

REPORT

GROW ORGANIC:

THE CLIMATE, HEALTH, AND ECONOMIC CASE FOR EXPANDING ORGANIC AGRICULTURE



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ACKNOWLEDGMENTS

The Natural Resources Defense Council (NRDC) published this report in partnership with the Swette Center for Sustainable Food Systems at Arizona State University and Californians for Pesticide Reform. Kathleen Merrigan, Estève G.e Giraud, and Nadia El-Hage Scialabba of the Swette Center are the lead authors, with significant contributions from Lena Brook and Allison Johnson of NRDC and Sarah Aird of Californians for Pesticide Reform.

The authors would like to thank our peer reviewers, Amber Sciligo from The Organic Center; Jessica Chiartas from the University of California, Davis; Margaret Reeves from Pesticide Action Network; Brise Tencer and Gordon Merrick from the Organic Farming Research Foundation; and Catherine Greene from the Swette Center, as well as numerous other partners for taking time out of their busy lives to provide invaluable input on our early drafts. We are also grateful to our NRDC colleagues for their support, wisdom, and input: Arohi Sharma, David Wallinga, Jennifer Sass, Miriam Rotkin-Ellman, Melodie Mendez, and Leah Stecher.

We are especially grateful to Sarahlee Lawrence, Benina Montes, Kanoa Dinwoodie, Yasmin Alvarado, Klaas Martens, Arnott Duncan, Loretta Adderson, Andrea Davis-Cetina, Daphne Snow, Will Glazik, Carmen Mendoza, Sedrick Rowe, Patricia Rodriguez, Anna Jones-Crabtree, and Doug Muller for informing our policy recommendations and allowing us to share their stories.

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Cover image: © Lance Cheung/USDA

Design and Production: www.suerossi.com

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Executive Summary

Organic agriculture holds significant and largely untapped potential to address multiple crises facing our society, including climate change, health, and struggling economies. Public policies that support expansion of organic farming and ranching across America—including substantial investments in the next Farm Bill—can unlock this potential and deliver a critical triple win for our climate future, the health of farmworkers and consumers, and prosperity in farming communities.

Organic agriculture is a time-tested, scientifically supported approach to farming and ranching that centers ecological diversity, soil fertility, and natural systems rather than chemical interventions. The Organic Foods Production Act of 1990 (OFPA) created a National Organic Program (NOP) that provides a consistent framework and third-party certification system for agricultural products labeled “organic,” informed by decades of experience of farmers and ranchers, soil and plant scientists, food system workers, environmentalists, and consumers.

In contrast, the dominant, conventional agriculture system is extractive and exploitative. It relies on fossil fuel-intensive synthetic pesticides and fertilizers that harm human health through contamination of air, water, and food. Large-scale conventional livestock operations are a major source of methane, a potent greenhouse gas, as well as environmental pollution that threatens neighboring communities. And conventional agriculture as a system disproportionately benefits corporate agribusiness—just a handful of companies—rather than farmers and consumers.



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Organic Means:



- ✓ Healthy soil with compost, cover crops, crop rotation
- ✓ Natural pest control
- ✓ Organic feed and pasture for animals
- ✓ Ecosystem protection
- ✓ Climate-friendly and resilient
- ✓ Legally defined, third-party verified

- ✗ No synthetic fertilizers
- ✗ Few synthetic pesticides
- ✗ No antibiotics or growth hormones
- ✗ No GMOs, irradiation, sewage sludge
- ✗ Limited food additives

ORGANIC AGRICULTURE BENEFITS OUR CLIMATE, OUR HEALTH, AND OUR LOCAL ECONOMIES

OFPA and the NOP ensure that organic producers:

- Build healthy soil with holistic practices like composting and cover crops, without synthetic fertilizers;
- Rely on natural pest and disease control strategies instead of synthetic pesticides;
- Raise animals with more time on pasture and without antibiotics and other drugs;
- Reduce additives and protect against chemicals in processed organic foods;
- Avoid genetically modified organisms (GMOs), irradiation, and sewage sludge; and
- Preserve and protect biodiversity and natural resources.

CLIMATE: Organic agriculture reduces the greenhouse gas (GHG) footprint of farming by eliminating most fossil fuel-based inputs, and it builds climate resilience by promoting healthy soils, diversifying food crops, and supporting threatened wildlife habitats and biodiversity. Data show that organic farming emits less nitrous oxide by avoiding chemical fertilizers and pesticides commonly used in conventional agriculture, and organic livestock production leads to fewer methane emissions compared with conventional concentrated animal feeding operations (CAFOs). And by building healthy soils that retain water and store carbon, organic agriculture builds resilience and stabilizes our food supply in the face of drought and other extreme weather conditions that will occur with increasing frequency in a changing climate.

HEALTH: Research demonstrates that organic agriculture benefits our health by dramatically reducing exposure to agricultural pollution in air, water, and food. Farmworkers and others working and living near conventional farms suffer serious acute and chronic health ailments associated with pesticide exposure, and studies indicate that pesticide residues in our food may be harmful to consumer health. Organic producers avoid dangerous synthetic pesticides and numerous additives and processing chemicals that are allowed in or on nonorganic foods, and they limit fertilizer and waste contamination of waterways. In addition to protecting health by cutting toxins from our environment,

organic agriculture produces healthier, more robust crops that have enhanced nutritional benefits. As a holistic approach to food production, organic protects the health of farmworkers, farmers, eaters, ecosystems, and our environment.



ECONOMIES: Evidence shows that organic agriculture creates economic vitality and growth important to farmers and farming communities. Researchers have identified “organic hotspots” across the United States where increased organic production generates new jobs, lowers unemployment, and spurs agricultural business growth across a region. An emerging generation of young farmers is discovering that organic agriculture can be both highly productive and profitable, enabling these farmers to stay in business and expand production for local and regional markets.

However, in spite of its many public benefits, organic agriculture does not receive the governmental support necessary for widespread adoption. Only 1 percent of U.S. agricultural land is managed organically, and organic agriculture receives only a sliver of federal agriculture spending annually. Meanwhile, conventional agriculture is supported by billions of taxpayer dollars a year.

We need to transform our agricultural policies to ensure that many more people can farm, ranch, and eat organically. In the next Farm Bill, Congress should significantly increase support for organic, to align public investments with the climate, health, and economic outcomes communities across the country need. In parallel, the executive branch should make a strong commitment to advancing organic.

OUR FEDERAL LEADERS SHOULD:

1. Expand organic production by reducing barriers to organic transition
2. Ramp up federal resources that promote organic innovation, success, and accessibility
3. Ensure racial and Indigenous justice and equitable participation in organic agriculture
4. Use true cost accounting to identify agricultural investments that benefit the public
5. Create stable organic markets and expand access through public procurement
6. Reward organic management and ecosystem services in agricultural policies
7. Educate the public about the benefits of organic
8. Invest in regional supply chains to meet growing demand for organic
9. Strengthen organic rules and enforcement
10. Integrate organic throughout public institutions

Today’s conventional agriculture system contains immense hidden health, environmental, social, and economic costs—subsidized by our tax dollars—that we can no longer afford. Expanding organic agriculture is an investment in a sustainable, healthy future.

Introduction

At its core, organic agriculture is based on a set of principles and values that center ecological diversity, the maintenance and improvement of soil fertility, and reliance (to the extent possible) on natural rather than synthetic interventions. By removing toxic chemicals from food production, organic protects the health of farmworkers, farmers, consumers, ecosystems around farms, and our environment.

Organically grown food has become widely popular in the United States. According to polling, more than 80 percent of Americans regularly purchased organic food in 2016.¹ The U.S. Department of Agriculture's (USDA) National Agricultural Statistics Service *2019 Organic Survey* reported a 17 percent increase in certified organic farms and a 9 percent increase in certified organic acreage between 2016 and 2019.²

To be certified as “organic,” farmers and ranchers must adhere to a set of scientifically supported, time-tested practices, rooted in Indigenous knowledge of ecosystems, that treat farming and nature as a holistic and interrelated system, both below and above the ground. These practices—informed by decades of experience of farmers, ranchers, soil and plant scientists, consumers, and other participants in the organic movement—were codified in the Organic Foods Production Act of 1990 (OFPA).³ Pursuant to OFPA, USDA created the National Organic Program (NOP), which establishes protocols to safeguard organic integrity, including rigorous scientific review of allowed inputs and ingredients and third-party oversight to ensure that everyone follows the rules.



Huerta del Valle, a 4-acre organic community supported garden and urban farm located Ontario, CA.



Organic Means:



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- ✗ Limited food additives

Organic rules under OFPA and the NOP support healthier people, crops, animals, and natural systems. Requirements include:^{4,a}

- Building healthy soil with holistic practices and natural fertilizers like compost, and without synthetic fertilizers
- Relying on natural pest- and disease-control strategies instead of synthetic pesticides
- Raising animals with more time on pasture and without antibiotics or other drugs
- Reducing additives and protecting against chemicals in processed organic foods
- Avoiding genetically modified organisms (GMOs), irradiation, and sewage sludge.

Organic farmers are also required to preserve and protect biodiversity and natural resources, with the aim of replenishing or maintaining ecological balance on farms.⁵ To accomplish this, organic farmers must support synergy among plants and animals; this is implemented through crop rotations, intercropping, cover cropping, and enhancing biodiversity in crop and non-crop habitats.⁶ Organic livestock farmers and ranchers, likewise, are required to ensure animals eat only organically grown feed and ruminant animals spend significant time on pasture.⁷

Obtaining organic certification—a prerequisite to selling products labeled “organic”—requires that a farmer or rancher: create an organic system plan that describes their management systems and all materials used and maintain detailed records; document that no prohibited pesticides or fertilizers have been applied to the land for three years; work with a USDA-accredited third-party certifier that reviews the organic system plan and inspects the operation every year; and be subject to unannounced inspections and soil testing to verify compliance.⁸ Processing or “handling” operations have similar requirements, to preserve organic integrity throughout the supply chain.⁹

THE ORGANIC RENAISSANCE: HOW DID WE GET HERE?

Today’s growing organic sector and the laws and regulations that make it possible did not arise overnight, nor without significant effort. The organic farming movement blossomed in the 1960s and 1970s, in tandem with environmental and public health movements and growing awareness of the dangers of conventional agriculture and the oversimplified approach of the Green Revolution, which focused on yields above all else.¹⁰ The push for a national organic standard gained steam in 1989, spurred by rising concern about Alar (daminozide), a carcinogenic chemical used in apple production.¹¹

“Organic production” is defined by law as “a production system that is managed in accordance [with the requirements of OFPA and NOP regulations] to respond to site-specific conditions by integrating cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity.”¹²

a See the Appendix to this report for a more detailed account of organic requirements.

Consumers and organic farmers sought clear, consistent standards and accountability for foods called “organic.” A year later, as part of the 1990 Farm Bill, OFPA became U.S. law.¹³

OFPA is a unique, groundbreaking statute for many reasons, including its prioritization of ongoing stakeholder input through a 15-member National Organic Standards Board that advises USDA on implementation and continuous improvement.¹⁴ No other agricultural standard has established a process to certify and monitor every type of production, in every region of the country, at every scale of operation.

The culmination of years of advocacy and public participation, OFPA led to meteoric growth in organic agriculture and public interest in organic products. In 1997 the law’s first proposed rule generated an extraordinary 275,603 public comments, more than had been seen for any previous USDA proposal.¹⁵ That level of interest from both farmers and the public has continued to grow.

Unfortunately, federal investments in research and marketing to support the industry have not matched the consistent, rapid growth of the organic sector. Meaningful public investments in organic production are long overdue, especially as farmers and ranchers are increasingly interested in sustainable practices and climate resilience.¹⁶

CONVENTIONAL AGRICULTURE’S HARMFUL TOLL

The agribusiness-driven “conventional” approach that dominates agriculture today stands in sharp contrast with organic agriculture’s foundational focus on health and sustainability. Conventional agriculture relies on synthetic chemical inputs (fossil fuel-intensive pesticides and fertilizers that undermine human health and pollute our air, water, and soil) to promote short-term yields and reduce labor needs. Conventional production is extractive, depleting rather than feeding our soil. It also pollutes our water and ecosystems and harms the health of farmers, workers, and communities who serve as the backbone of our food system.

This is true of livestock as well as crop agriculture. Concentrated animal feeding operations (CAFOs), where most animals in the United States are raised before slaughter, produce livestock on an industrial scale by cramming animals into tight quarters, feeding them grain instead of letting them graze, and relying on antibiotics to compensate for these unhealthy conditions. CAFOs generate massive amounts of manure as a waste product, which threatens community health and pollutes air, water, and soil.¹⁷ CAFOs and other intensive animal agriculture systems also decouple crop and livestock production, increasing reliance on synthetic crop nutrients rather than manure as a natural fertilizer.¹⁸



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Moreover, the harms from conventional production cannot be contained on those farms. Pesticide impacts reach beyond the conventional grower's operation. With a light breeze, airborne pesticides frequently drift over fields and fences to contaminate local communities and organic farms as well.¹⁹ For example, in 2021 alone, the U.S. Environmental Protection Agency (EPA) received nearly 3,500 reports that one particularly drift-prone herbicide, dicamba, was responsible for drift damage.²⁰ To avoid pesticide drift contamination when abutting conventional farms, organic farmers must often establish buffer strips, a practice that costs them land and money.²¹

A 1980 USDA report on organic farming noted “increasing concern about the adverse effects of our U.S. agricultural production system,” including:

- “(1) Sharply increasing costs and uncertain availability of energy and chemical fertilizer, and our heavy reliance on these inputs.
- (2) Steady decline in soil productivity and tilth from excessive soil erosion and loss of soil organic matter.
- (3) Degradation of the environment from erosion and sedimentation and from pollution of natural waters by agricultural chemicals.
- (4) Hazards to human and animal health and to food safety from heavy use of pesticides.
- (5) Demise of the family farm and localized marketing systems.”²²

“Consequently,” the report noted, “many feel that a shift to some degree from conventional (that is, chemical-intensive) toward organic farming would alleviate some of these adverse effects, and in the long term would ensure a more stable, sustainable, and profitable agricultural system.”²³

These observations remain highly relevant today. The chemical-intensive conventional system results in far-reaching harms to human health and our environment, including unsafe working conditions; extensive water, air, and climate pollution; and species loss.

Weakening the Stability of Farming Communities

A handful of enormous agribusinesses that profit from the sale of chemical inputs and cheap commodities have shaped conventional agriculture and reinforced their dominance by influencing public policy.²⁴ Agrichemical companies popularized synthetic pesticides and fertilizers in the 1940s.²⁵ One of the best-known early synthetic insecticides, DDT, was used in World War II to fight diseases carried by mosquitoes and lice. In peacetime, the chemical industry shifted to marketing it—and numerous other chemicals—for widespread use.²⁶

At the same time, and alongside lax antitrust enforcement that allowed massive conglomerates to proliferate, late-twentieth-century agricultural policies compelled farmers and ranchers to “get big or get out.”²⁷ Since the 1970s especially, public spending on agriculture, including Farm Bill commodity payments and more recently crop insurance, have propelled a conventional system that supports large-scale production of cheap, heavily subsidized, and input-intensive commodities (such as soy, corn, wheat, sugar, and cotton) and production of meat through harmful, polluting CAFOs.²⁸

After decades of mergers and growth pressure, a handful of companies continue to shape and profit from conventional agriculture, creating a food and farming system that works for very few and leaves producers, workers, and consumers with diminishing options. This consolidated marketplace limits the ability of smaller-scale farmers and ranchers to thrive—or even survive.²⁹ Producers are forced to shell out more and more for synthetic inputs that deliver less over time and feel constant pressure to get bigger or sell the farm; half of U.S. farms barely break even every year.³⁰ As a result of these and many other stressors, farming communities face a growing mental health crisis.³¹

Threatening Human Health

Pesticide exposure and environmental contamination threaten the health of agricultural workers and their communities, neighboring farms, chemical manufacturing workers and their communities, ecosystems, and consumers.

Pesticides are designed to kill and are inherently toxic. While chemicals are designed to target specific pests (e.g., herbicides kill plants, insecticides kill insects), they have wide-reaching “nontarget” effects as well. More than 1.1 billion pounds of pesticides are applied annually to crops in the United States, accounting for approximately 23 percent of global pesticide use.³² Many of the pesticides that dominate U.S. agriculture are banned in other countries, including the European Union, Brazil, and China, because they pose such dire threats to public health and the environment.³³

Farmworkers—the people at the heart of our food supply—are on the front lines of pesticide health threats and most at risk from this environmental injustice. Exposed daily to toxic chemicals that studies have repeatedly linked to both acute poisonings and chronic diseases, including asthma and various cancers, farmworkers suffer more chemical-related injuries and health issues than any other U.S. workforce.³⁴ Workers and communities near agrochemical manufacturing sites face similar health risks.³⁵



The health threats from pesticides also extend well beyond farms and factories. Those living near farming areas are harmed by pesticide drift and other types of exposure, while pesticide residues in our food put all consumers at risk.³⁶ Pregnant women, infants, and young children are particularly vulnerable to harm from pesticides.³⁷ Exposure to even low levels of some of our most widely used pesticides early in life increases the risk of permanent brain impairment.³⁸ In addition, exposure to multiple chemicals can contribute to a more harmful “toxic cocktail” effect, but chemical safety regulations do not adequately address these cumulative impacts.³⁹

Conventional agriculture also undermines health by contributing to the spread of antibiotic resistance. The CAFOs that produce most of America’s meat and dairy are a major driver of antibiotic resistance in humans.⁴⁰ CAFOs routinely rely on antibiotics to help animals survive in profoundly unhealthy, intensely crowded and inhumane conditions, instead of providing healthy environments where animals can thrive.⁴¹ Use of antibiotics

in conventional crop agriculture is also expanding, with concerning implications for human health.⁴² Repeated exposure to antibiotics drives the growth of antibiotic-resistant strains of bacteria that can make common human infections hard or impossible for doctors to treat.⁴³

Worsening Our Climate Crisis

With its reliance on fossil fuel-based pesticides and fertilizers, conventional agriculture has transformed U.S. food production from a biological process driven by sunshine, rainfall, and healthy soils into a polluting industrial system that increases greenhouse gas (GHG) emissions at a time when we must urgently reduce them. Agriculture as a sector generates at least 11 percent of overall U.S. GHG emissions, according to the EPA.⁴⁴ This figure is likely a substantial underestimate of the true climate impacts of chemical-intensive agriculture, as it does not include many pre- and post-production emissions, from pesticide, fertilizer, and equipment manufacturing

to processing, distribution, and waste.⁴⁵ Through the production and use of fossil fuel-based inputs—especially synthetic nitrogen fertilizer—and major GHG emissions from confined livestock operations, conventional agriculture is a significant contributor to the climate crisis. In today's era of climate upheaval, conventional agriculture is a dangerous and outmoded means of food production—part of the problem rather than a solution.

Undermining Ecosystems

For decades researchers have documented harms to ecosystem health and biodiversity from conventional farming, including the catastrophic decline of insects, collapse of fisheries, loss of birds, and birth defects in wildlife.⁴⁶ Toxic pesticides and chemical fertilizers contaminate water, leading to dead zones where life cannot be sustained; they also harm beneficial insects and soil life that are necessary for healthy crops, destroy vital pollinators, and threaten biodiversity, which is critical to ecosystem resilience. Our global food system directly threatens 24,000 of the 28,000 species at risk of extinction and has been identified as the primary driver of biodiversity loss.⁴⁷

EXPANDING ORGANIC WILL IMPROVE HEALTH, CLIMATE, AND ECONOMIES

Organic agriculture offers producers and communities another path. Expanding public investment in organic agriculture will produce vital benefits for our health, for our climate future, and for agricultural economies across the United States.

