




OUR MISSION

Through organic leadership, we improve the health and well-being of people and the planet.





Learn more at
[RODALEINSTITUTE.ORG/FST](https://rodaleinstitute.org/fst)

RESULTS AT A GLANCE

Our decades-long research has shown that, in comparison with conventional methods, organic systems:

- **PRODUCE** competitive yields after a 5-year transition period
- **YIELD** up to 40% more in times of drought
- **EARN** 3-6x greater profits for farmers
- **IMPROVE** soil health and build soil organic matter over time
- **USE** 45% less energy
- **RELEASE** 40% fewer carbon emissions
- **LEACH** no atrazine, a toxic chemical, into waterways

RODALE INSTITUTE is a 501(c)(3) nonprofit dedicated to pioneering organic farming through research and outreach. For more than 70 years, we've been researching the best practices in organic agriculture and sharing our findings with farmers and scientists throughout the world, advocating for policies that support farmers, and educating consumers about how going organic is the healthiest option for people and the planet.

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FARMING SYSTEMS TRIAL



**THE LONGEST-RUNNING
 SIDE-BY-SIDE COMPARISON OF
 ORGANIC VS. CONVENTIONAL
 AGRICULTURE IN NORTH AMERICA**

SINCE 1981



FARMING SYSTEMS TRIAL

The Farming Systems Trial (FST)[®] at Rodale Institute is the longest-running side-by-side comparison of organic and conventional grain cropping systems in North America. After nearly 40 years, data from FST has established that organic management practices match or outperform conventional. FST continues to innovate to determine the potential for organic agriculture to benefit soil, human and environmental health.

ABOUT

The Farming Systems Trial was started in 1981 to study the dynamics of transitioning from conventional to organic agriculture. Since inception, FST has compared three core systems: a manure-based organic system, a legume-based organic system, and a chemical input-based conventional system. In each, corn and soybean production is the focus, because 70% of U.S. acreage is devoted to growing grains. In 2008, each core system was further divided to compare traditional tillage with no-till practices. At that time, genetically modified corn and soybeans were also introduced to the conventional system to mirror common practice.

THE DIFFERENT SYSTEMS



ORGANIC MANURE

This system represents an organic dairy or beef operation. It features a long rotation of annual feed grain crops and perennial forage crops. Fertility is provided by leguminous cover crops and periodic applications of composted manure. A diverse crop rotation is the primary line of defense against pests.



ORGANIC LEGUME

This system represents an organic cash grain system. It features a mid-length rotation consisting of annual grain crops and cover crops. The system's sole source of fertility is leguminous cover crops and crop rotation provides the primary line of defense against pests.

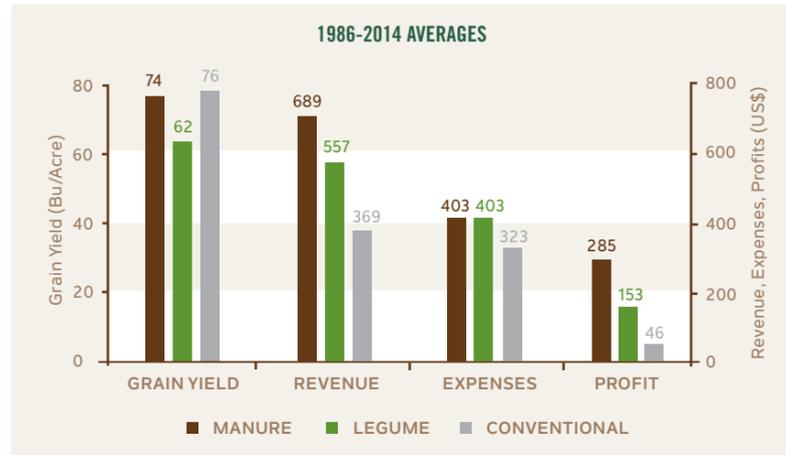


CONVENTIONAL SYNTHETIC

This system represents a typical U.S. grain farm. It relies on synthetic nitrogen for fertility, and weeds are controlled by synthetic herbicides selected by and applied at rates recommended by Penn State University Cooperative Extension.

SUMMARY

After nearly 40 years of existence, FST continues to demonstrate, through scientific research data, that organic farming outperforms conventional systems with regard to building, maintaining, and replenishing the health of the soil, which is the key to regenerative agriculture.



YIELDS

Consistent with our long-term finding that organic can outperform conventional, in 2016, our no-till organic manure systems produced 200 bushels of corn per acre. It was a **record-breaking yield** for our county that **surpassed both conventional yields and the county average by 22%**.



Due to better soil health & water-holding capacity, organic grains outperform conventional in years of drought or extreme weather.

HUMAN HEALTH: NUTRIENT-DENSITY

HEALTHY SOIL = HEALTHY FOOD = HEALTHY PEOPLE

Preliminary research reveals that organic oats grown in systems utilizing legume cover crops contain **higher levels of total protein** and **higher levels of 8 out of 13 essential minerals** analyzed—including magnesium, zinc, phosphorus, and potassium—than conventional oats.

WEED CONTROL

Corn and soybean crops in organic systems tolerate higher levels of weed competition than their conventional counterparts while producing equivalent yields. We utilize the roller crimper as our primary weed control tool in organic no-till systems, and we continue to research best practices for reducing weed pressure.



The innovative roller crimper, developed here at Rodale Institute, enables farmers to terminate a cover crop and create a weed-suppressing mulch while planting the next crop—all in a single pass.

SOIL HEALTH

Healthy soil allows plants to grow to their maximum productivity while limiting disease, pest and fertility issues, and without a need for off-farm inputs. FST data shows that soil health in organic systems continuously increases over time, while soil health in conventional systems remains essentially unchanged.



Organic soils have greater soil organic matter, an important indicator in soil health.

Due to improved soil health, **15-20% more water** percolates through the soil in organic systems, replenishing ground water and helping organic crops perform well in extreme weather. Healthy soil also contains more total microorganisms that make nutrients available to plants for strong growth.

WATER HEALTH

Data from 2018 shows **that conventional systems leech atrazine**, an herbicide known to disrupt human and animal endocrine systems, into the water table. Organic systems, which do not rely on synthetic inputs, leech **zero** atrazine.



In 2018, we began a new study in partnership with Stroud Water Research Center to explore and educate the public on connections between farming practices and clean water.

We are conducting a trial similar in design to FST comparing organic, conventional and conservation agriculture on 40 acres of sloped land in Chester County, Pennsylvania, to measure:

- Residues of pesticides, fungicides, and herbicides on crops and in the water and soil
- Water infiltration rates
- Quantity and composition of runoff
- Stream water quality, or the presence of harmful microbes in the water
- Crop yields
- Physical, chemical, and biological properties of soil
- Emissions and energy use

Looking upstream at the way we farm can have a huge impact on the quality and quantity of clean, fresh water available worldwide.

