

## Organic Agriculture



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**OREGON STATE**  
University

## What is Organic Agriculture?

- *The production of crops and animals without the use of synthetic pesticides or fertilizers.*
- *"An organic farm, properly speaking, is not one that uses certain substances and avoids others; it is a farm whose structure is formed in imitation of the structure of a natural system." - Wendell Berry*



## Organic Fertility

*Soil and soil management is the foundation of organic production. Organic growing systems are soil based, care for the soil and surrounding ecosystems, and provide support for a diversity of species while encouraging nutrient cycling and mitigating soil and nutrient losses.*

IFOAM Norms, 2002

...To the maximum extent feasible, Organic Farming Systems rely on crop rotations, crop residues, animal manures, legumes, green manures, off-farm organic wastes, and aspects of biological pest control to maintain soil productivity and tilth, to supply plant nutrients, and to control insects, weeds and other pests. (USDA)

## Fundamental Principles

from Stockdale et al, 2001 *Advances in Agronomy* 70

- Maintaining long-term soil fertility by maintaining SOM levels, fostering soil biological activity, and careful mechanical intervention

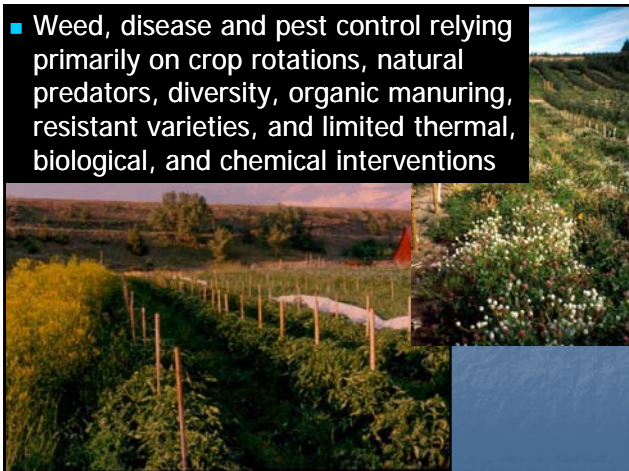


- Nitrogen self-sufficiency through the use of legumes and biological N fixation, as well as effective recycling of organic materials, including crop residues and livestock wastes



- Supplementing crop nutrients, where necessary, by using nutrient sources which are made available to the plant indirectly by the action of soil microorganisms and chemical reactions in the soil

- Weed, disease and pest control relying primarily on crop rotations, natural predators, diversity, organic manuring, resistant varieties, and limited thermal, biological, and chemical interventions



- The extensive management of livestock, paying full regard to their evolutionary adaptations, behavioural needs, and animal welfare issues with respect to nutrition, housing, health, breeding, and rearing.



from Stockdale et al, 2001 (Advances in Agronomy 70)



■ Careful attention to the impact of the farming system on the wider environment and the conservation of wildlife and natural habitats

photo courtesy of the Wild Farm Alliance

# What's The Federal Government Got To Do With It?

USDA United States Department of Agriculture  
Agricultural Marketing Service

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## National Organic Program

**Program Overview**

The National Organic Program (NOP) develops, implements, and administers national production, handling, and labeling standards for organic agricultural products. The NOP also accredits the certifying agents (foreign and domestic) who inspect organic production and handling operations to certify that they meet USDA standards.

- NOP-AQSS ("Access")
- NOP Reading Room
- NOP Newsroom
- National Organic Standards Board (NOSB)

**Today's News**  
April 25, 2008  
Questions and answers have been added to NOP-AQSS

**I Want Information On**

- Certifiers
- International Issues
- Labeling
- National List of Allowed and Prohibited Substances
- Organic Cost Share Program
- How "I Want Information On" Updates

**General Information**

- List of USDA Accredited Certifying Agents
- NOP Fees

http://www.extension.org/organic-production

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## Organic Agriculture

**In This Resource Area**

**Farming Systems**

- Dairy Production
- Vegetable Production

**General Topics**

- Introduction to Organic Agriculture
- Certification
- Cover Cropping
- Insect Management
- Marketing and Food Systems
- Plant Breeding
- Plant Disease Management
- Seeds and Seed Production
- Soil and Fertility Management
- Weed Management
- Video Clips

• eOrganic YouTube channel  
• Follow us on Twitter

**Answers from our Experts**

April 23, 2008  
Where can I buy organic seed?

