


Strengthening Organic Agriculture: Research Updates from The Organic Center

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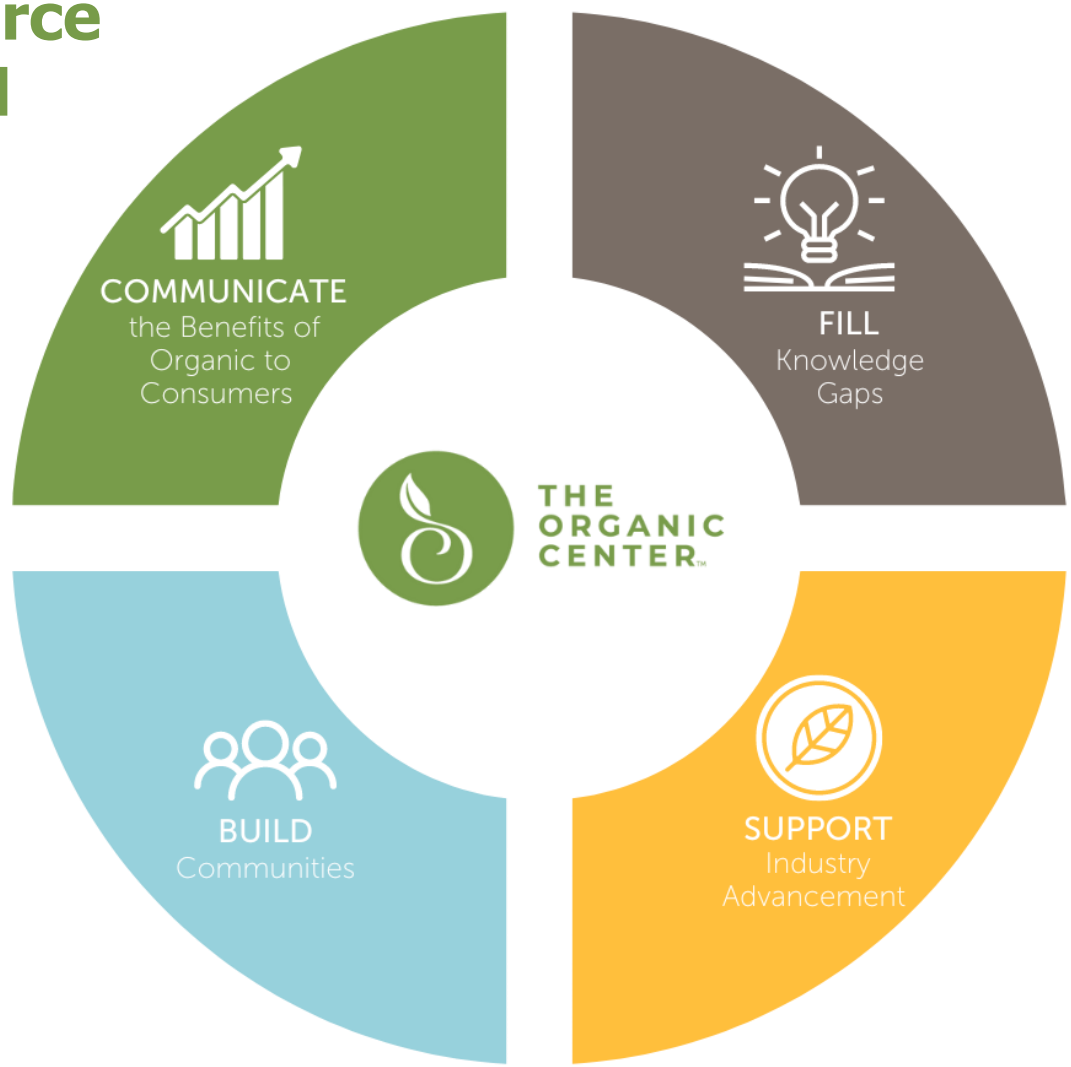
DIRECTOR OF SCIENCE PROGRAMS
THE ORGANIC CENTER

THE ORGANIC CENTER™

The Organic Center is the trusted source on the science of organic farming and products

We convene credible, evidence-based science to fill knowledge gaps and support organic farmers and businesses.

We work with stakeholders across the industry to advance organic by facilitating research, developing resources to promote the benefits of organic, and communicating the organic difference to consumers.



Communicate benefits of organic to consumers

The Organic Center communicates directly with consumers, sharing the latest unbiased research on how organic farming and products can protect their health and the planet.

We serve up the facts in easy-to-digest content such as:

Recipes

Microsites dedicated to specific research topics

Educational Videos

Newsletters

Webinars

Spice Report
organic-center.org/spices

#OrganicBenefit
organic-center.org/benefit

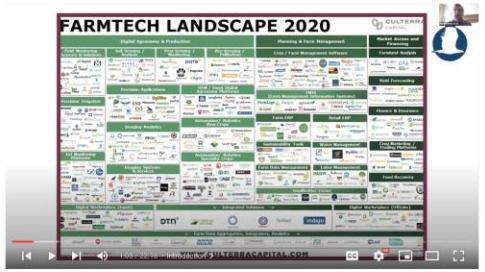
Build Communities

The Organic Center brings stakeholders from across the industry together to address important and emerging issues related to organic.

Together we:

- Develop critical research projects (USDA OREI, AFRI)
- Host an annual **Organic Confluences** conference

Chemical Treadmills and Agricultural Inequality, Brian Williams



Race, Power and Wealth: The Other Side of Digital Technology in Agriculture by Erik Nicholson

The Invisible Gender: The Right for Women to Farm, Karen Washington

Fill Knowledge Gaps

The Organic Center works to fill critical industry knowledge gaps by managing research projects and providing tools and training to help organic farmers and businesses thrive.

Climate Change Mitigation; Environmental Health Research
– Soil Health and Cardon Sequestration – Biodiversity
– Pollinator Health – Nitrogen Pollution – Yield

Human Health Research
– Pesticides, Hormones, and Antibiotics in Milk
– Combating Antibiotic- Resistant Bacteria – Nutritional Benefits of Organic

Industry Tools and Solutions
– Avoiding Chemicals in Dairy Calculator
– The Healthy Farm Index Biodiversity Calculator
– Integrating Livestock into Crop Production – Organic Control of Citrus Greening
– Alternatives to Conventional Celery Powder – Balancing Soil Health and Food Safety
– Protecting Farmworkers from Pesticide Exposures

Visit **organic-center.org/our-work** to learn more about our research projects.