By removing toxic chemicals from agriculture, organic farming and ranching protect the health of workers and consumers, the air we breathe, and the water we drink. By minimizing our environmental and dietary exposures to synthetic chemicals, more organic farming and food consumption will boost our health as a society. Likewise, the reduction of antibiotic use in livestock and crop agriculture will ensure that precious human medicines continue working as long as possible and can be relied on when we need them most.

To meet the Paris Climate Agreement target of holding global warming under 1.5 °C, we must change the ways we produce our food.⁴⁸ Organic agriculture—the most comprehensive climate-friendly food production system with enforceable legal standards—offers an enormous

untapped opportunity to dramatically reduce greenhouse gas emissions. By supporting public investments, policy incentives, and new markets to promote organic farming and ranching, decision makers can help significantly reduce the climate footprint while also dramatically increasing the resilience of the agriculture sector.

Finally, for struggling farmers and farming communities, organic can bring a surge of fresh economic life. Diversified organic farms—compared with conventional farms that grow a single crop—have more resilience and less risk of crop failure in extreme and stressful conditions, varied revenue sources, and access to local and regional markets that contribute to economic stability.^{49,b} While organic farmers are not insulated from challenges, research shows that they are more profitable than their nonorganic counterparts.⁵⁰ Between 2012 and 2017, organic farm income doubled, while average U.S. farm income remained flat.⁵¹ Shifting to more organic production can help farmers and ranchers improve their incomes, provide more year-round employment opportunities by producing a wider range of crops and products, and benefit businesses up and down the organic supply chain such as organic food processors, seed and input suppliers, and retail outlets.⁵²

Researchers have also identified “organic hotspots,” counties with high levels of organic agricultural operations. These areas have higher median household incomes, higher employment rates, and lower rates of poverty than regions with similar levels of general agricultural activity.⁵³ These hotspots suggest that organic agriculture can and should be leveraged as an engine of rural economic development for struggling farm communities across America.

FOOD AND FARMING POLICIES SHOULD UNLOCK THE POTENTIAL OF ORGANIC

To protect and restore our climate, public and ecological health, and farming community economies across the United States, the time has come to invest in what we know works: organic agriculture. Currently, only 6 percent of food sold in the United States is certified organic, and we urgently need that number to rise.⁵⁴ Strong investments in organic throughout the Farm Bill and across federal government can be leveraged to expand existing programs that support organic farming and ranching, to develop new ones, and to ensure that organic is for everyone, including producers and communities of color who haven't been served fairly by federal agricultural policies or our food system.

^b Farms that grow the same crop year over year on the same parcel of land are also known as monocultures or mono-crop systems.



The Farm Bill should include programs that support farmers as they transition to organic production and should link them with key markets, such as schools and other institutions. It should also include substantial investments in organic agriculture research, technical assistance, and other tools to support producers, delivered in ways that address existing structural inequities in agricultural policies and support underserved producers, consumers, and regions. At the same time, we need a

strong administrative commitment to organic, to ensure a consistent, whole-of-government approach to organic production.

Expanding organic agriculture is an investment in our future. Today's conventional system contains immense hidden costs subsidized by our tax dollars that we can no longer afford. Our public resources should instead support the positive health, environmental, social, and economic outcomes that organic can deliver.



ORGANIC & CLIMATE

Organic Increases Agricultural Climate Resilience

Organic Improves Soil Health and Carbon Sequestration

Organic Reduces Greenhouse Gas Emissions

Organic Reduces Greenhouse Gas Emissions and Builds Resilience

In order to meet the 1.5 °C reduction target set by the Paris Climate Agreement, we must dramatically shift the ways we farm and eat.⁵⁵ According to the EPA's Greenhouse Gas Inventory, U.S. agriculture was directly responsible for about 11 percent of human-caused GHG emissions in the nation in 2020 (the transportation sector, the largest contributor, accounts for 27 percent), primarily through nitrous oxide (N₂O) from synthetic fertilizer application and manured soils, and methane from animal agriculture.⁵⁶ When taking into account a wider array of activities outside the farm gate, the food and agriculture sector is responsible for up to 30 percent of total human-caused GHG emissions in the United States.⁵⁷ Meanwhile, the climate footprint of synthetic pesticides remains under-researched and under-quantified. Our dependence on fossil-based inputs and other agricultural practices that increase the climate footprint of agriculture systems is simply not compatible with a sustainable climate future.⁵⁸

In the United States, agricultural lands, including croplands, permanent pasture, and rangelands, occupy more than one billion acres, representing the largest land use in the country.⁵⁹ Based on scale alone, U.S. agriculture has the potential for immense damage to the environment and communities—or immense benefits. As an industry, agriculture is vulnerable to the impacts of climate change but also has the capacity to become a climate solution. In addition to reducing greenhouse gas emissions, organic management practices can draw down carbon into soil and support increased resilience to drought, floods, pests, and disease.

At this time, organic is among the most comprehensive and time-tested agricultural systems for mitigating and adapting to climate change, and it has the benefit of being enforced through a rigorous legal standard.⁶⁰ The NOP ensures that organic production systems support soil health, reduce or eliminate fossil fuel-based inputs, and diversify crop rotations, among other key strategies that offer significant climate benefits.⁶¹ Organic agriculture can produce abundant and nutritious food reliably while increasing our resilience to climate threats and decreasing the climate pollution coming from our food system.⁶²

We urgently need to move toward a climate-friendly and ecologically beneficial food system by shifting farming and ranching practices while also modifying diets, reducing food waste, and adopting other interventions.⁶³

ORGANIC INCREASES AGRICULTURAL CLIMATE RESILIENCE

Climate change threatens our agricultural systems and food security. This was recognized more than three decades ago when the Global Climate Change Prevention Act, part of the 1990 Farm Bill, was adopted with strong bipartisan support. This “climate title” required USDA to assess the relationship between agriculture and climate change and set policy accordingly.⁶⁴

The 1990 Farm Bill required USDA to

“ensure that recognition of the potential for climate change is fully integrated into . . . research, planning, and decision-making.”

Today, even more than in 1990, unpredictable weather events and shifting climate patterns compromise the reliability of our food system and increase risk for already challenged rural communities.⁶⁵ While agriculture has always been dependent on weather and vulnerable to unpredictable events, today's climate instability significantly departs from historical trends.⁶⁶ Farmers and farmlands face more frequent extreme weather events such as droughts, floods, fires, and storms, and increased crop threats from weeds, pests, and disease.⁶⁷ The American Farm Bureau Federation estimates that in 2021, 20 major weather and climate disasters in the United States, including droughts, floods, hailstorms, hurricanes, tornadoes, fires, and extreme temperatures, caused \$12.5 billion in crop and rangeland losses.⁶⁸ The 2015 drought in California was estimated to result in more than 500,000 acres of fallowed land and more than 18,000 lost jobs, causing statewide losses of close to \$2.7 billion in output.⁶⁹ In 2018, extreme drought impacted twice as much land around the world as its historical baseline.⁷⁰ Due to heat stress, drought, and increased pest pressure caused by climate change, global crop yield potential for staples like corn, winter wheat, soybeans, and rice has been consistently decreasing since 1981.⁷¹

Conventional, input-dependent agricultural systems are not designed to withstand these new stressors. Rapidly changing climate conditions are straining the ability of

historically productive and reliable breeds and seeds to adapt, increasing food system instability.⁷² Farmers and ranchers across the United States face growing challenges to remain productive and profitable in an industry already fraught with workforce gaps, continually thinning margins, and an aging population. They are on the front line of climate change, economically distressed, and reliant on disaster relief from government programs to survive.⁷³

Conversely, organic agriculture has significant potential to bolster agricultural resilience by boosting soil's ability to infiltrate and retain water and the natural nutrients that make it healthy.⁷⁴ Organic farming shows improved yield and resilience especially during times of climatic stress. Over 40 years of studies by the Rodale Institute, comparing crops grown in organic and conventional systems, show that after a five-year transition period organic yields are competitive with conventional yields—and in times of drought, organic yields are up to 40 percent greater.⁷⁵ Similarly, a 20-year study at the Russell Ranch Sustainable Agricultural Facility at the University of California, Davis, found that organic production results in more stable yields in some crops, and that this stability could also likely be seen in other crops if coupled with appropriate breeding.⁷⁶

As climate conditions become increasingly volatile, organic farming—including growing diverse crops, integrating animals into operations, prioritizing soil health, and supporting biodiversity, provides a natural insurance policy against crop failure.

ORGANIC IMPROVES SOIL HEALTH AND CARBON SEQUESTRATION

Maintaining healthy soil is a bedrock requirement of organic agriculture. Organic farmers are expected to build healthy soil using biologically based nutrients like compost, leguminous cover crops, and animal manure rather than chemical inputs (Figure 1). Organic regulations also require farmers to rotate crops to interrupt disease cycles and increase soil fertility.⁷⁷ Organic practices like cover cropping, mulching, and conservation tillage also bolster soil health, and keeping soil covered as much as possible results in less heat radiating from soil, better absorption of solar energy, more water infiltration, and ultimately, increased potential for carbon and water storage.⁷⁸ Organic livestock ranchers who use rotational grazing also help build healthy soils, both by using organic feed and through specific practices that protect and replenish pasture soil.⁷⁹ These are all essential parameters to ensure soil health, build soil organic matter, and improve and sustain a farm's resilience to climate change. In fact, a national comparison estimated a 26 percent greater potential for long-term carbon storage on organic farms than on conventional farms.⁸⁰

SARAHLEE LAWRENCE, RAINSHADOW ORGANICS, SISTERS, OREGON

Farming in central Oregon's erratic weather—where it's dry, and every day there's a risk of extreme heat or a freeze—provides a road map for farming in a changing climate. A former river guide turned organic farmer, Sarahlee Lawrence likes to live on the edge; she finds the unpredictability of her environment stimulating, and organic farming has been key to her farm's ability to ride it out.

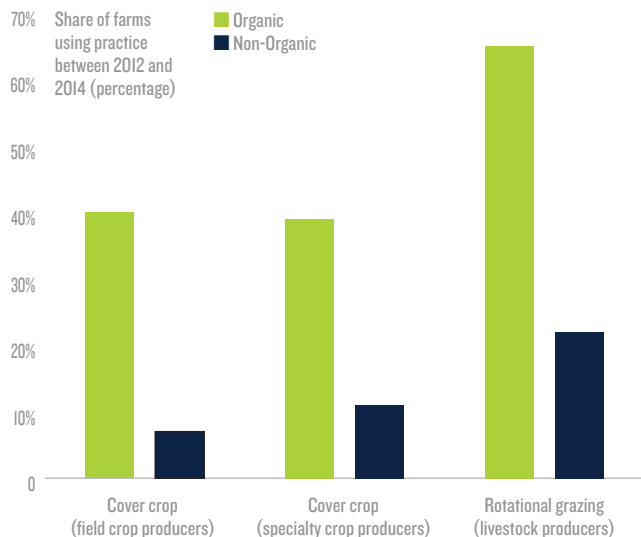
Sarahlee started farming in 2010, having never planted a seed. Her father had raised hay and cattle, and when he was ready to leave farming, she returned to her family's land. She began with a small vegetable garden and now farms hundreds of diversified acres that provide 45 families with a full diet including produce, grains, milk, eggs, meat, honey, preserves, and spices. Her husband, Ashanti, a former rodeo cowboy, has also thrived, as a rancher, and continues to expand the grazing land for their beef operation.



Together they have witnessed the resilience of organic land firsthand. In late May 2020 an unprecedented storm swept central Oregon, obliterating their crops. But despite being hit at the worst possible time, after all their crops for the season had been planted, the farm made a near-complete recovery. Sarahlee attributes the farm's ability to bounce back to organic management and healthy soil.

Sarahlee also deeply values the resilience of the organic farming community. One of her core motivations for pursuing organic certification was her desire to be in clear alignment with other farmers; she and other organic farmers are part of a movement and have committed to being held accountable to each other and to the public. She stands with her peers to build power—to say, “We exist in growing numbers and our work is essential to our communities, our nation, and our planet.”

FIGURE 1: ORGANIC PRODUCERS USE SIGNIFICANTLY MORE COVER CROPS AND ROTATIONAL GRAZING THAN NONORGANIC PRODUCERS⁸¹



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Additionally, research shows that organic farming is not only more effective at storing carbon than conventional farming but may also contribute to a more stable form of carbon sequestration—building stable soil organic matter (SOM) much deeper in the ground, reaching six feet below the surface. Soil that is high in organic matter provides numerous benefits, including reduced erosion, increased nutrient retention and storage, improved water infiltration and holding capacity, greater fertility, and diversified soil microbial populations.⁸² In addition, higher SOM, along with increased microbial activity, helps trap carbon in soil and keep it there for hundreds to thousands of years, reducing carbon dioxide (CO₂) in the air.⁸³

In a nearly 20-year California study comparing soil carbon changes in two different management systems, researchers found that soil organic carbon (SOC)^c at a six-foot depth increased by 12.6 percent in organic farms, but decreased by 10.8 percent in conventional operations that added cover cropping.⁸⁴ This indicates that compost and organic management overall have an important impact on the soil ecosystem, compared to cover cropping alone. Carefully managed grazing has also been found to rapidly build SOC on land previously used for tilled row crops.⁸⁵ A meta-analysis found that organic best practices, in sum, improve organic carbon concentrations in soil by 18 percent on average.⁸⁶ These findings show that transitioning

conventional cropland to organic farming and ranching is a significant opportunity to produce food in ways that also store carbon, a key climate solution.

Meanwhile, conventional agricultural practices, including the use of synthetic pesticides and fertilizers, monocropping, and allowing ground to be bare for prolonged periods, deplete soil health and lessen climate resilience. Pesticide chemicals like insecticides and fungicides are designed to kill the living organisms that help increase soil carbon sequestration; we are just beginning to understand the wide-reaching impacts of their production and use on GHG emissions and general soil health. A 2021 analysis showed that in 70 percent of nearly 400 studies, pesticide use was associated with damage to soil invertebrates, whose activity is critical to carbon sequestration.⁸⁷ Research also shows that overall soil microbial activity decreases proportionally to the amount of pesticides applied to soil.⁸⁸

Though there is still much to learn about what practices on what landscapes have the greatest potential for soil carbon sequestration, scientists agree that even small changes in soil carbon stocks can have a strong impact on atmospheric CO₂ concentration. Estimates indicate that with worldwide adoption of agroecological best management practices like diversified organic farming, soils could draw down up to 157 parts per million of CO₂ between 2020 and 2100.⁸⁹

c Carbon that is stored in soil organic matter.

BENINA MONTES, BURROUGHS FAMILY FARM, DENAIR, CALIFORNIA

Benina Montes grew up on her family's diversified farm, raising beef cattle, dairy cows, row crops, and almonds, and she and her siblings have each taken on a portion of the operation. When she returned to the farm after college, Benina took over the almond orchards, but she worried about the viability of growing only almonds. Organic farming turned out to be the key for her new operation.



After witnessing her sibling's success in operating organic farms, Benina transitioned her first almond orchard, using natural pest control and fertilizers. And she began to observe changes. While she was buying expensive inputs for the conventional orchards, her organic orchard stayed greener and had fewer pest problems. She gradually transitioned more acreage to organic until she was pregnant with her first child. Benina didn't want to risk the health of her child by mixing the chemicals for her conventional orchards anymore—and she didn't want to ask anyone else to do it either. So she transitioned the rest of the operation to organic.

In addition to almonds and olives, Benina and her husband, Heriberto, raise laying hens in mobile egg trailers and recently introduced sheep to graze the orchards. While monocultures may make sense if you only consider short-term efficiency, diversification makes the whole farming system stronger and able to withstand increasing fluctuation in weather patterns. The animals serve several important roles on the farm: keeping weeds in check, fertilizing the soil (and thus reducing fossil fuel consumption), and making the farm more economically sustainable—maintaining the balance between farm income, health, and environmental stewardship that is critical to a farm's long-term survival.

Benina sees a need for that balance throughout the food system. A truly functioning marketplace would pay farmers and workers their fair share, hold companies that make poisonous inputs accountable, and have regulations that protect our resources without overburdening farmers. Keeping our organic regulations and oversight strong will help get us there.

ORGANIC REDUCES GREENHOUSE GAS EMISSIONS

While bolstering our resilience to climate threats and sequestering vast amounts of carbon, organic agriculture can also substantially reduce both direct and indirect GHG emissions. The production and use of synthetic nitrogen fertilizer alone accounts for 2.4 percent of global GHG emissions.⁹⁰ In contrast, studies report lower emissions across widely differing organic enterprises, ranging from orchards to grain production to livestock ranching.⁹¹

Organic Avoids Carbon Dioxide Emissions From Synthetic Input Production

Energy-intensive and fossil fuel-based synthetic inputs, especially synthetic nitrogen fertilizers, are significant sources of agricultural GHG emissions.⁹² Globally,

production of synthetic nitrogen fertilizers accounts for 41 percent of the agricultural sector's energy consumption.⁹³

Synthetic nitrogen fertilizers are made through an energy-intensive process that uses high pressure and temperature to convert nitrogen gas into synthetic ammonia, which is then used to make a variety of fertilizer products.⁹⁴ Synthetic nitrogen fertilizer production generates 2.4 percent of global CO₂ emissions (and use of these fertilizers had been on the rise until the Russian invasion of Ukraine disrupted the market and made these inputs even more expensive for farmers).⁹⁵ Synthetic pesticides are also energy-intensive to produce, and many are made from petroleum chemicals whose full climate impact remains understudied.⁹⁶ Organic regulations prohibit use of all synthetic fertilizers and nearly all synthetic pesticides, so organic producers avoid GHG emissions related to production of these inputs.⁹⁷



Organic Reduces Nitrous Oxide Emissions

Beyond the emissions generated through input production, conventional soil management itself generates greenhouse gases, primarily N_2O , through the use of fertilizers and other problematic practices. N_2O has a global warming potential 300 times higher than CO_2 on a 100-year time scale, and agricultural soil management generates about 75 percent of all N_2O emissions in the United States.⁹⁸ Over-application of nitrogen-based fertilizers can generate significant N_2O emissions by stimulating processes in soil that convert nitrogen to N_2O faster than they normally would.⁹⁹ In addition, wet conditions and poorly drained soil can contribute to increased N_2O emissions, which is especially problematic as extreme weather events and flooding become more common.¹⁰⁰

Growing evidence also shows that the use of three commonly used fumigants—chloropicrin, metam sodium, and dazomet—is associated with anywhere from a sevenfold to a hundredfold increase in N_2O emissions, compared with areas where fumigants are not used.¹⁰¹ In 2018 alone, about 50 million pounds of metam sodium

and 20 million pounds of chloropicrin were applied to crops in the United States, creating a significant source of N_2O emissions.¹⁰² Use of two other agricultural fumigants, dimethyl disulfide and allyl isothiocyanate, increases N_2O emissions by a factor of 6 to 20.¹⁰³

Organic greatly reduces these emissions by prohibiting the use of almost all synthetic inputs and requiring careful nutrient management that reduces overuse of fertilizers.¹⁰⁴ Rather than relying on synthetic fertilizers and pesticides, organic farms aim to achieve ecological balance and maintain soil fertility through crop rotations, integrated crop–livestock systems, cover cropping, and the use of natural manure or compost fertilizers.¹⁰⁵ Studies conducted by the USDA ARS Farming Systems Project and the Rodale Institute indicate that these organic farming practices boost soil fertility, require fewer inputs, and reduce GHG emissions.¹⁰⁶ Organic farming systems emit about 40 percent less N_2O than conventional production does.¹⁰⁷ The decrease can be attributed to the restricted use of synthetic chemical inputs as well as the focus on building healthy, living soils.