March 04, 2008  
I've heard that non-organic milk replacer, fed to calves, often contains cattle and hog blood.

March 03, 2008  
Should I add molasses to the soil?

More ...

**In The News**

Nov 14, 2008  
How Birds Help Our Gardens: Ohio Classic Available for Preorder

Nov 03, 2008  
New Funding Opportunities for Organic Production

Nov 12, 2008  
Switching to Organic Pork Production Has Potential Advantages and Drawbacks

More

http://www.extension.org/article/18349

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Articles from our resource area experts.

## National Organic Program Summary

Last Updated: January 15, 2009 | Related resource areas: Organic Agriculture

**eOrganic authors:** Brian Baker, Organic Materials Review Institute  
Jim Ridd, University of Minnesota

**Source:** Agricultural Marketing Service - United States Department of Agriculture (USDA)

**Introduction**

This summary was prepared to help agricultural professionals understand the basic requirements of organic certification. It is not comprehensive and is not a substitute for the regulatory text. Producers and handlers who seek certification are encouraged to read the National Organic Program (NOP) rule in its entirety and contact their certification agent if they have specific questions about certification of their operations. Certification agencies seeking guidance on accreditation are encouraged to contact the USDA staff responsible for the accreditation program.

- Subpart A: Definitions
- Subpart B: Applicability
- Subpart C: Organic Production and Handling Requirements
  - Crop Production
    - Livestock Production
    - Handling
  - Subpart D: Labels, Labeling, and Market Information
  - Subpart E: Certification
  - Subpart F: Accreditation and Certifying Agents

**Resource Area Feeds**

- Track all new content

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- Soil and Fertility Management
- Weed Management



## Transition to Organic

- A period of three years is required for the transition from conventional to organic production, during which time products may be marketed as "transitional organic," but not as certified organic.
- This time is calculated from the date of application of the last prohibited material or practice to the date of harvest of the first organic crop.
- Land where no prohibited materials have been used for three or more years can be put directly into certified organic production.

from [www.rodaleinstitute.org](http://www.rodaleinstitute.org)

## Organic System Plan

- The centerpiece of your application for certification is your Organic System Plan. This might include an Organic Livestock Plan (for livestock producers) and an Organic Handling Plan (for on-farm or off-farm handling, processing or retailing).

Your Organic System Plan should include:

- details about the crop rotation you intend to follow (including cover crops)
- a conservation plan detailing how you plan to improve your soil and manage runoff and erosion
- how you'll control pests, diseases and weeds organically

from [www.rodaleinstitute.org](http://www.rodaleinstitute.org)

## Certification Process

- The audit trail involves meticulous recordkeeping and documentation to show that you are following your plan, monitoring your results and not using any prohibited substances.
- Once these systems are in place, an inspector employed by your certifier will schedule a farm visit, which usually lasts about three to five hours.
- Following the visit, the inspector submits a report to the certifying agency, where a committee will review your application.
- Once you are certified, you are still required to maintain a system plan, keep good records and have your soil tested regularly. Water used for irrigation, washing, or livestock is also subject to testing for contaminants. You can expect a visit from an inspector at least once a year.

from [www.rodaleinstitute.org](http://www.rodaleinstitute.org)

What's science got to do with it?

## Organic Management Improves Soil Quality

Mäder et al, 2002  
Reganold et al, 1987  
and 2001  
Andrews et al, 2002  
Bullock et al, 2002  
Drinkwater et al, 1995  
and more....