Fill Knowledge Gaps

The Organic Center launched a new initiative with the **Foundation for Food & Agriculture Research (FFAR)** to fund innovative climate research and much-needed training and technical support for organic agriculture professionals

Two programs:

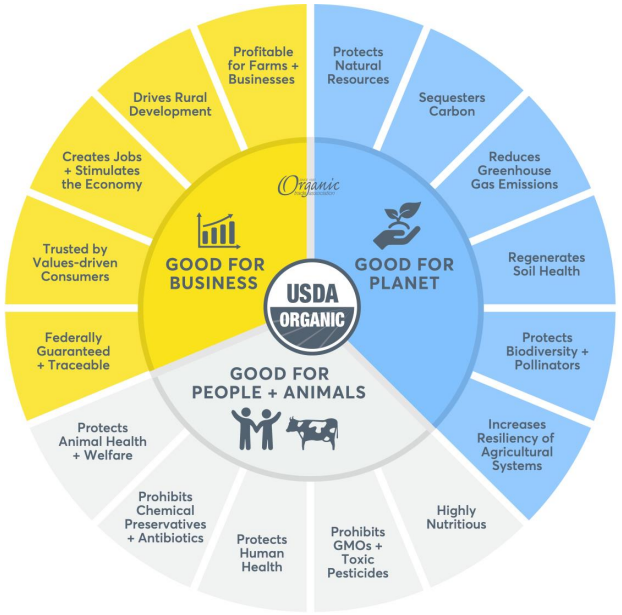
- **Organic Training for Ag. Professionals Prize** ($400K) Matched by recipients
- **Organic Research Program** ($400K) Matched by The Organic Center

THE ORGANIC CENTER™

Organic-Center.org

Support Industry Advancement

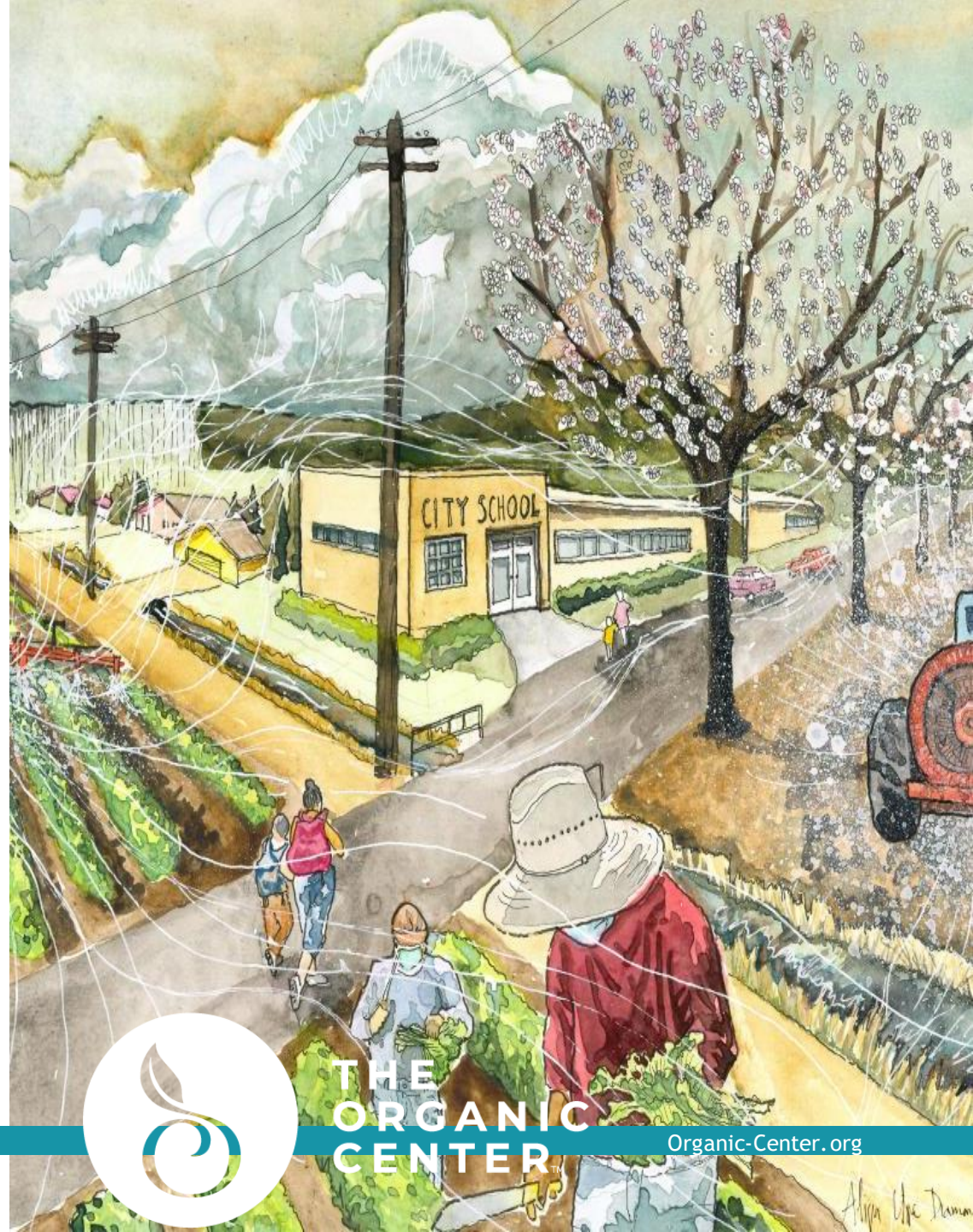
The Organic Center's efforts are centered around advancing the organic industry. Here are some of the ways we support industry advancement:



- Build research teams and facilitate fundraising through public and private partnerships
- Work with the Organic Trade Association and other stakeholders to develop resources farmers and businesses can use to promote the science-backed benefits of organic and their products
- Prioritize the inclusion of scientists and speakers from underrepresented groups, require strong DEI plans for all research and extension programs we fund, and develop educational materials on environmental justice and tools to help underrepresented farming communities thrive
- Provide scientific review and comments to the NOSB and USDA programs to guide research priorities

AGROCHEMICALS, RACISM, AND SOCIAL JUSTICE REPORT

SCAN ME



Organic is unique

It is the most transparent, the most consumer-driven and the most heavily regulated food system. Unlike other eco-labels, the organic label is the **ONLY** label backed by:

- ✓ A uniform federal standards
- ✓ 3rd party organic certification
- ✓ Annual on-site inspections
- ✓ Government oversight and enforcement

Only ORGANIC guarantees:

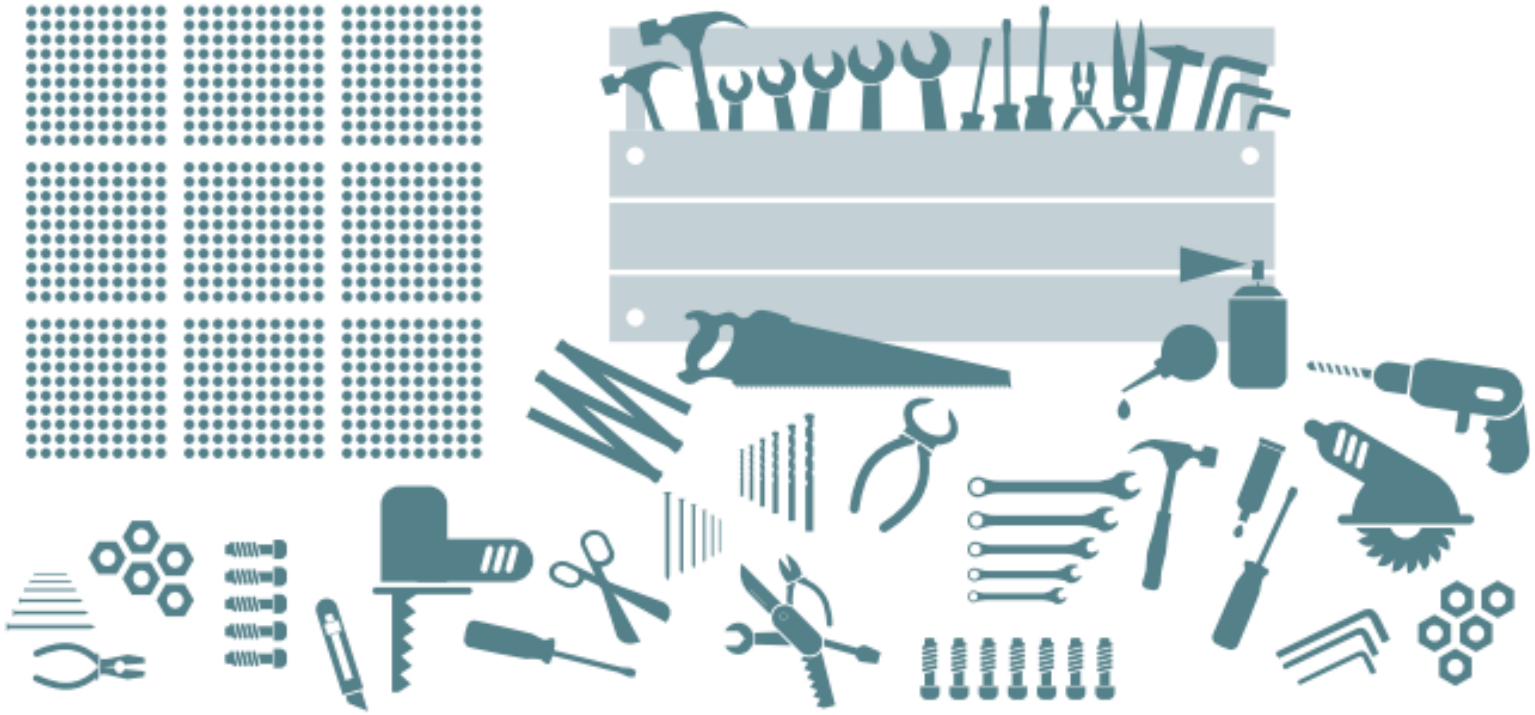
- ✓ 3rd party certification and USDA enforcement
- ✓ Three-year transition
- ✗ Restricted use of pesticides and fertilizers
- ✗ No GMO ingredients
- ✗ No antibiotics, synthetic growth hormones or slaughter by-products
- ✗ No artificial flavors, colors, or preservatives
- ✗ No irradiation or sewage sludge
- ✓ Traceability from farm to the consumer

How do the synthetic pest control products allowed in organic farming compare to the pesticides allowed in conventional farming?

27 synthetic active pest control products allowed in organic crop production

The organic farmer must first use mechanical, cultural, biological and natural materials and move onto the toolbox only when and if they don't work. In this way the toolbox is "**restricted**."

900+ synthetic active pesticide products registered for use in conventional farming by EPA*



How do the synthetic livestock health treatments allowed in organic livestock production compare to the drugs allowed in conventional livestock production?

37 synthetic livestock health treatments allowed in organic livestock production

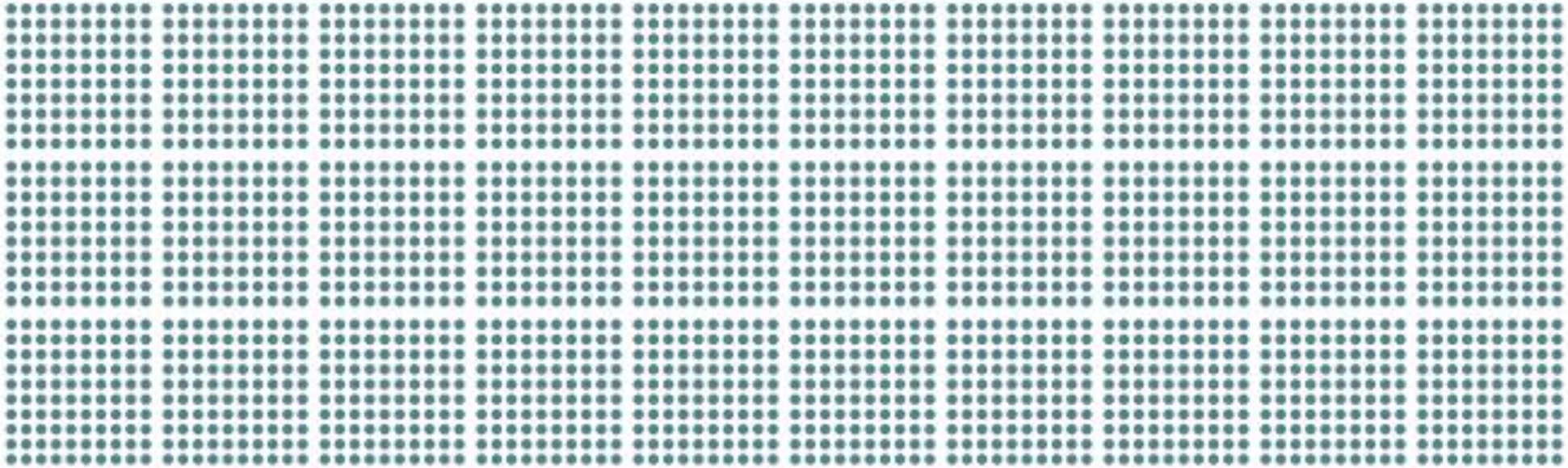
The organic farmer must first use preventive practices and biologics to prevent sickness and move onto the toolbox only when and if they don't work. In this way the toolbox is "**restricted**."

550+ synthetic active ingredients approved by FDA* in animal drug products

How do the materials allowed in organic processed foods compare to the materials allowed in all other food?

67 non-agricultural minor ingredients allowed in organic processing

3000+ substances comprise Everything Added to Food in the United States (EAFUS)



Compared to the 67 non-agricultural minor ingredients allowed in organic processing, more than 3,000 total substances comprise an inventory often referred to as Everything Added to Food in the United States (EAFUS), and this is only a partial list of all food ingredients that may be lawfully added to conventional food.

The Benefits of Organic

Organic is good for the planet, good for people and animals, and good for business.