Organic Livestock Production Reduces Greenhouse Gas Emissions

Animal agriculture has an outside climate footprint, exacerbated by the widespread use of CAFOs. The sector is a major source of methane, which is about 30 times as potent a GHG as CO₂. The EPA estimates that in the United States, methane from just two aspects of animal agriculture—manure management and animal digestive systems—together account for more than 36 percent of methane from anthropogenic activities.¹⁰⁸ Recent research indicates that these numbers may actually be higher.¹⁰⁹

Ruminant livestock like dairy and beef cows, in particular, account for 56 percent of all agriculture emissions globally.¹¹⁰ Ruminants have four-chambered stomachs that allow them to digest fibrous plant material efficiently. Those materials ferment in the animals' fore-stomach (rumen) as a natural part of their digestive process called enteric fermentation. This produces methane gas, released through flatulence and belching.¹¹¹ However, the amount of these digestion-related methane emissions varies significantly based on animal feed types and other management strategies.¹¹² These animals will always generate some methane, and raising them en masse is a major driver of the food system's climate footprint.¹¹³

The CAFO system produces excessively high levels of methane and other emissions. In conventional livestock production, animals live in CAFOs for a significant portion of their lives, subsisting primarily on conventionally grown corn and soy-based feed that brings them to market weight quickly.¹¹⁴ This feed is produced with large amounts of synthetic fertilizers and pesticides that, as noted above, are GHG intensive.¹¹⁵

CAFOs also pack together thousands of animals, which leads to vast amounts of waste. This waste is often stored in liquid-based systems, including manure lagoons that can be as large as several football fields.¹¹⁶ In these liquid systems, the absence of oxygen leads manure to break down into methane. Due to a broad shift to the industrial CAFO model, with its waste management issues and reliance on manure lagoons and spray fields, methane emissions from manure increased by nearly 70 percent in the United States in recent decades.¹¹⁷

In contrast, federal organic standards require that ruminant animals eat an organic diet, including grazing on pasture during the appropriate seasons, thus eliminating the emissions associated with conventional feed production.¹¹⁸ The grazing period must be a minimum of 120 days out of the year and provide at least 30 percent of

KANOA DINWOODIE, FERAL HEART FARM, SUNOL, CALIFORNIA



For Kanoa Dinwoodie, organic farming must be rooted in social, economic, and environmental resilience. He started Feral Heart Farm as a food security project with friends, and he continues to explore ownership structures and business models that will allow him to focus on food access and mutual aid. In particular, Kanoa has found that it's hard to find culturally appropriate foods that are grown organically; as a Filipino and Chinese farmer, he is able to grow his own culturally important foods and has tailored the farm's offerings to serve communities of color.

Kanoa established Feral Heart Farm in 2014 in the collective farming lands of Sunol Ag Park, and his operation achieved organic certification in 2015. The Ag Park requires organic farming as part of its licensing agreement, so new operations can easily show that the land has not been treated with prohibited pesticides and fertilizers and become certified organic quickly. The Ag Park's model is highly collaborative; the seven farms there share tractors, buy cover crop seed and compost together, and sometimes market jointly as well.

Farming in the Ag Park has been eye-opening and taught Kanoa about the importance of careful land management; even though the land had been farmed organically, some areas had been damaged and overwhelmed by weeds that have been challenging to manage. To support long-term resilience, Kanoa would like to see more public investment in technical assistance for organic farms—especially climate-friendly weed management with limited tillage—and regionally appropriate seed breeding and production. To support thriving local agriculture, particularly in a changing climate, we need to know where our seed comes from and breed for growth in specific locations. He collaborates with Second Generation Seeds, Seed Savers Exchange, and the Organic Seed Alliance to save, breed, and trial organic seeds that are specifically adapted to thrive in the farm's bioregion and climate.^d

^d The Organic Seed Alliance's latest report can be found here: <https://stateoforganicseed.org>.

the animals' dry matter intake during grazing.¹¹⁹ Organic certifiers evaluate the degree to which manure production matches land capacity, to ensure that farmers do not over-apply manure to their fields.¹²⁰ Organic farmers are also required to manage their pastures as cropland to ensure that the vegetation meets organic quality and quantity requirements for their animals' feed.¹²¹

Methane emissions from pastured animals are also significantly lower due to dry manure management and the communities of microbial decomposers found on well-managed pastures.¹²² For example, holistic or rotational grazing, where animals move to different sections of pasture on a regular basis to allow grazed areas to recover and grow, may help reduce methane and other emissions and offer soil carbon sequestration benefits. This type

of grazing disperses manure throughout the landscape in balance with the needs of the ecosystem, instead of concentrating it in a massive lagoon or spray field. Using grazing best practices can reduce net GHG emissions per pound of meat or milk production.¹²³

In the United States and other affluent countries, reducing the consumption of GHG-intensive CAFO-produced meat and dairy products is the most effective way to lessen the climate effects of industrial livestock production.¹²⁴ In addition, shifting to organic and integrating crop and animal agriculture can reduce the livestock sector's climate footprint by avoiding GHG emissions associated with conventional feed production and improving manure management.

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CONNECTING ORGANIC AND REGENERATIVE AGRICULTURE

The value of soil and its importance to climate health are gaining currency throughout society, among food producers, retailers, researchers, journalists, policymakers, and consumers. Interest in the regeneration of land has sparked a movement in recent years, one inspired by the long-held farming and land stewardship practices of many Indigenous, Black, Latino, and other producers of color. In many ways, the organic and regenerative agriculture movements complement one another and amplify the importance of shifting agricultural practices toward ecological systems that work in harmony with nature.

Regenerative agriculture is a framework that provides growers with a set of principles to support adaptive land management relative to its unique context. The universe of regenerative approaches can be narrower or broader than organic systems. For example, some regenerative farmers may begin experimenting with one or two practices at a time—such as adopting low-till or no-till practices to reduce erosion and protect soil structure—while keeping herbicide use in their toolbox. Other regenerative farmers who are certified organic may be looking to go beyond the requirements of the NOP and to earn recognition for their strong agroecological practices.¹²⁵ Somewhere in the middle are producers who seek more flexibility than afforded by organic or other certification programs.

In this complex landscape, Regenerative Organic Certified (ROC) offers the greatest specificity and alignment with organic practices and principles (Table A). ROC is a certification program administered by the Regenerative Organic Alliance.¹²⁶ Launched in August 2020, ROC uses the NOP certification as a baseline for its farming standards and builds on it in three areas: soil health and land management, animal welfare, and farmer and worker fairness. Nearly 100 farms have received ROC certification worldwide.¹²⁷

TABLE A: COMPARISON OF ORGANIC AND REGENERATIVE SYSTEMS

Attributes	Regenerative systems	Certified Organic systems	Regenerative Organic Certified
Type of program	A framework of principles and outcomes	Enforceable legal certification standard	Private certification standard, with certified organic as foundation
Synthetic pesticides	Depends on practices adopted by farmer	Nearly all prohibited	Same as certified organic
Soil and water health	Depends on practices adopted by farmer	Includes some requirements; could be stronger	Robust standards
Synthetic fertilizers	Depends on practices adopted by farmer	Prohibited	Prohibited
GMOs	Depends on practices adopted by farmer	Prohibited	Prohibited
Sewage sludge fertilizer	Depends on practices adopted by farmer	Prohibited	Prohibited
Crop rotation	Depends on practices adopted by farmer	Required	Required
Cover crops	Depends on practices adopted by farmer	Required as appropriate	Required as appropriate

The emergence of ROC and other regenerative programs and labels (including Intertribal Agriculture Council's Rege[N]ation pledge and seal for Native American and Alaskan Native agriculturalists¹²⁸) highlights the need for continuous improvement in the NOP; the failure of USDA to respond in a timely manner to requests from organic farmers, ranchers, and processors for stricter regulations; and the historical and ongoing patterns of discrimination at USDA and challenges with inclusivity and culturally appropriate approaches. Rather than leaving it up to individual farmers and private certification systems to help organic evolve, USDA should strengthen enforcement of the NOP's soil health requirements, build organic market opportunities, and ensure that certification is valuable and accessible to all producers. The policy recommendations section of this report offers ideas on how these goals can be achieved, as does the Swette Center for Sustainable Food Systems 2021 report on the critical to-do list for organic agriculture.¹²⁹ NRDC's 2022 report on regenerative agriculture also offers a variety of policy recommendations outside the scope of the NOP.¹³⁰



ORGANIC & HEALTH

Organic Protects People From Agricultural Chemicals

Organic Stems the Antibiotic Resistance Crisis

Organic Farming Protects Ecological Health

**Organic Farmers Build Soil in Ways that Support
Ecosystems and Human Health**

Organic Is a Healthier Food Choice

Organic Protects and Promotes Health

Consumers consistently cite human health as their top reason for purchasing organic food, and for good reason: significant and mounting scientific evidence points to many positive connections between human health and organic agriculture.¹³¹

Organic agriculture promotes health in three main ways: protecting people on and around farms, including workers, farmers, and those living in farming communities, from chemical contaminants; nurturing ecosystems, from soil and waterways to pollinators and other beneficial organisms; and producing healthy foods that are richer in nutrients and largely free of pesticide residues and additives. Organic farmers guard health by avoiding nearly all synthetic pesticides and fertilizers commonly used in conventional farming, which ensures that people are less exposed to harmful chemicals, whether in their workplaces, in their communities, or at the dinner table. Organic livestock operations produce animal products without antibiotics and other drugs commonly used in conventional livestock production, which helps slow the growing health crisis posed by the dangerous spread of antibiotic-resistant bacteria. Organic farmers proactively promote and manage biodiversity, generating a host of benefits including increased populations of natural enemies that help control pests and diseases without chemicals; improved natural resources such as soil, water, wetlands, woodlands, and wildlife; and support for pollinators, which are essential to maintaining healthy ecosystems as well as producing a diversity of healthy foods.

In contrast, conventional farming often contaminates soil, air, and water, contributes to ecosystem deterioration, and leaves traces of numerous chemicals in and on food. Additionally, use of synthetic inputs often creates an inescapable cycle, requiring more and more inputs (and leading to more and more exposure) over time. For example, overuse of synthetic fertilizers can make plants more susceptible to pests, leading to increased pesticide use.¹³² And pesticides' negative impacts on soil biology can lead to decreased naturally occurring nitrogen and increase reliance on synthetic fertilizers.¹³³

ORGANIC PROTECTS PEOPLE FROM AGRICULTURAL CHEMICALS

Organic agriculture is a systems-based approach to managing soils and crops to prevent pest problems by building healthy soil and ecosystems without the use of synthetic pesticides and fertilizers that harm people. As the default, organic farms can use only natural inputs, like compost and natural pesticides.¹³⁴ Any proposal to use a

synthetic input in organic agriculture must meet strict criteria—including that the substance and its breakdown products will not adversely affect human health.¹³⁵ Organic producers show that agricultural systems can thrive while also protecting human and environmental health.

Synthetic Pesticides Threaten Health

Many pesticides widely used in conventional agriculture threaten human health, and existing regulations and enforcement do not adequately prevent these harms (see Table B). Approximately 900 synthetic pesticides are allowed for use in conventional agriculture, and there is a long historical pattern of pesticides initially being considered “safe,” then years later documented as toxic and harmful.¹³⁶ Perhaps the best-known example is DDT, a highly toxic insecticide deployed extensively on crops across the United States for decades. Even after growing public concern following the 1962 publication of *Silent Spring*, Rachel Carson’s influential account of the human and environmental harms of pesticides, it took a decade to ban DDT. Traces of the chemical are still found in our environment to this day.¹³⁷

While science evolves, people and the environment suffer harm; regulations to protect our health, such as the Food Quality Protection Act of 1996, often take decades to enact and are poorly enforced.¹³⁸ It took more than 30 years to ban most uses of chlorpyrifos, a once widely used insecticide that causes numerous human harms, including developmental issues in babies and children—and chlorpyrifos is just one of a large class of neurotoxic organophosphate pesticides.¹³⁹ Today, while newer pesticide chemicals such as neonicotinoids are touted as targeting specific pests with little or no human impact, evidence of threats to human health is already emerging.¹⁴⁰



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New and beginning farmers—many of whom are Latino immigrant farmworkers—receive education and support at the Agriculture and Land-Based Training Association’s 100-acre organic farm in California’s Salinas Valley.

Unfortunately, pesticide exposures currently considered safe by the U.S. Food and Drug Administration (FDA) and the EPA may be harmful, especially in light of recent research on the gut microbiome.¹⁴¹ It has long been argued that because the biological pathway targeted by herbicides in plants does not exist in humans, effects on human health are supposedly minimized. However, this claim fails to address pesticides’ direct impact on the gut microbiome, which helps maintain our metabolic function and immune system health. For example, the herbicide glyphosate targets an important pathway for protein synthesis in some gut bacteria, and dietary exposure to glyphosate may directly hinder these important bacteria’s ability to support our health.¹⁴²

The extent to which individual pesticides threaten health depends on the chemical(s) and how they are used. While some appear less harmful to humans (or their impacts are not yet fully understood), others are known to cause acute poisoning effects (e.g., burning eyes, shortness of breath, skin rashes, vomiting) and/or chronic harm (e.g., cancers, birth defects). Additionally, a pesticide’s toxicity level is usually classified according to its active ingredient, but the pesticide’s impacts are compounded by other chemicals in the formulated products, like metabolites and inert ingredients that often make up the majority of chemicals used in pesticide products. Many of the thousands of these inert ingredients are biologically active and pose serious human health risks yet are hidden from the public as manufacturer “trade secrets.”¹⁴³

Another key health concern is the cumulative, long-term effects of exposure to the many different pesticides found in our food, air, and water.¹⁴⁴ Numerous factors influence the health impacts of pesticide exposure, even at low levels, including age, stage of development, general health status, interactions with other chemicals in our diet and environment, environmental factors, and complications from existing health issues. For example, a person with liver or kidney disease is likely to be more sensitive to pesticide poisoning because they cannot efficiently filter out the harmful compounds.¹⁴⁵ Heat stress may also make people more susceptible to harms from pesticides—a major concern for farmworkers who face increased heat exposure in a changing climate.¹⁴⁶

Early development stages can be especially sensitive periods for toxic exposures, making pesticide exposures particularly harmful to pregnant women, infants, and young children.¹⁴⁷ Studies have shown that residential proximity during pregnancy to areas with high pesticide use is associated with lower IQ in children born to those mothers.¹⁴⁸ Many other studies have identified similar harms to children from pesticides.¹⁴⁹ Childhood exposure, especially to organophosphate insecticides, has been shown to harm brain development, increasing the likelihood of brain and physical developmental delays, learning disabilities, attention disorders such as attention deficit/hyperactivity disorder, poorer memory, changes in social behavior, and lower IQ.¹⁵⁰

TABLE B: USES AND RISKS OF COMMON SYNTHETIC PESTICIDES PROHIBITED BY ORGANIC STANDARDS

Pesticide name or class	Primary product producers ¹⁵¹	Category	Major agricultural uses	Potential human health risks
Glyphosate (Roundup)	Bayer, Syngenta	Herbicide	Genetically modified herbicide-tolerant corn, soybeans, cotton, pasture, and hay Drying grain crops	Non-Hodgkin lymphoma ¹⁵² Nose and lung irritation ¹⁵³ Asthma ¹⁵⁴
Dicamba	Bayer, Syngenta, BASF, Corteva Agriscience	Herbicide	Genetically modified herbicide-tolerant soybeans, corn, cotton, pasture, and hay	Liver cancer and leukemia ¹⁵⁵ Hypothyroidism ¹⁵⁶ Eye irritation ¹⁵⁷
Organophos-phates (e.g., chlorpyrifos)	Corteva Agriscience (chlorpyrifos), FMC, BASF	Insecticides	Many fruits and vegetables including apples, oranges, berries	Disruption of brain development, learning disabilities in children exposed prenatally ¹⁵⁸
Neonicotinoids	Bayer, Syngenta, FMC, Makhteshim Agan	Insecticides	Seed coatings, fruits and vegetables, soybeans, cotton, corn, almonds	Birth defects of the brain and heart ¹⁵⁹
Fumigants (e.g., 1,3-dichloropropene [Telone], chloropicrin, methyl bromide, dazomet, metam sodium, metam potassium)	Corteva Agriscience	Soil pesticides	Fruits and vegetables, including strawberries and grapes; almonds	Cancer ¹⁶⁰ Severe irritation and damage to the lungs, eyes, and skin ¹⁶¹ Possible death if inhaled ¹⁶²
Paraquat	Syngenta, Amvac	Herbicide	Corn, soybeans, cotton	Death if inhaled (there is no antidote) Organ damage (lungs, kidneys) Skin and eye irritation and damage Respiratory irritation and lung damage Brain diseases, including potential risk of Parkinson's disease ¹⁶³

While pesticides pose health risks to everyone who produces or consumes food, farmworker communities—which, in the United States, tend to be low-income and predominantly Latino—experience especially high levels of exposure and bear the worst harms from toxic pesticides. Communities surrounding factories that manufacture these chemicals face similar threats.¹⁶⁴ Researchers at the California Environmental Protection Agency have found that pesticide use is one of the pollution burdens with the greatest racial, ethnic, and income disparities in the state, disproportionately imposing more of a hazard than

multiple air pollutants and other toxic releases.¹⁶⁵ And a recent environmental justice study found average levels of biomarkers for 12 harmful pesticides were as much as five times higher in the blood and urine of Black or Mexican Americans than in white people over the past 20 years.¹⁶⁶ The authors also reported that almost all pesticide use in California, the largest agricultural state in the nation, occurs in the 60 percent of California zip codes that have the highest percentage of people of color.¹⁶⁷

YASMIN ALVARADO, FORMER STRAWBERRY FIELD WORKER, VENTURA, CALIFORNIA

As a strawberry harvester, Yasmin Alvarado has experienced the short-term and long-term physical effects and the mental health impacts of pesticides that touch too many farming families. Yasmin worked in strawberry fields for 16 years, including while she was pregnant with her identical twin daughters. Her pregnancy was rocky. She landed in the emergency room three times and nearly lost her girls. On one of those days, she had eaten a single strawberry in the field at work and learned later that a pesticide had been applied just two days earlier. Her hands



itched as if mosquitoes had bitten her, she began to vomit, and when she went to the bathroom, she discovered she was bleeding. The ER doctor just sent her home to rest for a day—the first of many unsatisfying encounters with a medical system ill equipped to assess the impacts of pesticide exposure.

When Yasmin's twins were toddlers, she noticed that they weren't speaking like their peers, but the pediatrician brushed off her concerns. After the twins reached kindergarten, they were finally diagnosed with learning disabilities that include short-term memory challenges; one also has trouble hearing. The news was crushing, and Yasmin wonders whether agricultural chemicals may have played a role. But it's been nearly impossible for her to find someone willing to try to pinpoint the cause of these disabilities, despite extensive science linking prenatal exposure to pesticides with increased risk of learning disabilities.

Yasmin and her coworkers often witnessed and smelled pesticide applications nearby, but they received no information about what pesticides were used, their health risks, or precautions they should take. For years her eyes, hands, and body were swollen and red, her nose ran, and her skin itched. Now, after more than a year away from field work, Yasmin sees noticeable improvements in her own health. Even so, the worries about how pesticides have impacted her family, and her kids' future, will stay with her for life.