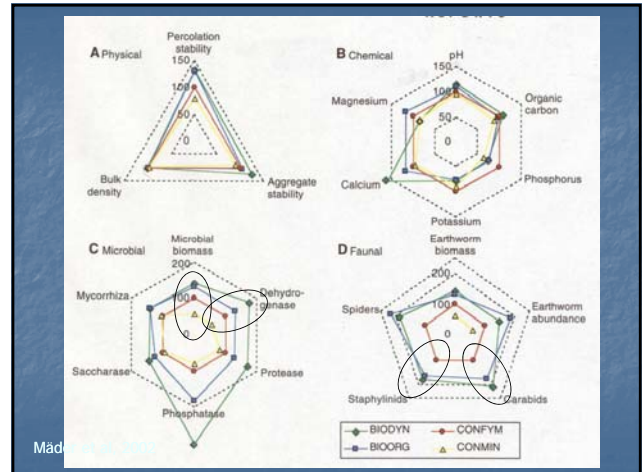
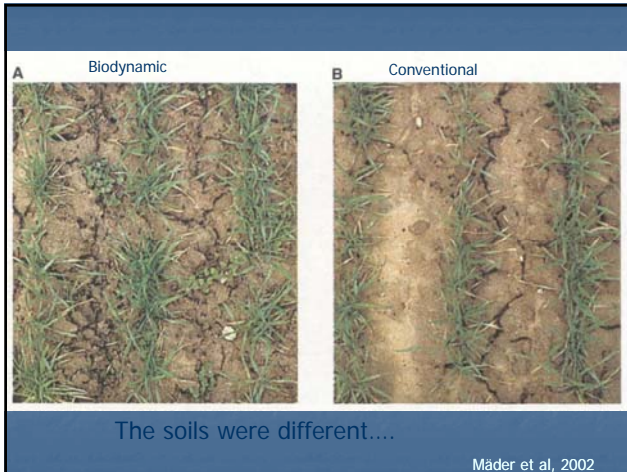
- VERY WELL DOCUMENTED



## Soil Fertility and Biodiversity in Organic Farming

Mäder et al, 2002 (Science 296:1694)

- 21 year systems trial: Therwil, Switzerland
- Biodynamic/organic, conv, conv + FYM
- Winter wheat, potato, grass/clover rotation
- Yields: WW (90% of conv), potato (58-66% due to K fert and late blight), grass/clover (equiv)
- Nutrient input 34-51% lower in org
- Energy required to produce crop dry matter unit was 20-56% lower in organic