Environmental benefits include improvements of: Biodiversity, soil health, farm resilience and climate change mitigation

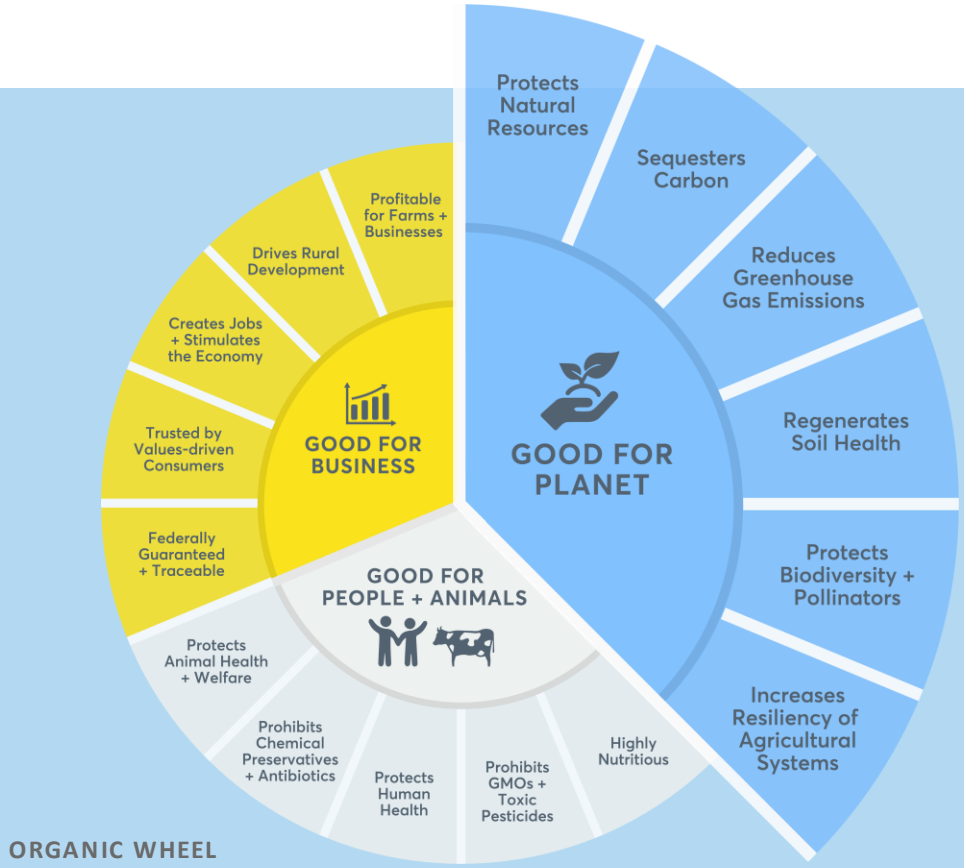
Organic protects farmers, farmworkers, animal health, and rural communities, by reducing chemical exposure

Organic is good for business as it continues to be one of the fastest growing sectors in US agriculture and organic aligns with consumer priorities and values

GOOD FOR THE PLANET

By relying on ecosystem services to produce food and fiber, organic farms have a regenerative—rather than extractive—effect on the environment.

Organic standards require that farmers protect the natural resources on their lands, which makes organic farms key players in the fight against the climate crisis.



ORGANIC WHEEL OF SUSTAINABILITY

Protects Natural Resources and Biodiversity

Organic farmers are required to maintain or improve the natural resources on and around their farms, including soil, water, wetlands, and wildlife habitats. By avoiding toxic chemicals and maintaining healthy wildlife habitats, organic practices promote biodiversity and protect pollinators.

Protects Natural Resources

Required. Organic farmers are required to build soil health, support biodiversity, protect water quality, and reduce soil erosion through activities such as crop rotation, cover cropping and composting.

ORGANIC FARMS . . .

Increase overall **biodiversity by 30%** and **pollinator diversity by up to 50%**.

Reduce nitrates released into groundwater **by 50%**.

Chemical Fertilization

Prohibited. Synthetic nitrogen fertilizers, soil fumigants and sewage sludge ("biosolids" are strictly prohibited).

Synthetic Pesticides

Prohibited. Pest management on organic farms relies first upon prevention, monitoring, and natural/biological controls. As a last resort, producers may select from a limited toolbox of non-toxic pest control options approved by the National Organic Standards Board and USDA.

SINCE 1985 Organic trade association

Sequesters Carbon and Reduces GHG Emissions

ORGANIC FARMS . . .

Emit **18% less global warming-causing gases** and use **~50% less new reactive** nitrogen (an extremely potent greenhouse gas).*

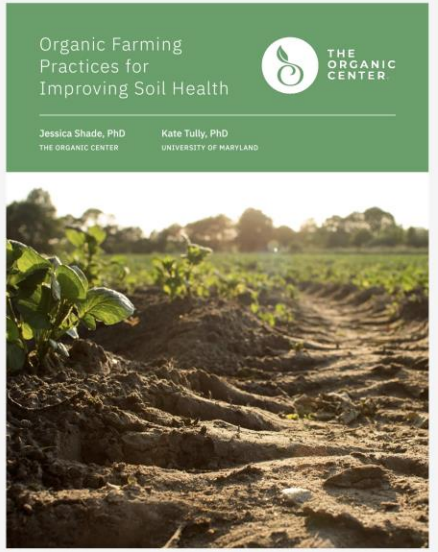
Produce healthier soils that contain **13% higher total organic matter** and capture **44% more stable sequestered carbon**.*

Releases **40% fewer carbon emissions**.*

*As compared to conventional

Organic Trade Association SINCE 1985

Organic Practices that Build Soil Health



Crop rotations

Crop rotations are a fundamental farming practice that is defined simply as a sequence of different crops grown on the same land over time. They break pest and weed cycles to more efficiently cycle nutrients and to reduce economic risk. Longer rotations with perennial crops like alfalfa have been shown to be the most impactful.

Cover crops

Cover crops are usually non-cash crops that are incorporated into crop rotations in place of leaving the ground bare while resting. Cover crops can reduce erosion and runoff, improve nutrient cycling, and accumulate large quantities of above and belowground biomass that leads to more carob sequestration.

Organic soil amendments

Instead of using synthetic nitrogen fertilizers to manage soil fertility, organic farmers use soil amendments such as compost, aged or raw manures, and green manure (nitrogen-rich cover crops that are turned back into the soil). When organic amendments are combined (e.g. manure + vermicompost) they show higher nitrogen availability, soil pore connectivity, crop yield and more carbon sequestration than when applied alone.

Conservation tillage

Tilling soil is used to help manage weeds and to turn the soil before planting the next crop. But too much tillage can destroy soil structure and can lead to soil organic carbon loss, which negatively impacts soil infiltration, water holding capacity, nutrient cycling, and microbial dynamics. Reduced-tillage strategies maximize soil ecosystem services while providing weed control.

Organic: The Original Climate-Smart Agriculture

Carbon Sequestration: organic's powerful advantage against climate change

Organic farming provides a model for how agriculture can help mitigate climate change and help farmers adapt to the climate changes we are experiencing. Eighty percent of the Earth's terrestrial carbon is stored in soils, and while agriculture is one of the main causes of carbon depletion in the soil and increased carbon dioxide gas in our atmosphere, a number of studies suggest that organic practices actually increase the carbon pool in our soils while reducing greenhouse gas emissions – making organic part of the climate change solution.

Past work from the Organic Center shows that using organic practices increases overall carbon sequestration, and keeps that carbon in the soil for longer periods of time. New work that builds off this research helps pinpoint the specific practices that are most effective at carbon sequestration, which will guide organic farmers to be even more a part of the climate change solution.

Organic farming utilizes techniques that change the soil structure in important ways and help lock carbon into the soil. These practices include:

- extended crop rotations
- rotational grazing
- fallowing and the use of manure
- compost and legume cover crops

Organic: The Original Climate-Smart Agriculture

Organic: The results are impressive

The results of this meta-analysis show that by adopting best management practices organic growers can boost their soil organic carbon by an average of **18%**, and increase microbial biomass carbon by an average of **30%**. This means that by understanding and implementing the latest information on organic techniques organic farms could continue to increase their impact on sequestering carbon in the soil, above the baseline benefits previously found by past studies.