Farmworkers are routinely at risk from direct exposure to hazardous chemicals when mixing and applying pesticides, and while working in fields. As a result, they suffer more chemical-related injuries and illnesses than any other U.S. workforce and experience heightened risks of chronic illnesses such as asthma and various cancers.¹⁶⁸ In addition, pesticide exposures for farmworkers and their communities extend far beyond the fields. Workers carry pesticides home on clothes, shoes, and skin, inadvertently exposing their children and other family members. These chemicals can drift long distances through the air, in some instances miles from the site of the original application, which can harm people living, working, and going to school near farms.¹⁶⁹ People living in agricultural areas are also often exposed to contaminated house dust, air, and groundwater.¹⁷⁰ A diet intervention study of primarily low-income Mexican-American children in California reported that participants from farmworking families in an agricultural area (Salinas) had higher levels of pesticide metabolites in their urine than children living in an urban setting (Oakland).¹⁷¹

Most consumers are exposed to pesticides through dietary and environmental pathways. Alarming, pesticides are commonly found in the urine and blood of the U.S. population.¹⁷² USDA's Pesticide Data Program, which monitors pesticide residue on foods likely to be consumed by children, finds a wide range of pesticide residues on these foods every year.¹⁷³ For example, in 2019 program

staff found 17 different pesticides on blueberry samples and 21 pesticides on collard green samples; at least one pesticide was detected on more than two-thirds of all samples.¹⁷⁴ Similarly, the FDA's Pesticide Residue Monitoring Program, which conducts targeted monitoring for consumer protection, consistently finds pesticide residues on more than half of the samples analyzed.¹⁷⁵ The practice of spraying grain and bean crops with glyphosate to dry them before harvest can contribute to traces of this pesticide in products like cereals and pastas.¹⁷⁶ In addition, U.S. Geological Survey water monitoring has found pesticides or their breakdown compounds in more than 40 percent of samples from wells connected to major drinking-water aquifers.¹⁷⁷ While a single exposure to pesticide residue on food or in water may not cause harm, evidence shows that long-term, cumulative exposure to multiple pesticides can have a toxic cocktail effect and threaten health.¹⁷⁸

Due to these hazards, national organic standards prohibit nearly all synthetic pesticides, including those described in Table B.¹⁷⁹ Organic rules also ban certain natural pesticides, such as arsenic, tobacco dust, and rotenone, due to toxicity concerns.¹⁸⁰ Certifiers review all inputs that organic farmers plan to use and conduct random tests to ensure that no prohibited pesticides are used. Organic producers must also meet very strict pesticide residue standards.¹⁸¹ In rare cases when certifiers discover pesticide residue on organic food, they notify the producer



and conduct an investigation.¹⁸² If contamination is found, the producer faces a range of potential consequences, such as prohibitions on selling products as organic, fines, loss of certification, and a restart of the three-year transition period for land treated with prohibited substances.¹⁸³

As a result, eating organically grown foods has documented health benefits.¹⁸⁴ Organic foods have significantly fewer pesticide residues compared with conventionally produced foods; a 2019 survey sampling milk sold at grocery stores around the United States found pesticide residues were 20 times higher in nonorganic milk than in organic milk.¹⁸⁵ Research consistently shows that switching to an organic diet dramatically reduces urinary pesticide levels in a short time.¹⁸⁶ In fact, a 2020 study found that average levels of the carcinogenic pesticide glyphosate in study participants' bodies dropped 70 percent in just one week on an organic diet.¹⁸⁷ In another study, individuals who reported eating organic produce at least occasionally had significantly less exposure to neurotoxic organophosphates than those who ate primarily nonorganic produce.¹⁸⁸

Synthetic Fertilizers Contaminate Drinking Water

Synthetic fertilizers also pose human health risks. Synthetic nitrogen fertilizer is a major source of water pollution in regions dominated by conventional agriculture.¹⁸⁹ While some nitrates occur naturally in aquatic systems, runoff from fertilizers leads to much higher—and concerning—levels of nitrates, including in drinking water. Epidemiological evidence suggests that nitrates in drinking water are associated with elevated risks of cancer, conditions like methemoglobinemia (“blue baby syndrome”), birth defects, and preterm birth, even when levels are below the EPA drinking water allowable limit (10 mg/L).¹⁹⁰

Synthetic fertilizer pollution disproportionately burdens Latino communities. In California’s San Joaquin Valley, the nation’s leading agricultural region, nitrate contamination of drinking water is particularly widespread.¹⁹¹ A study of drinking water in that region between 2003 and 2017 found that most San Joaquin Valley communities in which nitrate pollution exceeded the federal legal limit had majority-Latino populations, and that hundreds of water systems

serving nearly four million primarily Latino residents had an average nitrate concentration above 5 mg/L.¹⁹² This is consistent with the findings of a study of nearly 40,000 U.S. community water systems reporting that between 2010 and 2014, some 5.6 million Americans were served by water systems with an average nitrate concentration above 5 mg/L (which indicates contamination); moreover, systems serving the highest percentages of Latino residents were three times more likely to have nitrate concentrations above the federal legal limit than those serving the lowest percentages of Latino residents.¹⁹³

ORGANIC STEMS THE ANTIBIOTIC RESISTANCE CRISIS

Organic agriculture prohibits antibiotic use, which protects human and animal health by reducing the development and spread of antibiotic-resistant bacteria. Antibiotic drugs are commonly used in modern medicine to treat bacterial infections like strep throat and pneumonia and to ward off infection during common procedures like surgeries, chemotherapy, and dialysis. Unfortunately, we may be on the brink of losing these life-saving drugs as overuse breeds resistance to them. Heightened levels of antibiotic-resistant bacteria and infections have been documented in meat processing plant workers and communities living near industrial farms that routinely feed antibiotics to animals.¹⁹⁴ Resistant bacteria also find their way to the general population through the meat we consume

and through air, water, soil, and wildlife.¹⁹⁵ Infections caused by antibiotic-resistant bacteria are often difficult and sometimes impossible to treat. Antibiotic-resistant bacteria, sometimes known as superbugs, cause more than 2.8 million infections and contribute to between 35,000 and 162,000 deaths in the United States each year.^{196,e}

Conventional agriculture is a major contributor to this antibiotic resistance crisis. As of 2019, nearly two-thirds of all medically important antibiotics in the United States were sold for use in conventional animal agriculture, not human medicine.¹⁹⁷ The vast majority of these are given to animals through feed and water, not to treat a bacterial infection but to compensate for the health risks associated with the crowded, stressful, unsanitary conditions typical of the industrial facilities where most U.S. food animals are raised.¹⁹⁸ In addition, crop use of antibiotics to fight plant diseases is expanding.¹⁹⁹

In contrast, antibiotics are not allowed in organic systems. Organic livestock regulations also include higher standards for feeding, housing, and caring for farm animals.²⁰⁰ Organic livestock must be fed a certified organic diet, including pasture and forage, and must generally have access to the outdoors, shade, shelter, exercise, fresh air, clean water, and sunlight.²⁰¹ Organic producers must also use preventative measures to protect animal health and reduce disease risk by incorporating improved animal welfare and husbandry practices.²⁰²

KLAAS MARTENS, LAKEVIEW ORGANIC GRAIN, PENN YAN, NEW YORK

Klaas Martens's family transitioned from organic farming to "modern" chemical-reliant farming and back to organic again, after witnessing the health threats and long-term shortcomings of the chemical approach firsthand. Klaas's parents, who arrived in the United States as refugees from Germany, were suspicious of agricultural chemicals and used traditional organic methods long before there was a national standard. Nonetheless, after Klaas attended a land grant university where he learned about the Green Revolution, he convinced them to adopt "cutting-edge" farming practices that promised higher yields. And they saw results immediately: with synthetic inputs, yields doubled, practically overnight.

But about five years into the new approach, Klaas saw his soil changing. While the farming system he had learned about in college predicted the results he saw in the short term, the story was very different in the long term. More and more inputs were needed to get the same yield response over time. In retrospect, Klaas realized that he had traded the long-term strength and health of the soil for short-term yield gains.

His family had taught him to keep meticulous records, and after tracking his costs and yields for several years, he saw that more diverse cropping systems had both lower costs and a better response to inputs and that resting the soil periodically made the whole system work better. At the same time, Klaas and his wife, Mary-Howell, were beginning to have children and paying closer attention to the health warnings on chemicals. They worried that they had put their family's health at risk. Klaas began to experiment with organic farming after he saw an ad in the paper seeking organic wheat. But he didn't hit a true turning point until several years later, when his right arm suddenly became paralyzed as he folded up his 2,4-D sprayer. He recalled that the book *Silent Spring* had described the neurotoxic impacts of pesticides, and he realized those impacts were not limited to plants. Klaas's arm remained immobile for the entire summer.

After Klaas and Mary-Howell decided to go fully organic, their phone started ringing; buyers were seeking out organic crops and asking Klaas to name a price—something that never happened in the conventional marketplace. Now, with more than 30 years of organic farming behind him, Klaas recognizes that the farm sits in a delicate balance. A pest or weed outbreak is nature's signal that something has fallen out of whack—but it can be managed by restoring balance, rather than turning to synthetic chemicals.

^e While antibiotics are not used to treat COVID-19, they are used to treat secondary infections like bacterial pneumonia. It is worth noting the heightened importance of safeguarding the effectiveness of these lifesaving medicines in an age of pandemics.



When animals on organic farms get sick and alternative treatments prove ineffective, organic rules require that the animals be given the appropriate treatment, even if that means using an antibiotic.²⁰³ Once treated with an antibiotic, an animal can no longer be considered organic and must be diverted into conventional marketing channels.

Leading medical experts at the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO), among others, warn that we must stop overusing antibiotics in both human medicine and animal agriculture, or the life-saving drugs we rely on to treat common infections and enable medical procedures could stop working. In 2017 the WHO published antibiotic use guidelines for livestock, urging an end to giving medically important antibiotic drugs to healthy animals.²⁰⁴ Organic farmers and ranchers have been ahead of the curve on this recommendation for decades.

ORGANIC FARMING PROTECTS ECOLOGICAL HEALTH

Maintaining environmental health and biodiversity is critical to human health, which depends on clean air and water and rich and diverse ecosystems that support other species and provide essential ecosystem services. Unfortunately, evidence shows that conventional agricultural practices undermine our natural resources and ecosystems.

For one thing, conventional agriculture threatens pollinators, which play a vital role in the food system and are essential to healthy, vibrant habitats for plants and animals. More than 90 percent of fruits, vegetables, and tree nuts in the United States, including popular foods like apples, almonds, and blueberries, rely on bees and other pollinators for fertilization.²⁰⁵ Without pollinators, these plants would not be able to fruit or reproduce. The steep decline of pollinators worldwide, especially in the United States and Europe, has generated widespread concern. Neonicotinoids, a harmful class of newer pesticides, have played a major role in this decline.²⁰⁶ Landscape diversity and species richness are also critical for pollinators, and monocropping depletes species richness.²⁰⁷

Pesticides also wreak havoc on ecosystems more broadly. Water contaminated with neonicotinoids has been linked to the collapse of fisheries, the widespread loss of birds that depend on those aquatic habitats, and birth defects in wildlife.²⁰⁸ These habitats are vital to broader ecological health and species' interrelated survival. Pesticide use in conventional agriculture wipes out many non-crop plants (often considered "weeds") and beneficial biota that play key roles in ecosystems.²⁰⁹ Pesticides can also interfere with soil health, nutrient cycling, and the fauna, flora, microflora, and fungi that are essential components of soil.²¹⁰

By farming and ranching without dangerous chemicals and in synergy with natural systems, organic agriculture protects and supports healthy ecosystems. Organic producers are required to “maintain or improve” the soil, water, wetlands, woodlands, and wildlife on their farms and ranches, which are inextricably linked to broader natural systems.²¹¹

ORGANIC FARMERS BUILD SOIL IN WAYS THAT SUPPORT ECOSYSTEMS AND HUMAN HEALTH

Crops need healthy and nutrient-rich soil in order to grow, so many farmers bolster soil nutrients with natural or synthetic fertilizers and other soil-building practices. However, these practices in turn can impact—positively or negatively—the health of local ecosystems and the people who live nearby or consume those crops.

Organic production systems build and maintain soil nutrients, rich microbial soil life, and organic matter—naturally.²¹² To prevent harmful practices and ensure healthy soils, federal organic standards strictly regulate what producers can use to build soil health.²¹³ Many conventional farms rely on quick-fix synthetic inputs to feed crops, like synthetic nitrogen fertilizers. However, agricultural nitrogen can leach into the environment, where it can harm human health, produce greenhouse

gas emissions, and reduce biodiversity.²¹⁴ The synthetic fertilizers used in conventional farming are water soluble, which makes them readily available for plants, but it also means they can release nitrogen into waterways. In contrast, natural nitrogen that microorganisms slowly integrate into soil poses less leaching risk. Research shows that organic farms can reduce nitrogen leaching by up to 30 percent when compared with conventional operations.²¹⁵ Organic farms mostly use compost fertilizers, which recycle nitrogen into the soil in a more stable form, slowly releasing it over time. This practice can reduce nitrate pollution.²¹⁶ Organic farms also reduce nitrate pollution with careful nutrient management (applying only what the crops need) and the use of cover crops and crop rotations that can pull nitrogen from deep in the soil and cycle it to the surface.

The use of fertilizers derived from waste—common in conventional agriculture—can be harmful to the environment and public health. Conventional operations can use sewage sludge, i.e., the leftovers generated during municipal wastewater treatment.²¹⁷ While sewage sludge may contribute nutrients to the soil, it may also contain thousands of heavy metals and traces of pesticides, pharmaceuticals, and other contaminants, including antibiotics that contribute to resistance and harm the soil microbiome, microplastics, and per- and polyfluoroalkyl substances (PFAS), “forever chemicals”

ARNOTT DUNCAN, DUNCAN FAMILY FARMS, GOODYEAR, ARIZONA



Arnett Duncan began his transition to organic serendipitously, through the magic of compost. Hay bales from the farm’s visitor center got soaked with rain, then mixed with green waste and manure from the petting zoo, and were moved periodically—after a while, the pile began to smell like earth. Arnett decided to spread this accidental compost across the visitor center demonstration garden and was amazed by the results: plants with more robust colors, more earthworms, and fewer pest problems than with the crops he was growing just 100 feet away.

Arnett slowly expanded his composting operation to the rest of his conventional farmland, using free horse manure from a nearby racetrack. His first experiment at scale was a cabbage field contaminated with black rot, a hard-to-eliminate fungal disease. Instead of treating the field with fungicide, Arnett covered it with compost to restore balance and soil health. When he planted the field the following season, the disease was gone.

Arnett made the jump to certified organic production when a potential buyer saw his piles of compost and asked if Arnett could sell him organic lettuce. While Arnett was able to rush some untreated land into production to meet this surprise demand, he now recognizes how important the three-year transition period is for organic farming—that time frame is essential for getting weeds under control, balancing soil nutrients, and reinvigorating soil with compost.

Today, Duncan Family Farms is 100 percent organic, and Arnett says you can see the quality difference in the lettuces he grows—they have more texture and thickness, brighter color, and they stay “fluffy” longer in the bag. Farming organically takes patience and constant learning, but the results are worth it. Arnett also sees great potential for closing the loop on food waste with organic farming, by strengthening standards for composting to ensure that municipal food scraps can easily feed healthy, organic soil and start the cycle again.

that can permanently contaminate land.²¹⁸ Because of these contamination risks, sewage sludge is not allowed in organic production.²¹⁹

Application of raw manure and other animal waste as fertilizers on conventional fields can also threaten health. CAFOs generate massive amounts of animal waste that is often overapplied to nearby cropland, posing significant risks for drift and runoff that harm neighboring communities and waterways.²²⁰ While animal manure applied at the right time can be beneficial to a farm, these inputs must be properly used and handled to avoid public and ecological health risks.²²¹ To reduce risks of microbial contamination of crops, organic farms have significant waiting periods between manure application and crop harvests.²²² In contrast, conventional farmers are not bound by any waiting requirements. The FDA has not yet fulfilled its promise to regulate raw manure use but advises in the meantime that all farmers take the “prudent step” of following the NOP standard.²²³

Additionally, cutting-edge research shows that healthy soil builds healthier plants and may also offer direct and indirect human health benefits.²²⁴ In the absence of synthetic fertilizers that accelerate growth, organic plants may develop stronger cell membranes and higher levels of compounds that protect plants from stress.²²⁵ These compounds—polyphenols and antioxidants—are also important for human health. Soil microbes themselves can also boost the nutrient content of food.²²⁶ Further, there is an emerging understanding of the complex connections among the soil microbiomes that feed plant roots, the human gut microbiome, and improved physical and mental health outcomes. For example, soil microbes have been found to ease stress responses in mice; this connection between microbiology and the nervous system could be one of the reasons gardening benefits mood and mental health.²²⁷ The relationships between healthy soil, plants, animals, and people are complicated, but clearly they are interconnected. Organic farming systems build that healthy soil, which nourishes the rest of the ecosystem.

THE “BIG 3”: SEWAGE SLUDGE, IRRADIATION, AND GMOS PROHIBITED IN ORGANIC

Sewage sludge, irradiation, and GMOs, often dubbed “the Big 3,” are all prohibited in organic production because they are incompatible with the health and environmental principles of the organic movement.²²⁸ In the late 1990s, the first proposed organic regulations elicited “the largest public response to a proposed rule in USDA history”—more than 275,000 comments—in part because the rules would have allowed use of these controversial inputs.²²⁹ Due to this public outcry, the “Big 3” are prohibited in organic production.

ORGANIC IS A HEALTHIER FOOD CHOICE

Scientific studies increasingly demonstrate that organic food benefits our health in numerous ways. Many consumers seek out organic foods because they believe they are safer and more nutritious, and a growing body of research indicates that they are right. Organic farming can indeed increase crops’ nutrient content. And processed organic products, from tomato sauce to ice cream, often have shorter, simpler ingredient lists with minimal synthetic additives or chemical processing, making them safer to consume.

Organic Minimizes Additives

Organic rules protect our health because they strictly limit additives and the use of nonorganic ingredients in processed foods.²³⁰ Materials can make it onto the National List of allowed nonorganic materials only after rigorous scientific review, approval by the National Organic Standards Board, and rulemaking that provides an opportunity for the public to weigh in.²³¹ By contrast, conventional processed foods allow thousands of added ingredients, including artificial colors, flavors, and preservatives. While these are FDA approved, they raise many potential health concerns, including increased cancer risk and disruptions to our nervous systems, hormonal balance, and immune systems.²³²

Organic Maximizes Nutritional Benefits

While many factors influence the nutrient and mineral content of food, mounting research indicates that organic foods may be more dense in nutrients and minerals important to health (such as potassium, phosphorus, magnesium, iron, and zinc), antioxidants (14 to 26 percent higher), and other beneficial phenolic compounds.²³³ Phenolic compounds play a particularly important role in preventing several diseases, including cancer.²³⁴ In fact, a 2018 study of nearly 70,000 people’s diets and lifestyles found that more frequent organic food consumption is associated with reduced cancer risk, regardless of other diet and physical activity characteristics.²³⁵

Organic milk and meat are frequently richer in beneficial fatty acids, due largely to grass and red clover eaten by these pasture-fed organic animals.²³⁶ Whereas the feed grains consumed by conventional livestock contain less of these important nutrients.²³⁷

LORETTA ADDERSON, ADDERSON'S FRESH PRODUCE, KEYSVILLE, GEORGIA



Loretta Adderson returned to her family's farm in Georgia after she retired, and now, at 78 years old, she's thinking about how she can help her kids and grandkids carry on the family's organic farming legacy.

