The Farming Systems Trial (FST)® at Rodale Institute is America's longest running, side-by-side comparison of organic and conventional agriculture. In 1981, Bob Rodale designed the FST to prove that organic growing methods are superior to conventional systems. Now, after 30 years, the scientific data is indisputable.

FST FACTS

- Organic yields match conventional yields.
- Organic outperforms conventional in years of drought.
- Organic farming systems build rather than deplete soil organic matter, making it a more sustainable system.
- Organic farming uses 45% less energy and is more efficient.
- Conventional systems produce 40% more greenhouse gases.
- Organic farming systems are more profitable than conventional.

Healthy Soil, Healthy Food, Healthy People®

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TO LEARN MORE

Contact Rodale Institute at 610-683-1400 or visit our website at www.rodaleinstitute.org

VISIT

To schedule a custom tour call 610-683-1481. Self-guided tours are also available.

OUR MISSION

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

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RODALE INSTITUTE is a 501(c)(3) nonprofit dedicated to pioneering organic farming through research and outreach. For more than sixty years, we've been researching the best practices of 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.

FARMING SYSTEMS TRIAL

RODALE INSTITUTE™

THE FARMING SYSTEMS TRIAL

FST

THE FARMING SYSTEMS TRIAL

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THE DIFFERENT SYSTEMS

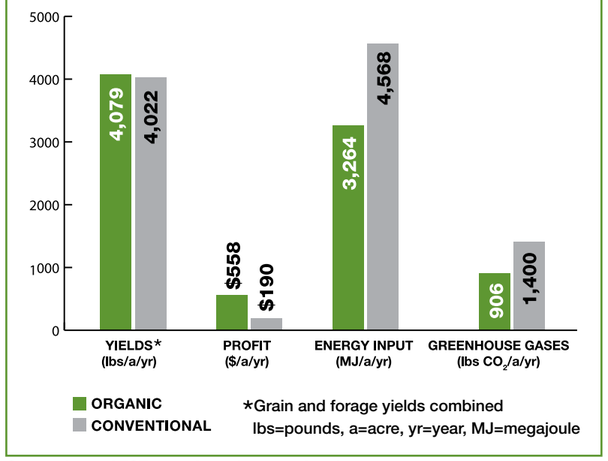
ORGANIC MANURE
This system represents an organic dairy or beef operation. It features a long rotation including both annual feed grain crops and perennial forage crops. The system's fertility is provided by leguminous cover crops and periodic applications of manure or composted manure.

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 the rotation provides the primary line of defense against pests.

CONVENTIONAL SYNTHETIC
This system represents the majority of grain farms in the U.S. 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. In 2008, genetically modified (GM) corn and soybeans were added to this system.

NO-TILL SYSTEMS
Each of the major systems was divided into two in 2008 to compare traditional tillage with no-till practices. The organic systems utilize our innovative no-till roller/crimper, and the no-till conventional system relies on current, widespread practices of herbicide applications and no-till-specific equipment.

SUMMARY



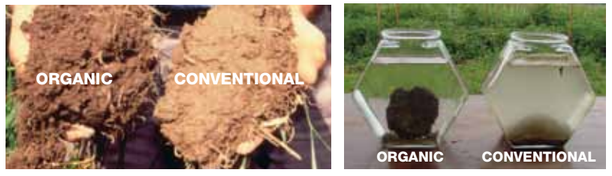
Comparison of FST organic and conventional systems

SOIL

One measure of soil health is the amount of carbon contained in the soil. Carbon acts as a reservoir of plant nutrients, binds soil particles together, maintains soil temperature, provides a food source for microbes, binds heavy metals and pesticides, influences water holding capacity, aeration, and more.

Carbon increase was highest in the organic manure system, followed by the organic legume system. The conventional system has shown a loss in carbon in more recent years.

Organic fields increased groundwater recharge and reduced runoff. Water volumes percolating through soil were 15-20% higher in the organic systems. Rather than running off the surface and taking soil with it, rainwater recharges our groundwater reserves in the organic systems, leaving soil in the fields where it belongs.



Soils in the organic and conventional plots are very different in appearance due to the increase in soil organic matter in the organically managed soils. The organically managed soil is darker and aggregates are more visible compared to the conventionally managed soil.

YIELDS

Over the 30 years of the trial, organic corn and soybean yields were equivalent to conventional yields in the tilled systems.

Wheat yields were the same for organic and conventional systems. (Wheat was only added to the conventional system in 2004).

Organic corn yields were 31% higher than conventional in years of drought. These drought yields are remarkable when compared to genetically engineered "drought tolerant" varieties which saw increases of only 6.7% to 13.3% over conventional (non-drought resistant) varieties.

Corn and soybean crops in the organic systems tolerated much higher levels of weed competition than their conventional counterparts, while producing equivalent yields. This is especially significant given the rise of herbicide-resistant weeds in conventional systems, and speaks to the increased health and productivity of the organic soil.

Corn in the organic legume-based (left) and conventional (right) plots six weeks after planting during the 1995 drought. The conventional corn is showing signs of water stress.

ECONOMICS

The organic systems were nearly three times more profitable than the conventional systems. The average net return for the organic systems was $558/acre/year versus just $190/acre/year for the conventional systems.

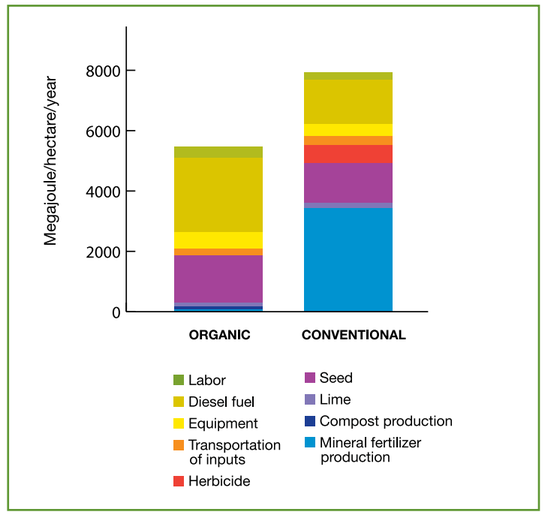
Even without a price premium, the organic systems are competitive with the conventional systems. Lower input costs make the organic systems economically competitive with the conventional system, even at conventional pricing.

ENERGY

INPUTS
The organic systems used 45% less energy than the conventional systems.

Production efficiency was 28% higher in the organic systems than in the conventional systems, with the conventional no-till system being the least efficient in terms of energy usage.

EMISSIONS
The conventional systems emit nearly 40% more greenhouse gases (GHG) per pound of crop produced than the organic systems.



The energy analysis covers only the time period 2008-2010 to reflect data collected for the most recent cropping system comparisons.

HUMAN HEALTH

When we sampled for herbicide and nutrient leaching into groundwater in the FST, we found:

Water leaching from the conventional system more frequently exceeded the legal limit of 10 parts per million for nitrate-nitrogen concentrations in drinking water.

Atrazine leaching in the conventional system sometimes exceeded the maximum contaminate level set by the EPA for drinking water. And concentrations in all conventional samples exceeded 0.1 parts per billion, a concentration that has been shown to produce deformities in frogs.