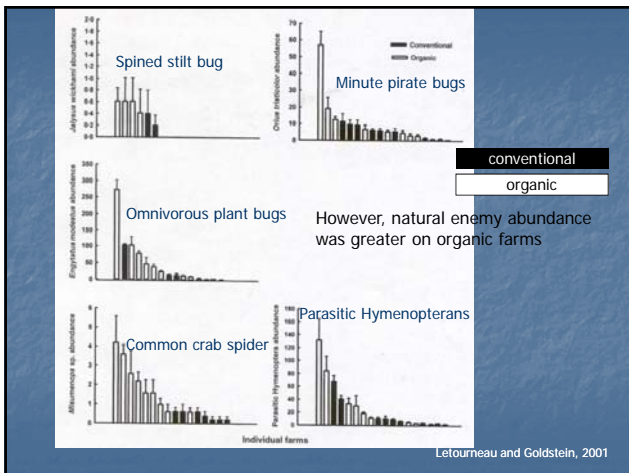
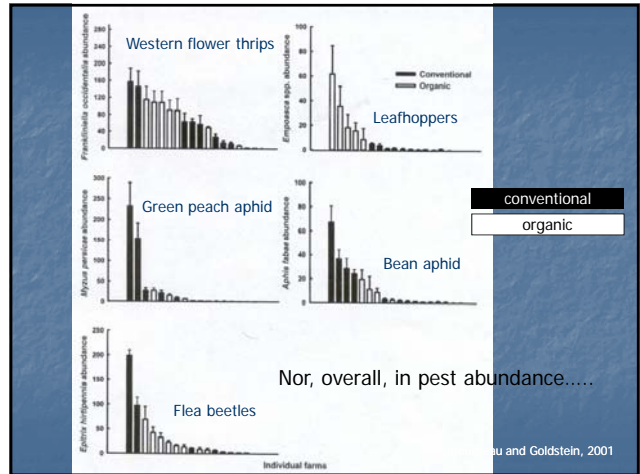
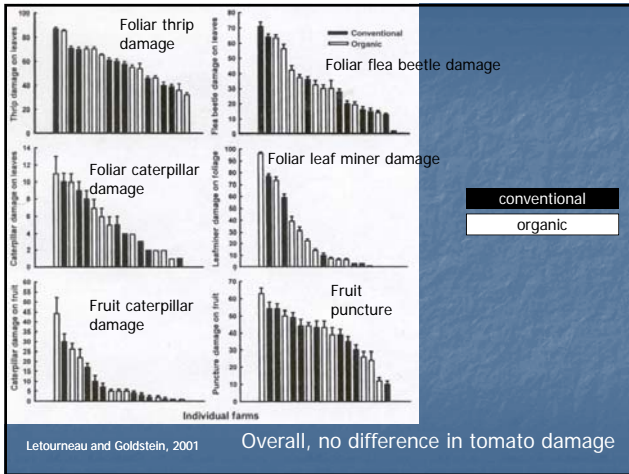


### Use of Manure

- Raw manure requires an interval of 120 days between application and crop harvest, where the edible portion of the crops destined for human consumption are in contact with soil, and 90 days for crops whose edible portion does not have direct contact with the soil surface or soil particles.
- To meet organic standards and harvest within this interval, animal manure must be composted by the process specified in the NOPS. The process includes an initial C:N ratio of between 25:1 and 40:1, and temperatures between 131°F and 170°F for 15 days in the case of windrow composting system, during which period the materials must be turned a minimum of five times (7 CFR Part 205.203 (c)(2)).

### Fundamental differences between conventional and organic tomato agroecosystems in CA

- Drinkwater et al, 1995 (soils, overview)
- Workneh et al, 1994 (plant pathology)
- Letourneau and Goldstein, 2001 (entomology)
- 9 org and 9 conv tomato farms
- Sacramento Valley, CA



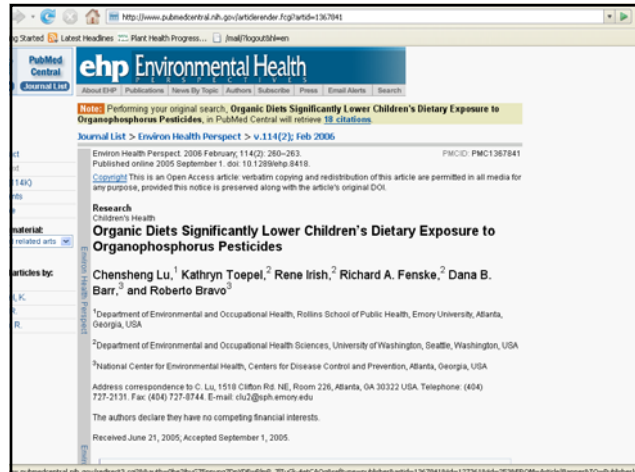
### Factors related to relative abundance of arthropod species

- Bare vs. vegetative winter fallow
- Insecticide use intensity
- Relative amount of surrounding natural vegetation
- Conventional vs. organic management in general
- Greater or less than 25% natural lands within 1 km