The second major finding of this study is that organic soil amendments are key players in carbon sequestration. Organic production uses natural sources of soil amendments like compost and this gives organic the biggest boost in carbon sequestration with quick results—according to this study, using best practices when it comes to biological soil amendments boosts soil organic carbon by an average of **24%**. And because much of that carbon was found in the top 50 cm (20 in) of soil, using organic amendments is one of the most impactful strategies to quickly replenish carbon back into the soil, which improves soil health and builds resilience to climate changes.

Organic: The Original Climate-Smart Agriculture

Remember: Organic stores more long-term soil carbon

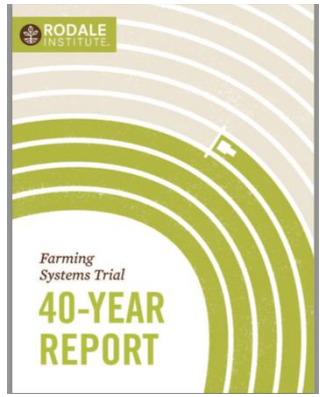
The Organic Center partnered with the National Soil Project at Northeastern University to explore how organic farming impacts carbon sequestration in the soil and found that not only do organic farms store more soil carbon in general, but they also store more of the type of carbon that stays in the ground for longer periods of time.

By analyzing over a thousand soil samples from organically and conventionally managed from across 48 U.S. states, this ground-breaking work found that organic soils had 13% higher soil organic matter and 44% higher long-term carbon storage than conventionally managed soils.

These results highlight the potential of organic agriculture to increase the amount of carbon sequestration in the soil, contributing to climate change mitigation.

TO TILL *or* NOT TO TILL?

THE EFFECTS OF COMMON SOIL AND WEED MANAGEMENT PRACTICES ON ORGANIC AND CONVENTIONAL FARMS



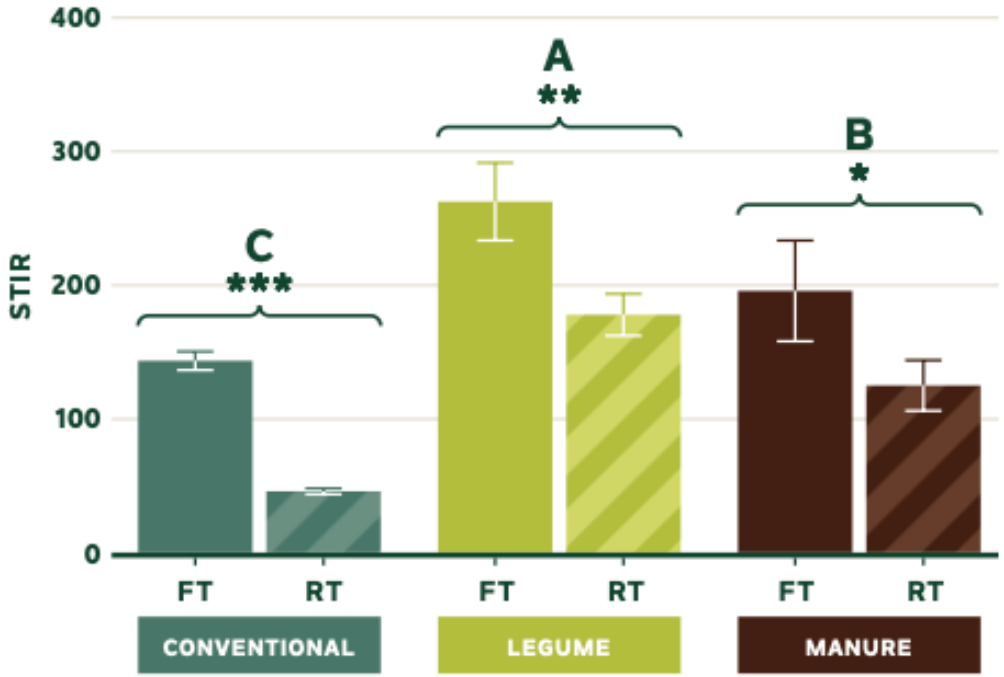


Figure 1 Average annual Soil Tillage Intensity Rating (STIR) of each of the systems in the Farming Systems Trial from 2008–2020. The STIR is a rating system created by USDA NRCS to measure overall soil disturbance. It accounts for tillage type, depth of tillage operation, operational speed of tillage equipment, and percentage of the soil surface area disturbed.

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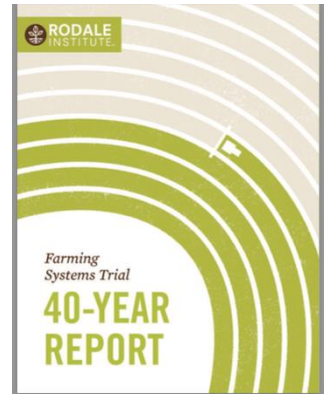
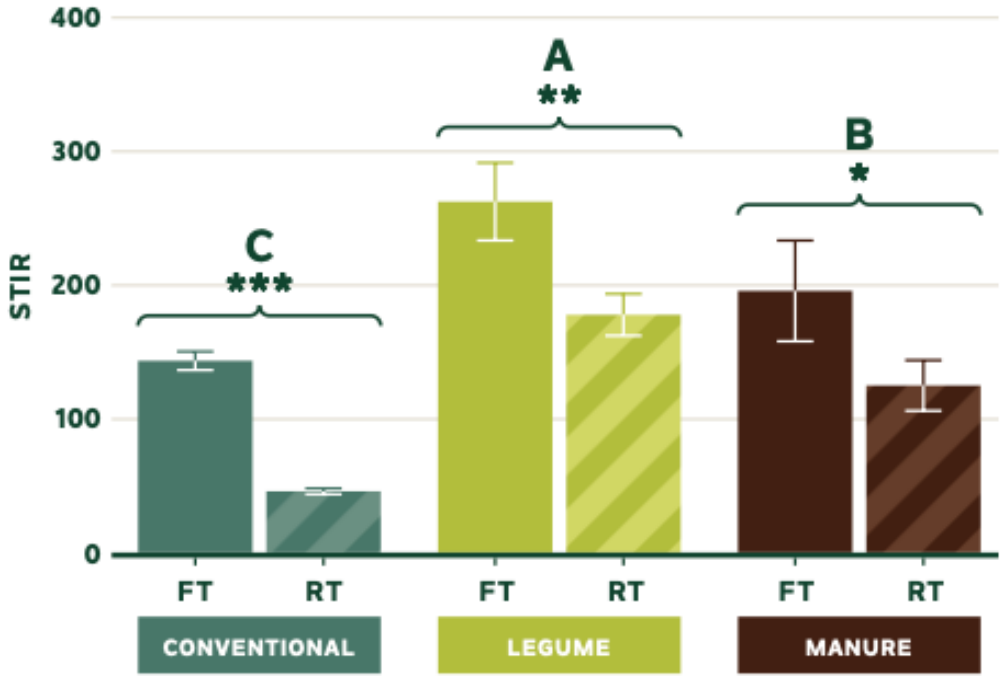


