to the Climate Registry. Besides the fact that organic practices produce less greenhouse gasses than conventional, Fetzer Vineyards also keeps emissions low by powering their operations entirely with renewable energy, about 20 percent of which comes from their on-farm solar system while the rest is purchased from a wind turbine. To make up for the emissions they can’t eliminate, the company purchases carbon offsets to become a certified CarbonNeutral® company.

Agriculture’s impact on the atmosphere doesn’t end at the farm. Waste that goes into landfills or incinerators also causes greenhouse gas emissions. That’s why Fetzer Vineyards has been reducing its waste since 1990, and in 2014 became a certified Zero Waste company. Over 99 percent of waste produced by the vineyards, winery, and office buildings is composted, reused, or recycled.

The vineyard’s water is recycled, too. A promising new technology uses earthworms and microbes to clean all of the winery’s wastewater which then irrigates the vineyard. The new system cuts energy costs by 85 percent and will keep the vineyard well-watered even in times of drought. As an added

bonus, the earthworms generate castings, a valuable ingredient that is added to the compost made from grape seeds, skins, and stems. This compost, in turn, feeds the grape plants and builds soil organic matter, which besides sequestering carbon, also increases water retention in the soil, protecting the plants from heat spikes during the summer ripening phase.

Fetzer Vineyards wants to be a leader in the movement to reverse climate change. Says Prigge, “Agriculture is seen as contributing so much to climate change. What we’re saying is that we can actually be the biggest ally in this fight.”

The Solution is in Our Hands

These outstanding farmers prove that making environmentally-sound management choices doesn’t mean sacrificing your crops or your profits. On the contrary, organic farms thrive when ecosystems are healthy. By using less fossil fuel, improving soil health to sequester carbon, and encouraging a diverse ecosystem of plants and insects, organic farmers are fortifying their farms against unpredictable conditions while simultaneously alleviating the impacts of—and potentially reversing—climate change. What’s more, these farmers have gone above and beyond the basic requirements for organic certification, finding innovative ways to make a positive impact on the soil, the aquifer, local ecosystems, and the atmosphere as a whole.

It’s easy to feel pessimistic when it comes to climate change. In order to avoid potentially apocalyptic consequences, our fossil fuel-addicted economy will have to undergo extraordinary transformations that can’t come quickly enough. The rising temperatures remind us that all ecosystems are interconnected—no one will escape the impacts of climate change. And yet this interconnectedness also means that the changes we make locally can impact the entire planet. Organic farmers are proving that we already hold the solutions in our hands, and in the soil beneath our feet. As we face the biggest environmental challenge in human history, we’ll look to the wisdom of organic farmers to lead the way.