Letourneau and Goldstein, 2001

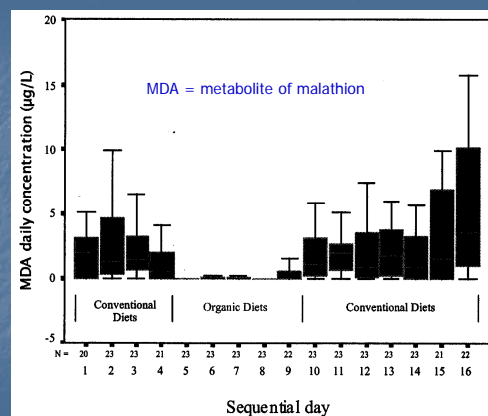
## Organic Diets Significantly Lower Children's Dietary Exposure to Organophosphorus Pesticides

- Research supported by the EPA
- Work conducted by Lu et al.:
  - Dept of Environ and Occupational Health, Emory University
  - Dept of Environ and Occupational Health Sci, Univ. of WA, Seattle
  - National Center for Environmental Health, Centers for Disease Control and Prevention, Atlanta.



## Organic Diets and OP Exposure

- 23 elementary school students
- Substituted organic foods for 5 days
- Collected first-morning and pre-bedtime urine samples
- Analyzed for OP residues
- Levels of specific metabolites of malathion and chlorpyrifos (insecticides) were significantly lower while children were eating organic foods
- Conclusion: "an organic diet provides a dramatic and immediate protective effect against exposures to OP pesticides that are used in ag production..."



## What is organic milk?

Why was there a boycott against Horizon milk?  
Why should anyone care?



**§205.239 Livestock living conditions** —Organic livestock must have access to the outdoors, shade, shelter, exercise areas, fresh air, and direct sunlight suitable to the species, its stage of production, the climate, and the environment, including access to pasture for ruminants.

- grazing during the entire growing season, but not less than 120 days, and providing a minimum of 30% dry matter intake during the growing season



FORTUNE  
Sustainability by Marc Gunther

Column archive

## An organic milk ripoff

*The government says one of the nation's largest producers of organic milk has been breaking the rules, says Fortune's Marc Gunther.*

By Marc Gunther, Fortune senior writer  
September 4 2007, 11:40 AM EDT

NEW YORK (Fortune) -- Some consumers pay \$5 or \$6 a gallon for organic milk, up to twice as much as the conventional kind. They're not always getting their money's worth.

A company that supplies milk to Wal-Mart, Costco, Target and Safeway was charged last week with selling milk labeled organic that failed to meet the national organic standards.

**Aurora Organic Daily**, a private company based in Boulder, Colorado, says it never broke any rules. But Aurora, which operates large-scale organic farms in Colorado and Texas, signed a consent decree with the U.S. Department of Agriculture, promising to clean up its act.

"We're doing a transformation - cows reduced, pasture increased, all animals organic from birth and a significantly increased commitment to research," says Clark Driftmier, vice president of marketing at Aurora.

An Aurora farm in Plattsville, Colorado, for example, which once had as many as 4,200 cows, will reduce that number to 1,250, even as most of the farm's buildings and paddocks are torn down to create more pasture land.



Jon Bansen, Double J Jerseys,  
Monmouth, Oregon

- <http://cookingupastory.com/?s=jon+bansen>

## Herd Health (Hardeng and Edge, 2001)

- Norwegian Dairy Herd Recording data sets
- Matched three conv: one org herd (based on size and region: 31 org, 93 conv)
- Org herds typified by lower intensity production and lower use of concentrates, more varied feedstocks, longer spring calving, older cows, access to the outdoors, more complex breeding composition

Organic : conventional odds ratios

- Mastitis, ketosis and milk fever incidence were all lower on organic farms
- Low disease incidence in organic herds has been reported previously (e.g. Weller and Bowling, 2000)

The image shows the cover of a document titled 'Improving Sustainability in Organic and Low Input Food Production Systems'. It is the 'Proceedings of the 3rd International Congress of the European Integrated Project Quality Low Input Food (QLIF)'. The event took place from March 20 to 23, 2007, at the University of Hohenheim, Germany. The cover features a logo with a globe and the text 'QualityLowInputFood'.