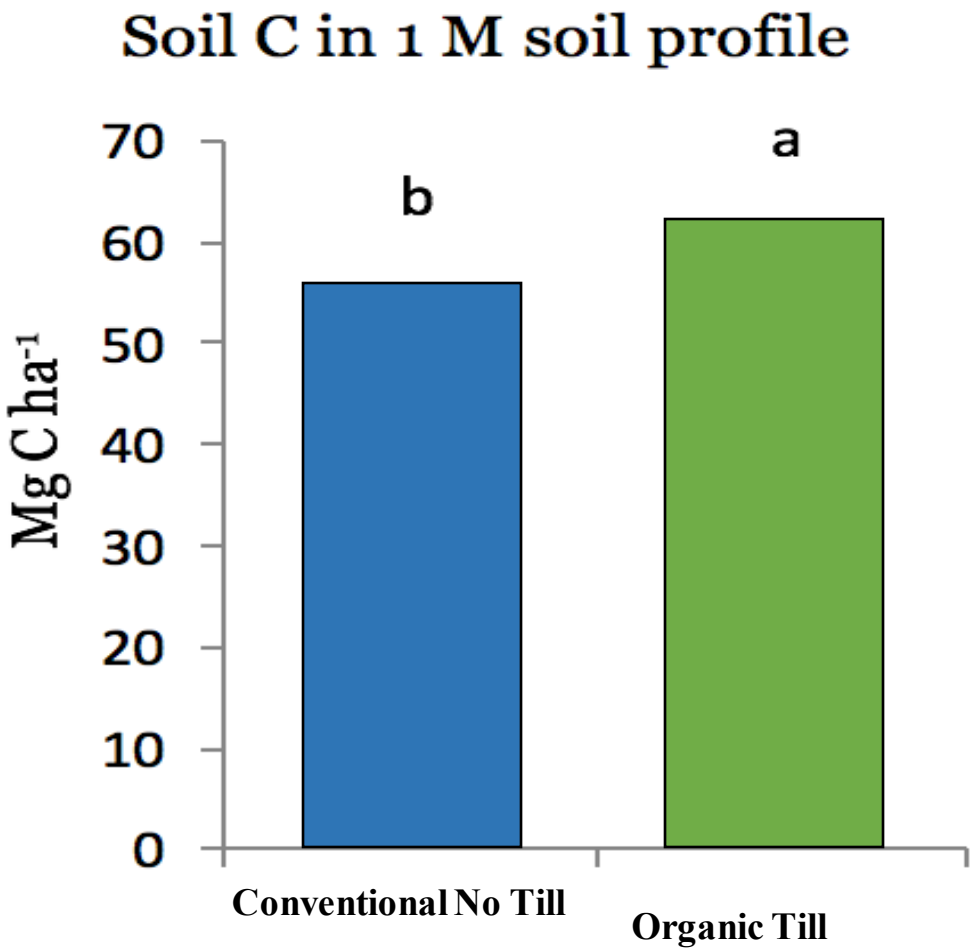


KEY TAKEAWAY

Certain annual cover crops, such as crimson clover, winter rye, barley, buckwheat, oats, and hairy vetch, are best-suited to organic reduced-till practices.

Figure 1 Average annual Soil Tillage Intensity Rating (STIR) of each of the systems in the Farming Systems Trial from 2008–2020. The STIR is a rating system created by USDA NRCS to measure overall soil disturbance. It accounts for tillage type, depth of tillage operation, operational speed of tillage equipment, and percentage of the soil surface area disturbed.

Soil Organic Carbon Organic Till vs Conventional No-Till

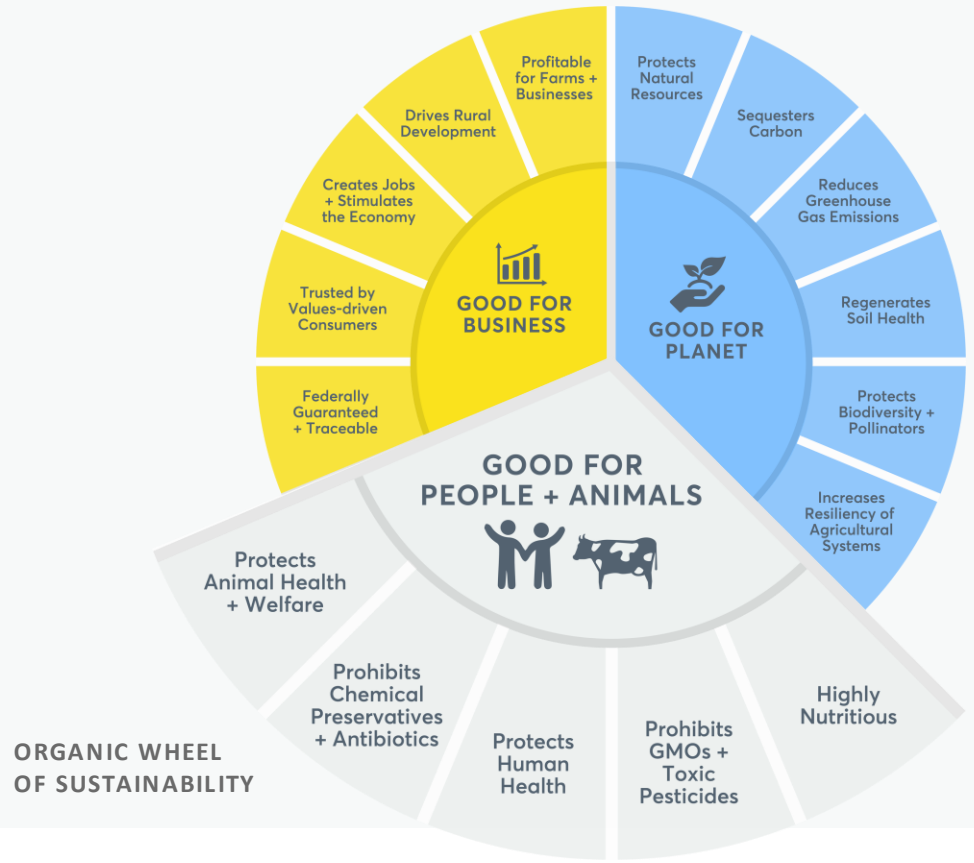


- Organic tillage systems have greater amounts of SOC than conventional no-till
- Organic tillage systems have more carbon at deeper depths where carbon stores are more stable

Cavigelli et al. 2013

GOOD FOR PEOPLE AND ANIMALS

Organic is the only label claim federally certified to always be non-GMO and produced without the toxic pesticides, chemical preservatives, or antibiotics that can be harmful to consumers, farmworkers, and animals.



Protecting Animal Health and Welfare

Organic farmers and ranchers must **support the health** and **accommodate the natural behavi**or of their animals year-round.

Animals must have **access to pasture and the outdoors**.

Animals must be **raised on certified organic land, fed 100% certified organic feed,** and **managed without antibiotics, growth hormones or slaughter byproducts**.