As a nutritionist, Loretta is focused on the holistic health part of farming; she farms organically because she wants to make sure the soil is healthy, to protect the water and environment for the future, and to support her community. Communities in Burke County, where Loretta farms, have high rates of heart disease, high blood pressure, and diabetes. So Loretta started growing organic greens to sell locally, beginning with just three varieties of kale and ultimately peaking at 91 items on her market list. But seeking out 91 types of organic or untreated, non-GMO seed is both expensive and time consuming—and may not be sustainable for the farm in the long term.

Loretta recognizes that affordability and taste are key to changing diets, so she has been an active participant in a farmers' market vegetable "prescription" program run in partnership with local doctors. The program brings affordable organic produce to an underinvested region of Augusta; they also offer tasting projects and demonstrations that help people cook healthy organic veggies. She has constantly sought out ways to support nutrition in her community.

Even as Loretta contemplates scaling back her farm to make it personally sustainable, she remains committed to recruiting more farmers to grow organically. And she has witnessed the power of mentorship firsthand. One farmer she trained brought on another mentee; another moved to Mississippi, and they're able to continue working together remotely. Each new organic farmer can reach a new group of consumers and steward more land.

From Loretta's perspective, the biggest gap in the organic sector is messaging. She says eating organic should be at the top of everyone's list, and when people say they don't like organic, that means the movement isn't doing its job. It's time for organic leaders and the United States to invest in making organic more visible and to market the benefits of organic on every platform. In the meantime, she's committed to finding ways to keep her community fed—just like her mom and dad did, and like she hopes her kids and grandkids will do into the future.



ORGANIC & ECONOMIES

Demand for Organic Is High and Growing

Young People Are Embracing Organic

**Organic Supports Farmer Livelihoods and
Economic Resilience**

Organic Is an Engine for Rural Economic Development

Organic Agriculture Supports Vibrant Local Food Systems

**Organic Prices Reflect Food's True Costs;
Conventional Prices Mask Them**

A Market Awaits: The Need to Increase Organic Supply

Organic Contributes to Prosperity and Revitalizes Communities

While better known for its health and ecological benefits, organic agriculture also provides a significant economic benefit. Research shows that organic farming spurs local economic vitality, creating the conditions for economic resurgence in struggling rural areas and offering new opportunities for farmers. Demand for organic food continues to rise. And as consumers—particularly younger millennials and Generation Z’ers—seek more direct relationships to food and farming, organic is fostering those connections in ways that nourish communities both economically and socially. Organic agriculture generates important economic dividends for individual farmers and rural communities—and with more public investment and policy support, organic agriculture can be a major economic engine across rural America.

DEMAND FOR ORGANIC IS HIGH AND GROWING

Organic’s economic bounty and promise stem from consistently rising demand. The United States is the largest organic market in the world, and organic is the fastest-growing sector of U.S. agriculture.²³⁸ The organic market has grown steadily in the two decades since NOP regulations went into effect, with double-digit growth in most years since 2000. This includes years when the overall agricultural market declined.²³⁹ Organic sales surpassed \$50 billion in 2020 (Figure 2).²⁴⁰

Consumers across the country seek out organic food. In 2016, 82 percent of U.S. households reported purchasing organic products on a regular basis—at least 70 percent



82%



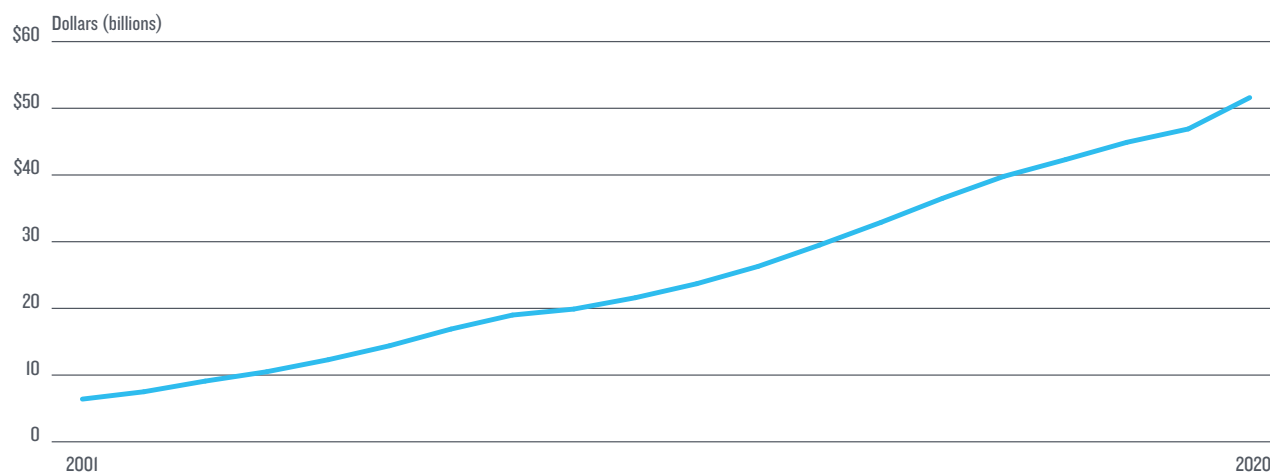
of households or 4 out of 5 people buy organic

Source: Organic Trade Association.

of households in every state and more than 90 percent of households in leading organic states.²⁴¹ Likewise, in 2017, more than four in five adult U.S. consumers bought organic products.²⁴²

Accordingly, organic is now a norm across the U.S. supermarket sector. In 2020, the majority of organic food was sold in mainstream grocery outlets like Costco, Walmart, and Safeway.²⁴³ Despite stereotypes of organic as being mostly for upper-class, predominantly white consumers, organic’s appeal spans diverse income and racial groups. While people with higher incomes and education levels purchase more organic foods than people in other demographic sectors, organic consumers come from a wide range of backgrounds.²⁴⁴ A 2020 study found that 14 percent of dedicated organic consumers identify as Black, 25 percent as Hispanic, and 10 percent as Asian—each group exceeding its representation in the overall U.S. population.²⁴⁵

FIGURE 2: U.S. ORGANIC SALES GREW FROM LESS THAN \$7 BILLION IN 2001 TO MORE THAN \$50 BILLION IN 2020²⁴⁶



YOUNG PEOPLE ARE EMBRACING ORGANIC

There is a surging interest in organic food and farming among young people. Millennials, some 73 million strong, represent the largest adult generation in the United States and a growing market for organic food.²⁴⁷ Millennials also tend to prioritize how food is produced more than older generations.²⁴⁸ A 2020 market research survey reported that millennials (and younger members of Generation X) tend to be the primary organic food buyers, and a 2018 survey from the Pew Research Center found that more than half of young adults (ages 18 to 29) believe that organic produce is better for health than conventionally grown produce.²⁴⁹ Organic is especially appealing because it is the only consumer label that encompasses climate-friendly farming practices, prohibitions on toxic pesticides and GMOs, and backing by federal law and enforcement authority. Surveys show that younger generations, including Generation Z, are not only more likely to eat organic, they are also more willing to pay more for healthy foods.²⁵⁰



This rising demand is spurring more organic farming. Despite the overall decrease in the number of farmers producing conventionally, the number of U.S. certified organic operations has increased consistently every year, reaching nearly 30,000 in 2021.²⁵¹ There are organic farms, ranches, and processors in every state (Figures 3-5).²⁵²

ANDREA DAVIS-CETINA, QUARTER ACRE FARM, GREENSBORO, MARYLAND



Andrea Davis-Cetina began farming on a quarter acre of leased land in California during the 2008 recession and was forced to move her farm 5 times in 10 years. She achieved organic certification in 2010 and continued to invest in certification at each new location—even though she couldn't secure a lease for more than three years at a time, and most were year-to-year. The disconnect between landowner and farmer expectations was stark. What some owners expected as a monthly payment was the total she could afford for a year, and no one would consider a 50-year lease that would give her farm true stability. She ultimately landed in Maryland, where tax incentives encourage owners to keep land in agriculture; many landowners don't even charge farmers rent because the tax breaks are so substantial. In Maryland, a small, stable organic farming operation may be within reach: in 2021, Andrea purchased a 12.6 acre property and is currently transitioning the farm to organic.

As a young, female farmer, Andrea has struggled to access land and to be treated respectfully. Being certified organic has helped. She became certified early, when her farm was still very small, and she

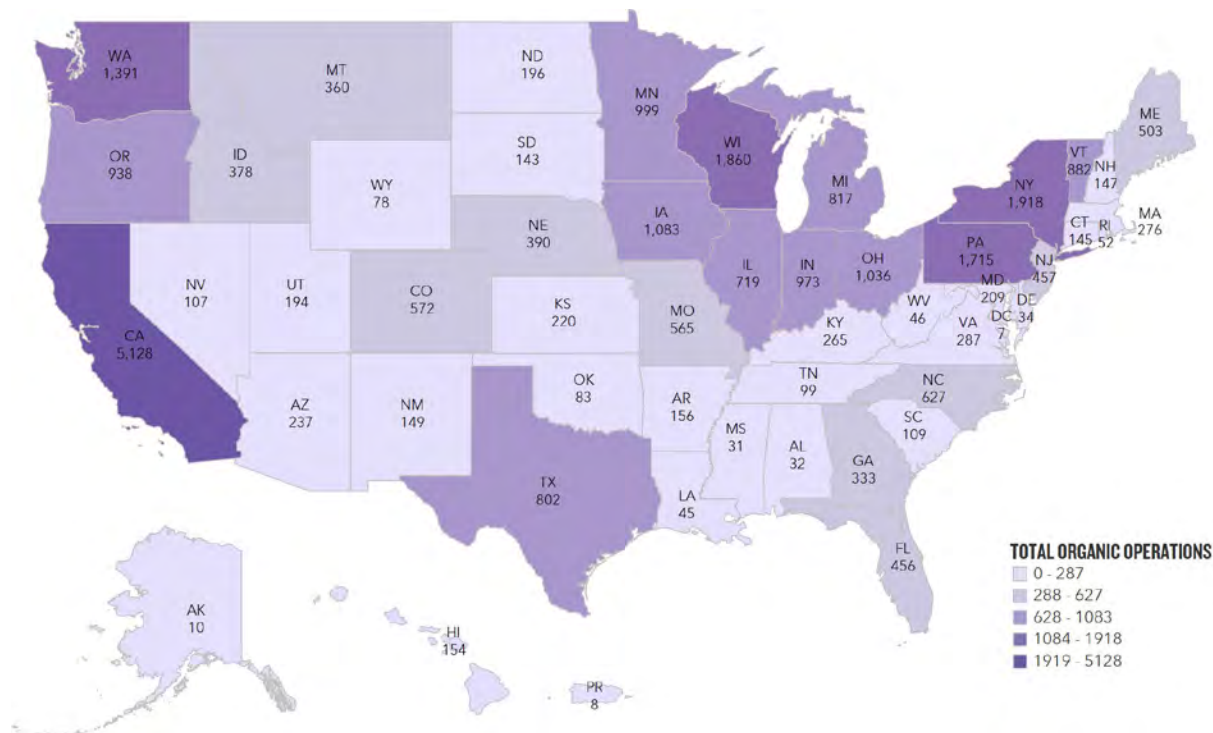
found that the certification gave her legitimacy; adding the USDA Organic seal and CCOF logo to her business cards distinguished her from hobby gardeners and made it clear that she runs a serious commercial farming operation.

The federal organic certification cost-share program—which reimburse farmers for certification expenses—has been essential to Andrea's success. Her certification fees are scaled to size, and her inspections are quick because she has a small operation and proactively keeps her paperwork in order.

On the other hand, finding organic-compliant inputs, such as organic fertilizer, can be particularly challenging at her scale. Companies may not sell a single bag of material or a small volume of a particular organic seed, so Andrea has to spend significant time on sourcing.

Nonetheless, Andrea believes that being certified organic makes her a better farmer. She carefully scrutinizes materials before using them and has found that it's easier to communicate her growing practices to her customers. She's also excited about what her generation will bring to organic: an end to the combative style of battling pests that dominates nonorganic agriculture, and an open-mindedness that leaves plenty of room for creativity and innovation in farming.

FIGURE 3: ALL U.S. ORGANIC OPERATIONS BY STATE, 2021²⁵³



This slow but steady rise in organic production is being outpaced by growing consumer demand for organic food—a frustrating but promising mismatch that policymakers can address through a variety of interventions (including those offered in this report). Research demonstrates that such an expansion will result in economic gains for both farmers and rural communities.

ORGANIC SUPPORTS FARMER LIVELIHOODS AND ECONOMIC RESILIENCE

More than half of U.S. farm households lose money farming each year, and many farmers rely on second jobs off the farm to stay afloat.²⁵⁴ The vast majority of these struggling operators are small and midsize farmers who find it difficult to access public and private capital, land, equipment, insurance, and markets—as well as meet the basic needs of their families, like health care and child care.²⁵⁵ Farmers are already vulnerable to seasonal yield variability and the price volatility of agricultural inputs and outputs. Exacerbating these conditions, the increasing consolidation of agricultural enterprises hinders the ability of independent and smaller-scale farmers to compete in a marketplace skewed against them.²⁵⁶

While organic farmers are not insulated from these challenges, research shows that certified organic farms are more profitable than their nonorganic counterparts.²⁵⁷ Between 2012 and 2017, organic farm income doubled while the income of all U.S. farms remained flat.²⁵⁸ Organic farmers may fare better economically because diverse crop rotations can stabilize their returns, making them less sensitive to changes in prices.²⁵⁹ Similarly, the resilience of organic farms in the midst of climate change (for example, robust soils retain more water to endure chronic droughts) creates an economic resilience that conventional farms lack.²⁶⁰ Perhaps more than anything else, the higher market prices of organic food—reflecting a truer cost of



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production—entice farmers to transition to organic and help their farms survive. As a result, fewer organic farmers than conventional farmers are forced to seek off-farm employment for supplemental income.²⁶¹

For these and other reasons, growing numbers of young and beginning farmers are committing to organic practices.²⁶² The *2017 Census of Agriculture* reported that the average age of producers for all farms was 57.5 years, while that of organic farmers was 50.5 years.²⁶³ This promising shift to organic farming is particularly important as farmers age out and a new generation produces the nation's food.

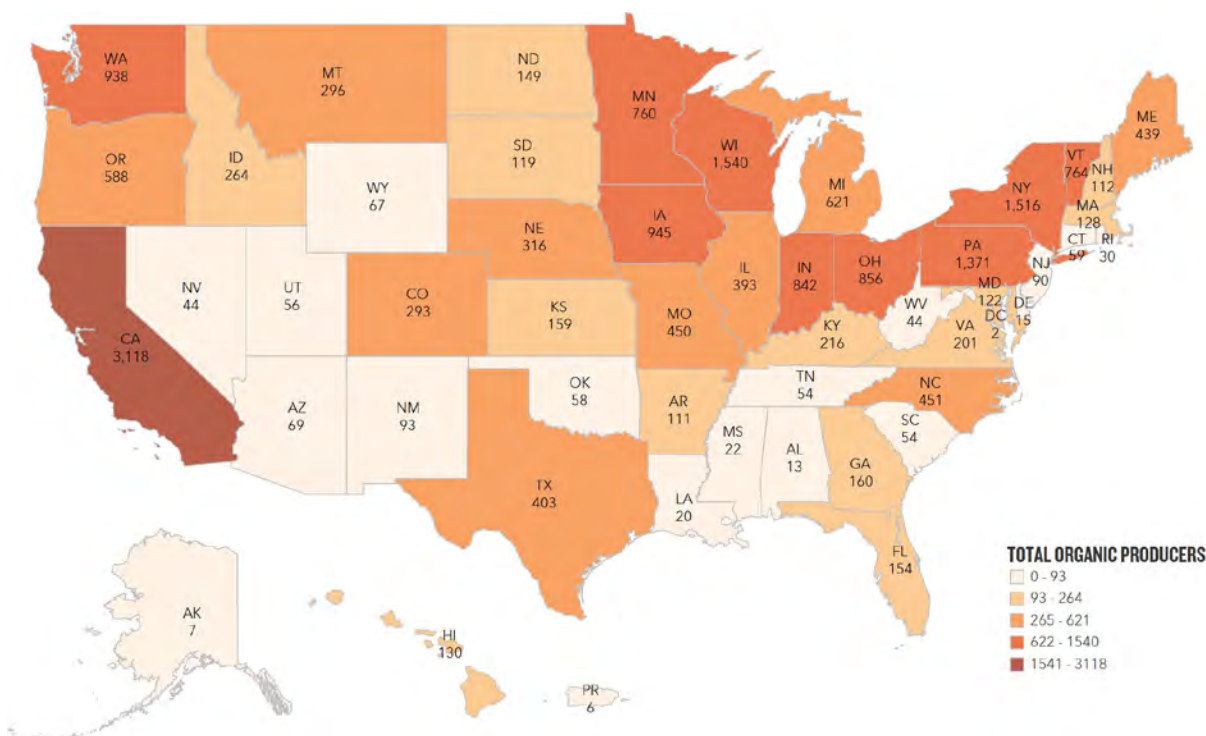
Young organic farmers are more entrepreneurial than conventional farmers and are more open to new ideas. For instance, they show greater interest in and success with consumer-direct and value-added marketing such as farmers markets and community-supported agriculture (CSA) produce box programs.²⁶⁴ Nearly 8 percent of organic farmers in 2014 were also organic handlers,^f producing value-added products like wheat flour, tomato sauce, and dried fruit that garnered an additional \$730 million in farm sales.²⁶⁵ Strategies like these, adopted increasingly by younger organic farmers, diversify income streams and help make food production an economically viable long-term enterprise.

ORGANIC IS AN ENGINE FOR RURAL ECONOMIC DEVELOPMENT

Across the decades there has been a steady migration out of rural America; as of 2020, only 14 percent of the U.S. population resided in a rural area.²⁶⁷ In addition to the many young people choosing city life over farm life, declining birth rates and rising mortality rates among working adults contribute to rural population decline.²⁶⁸ Migration rates tend to fluctuate in response to economic conditions, with more people leaving rural communities in times of rising unemployment and poverty.²⁶⁹ This out-migration worsens economic struggles by also moving money out of rural communities.²⁷⁰

Organic agriculture helps to counter and reverse this rural flight by creating new (and better) economic opportunity that reverberates throughout local communities. Organic farming and ranching are job creators all along the supply chain. An organic industry survey found that in 2019, 36 percent of surveyed organic businesses hired full-time employees (and had projected similar growth prior to the 2020 COVID-19 shutdowns).²⁷¹ Although organic standards do not address systemic injustices related to farm labor, organic farms are safer workplaces for farmworkers

FIGURE 4: ALL U.S. ORGANIC FARMING, LIVESTOCK, AND WILD CROP OPERATIONS BY STATE, 2021²⁶⁶



^f Organic handlers perform numerous functions, including packing and shipping, manufacturing and processing, and brokering, wholesaling, or distributing. Any product labeled organic must be handled in accordance with NOP standards from farm to consumer, including ensuring traceability and being protected from contact with prohibited materials. 7 CFR §§ 205.270, 205.272.