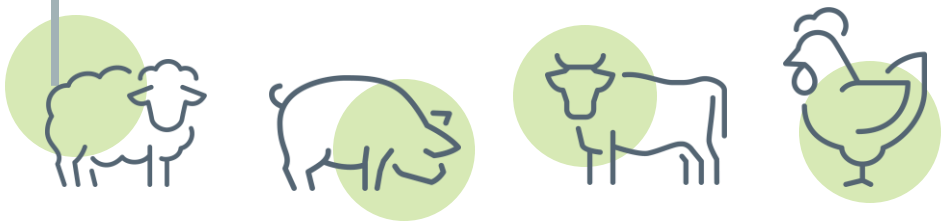
The result? *Healthy, happy animals that exhibit the behaviors nature intended and consumers expect.*

Organic trade association SINCE 1985

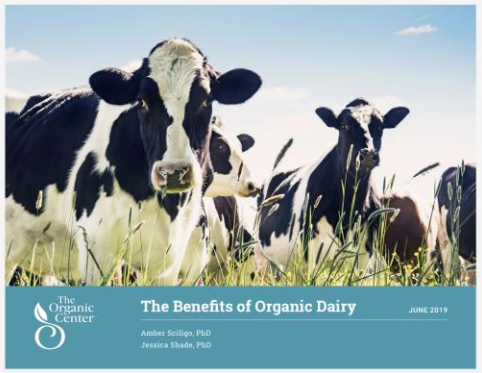
WHAT ABOUT ANIMAL HEALTH AND WELFARE?

Organic farmers are required to raise animals without the use of antibiotics or synthetic growth hormones. Animals must have 100% organic feed and safe, cage-free living conditions.

Organic farmers must provide their animals with access to the outdoors and pasture so that they can freely roam about. In fact, organic standards require that cows graze on grass for a minimum of one third of their lives.



The Benefits of Organic Dairy



Organic dairy means:

No antibiotics, growth hormones, GMOs, or pesticides.

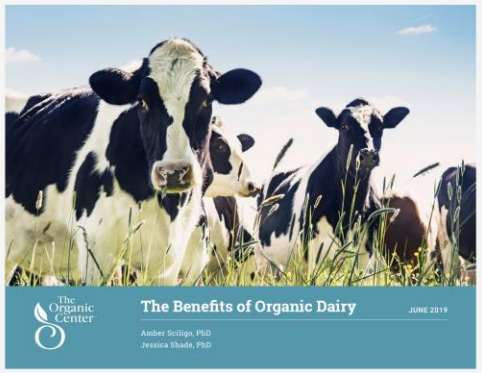
Organic dairy farmers must take care of the health of their cows, using holistic, preventive health care practices.

The health and natural behavior of cows are prioritized.

All livestock feed must be 100% organic.

Cows are pasture-raised and grazed throughout the grazing season.

The Benefits of Organic Dairy



NUTRITION

Organic milk has more antioxidants and nutritional minerals

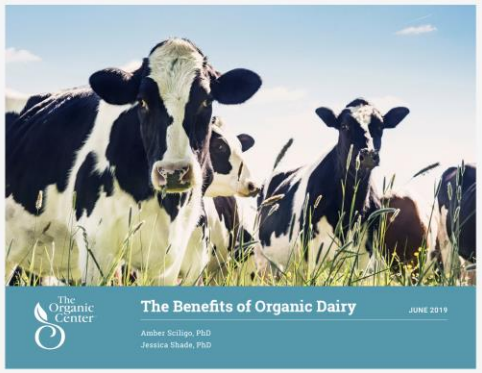
A study published in the *British Journal of Nutrition* showed that organic milk had several beneficial increases in nutritional minerals and antioxidants, such as higher concentrations of iron, vitamin E, selenium, and carotenoids. While several other studies have supported the benefits of consuming organic milk, this publication stood apart as the most comprehensive review conducted on this topic, drawing upon findings from 196 studies on milk from around the world.

Cows that eat more grass have more nutritious milk

Why is milk that comes from organic dairy cows more nutritious? Simply put, it's because they eat more grass. Milk from cows that eat more grass and legume-based forages (like alfalfa hay) has been shown to have more omega-3s and fewer omega-6s, among other improved nutritional qualities.

Organic milk is not only more nutritious, but it is also free from harmful substances such as artificial hormones and antibiotics because these are prohibited in organic dairy management.

The Benefits of Organic Dairy



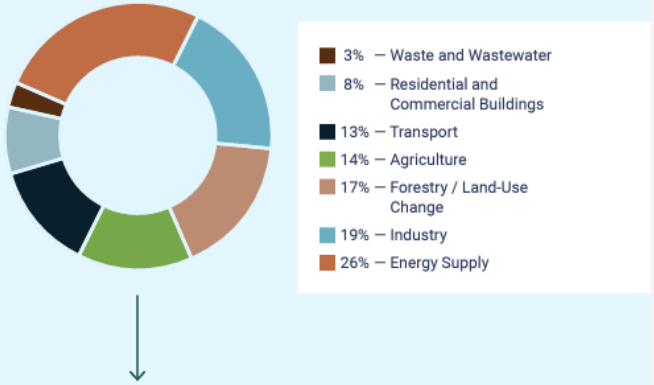
Organic dairy can help mitigate climate change

Organic dairy doesn't just have important differences when it comes to health, it can also help mitigate climate change by using practices that build soil health to sequester carbon, and requires cows spend more time in the pasture than conventional dairy, which reduces energy use and greenhouse gases in multiple ways.

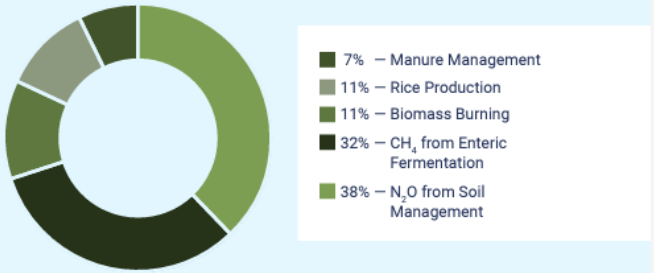
It's important to consider agriculture when thinking about climate change. Not only is our food security threatened by a changing climate, but agriculture is also one of the major contributors to climate change. According to the International Panel on Climate Change, agriculture is responsible for 14% of total greenhouse gas (GHG) emissions, and livestock in particular contributes to this through manure management, enteric methane fermentation (e.g. cow belches), and nitrous oxide emissions from soil management for livestock feed (both pasture and grain production).

What cows eat, how their feed is produced, and where they are housed all influence the impact on GHG emissions and the potential for contributing to or mitigating climate change.

GREENHOUSE GAS EMISIONS BY SECTOR



EMMISIONS IN THE AGRICULTURE SECTOR

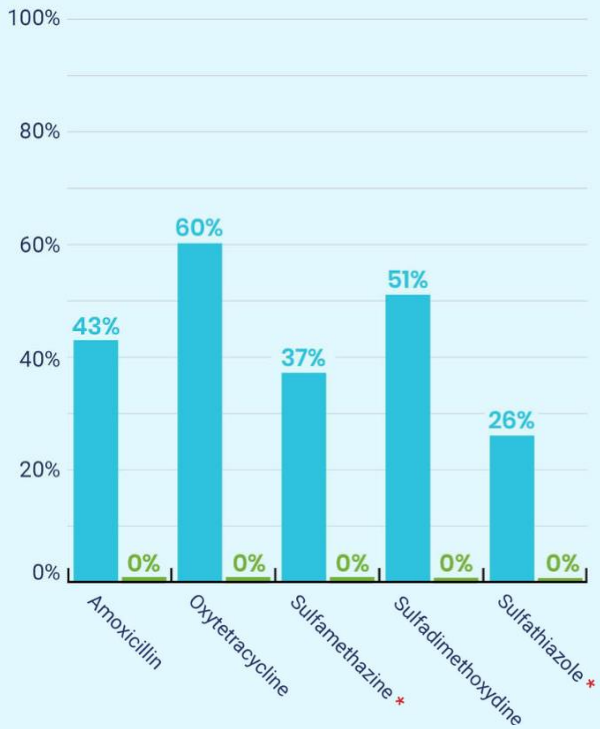


This data from IPPC shows how much agriculture contributes to greenhouse gas emissions and how much opportunity there is for organic agriculture, especially organic dairy and livestock

If you want more of the good stuff and none of the chemical contaminants, choosing ORGANIC is an easy way to ensure that the milk you are drinking is clean.

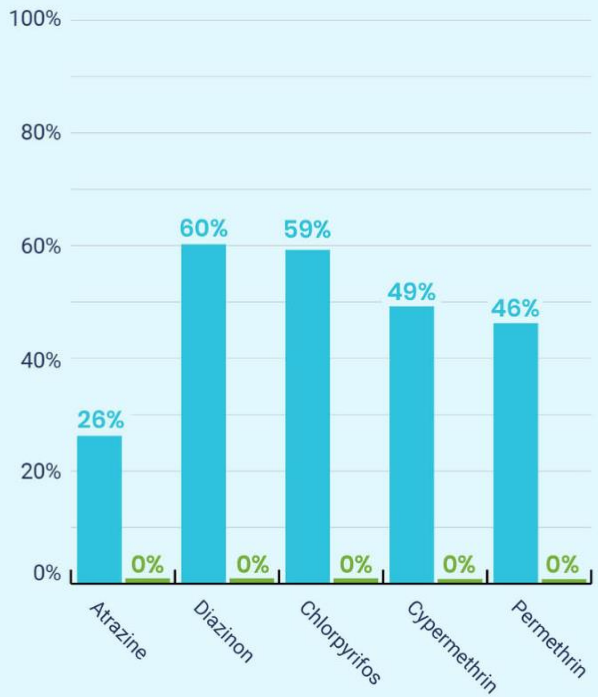
ANTIBIOTICS IN MILK

Percentage of samples with detectable levels of antibiotics



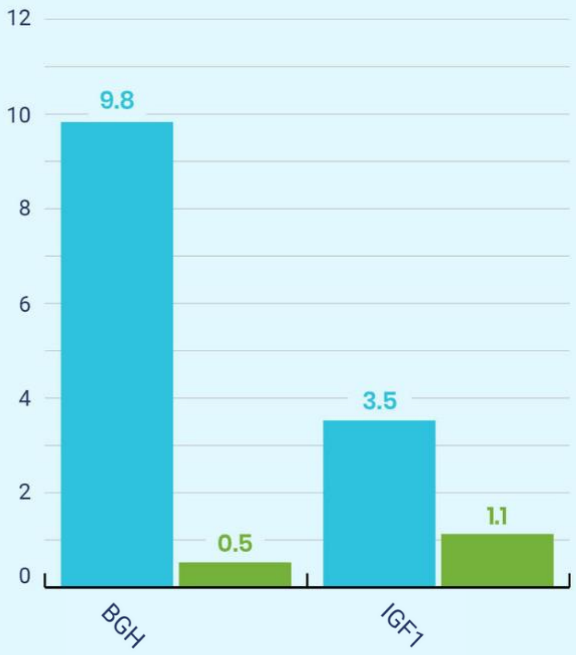
PESTICIDES IN MILK

Percentage of samples with detectable levels of pesticides



GROWTH HORMONE LEVELS IN MILK

Median level of growth hormone (ng/mL)



Protecting Families, Protecting Farmworkers

Organic agriculture drastically reduces environmental and dietary exposure to toxic pesticides, protecting families and farmworkers alike

Pesticide residues in organic produce are 55x lower in vegetables and 115x lower in fruits versus conventional produce.

Organic protects frontline farmworkers, who experience the most danger of acute exposure and health consequences.

GOOD FOR BUSINESS

Customers want to know that brands and retailers have carefully considered their values and integrated purpose and societal impact into the products they sell.

Most surveyed consumers reported that organic was the label that best embodies their values.

ORGANIC WHEEL
OF SUSTAINABILITY

Creates Jobs, Drives Development, and Stimulates the Economy

Clusters of organic businesses **LOWER THE LOCAL POVERTY RATE BY**

1.35%

Organic hotspots **INCREASE HOUSEHOLD INCOME BY OVER**

$2,000

Trusted by Value Driven Consumers: The Organic Shopper

FAMILY ORIENTED

Organic shoppers are **15%** more likely to have children in their household.

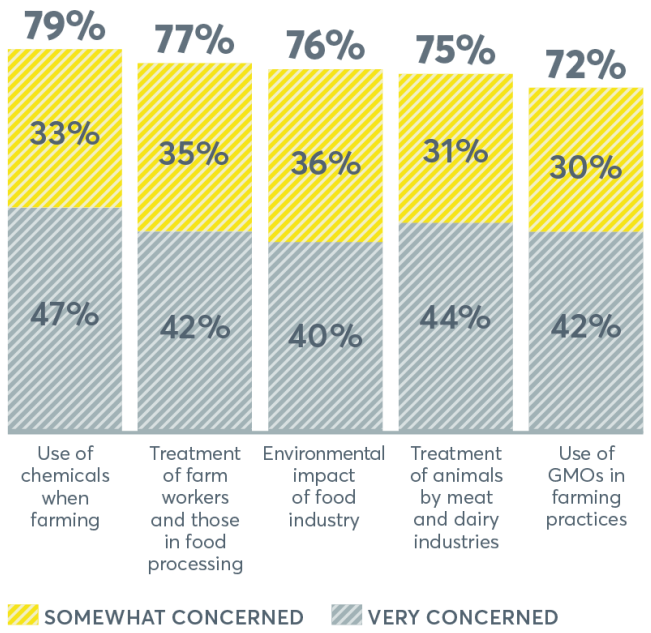
71%
OF PARENTS USE ORGANIC PRODUCE

65%
OF ORGANIC PACKAGED FOOD

62%
USE ORGANIC MILK

More than **82%** of US households **stock organic food in their kitchens**.

ORGANIC ALIGNS WITH CONSUMER PRIORITIES AND VALUES



Source: Edelman Trust Survey, 2021

Organic Confluences 2023:
Reducing Plastic along the Entire Organic Supply Chain

Organic Confluences 2023:
Reducing Plastic along the Entire Organic Supply Chain

Agenda topics:

- The role of plastic in our food system: how does it move through/escape the supply chain and impact the environment and our bodies?
- Use of Plastics in Organic as important tools
- Organic Regulations and Plastics: Policies, Pathways, and Challenges
- The Future of Non-Input Synthetics, Recycling and Plastic-Alternatives in Organic
- Innovations in Plastic Alternatives: Lightning Session




Thank-you for your attention!

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