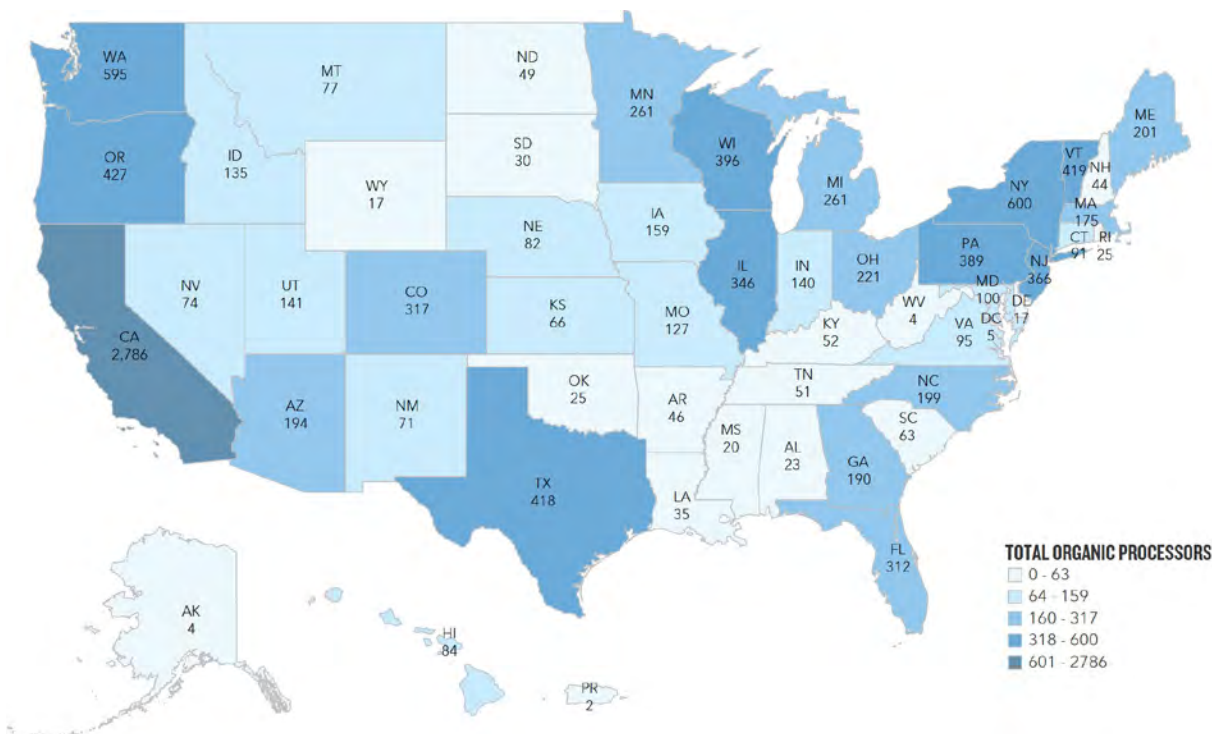
because of reduced risks of exposure to toxic chemicals and antibiotic-resistant bacteria. A study of organic farms in California and Washington—states with significant organic production—concluded that organic operations hire more workers per acre and more year-round workers than conventional farms do, as they replace synthetic inputs with human labor (such as hand or mechanical weeding), knowledge, and observation to manage healthy crop growth.²⁷²

In fact, regions with high concentrations of organic agriculture have an impressive cascade of economic benefits that stem from this type of farming. Several studies have shown that when areas have more organic agriculture their economies thrive, making them “organic hotspots.”²⁷³ A 2018 study identified 225 such areas across the United States. These organic hotspots—counties with a high number of organic operations and adjacent to other counties with high levels of organic activities—experience higher employment rates, higher median household income, and lower rates of poverty compared with households in nonorganic clusters.²⁷⁴ Hotspots strongly suggest that organic agriculture ought to be leveraged as an engine of rural economic development in more regions throughout the country.



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FIGURE 5: ALL U.S. ORGANIC PROCESSING OPERATIONS BY STATE, 2021²⁷⁵



DAPHNE SNOW, CHOCTAW FRESH PRODUCE, CHOCTAW, MISSISSIPPI



Daphne Snow manages four organic farms on five acres of the Choctaw reservation.²⁷⁶ The Tribe has about 11,000 members scattered across eight Tribal communities in rural Mississippi, where job creation remains a constant struggle. The Tribe initially approached farming as an economic development idea and turned to organic in hopes that, in off-reservation markets several hours away, consumers would pay organic price premiums that could help subsidize food production for the Tribe's members.

Unfortunately, that plan did not pan out. The market for organic remains small in Mississippi, and organic wholesale prices were lower than the farm managers expected; for instance, grocers paid the Tribe \$0.50 per pound for organic tomatoes and sold them for \$3–\$6 per pound.

Choctaw Fresh Produce still believed organic farming was the right choice, because the Tribe has witnessed firsthand the harm that agricultural chemicals can do. Farming organically was the best way to bring the land back to health.

So Daphne and the rest of the management team found creative ways to make the farm economically viable under challenging circumstances. They switched to keeping all the farm's production on-reservation, and they distribute it through several innovative programs: a "Tribal Supported Agriculture" box through the Tribe's diabetes program; a pickup opportunity on Fridays for the Tribe's Elders at their activity center; and sales to reservation casinos that are willing to recognize the value of the Tribe's farm in the prices they pay. The Tribe is also piloting a groundbreaking farm-to-school initiative supported through several USDA grants: cafeteria workers stay on staff through the summer to process and store the summer harvest, for use in meals during the school year.

The Tribe still faces numerous challenges. The nearest organic certifier is based in Florida, a 10-hour drive away, which makes annual inspections costly. And little organic research has focused on farming in the South, in hot and humid climates with strong pest and disease pressure. But Daphne hopes that persistence and new energy from young staff and the farm-to-school program will keep the farm growing.

ORGANIC AGRICULTURE SUPPORTS VIBRANT LOCAL FOOD SYSTEMS

Organic farming is often a part of—and a key driver of—vibrant local food systems and food economies.²⁷⁷ Through increased direct sales, organic fosters local and regional gross domestic product (GDP) growth. Farms that sell locally also tend to hire local labor and purchase local inputs when possible, which stimulates local job opportunities.²⁷⁸ In fact, according to USDA, one of the most striking differences between conventional and organic farming is the use of direct markets.²⁷⁹

Organic farms promote more local and direct sales than do nonorganic farms, with 11 percent of organic operations selling directly to consumers in pre-COVID years.²⁸⁰ Indeed, organic producers are considered to be leaders in direct marketing strategies, and they and their customers have built up numerous direct sales channels, including CSA shares, farmers markets, farm-to-school programs, and, increasingly, business-to-consumer e-commerce.²⁸¹

Direct and local sales result in higher profits for farmers. Typically, farms receive only \$0.16 of every \$1 consumers spend on food, with the rest going to various post-farm industries.²⁸² Shorter supply chains (i.e., fewer intermediary transactions) allow producers to capture more of the consumer dollar. In the early months of the pandemic, demand for direct sales and organic food increased.²⁸³ This became a lifeline for many small and midsize organic farmers—who lost access to numerous markets when conventional supply chains broke down in 2020—and for consumers, especially institutions.²⁸⁴ Additionally, organic farmers are increasingly exploring innovative business models like cooperatives that allow many producers in a region to collaborate, sharing infrastructure and other costs while increasing their ability to supply food to larger buyers.²⁸⁵

The layering of organic farming onto local food systems offers additive benefits that extend beyond just local or just organic production. In myriad ways, smaller-scale organic producers promote more local engagement with food and farming and more direct relationships between producers

and consumers. Additionally, with its emphasis on local knowledge, resources, and markets, the organic agriculture community has historically sought to create food systems based on local ecological knowledge and farmers' sharing of seeds and innovation to improve production for all.²⁸⁶ This stems partly from necessity. Decades of public policy biases supporting conventional production and minimal public investment in organic agriculture have forced organic farmers to create a culture of solidarity and sharing throughout the organic community, facilitating rich knowledge exchange, mentorship, and technical assistance outside of governmental structures.²⁸⁷ At the same time, organic farmers have historically played an important ambassadorial role that informs consumers about who grows their food and what it takes to get this food to their tables.

ORGANIC PRICES REFLECT FOOD'S TRUE COSTS; CONVENTIONAL PRICES MASK THEM

Organic food is often sold to consumers at higher but fairer prices, reflecting a higher cost of production, limited organic distribution and processing infrastructure, a lack of U.S. government subsidies and support for organic production, and a willingness for far too long on the part of industry and government to ignore the true social and health impacts of conventional products.

Organic producers frequently incur production costs unique to organic agriculture, including: (1) securing access to farmland that has not been treated with prohibited materials (e.g., synthetic pesticides or fertilizers) or waiting to complete the three-year organic transition period before marketing products as organic once land has been secured; (2) higher labor costs associated with manual weed management and harvesting diverse crops; (3) establishing separate handling systems to ensure organic products do not come in contact with prohibited materials, including conventionally grown products; (4) producing smaller volumes of diversified crops that do not benefit from economies of scale; (5) setting aside land for mandatory crop rotations to build soil fertility, including cycling out cash crops for cover crops that don't have robust markets; (6) inspection and certification fees (though these can be partially offset through the National Organic Certification Cost Share Program); and (7) recordkeeping and organic compliance.²⁸⁸ The three-year transition to organic, in particular, comes with a steep learning curve and substantial financial risks; producers must design an organic system plan, develop a relationship with a certifier, and implement a new system of farming—often with very little technical assistance or advice.²⁸⁹ These costs make it particularly challenging for organic producers to compete in a predominantly conventional marketplace.

Additionally, one of the major reasons that organic food may cost more at the checkout counter is that organic producers benefit from relatively few government investments. The vast majority of direct and indirect subsidies for U.S. farmers support conventional production of livestock, commodity crops like corn and soy that are often used for animal feed or fuel, and processed foods (in addition to fiber crops like cotton).²⁹⁰ Most large public nutrition assistance programs (e.g., the National School Lunch Program, the Commodity Supplemental Food Program, and the Emergency Food Assistance Program) do not include organic food, but do guarantee steady markets for industrial-scale conventional agriculture.²⁹¹ Similarly, the vast majority of public research dollars do not help organic producers, so they are left to experiment on their own and glean information from peers.

Because organic producers tend not to receive public supports and subsidies like many conventional commodity growers, earning a fair price for harvested product is essential to the economic survival of organic farmers and farming communities.²⁹² The potential to sell at a price point that reflects the true cost of production makes transitioning to organic farming more attractive to conventional producers, who constantly struggle to make ends meet.²⁹³

This presents a fundamental challenge for organic. On the one hand, higher prices for organic food may align more closely with the true costs and benefits of production, and fair prices are critical for organic producers to stay economically viable, particularly as they shoulder extra costs associated with organic certification. On the other hand, higher prices for organic products can put them out of reach for some lower-income consumers. Part of this dynamic can be explained by organic demand far surpassing supply and by the failure of current policies to address the extra costs organic agriculture incurs due to underdeveloped organic supply chains. Ultimately, current public policies do not do enough to bridge the gap between fair prices for organic producers and affordability and accessibility for all consumers.

True cost accounting is an updated and more comprehensive approach to cost-benefit analysis that makes the “true cost” of food more transparent. Policymaking informed by true cost accounting can help improve alignment between agricultural policy and desirable outcomes for consumers.²⁹⁴

A true cost accounting approach includes the monetary value of food production's societal impacts and costs (also known as externalities) in its analysis of the costs and benefits of food production practices and systems. That analysis—qualitative and quantitative, financial or otherwise—is informed by scientific assessments that are part of ongoing, transparent study, and it is iterative

in nature.²⁹⁵ When those externalities—for example, higher health care costs or cleanup costs of environmental pollution—are taken into account by those developing policy, conventional foods cost far more than their sticker price.²⁹⁶ And the reductions in harms and the positive impacts of organic production, from more stable yields over time to healthier communities and ecosystems, make organic foods a better deal.²⁹⁷ The transparency created through true cost accounting can help policymakers invest public resources in farming systems that provide the greatest public benefits, as well as ensure that producers receive fair prices and food remains affordable.

One holistic true cost accounting approach gaining traction worldwide is The Economics of Ecosystems and Biodiversity (TEEB) AgriFood Evaluation Framework, an initiative of the United Nations Environment Programme, supported by the Global Alliance for the Future of Food.²⁹⁸ In a 2020 study, researchers applied the TEEB AgriFood

framework to corn production in Minnesota, comparing organic and conventionally grown crops to assess impacts on air, water, soil, and biodiversity as well as social and human benefits.²⁹⁹ More than 90 percent of U.S.-grown corn is genetically modified (GM).³⁰⁰ As shown in Figure 6, the study found that a significant portion of the economic revenue generated by GM corn was offset by negative impacts on health and the environment. Specifically, it found that conventional farming using GM corn produced about \$560 million in costs to natural resources and an additional \$1.3 billion in negative impacts on public health; the proximity of farms producing GM corn to neighboring residences was associated with decreased health outcomes as compared with organic farms. In contrast, organic corn operations evaluated in the study were shown to have positive economic and health impacts—especially higher net returns and health benefits derived from improved air and water quality—and limited environmental costs.

WILL GLAZIK, COW CREEK FARM AND JW ORGANIC FARM, PAXTON, ILLINOIS



As someone who has worked in both organic and conventional agriculture, Will Glazik recognizes that culture is central to a widespread shift in farming practices. After college, Will sold farming chemicals and other inputs, and today he draws on that experience to communicate with diverse audiences. He has found that even if a farmer thinks organic farming is the right thing to do, it can be difficult to go against family history or peer pressure from neighbors who view GMOs and synthetic pesticide use as progressive. Will's solution was to slowly build organic critical mass in his community through field days, conferences, trial areas, and an organic apprenticeship program.

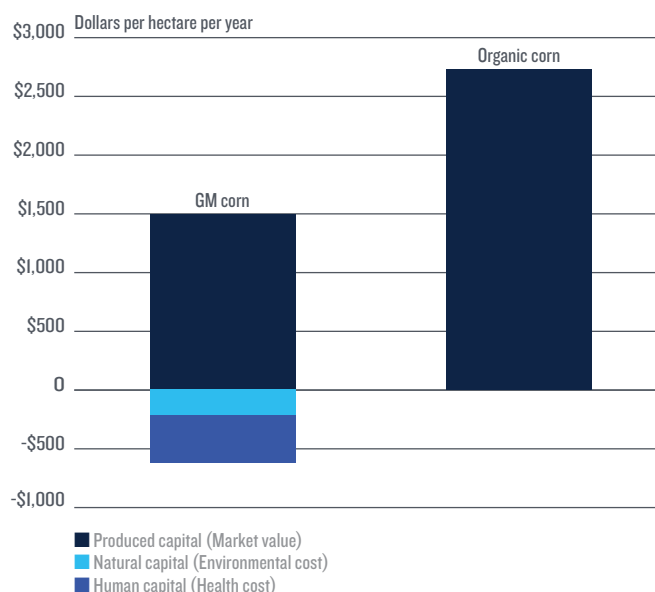
Will has been uniquely successful in expanding organic acreage in his region. He and his brothers took over their parents' 400 organic acres in 2015, and in just four years they expanded it to 1,000 acres. When his parents started farming organically, they were the only organic farm for several counties. Now, in their county alone, there are seven farms that are certified organic or transitioning—and landowners continue to seek him out with more land to transition. These days, instead of continuing to grow his farm, Will is training new organic farmers. He also cofounded the IDEA Farm Network, a peer-to-peer learning community of regenerative organic champions.

Will has found creative ways to expand markets for the various grains he grows. In addition to accessing strong wholesale and direct markets for organic corn, soy, oats, wheat, and rye and experimenting with other grains like spelt and buckwheat, Will's operations have expanded into grass-fed pork, beef, and chicken, and the latest endeavor—hard alcohol. Will distills transitional grain into vodka and whiskey that he sells across Illinois. He also supplies local breweries

and distilleries, including Old Bakery Brewery in Alton, Illinois, which brews certified organic beer with his grain. Will's next dream is to get into buckwheat alcohol—a perfect use for a key cover crop that needs a profitable second life, and a unique new product.

Will envisions organic agriculture as a driver of thriving small towns full of independent small businesses. As farmers retire and leave behind land, Will sees potential for a transformative shift—from one person farming 10,000 acres conventionally to 20 people farming organically and raising families in small towns across America.

FIGURE 6: TRUE COST OF GM AND ORGANIC CORN PRODUCTION IN MINNESOTA, 2017³⁰¹



Meanwhile, a 2021 analysis by the Rockefeller Foundation concluded that while U.S. consumers spend roughly \$1.1 trillion directly on food, the true cost of our food system nearly triples to \$3.2 trillion when impacts related to human health, the environment, and society are accounted for.³⁰²

New policy approaches addressing the true cost of food are critical to pivoting our food system toward centering human and environmental health and economic stability for producers. True cost accounting analysis can bring disparities in public investments and impacts to light. Incorporating this approach into policymaking will shift investments in farming systems toward those that offer the greatest benefits and away from those that cause the most harm, leading to more stability for organic farmers and lower costs for consumers.



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A MARKET AWAITS: THE NEED TO INCREASE ORGANIC SUPPLY

Chronic underinvestment in organic agriculture means that organic production falls far short of current demand in the United States. As Americans purchase and consume more whole foods, such as fresh fruits and vegetables and whole grains, and seek items with minimally processed, recognizable food ingredients, U.S. demand for organic is growing faster than the supply.³⁰³ Given the shortfall in domestic production of these high-demand foods, many U.S. companies have no choice but to import organic products.³⁰⁴ That's an enormous lost economic opportunity.

During the last decade, the United States imported much more organic food than it exported.³⁰⁵ In 2021, tracked organic imports reached \$2.7 billion, while exports were valued at \$700 million (Figure 7).³⁰⁶ Organic feed and grains, like corn and soybeans, remain significant import crops because there is not enough domestic supply to meet demand.³⁰⁷

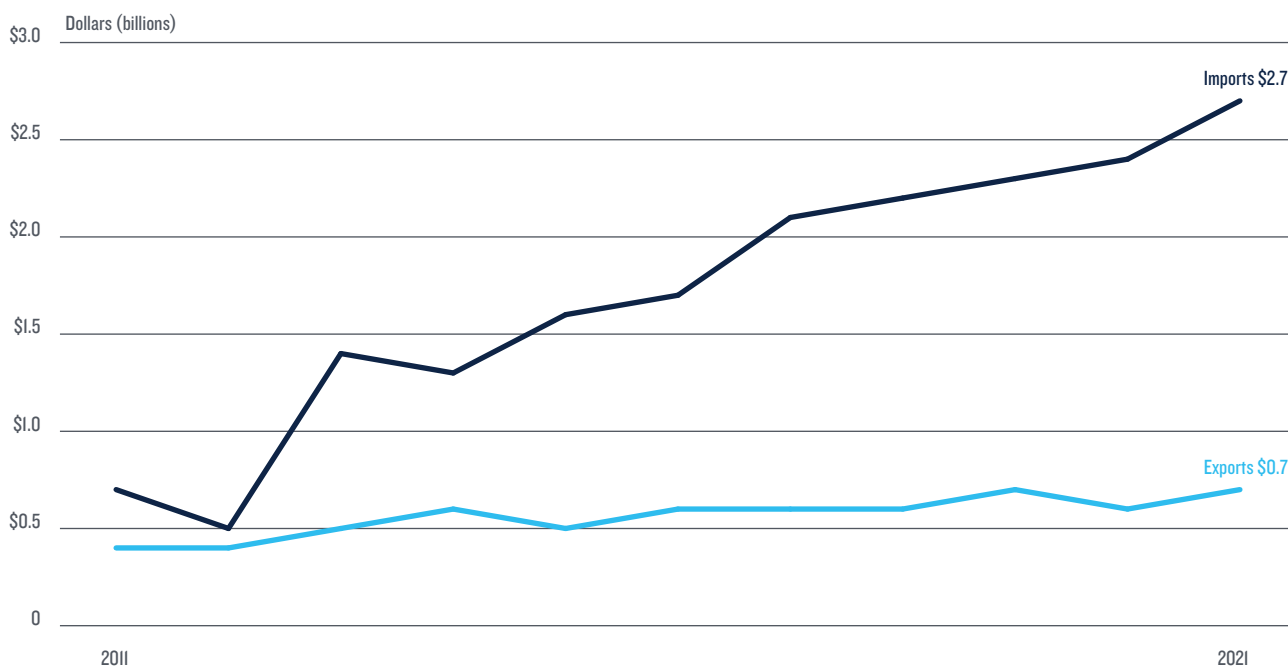
Some private-sector efforts are just beginning to address the domestic organic grain deficit. Several companies have begun to proactively encourage U.S. wheat and barley farmers to transition to organic, to shorten supply chains and reduce their reliance on imported ingredients.³⁰⁸ However, to sufficiently expand organic production and

enable American farmers to fill this lucrative demand, we need increased public investment, additional long-term research, and other reforms.

Expanding organic production will allow U.S. farmers to meet domestic demand and potentially expand export opportunities. For example, a USDA 2020 report on Taiwan, now the fifth-largest export market for U.S. organic products, forecasts that Taiwan's organic imports will grow by almost 50 percent between 2020 and 2025, creating new market opportunities for U.S. growers.³⁰⁹ However, other countries are also taking note of organic trade trends. Another USDA report reveals that India's organic sector is looking to increase exports to the United States. This could potentially eclipse organic market opportunities for young and beginning farmers in the United States.³¹⁰

Despite the challenges and complexities of a competitive global organic marketplace, there are major opportunities for domestic organic farming and ranching to expand—and for more producers to supply this fast-growing market by transitioning to organic. In meeting the rising demand, organic producers will be helping to boost farming economies, improve public health, and protect ecosystems. But organic producers need stronger public support to make this expansion possible. As the policy recommendations below elaborate, it's time to shift U.S. policies and resources to grow organic.

FIGURE 7: THE UNITED STATES REMAINS A NET IMPORTER OF ORGANIC. THE TOTAL VALUE OF U.S. ORGANIC IMPORTS EXCEEDED ORGANIC EXPORTS FROM 2011-2021³¹¹



CARMEN MENDOZA, FORMERLY OF THE ASIAN BUSINESS INSTITUTE AND RESOURCE CENTER, FRESNO, CALIFORNIA



Vivian, a diverse crop farmer in Fresno, CA.

When Carmen Mendoza was deputy director of the Asian Business Institute and Resource Center (ABIRC), an organization that serves small-scale farmers of color, she saw great potential to expand organic production—as well as significant hurdles. ABIRC supports several hundred farmers, including the Hmong farming community in California's Central Valley and other Southeast Asian, African American, and Latino farmers. Although most of their members farm diverse crops, build healthy soil, and use natural pest management, only three are certified organic.

ABIRC's members face numerous challenges to organic certification, with land tenure at the top of the list. Most ABIRC members rely on year-to-year leases, but organic certification requires that farms go three years without prohibited inputs before they can be certified, making it nearly impossible for these small farmers who have to move frequently to achieve and sustain organic certification. In addition, limited information and resources are available in non-English languages; this gap leads to misinformation and inadequate services for farmers who speak little or no English. Further, actions by government agencies that range from culturally insensitive to discriminatory—including labor raids on small Hmong family farms—have bred mistrust of government programs and reluctance to open farms to outside entities, a requirement for organic certification.

Even so, Carmen recognized opportunity on the horizon. Carmen's dream was to purchase 200 acres of land—or perhaps find a charitable donor—and give several acres to each of ABIRC's members to farm organically. They could use a co-op model to create an economy of scale for seeds, inputs, training, and marketing. They are excited to follow the successful lead of Hmong farmers in Minnesota, where substantial investment in land for farmers of color helped ensure that they are well-represented in the organic sector.

An aerial photograph of a vast agricultural landscape. The field is divided into several distinct sections of different colors and textures, representing various crops or stages of cultivation. In the lower-left foreground, a person is walking across a dark, tilled section of the field. The overall scene is bathed in the warm, golden light of late afternoon or early morning, with long shadows cast across the land.

POLICY SOLUTIONS TO GROW ORGANIC

1. Expand organic production by reducing barriers to organic transition
2. Ramp up federal resources that promote organic innovation, success, and accessibility
3. Ensure racial and Indigenous justice and equitable participation in organic agriculture
4. Use true cost accounting to identify agricultural investments that benefit the public
5. Create stable organic markets and expand access through public procurement
6. Reward organic management and ecosystem services in agricultural policies
7. Educate the public about the benefits of organic
8. Invest in regional supply chains to meet growing demand for organic
9. Strengthen organic rules and enforcement
10. Integrate organic throughout public institutions

Policy Solutions

Despite the many health, economic, ecological, and climate benefits of organic, less than 1 percent of U.S. agricultural land is currently certified.³¹² This is because the United States has not meaningfully invested in holistic public policy support for organic production systems.

Producers seeking organic certification must undertake a long, challenging, and financially risky process—typically without much or any government support. Many producers seeking organic certification must:

- survive a three-year transition period with a steep learning curve and limited technical assistance, without additional compensation during that time;
- take on the expenses and time demands of the certification process and annual inspections;
- learn new ways to manage pests, weeds, and other threats while restoring soil health and ecosystems and integrating more diversity into their operations;
- maintain field buffer zones to guard against pesticide drift from neighboring conventional farms;
- prepare for potential short-term drops in production during transition;
- seek out new suppliers and markets; and
- weather the social costs of doing something different from their families, neighbors, educators, and their primary sources of technical assistance.

These barriers are exponentially more challenging for producers who experience discrimination or whose primary language is not English, as well as for small farms with limited staffing, producers in parts of the country with less-developed organic sectors, and producers with uncertain land tenure.

In addition, organic research programs that identify and distribute information on best practices for organic farmers have paltry budgets when compared with conventional research. Public entities and programs (e.g., the Agricultural Research Service, the Natural Resources Conservation Service [NRCS], cooperative extension, land grant universities, state departments of agriculture) have not prioritized resources to meet the needs of organic producers or ensured that staff have organic expertise.³¹³

Organic producers are not operating on a level playing field. They must compete with heavily subsidized conventional agricultural industries and practices while assuming the financial risks of converting to organic.

It's time to prioritize health, climate, and prosperity in U.S. agricultural policy by dramatically expanding public support for organic agriculture. The next Farm Bill should pair clear and ambitious goals for growth in organic with the holistic policies and investments necessary to achieve them.

Timely models for this type of public commitment to organic already exist. The European Union's Farm to Fork Strategy prioritizes sustainable food production and health by directing member states to triple organic acreage by 2030 (to at least 25 percent of the European Union's agricultural land), and to cut pesticide use by 50 percent, fertilizer use by 20 percent, and sales of antimicrobials for animal agriculture by 50 percent in that same time frame.³¹⁴ U.S. lawmakers should set similarly ambitious goals and provide the resources necessary to achieve them.

More significant organic investments in the Farm Bill—together with a strong administrative commitment to organic and the continued advocacy of stakeholders—are necessary to ensure that everyone who wants to farm, ranch, manage land, and eat organically can do so. Together, the policy priorities outlined below will ease the organic transition process, make the organic sector more inclusive and equitable, and drive us holistically toward sustainable food systems.^g

I. EXPAND ORGANIC PRODUCTION BY REDUCING BARRIERS TO ORGANIC TRANSITION

Farmers and ranchers need a comprehensive support system to navigate the challenging three-year transition to organic production. During this transition, farmers may need to learn new management and recordkeeping



Agriculture and Land-Based Training Association (ALBA) educator trains farmers on soil conservation.

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^g For additional policy recommendations, see Merrigan, Giraud, and Greene, "The Critical To-Do List for Organic Agriculture."

practices, adopt new approaches to pest and weed control, find new sources of seed, and nurse land back to health with natural fertilizers and cover crops—all while still competing in the conventional marketplace. Many farmers have overcome these barriers, but countless others have not, with some failing along the way and others deciding not to pursue organic in the first place, given the costs and risks.³¹⁵

The USDA's long-standing Organic Transitions Program (ORG) supports important organic research but is insufficient to meet the holistic needs of producers interested in making the shift. The program is poorly funded (just \$3 million to \$6 million a year) and focuses narrowly on research at colleges and universities.³¹⁶

USDA took a significant step further in 2022, announcing plans for a \$300 million, multi-year Organic Transition Initiative that will include regional transition support networks with wraparound technical assistance and mentorship, conservation and risk management funding for transitioning producers, and targeted organic market development.³¹⁷

More work is needed to make holistic support for organic transition available on a permanent basis. To ensure that organic food is widely available and affordable, and to support a new, more diverse generation of organic producers, the United States should create a flexible and holistic organic transition program. Similar to the Organic Transition Initiative, the program should provide funding and other resources to producers and organizations that serve them, to ensure that transitioning producers can get help developing successful organic system plans and navigating organic rules, applications, inspections, and reporting requirements (especially important for those who do not speak or read English), as well as advice on adopting organic-compliant practices. It should also include resources to improve access to land and credit, mentorship and training, technical assistance, and market development (including opportunities to sell to public agencies).

Importantly, the organic transition program should include regionally tailored resources to expand the availability and affordability of organic certification, inspection services, research, and assistance in areas of the country where the organic industry remains nascent, including the South and the Midwest. Although producers in these areas may use some organic practices, they may find less value in committing to organic certification because they do not have access to organic supply chain infrastructure or well-developed organic markets. Expanding organic investments in these regions could encourage producers to transition to organic and significantly increase U.S. organic production, as well as leverage the organic hotspot effect, generating broader economic gains by promoting organic regional food systems.



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2. RAMP UP FEDERAL RESOURCES THAT PROMOTE ORGANIC INNOVATION, SUCCESS, AND ACCESSIBILITY

Investments in organic lag far behind the sector's contributions to the agricultural economy and the benefits it offers the public—and this underinvestment limits the potential of organic farming. Greater public investment in organic research, technical assistance, conservation incentives, and other support programs will put organic agriculture within reach for more farmers and help them succeed in the long term. Although farmers are scientists, experimenting and incorporating learnings year after year, agroecological science and breeding also need more public research, as well as extension and training to disseminate agroecological knowledge. For example, the Sustainable Agriculture Research Education (SARE) program has supported farmer-driven research with a “whole-farm approach” for more than 30 years, but SARE is only authorized for up to \$60 million annually, and annual appropriations cycles have delivered much less.³¹⁸

The federal government should significantly increase spending on organic to signal national prioritization of organic farming. Currently, organic food represents 6 percent of all food purchased in the United States.³¹⁹ Even using 6 percent as a minimum spending threshold for organic investments across all USDA programs would be a meaningful boost. In 2021 USDA spent about \$71 million on research directly pertinent to organic agriculture within its \$3.6 billion Research, Education and Economics mission area; a 6 percent share of that budget would be more than three times that much, about \$217 million.³²⁰ Dedicating an equitable share of research funding to organic practices—like finding better ways of managing pests by using natural predators instead of chemical pesticides—could deliver significant benefits to all producers, as well as to our environment and public health.³²¹ Given the far-reaching benefits, investments in organic should go well beyond current market share to reflect a national prioritization of organic farming.

Policies must also ensure that certification costs do not put organic out of reach for anyone. To assure organic integrity, producers must pay a third-party certifying agency to inspect and certify their operations annually. While this accountability is critical, the costs deter some producers, especially in parts of the country where inspection travel costs may be higher because certifiers and inspectors are sparsely scattered. Existing programs that cover some costs of certification should be expanded to cover, at a minimum, all certification costs for socially disadvantaged producers and small farms.

Together, these public investments in organic should reduce costs for organic producers and compensate them for the public benefits they provide, which should allow organic producers, and everyone else in the organic supply chain, to receive fair compensation for their work, while also supporting affordable pricing for all consumers.

3. ENSURE RACIAL AND INDIGENOUS JUSTICE AND EQUITABLE PARTICIPATION IN ORGANIC AGRICULTURE

Barriers to entry for Black, Indigenous, and other producers of color are significant and must be addressed to ensure that the organic sector represents and serves diverse communities. Uncertain land tenure presents unique challenges to organic farmers because of the three-year transition to organic and the long-term investments in soil health, conservation, and biodiversity that are inherent

in organic farming. Producers of color face particularly high barriers to land access, as well as limited access to capital and funding in the face of rising land prices.³²² These underlying struggles make organic certification disproportionately challenging for many producers of color.

The organic certification process and associated costs can also serve as a barrier for producers of color because of inequitable access to technology and other resources, lack of cultural competence among certifiers, and language barriers, among other factors. These are compounded by long-standing racial discrimination at USDA that has undermined access to and trust in the agency and its programs.³²³ For example, in a 2022 survey by the National Young Farmers Coalition, Black and Indigenous farmers reported denial of access to programs and being ignored or treated in unwelcoming ways because of race by USDA staff at higher rates than their white counterparts.³²⁴ In addition, regions of the country, especially in the South, that have greater numbers of Black farmers still lack strong organic markets.³²⁵

Congress and USDA should reduce barriers to organic certification for producers of color by prioritizing organic certification services, technical assistance, and research for underinvested geographic regions and communities, including the Southeast, Tribes, and non-English-speaking producers. Resources should be devoted specifically to producers who need written or spoken language assistance. In addition, targeted, culturally appropriate technical

SEDRIK ROWE, ROWE ORGANIC FARMS, ALBANY, GEORGIA

Sedrick Rowe builds thriving ecosystems—both on the farm and in his community. His degrees in plant science and public health helped him connect the dots between health and farming, and he understands that at a fundamental level, what you put in your mouth is what happens in your body.

Sedrick gravitated toward organic as a natural nexus between his interests, and he has rapidly carved out a niche in Georgia's nascent organic peanut sector. In 2017 he partnered with Georgia Organics on a grant-funded Organic Peanut Initiative, and he grew organic peanuts for his master's thesis at Fort Valley State University. That work sparked formation of a marketing co-op, the Georgia Organic Peanut Association, which now includes seven farms that collectively sell 8,000 tons of organic peanuts a year, at double the price of nonorganic peanuts. Sedrick is actively recruiting "traditional" farmers by demonstrating that it's possible to grow peanuts in a healthier way—and make more money in the process.

A key to Sedrick's success has been his partnership with Georgia Organics, a nonprofit organization dedicated to helping Georgia's small and organic farms support healthy families. In addition to the organic peanut collaboration, Sedrick participated in Georgia Organics' accelerator program, which provides farmers up to \$10,000 for business support along with weekly classes and regular check-ins that include goal-setting and planning, coaching on recordkeeping, and financial and market assessments. The program helped Sedrick improve his financial planning and advertising and to source inputs such as seeds. Along with peanuts, sunflowers, and watermelons, Sedrick grows hemp, a labor-intensive crop that must be harvested by hand. The financial analysis he completed through the accelerator program helped Sedrick figure out how to hire workers and expand his hemp harvest.

More practical resources like Georgia Organics' programs would help farmers in Sedrick's region go organic and thrive as farmers. For example, industry trends toward equipment built exclusively for large farms make it increasingly difficult for small-scale farmers to find affordable and appropriately sized tools, such as planters and pickers built for 2 rows instead of 6 or 12. Sedrick knows that in some parts of Georgia, NRCS offices have equipment that farmers can rent, but most of it is designed for large-scale production; more public investments in the tools that smaller-scale farmers need could help counter some of the pressures that push small farmers out.

assistance should support producers who grow food for consumers of differing ethnicities and nationalities, to deliver organic food to the diverse U.S. population. USDA must also end the legacy of discrimination that has undermined trust in the agency and that continues to deter producers from participating in the NOP. And it must take a more comprehensive approach to delivering land, capital, and resources to producers of color and disadvantaged communities.

The needs and goals of Tribal producers must also be addressed. Tribal Nations have 59 million acres of farmland and almost 80,000 farming and ranching producers.³²⁶ Although many Tribes have managed much of this land for millennia with ecological practices that would qualify as organic compliant, very few Tribal farms are certified. USDA should prioritize strategies and programs to facilitate participation—and recognize the sovereignty—of Tribal Nations in the organic sector. For example, USDA should consider pursuing organic equivalency agreements with federally recognized Tribal Nations, as it has with the European Union and Canada (among others), and/or group certification arrangements that make organic certification more compatible with the structure and culture of Tribal farms. Many organic farmers and ranchers have adopted

Indigenous practices to help them forgo chemical inputs, protect natural resources, promote biodiversity, and care humanely for animals. This traditional ecological knowledge should be recognized and valued.

4. USE TRUE COST ACCOUNTING TO IDENTIFY AGRICULTURAL INVESTMENTS THAT BENEFIT THE PUBLIC

The interconnected climate, health, and economic crises facing our country demand a better alignment between our food system values and our public spending. Most federal funding for agriculture goes to a small number of commodity crops, grown primarily in monocultures, with heavy reliance on synthetic fertilizers and pesticides. These investments shape our food landscape and strongly influence the food system's environmental and health impacts, as well as what food is available and affordable across the country.

Much of our agricultural policy is undergirded by a faulty process of assessing the benefits and burdens of our public investments. To date, society has undervalued the environmental and health benefits of organic agriculture

PATRICIA RODRIGUEZ, RODRIGUEZ ORGANIC FARMS, CASTROVILLE, CALIFORNIA



Patricia Rodriguez knows what her customers want: the freshest, tastiest, organic berries that she and her husband, Rosario, can grow. The couple started Rodriguez Organic Farms with three acres of strawberries in 1991, and they were among the first to transition to organic when the NOP rules went into effect. Farmers market shoppers sought out the farm because it was organic—and today those shoppers keep coming back because Patricia and Rosario have invested decades of work to ensure that their berries are the best.

The secret? Careful attention to soil health, diligent (and costly) crop rotations to allow the land to rest between berry crops, and years of risky trial and error. Patricia and Rosario plant only about half their acreage in berries each year, while cover crops like fava beans build healthy soil on the rest. For an operation that relies on leased land, this practice is expensive—and despite research and trials in their scarce free time, they haven't identified any marketable crops that they

can grow in rotation without compromising the quality of the berries they produce. Nonetheless, they remain committed because the rotation delivers better taste and longer shelf life.

In addition to the practical challenges of growing a fragile crop organically, Patricia juggles the administrative burdens of organic certification with the help of her son Omar, who recently returned to the farm. To remain in compliance, the family has to maintain careful records and communicate with their certifier about any changes to the operation—from new preserved strawberry products that reduce food waste to materials needed to control urgent threats of disease or pests. Every interaction with the certifier draws on one of the small farm's most precious resources: time. The paperwork alone could be a full-time job, and Patricia knows that it's easier for her than for many of her peers because she can speak, read, and write in English.

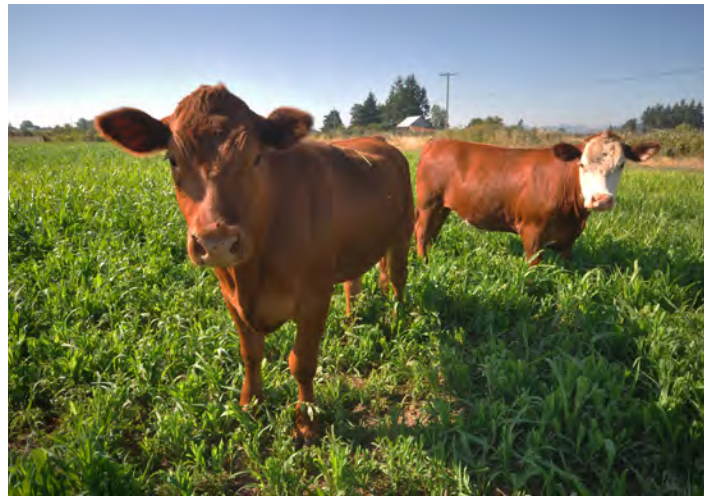
As a farmer who built organic from the ground up, Patricia can easily envision a system that works better for producers. For example, monthly open hours when producers can get help with their organic paperwork and access computers would save time and miscommunications, particularly for producers with less English and electronic fluency. She hopes that public investments in organic research and stronger support for the transition to organic will make it easier for those who follow in her footsteps.

and overvalued the purported benefits of conventional agriculture. Cost-benefit analyses typically give more weight to private economic benefits for businesses—including short-term cost savings from low wages, use of polluting inputs, and extractive practices—than to the public costs of environmental, health, and social harms, if those costs are even considered. As noted above, the Rockefeller Foundation estimates that while the United States spends \$1.1 trillion per year on food, the true cost of conventionally grown food, including health and environmental costs and other impacts, is at least \$3.2 trillion.³²⁷

To more accurately assess the benefits and burdens of public investments, USDA should adopt a true cost accounting approach in the cost-benefit analyses it uses to assess the impacts of major regulations and agency decisions. This will strengthen support for organic production by revealing the full societal costs of conventional farming and foods and accounting for the ecological and health benefits of organic. True cost accounting demonstrates how perceived benefits of conventionally produced food, such as low prices, are outweighed by the broader costs of pollution, erosion, diminished nutrition, and exploitation borne by the public—particularly by food system workers and neighboring communities; it also helps make transparent the many policies that drive price distortions. Clear articulation and analysis of the full suite of costs and benefits could lead to redirection of public investments, compensation for ecosystem services and climate benefits, and full implementation of the “polluter pays principle” (e.g., via charges on energy, CO₂, pesticides, and nitrogen).

5. CREATE STABLE ORGANIC MARKETS AND EXPAND ACCESS THROUGH PUBLIC PROCUREMENT

The federal government can dramatically increase long-term market opportunities for organic farmers and ranchers by using its own purchasing power, including by prioritizing organic in all government food purchases and in its buying guidance for all agencies. USDA purchases more than a billion pounds of fruit and vegetables annually for various nutrition programs; shifting even a portion of these purchases to organic would dramatically expand market opportunities for organic producers. It would also make organic food more widely accessible, provide educational opportunities for kids, and maximize the benefits of public spending on food and agriculture. USDA should support organic purchasing in a wide range of programs, including school meal programs, and ensure that Women, Infants, and Children (WIC) Program benefits may be used for organic foods in all states.³²⁸



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The CDC already recommends organic in food service guidelines for federal facilities.³²⁹ In collaboration with the CDC or independently, USDA should help federal agencies shift their procurement contracts to support organic and offer guidelines for schools, hospitals, state and local governments, and other major food purchasers, including USDA cafeterias. The Veterans Administration should procure organic food for its hospitals; the Department of Defense should procure organic food for service members and school meals; the National Park Service should feature organic food in its concessions. There are countless opportunities for government to use public procurement to invest in organic and incentivize more producers to transition to organic production.

6. REWARD ORGANIC MANAGEMENT AND ECOSYSTEM SERVICES IN AGRICULTURAL POLICIES

In addition to the food they grow, organic producers offer a wide range of services benefiting the public, including protecting natural resources, preserving biodiversity, and shrinking agriculture’s climate footprint—they should be compensated and incentivized to provide these public benefits. Federal risk management and conservation programs should reward organic practices such as crop diversity, reduced use of synthetic pesticides and fertilizers, cover cropping, use of compost, maintenance of hedgerows and other wildlife habitat, and integration of animal and crop agriculture, to ensure that small and midsize diversified farms can participate and benefit equitably. Incentives for practices that enhance biodiversity and soil’s ability to trap carbon—including organic agriculture and transitioning to organic—should be prioritized in USDA programs, the Farm Bill, and other policymaking opportunities.

7. EDUCATE THE PUBLIC ABOUT THE BENEFITS OF ORGANIC

Despite strong and growing consumer demand for organic food, polling shows that many still do not fully grasp the full suite of practices encompassed by the “organic” label. Since the passage of OFPA in 1990, consumers have consistently cited personal health as their top reason for purchasing organic but often underappreciate its wide-

reaching environmental and public health benefits.³³⁰ A 2018

Consumer Reports survey found that while 38 percent of grocery shoppers seek out organic, significantly more—48 percent—look for “pesticide-free,” even though that term is unregulated (whereas organic prohibits nearly all of the approximately 900

synthetic pesticides approved for use in agriculture).³³¹ USDA should expand its own efforts, as well as resources for organic organizations and producers, to educate the public about organic’s far-reaching benefits, including explaining how it reduces synthetic pesticide and fertilizer use and exposure, increases climate resilience and carbon sequestration, protects ecosystems, supports local economies, and builds healthy soil.

In particular, the Dietary Guidelines for Americans should address the positive contributions of organic food consumption. In 2015 a scientific advisory board recommended that USDA and the Department of Health and Human Services address sustainability in their dietary guidance, but they have not done so.³³² The 2025 Dietary Guidelines for Americans present the next opportunity for the federal government to educate the public—including kids who learn about the guidelines in school and school food purchasers who make decisions for millions of students—on food choices that support personal and planetary health.



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8. INVEST IN REGIONAL SUPPLY CHAINS TO MEET GROWING DOMESTIC DEMAND FOR ORGANIC

In regions across the country, there is an insufficient supply of domestically produced organic crops and food to meet rising demand. The United States imports \$2.7 billion worth of organic products each year, including grains and many vegetables.³³³ USDA should analyze organic import trends and invest in sectors with potential to replace imports with home-grown organic goods. This will create jobs for the next generation of farmers and food entrepreneurs and stabilize domestic supply chains.

Targeted investments in local and regional organic supply chains can reduce our reliance on imports and bolster food system resilience and rural economies by leveraging the organic hotspot effect—regions with higher concentrations of organic production have higher median household incomes, higher employment rates, and less poverty.³³⁴ Agricultural regions that are underrepresented in the organic sector or that are home to significant conventional production or processing need fresh opportunities and resources for organic market development, regionally tailored research, and other community-driven initiatives, undertaken in partnership with regional farming and community support organizations. Public investments that address the lack of local organic processing and distribution infrastructure (e.g., facilities for slaughter and meatpacking, nut hulling and roasting, canning and freezing, cold storage, etc.) can help organic producers market their products as organic and keep supply chains nimble in the face of climate, economic, and health crises.

USDA's recently announced plans to invest \$400 million in regional food business centers and \$300 million in organic transition have the potential to significantly strengthen domestic organic supply chains.³³⁵ To increase domestic supply and diversity of U.S.-grown organic food, organic farmers and ranchers need regionally and culturally relevant information and support. Research, breeding, and technical assistance tailored to regional needs will help producers expand organic supply while maximizing soil health, ecosystem benefits, yields, and long-term resilience. USDA's regional centers should conduct or facilitate regionally specific research. Additionally, these centers can help producers participate in federal programs; develop regional markets; connect producers with aggregation, distribution, and other key infrastructure; and work with municipal composting efforts to ensure reliable regional supplies of organic-compliant compost. This kind of investment will help feed an ongoing expansion of local and regional organic supply chains and reduce reliance on imports.

USDA should look to Europe's successful "bio-districts" when developing these regional centers. Bio-districts are multi-county regions primarily using organic agriculture and managed collectively by local food councils.³³⁶ They emerged as a grassroots collaboration among organic farmers, consumers, and other stakeholders to promote a coordinated approach to sustainable resource management, with shared social, economic, and environmental benefits.³³⁷ The model has been so successful that Italy codified bio-districts into law in 2022. The law provides a template that could be adapted to seed new organic regions in the United States.³³⁸

ANNA JONES-CRABTREE, VILICUS FARMS, HILL COUNTY, MONTANA



Anna Jones-Crabtree views her organic farm like a heart—it feeds people, takes care of the land, and supports the social structure around it. A complex 12,500-acre operation in Montana, growing more than 20 crops in five- and seven-year rotations, along with livestock grazing and more than 400 acres of pollinator habitat, Vilicus Farms stands in sharp contrast with the sea of pesticides and extractive approaches that dominate U.S. agriculture.

Current agriculture policies often reward operations that grow just a few crops in monocultures, rather than diversified farms like Anna's. This has consequences beyond her farm, including for U.S. carbon sequestration efforts. For example, Vilicus participated in a carbon market trial, but the farm's complexity—which should be promoted as a benefit—did not match up with the quantification and certainty required for a carbon marketplace. Simply mapping crops and management practices was an overwhelming challenge. And because Anna operates mainly on leased land, she couldn't offer a definitive commitment to maintain all her operations in the long term. We need more programs that reward and incentivize diversified and integrated farming and compensate farmers for using beneficial practices like organic farming.

Ultimately, Anna believes a primary goal of our farm policies should be making diversified organic farming a viable and economically sustainable career path that offers a stable income, affordable health insurance, and mental health care.

9. STRENGTHEN ORGANIC RULES AND ENFORCEMENT

Strong public trust in the USDA organic seal and certification process is essential to the success and growth of the sector. Delays in rulemaking, inconsistent interpretations of key provisions of OFPA, and rare but high-profile cases of fraud undermine consumer confidence and hurt farmers and ranchers. USDA should work closely with the National Organic Standards Board to ensure that rulemaking and enforcement reflect the core goals of OFPA, including cultivating healthy soil in ways that increase resilience, protecting water quality, promoting efficient nutrient cycling, and sequestering carbon. Specifically, the NOP should strengthen requirements for meaningful organic system plans, including plans to promote soil health and best practices in animal agriculture.

10. INTEGRATE ORGANIC THROUGHOUT PUBLIC INSTITUTIONS

It will take new leadership structures and processes to fully integrate organic across federal agencies, starting with USDA. USDA's staff should include a high-level organic advisor charged with integrating organic into the

agency's culture, elevating organic programs and policies within USDA, providing USDA leaders with access to on-the-ground knowledge of organic, and identifying ways to welcome more producers into organic production. Other federal agencies, including the EPA, the Department of Interior, the FDA, and the Department of Defense, should also hire organic advisors who can guide agency efforts to integrate organic across their federal management, enforcement, and procurement agendas.

The current center of organic activity at USDA, the NOP (within the Agricultural Marketing Service), needs greater resources, and its work should be reinforced by other agencies. NOP standards and enforcement activities are essential to consumer and producer trust in the organic label. But the NOP's strength and potential are compromised by egregious underfunding. The NOP budget must be increased significantly, to ensure that the program is sufficiently resourced to carry out its critical responsibilities and to advise other federal agencies on organic integration. The NOP cannot respond to all organic sector needs on its own; responsibilities for advancing organic should be shared across USDA's 17 agencies and throughout the government.

DOUG MULLER, HUDSON VALLEY SEED COMPANY AND FOUR FOLD FARM, ACCORD, NEW YORK



The Hudson Valley Seed Company, run by Doug Muller and his partner, Ken Greene, grew from seed sharing at a public library in 2008 to a nationwide seed company with 25 employees and an organic seed farm in 2021. Doug and Ken became farmers because of organic agriculture: Doug views small-scale organic farming as a solution to the problems of industrial agriculture, and he approaches food and farming as a reflection of his values.

Doug appreciates that farming organically forces him to tune in to his farm and become deeply familiar with the location, the climate, the crops, their rotations, and pest cycles. And he never has to worry about putting harmful chemicals into the environment or people's bodies.

Seeds are challenging crops to grow—especially organically—but growing a wide range of seeds helps the farm's resilience year to year. Even if poorly timed weather destroys a crop, there are always others that make it to market.

While organic farmers are required to seek out organic seed, they are allowed to use untreated nonorganic seed if organic is unavailable—which is too often the case. The company's focus on organic seed supply and diversity is helping fill holes in organic seed development. Doug's farm has an acre dedicated to hundreds of seed trials, and his company is constantly introducing new varieties, many in partnership with vegetable breeders at Cornell and the University of Wisconsin. Doug's work on seeds highlights the need for more public investment in organic seed breeding, to ensure that organic farmers can consistently source organic seed.

Conclusion

The benefits of organic agriculture are vast, well documented, and compelling. At a time when our climate and health needs urgently demand food system transformation, organic farming and ranching provide a proven and readily available agricultural system that reduces greenhouse gas emissions, builds climate resilience, bolsters health, and boosts prosperity in farming communities.

After 20 years of federally regulated organic production, with minimal public policy support and funding, the organic sector has already exceeded expectations, growing at a rate that far outpaces that of heavily subsidized conventional production. Organic has proven its popularity and staying power both in the marketplace and on the farm, yet it remains a small portion of the overall food system. Establishing organic as a national priority is an essential investment in our future.

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Appendix: National Organic Program at a Glance

The Organic Foods Production Act (OFPA) directed USDA to create a National Organic Program (NOP) with regulations that govern organic agriculture and labeling in the United States. This appendix summarizes the requirements that certified organic producers and handlers must meet.

I. ECOSYSTEM STEWARDSHIP

ORGANIC SYSTEM PLANNING. A farm or farm parcel intending to become organic must develop an organic system plan, including land conversion requirements (no prohibited substances may be applied for three years before certification), conversion time period for plant and animal production, and precautionary measures to avoid contamination (e.g., use of buffer zones to prevent contamination from drift or runoff from neighboring land).

MANAGING NATURAL RESOURCES ACCORDING TO THEIR CARRYING CAPACITY. Organic animal producers must limit stocking density to ensure sustainable land and water use and must protect nearby wetlands and riparian areas by using pasture practices that prevent runoff and erosion. Organic livestock operations must also manage manure in a manner that optimizes recycling of nutrients and protects food safety.

ENHANCING FUNCTIONAL BIODIVERSITY AND ECOSYSTEM BALANCE. Organic management maintains biodiversity in crop and non-crop habitats on the farm. Organic crop production employs interrelated processes for the management of pests and diseases, including site and crop adapted fertility management, choice of appropriate varieties, and enhancement of functional biodiversity.

2. MATERIALS AND TECHNOLOGIES

LIST OF DOS AND DON'TS. With very few exceptions, organic producers cannot use synthetic pesticides and fertilizers. Organic growers can use approximately two dozen least-toxic synthetic pesticides only as a last resort after nothing else has worked; in contrast, conventional growers can use more than 900 synthetic pesticides to grow food. Organic producers are also prohibited from using harmful nonsynthetic substances (e.g., tobacco dust) and nonagricultural substances in processed products. The “National List” of Allowed and Prohibited Substances specifies use restrictions and exceptional allowances for specific synthetic substances when there is no organic substitute, no environmental harm, and no residues above FDA tolerance limits.

GMOS. Organic systems cannot use genetically modified organisms (GMOs) or their derivatives (created, for instance, by adding, moving, or deleting genes with recombinant DNA technology).

IONIZING RADIATION. Organic production and processing systems cannot use ionizing radiation (e.g., to control microbial contaminants, pathogens, and pests).

SEWAGE SLUDGE. Organic production cannot use sewage sludge (i.e., solid and liquid residues generated by domestic sewage treatment).

Antibiotics and hormones. Organic animal operations cannot use antibiotics and hormones. When animals are sick or injured, they must be treated, but if prohibited substances are used, the animals cannot be marketed as organic.

3. SOIL QUALITY

IMPROVING SOIL FERTILITY. A diverse planting scheme is an integral part of the organic management system. In annual crops, operators must implement rotation practices, cover crops, green manures, catch crops, and intercropping in order to “maintain or improve soil organic matter content, provide for pest management, manage deficient or excess plant nutrients, and provide erosion control.”

PREVENTING LAND DEGRADATION. Organic crop production systems employ measures (e.g., tillage, cultivation practices) that maintain or improve the physical, chemical, and biological condition of soil; minimize soil erosion; and prevent land degradation (e.g., salinization).

AVOIDING POLLUTION. Organic management takes precautionary measures to avoid pollution and contamination. These include buffer zones around organic crops, cleaning farm equipment, and avoiding contact with prohibited substances. Organic soil management prevents the pollution of “crops, soil, or water by plant nutrients, pathogenic organisms, heavy metals, or residues of prohibited substances.” Synthetic fertilizers or fertilizers made soluble by chemical methods (e.g., superphosphates), sewage sludge (biosolids), and burning to dispose of crop residues are prohibited.

4. ANIMAL HEALTH

ANIMAL WELFARE. Organic animal management ensures that living conditions afford animals comfort and safety; allow them to exhibit natural behavior; give them freedom of movement; and allow access, whenever weather allows, to pasture, open air, and/or exercise areas. “Continuous total confinement of ruminants in yards, feeding pads, and feedlots is prohibited.” Feedlots used to provide finish-feeding rations must be large enough to allow all ruminants to feed simultaneously without competition for food.

PREVENTIVE HEALTH CARE. Organic animal management follows the principle of preventive health care, which starts with the selection of site-specific breeds (e.g., those with resistance to diseases and parasites) and provision of adequate nutrition and housing, then natural medicines and treatment, and finally, if unavoidable, treatment with allowed chemical drugs. Organic animal management never withholds medical treatment considered necessary for the welfare of an animal in order to maintain the organic status of the animal.

ANIMAL NUTRITION. Organic animal management includes feed rations that meet the dietary requirements of the species, for example access to roughage for ruminants. Organic animals are fed with organically produced feed, organic pasture and forage and vitamins, and trace elements and supplements only from natural sources, unless they are not available in sufficient quantity and/or quality. Feed must not contain prohibited substances, such as antibiotics, nitrogen compounds (e.g., urea), growth promoters (e.g., hormones), and plastic pellets for roughage. Organic animals are never fed slaughter by-products.

5. ORGANIC INTEGRITY IN PROCESSING

MAINTAINING ORGANIC INTEGRITY. Organic handling operations take measures to prevent commingling of organic products with nonorganic products in processing, packaging, storage, and transport in order to protect organic products from contact with prohibited substances (e.g., synthetic fungicides, preservatives, fumigants).

PROCESSING AIDS. The processing of organic ingredients uses only additives, processing aids, and solvents that are allowed by the National List of Allowed and Prohibited Substances. Minerals (including trace elements), vitamins, essential fatty acids and amino acids, and other isolated nutrients are used only when strongly recommended for the food products in which they are incorporated (in accordance with Nutritional Quality Guidelines for Foods).

PROCESSING METHODS. For food and feed production, organic processing uses only processing methods that are mechanical and biological in nature (e.g., cooking, baking, curing, heating, drying, grinding, churning, distilling, extracting, fermenting, dehydrating, freezing).

6. LABELING

THE ORGANIC CLAIM. Raw and processed products may only be labeled “organic” if the product contains not less than 95 percent organically produced ingredients (by weight or fluid volume, excluding water and salt). Labeling identifies the person (or company) legally responsible for the product and the certification body (accredited by USDA or acting under an equivalency agreement negotiated between the United States and a foreign government) assuring conformity to the organic standard. Small operations with gross agricultural income from organic sales totaling \$5,000 or less annually may represent products as “organic” without certification, but they must maintain records that demonstrate that the products were produced in compliance with NOP standards for production and handling.

THE ORGANIC SEAL. The USDA Organic seal on a product means that production and processing meet the NOP standards for “organic” products.

MULTI-INGREDIENT PRODUCTS. Claims that processed products are “made with organic” ingredient are made only if the product contains at least 70 percent organic ingredients (by weight or fluid volume, excluding water and salt). No ingredients may be produced using GMOs, ionizing radiation, or sewage sludge, or processing aids not approved on the National List.

EXCLUSION FROM ORGANIC SALE. If residue testing on a product detects prohibited substances at levels greater than 5 percent of the EPA’s tolerance for the specific residue detected or unavoidable residual environmental contamination, the product must not be sold, labeled, or represented as organically produced.

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