

The Organics Debate: Is the Premium Worth It?



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Differences in Conventional and Organic Food

Economic value to an individual consumer is driven by their preferences, values, desires, concerns, and expectations. Two key questions on the table are –

What are the differences between conventional and organic food?

To what extent, and how, do these differences matter? How do people place an economic value on the differences?



Major Differences Between Organic and Conventional Food and Farming



Three of five major food safety concerns largely eliminated:

- Pesticides
- Animal drug residues/antibiotic resistance
- GM food risks (e.g., novel allergens)

Help manage two other major food safety risks:

- Mycotoxins
- Bacterial contamination



Major Differences Between Organic and Conventional Food and Farming

- Worker safety
- Environmental impacts:
 - Build soil quality & increase terrestrial carbon sequestration
 - Promote biodiversity
 - Lower energy inputs
- Reduce impacts on birds, fish, pets, small mammals
- Increase N use efficiency, reduce the size of the Dead Zone in the Gulf



Organic Production Improves Organoleptic Quality

Results from three continents show higher organoleptic quality in organic apples

TOC-funded WSU strawberry fruit quality project found positive differences in strawberries (out soon)

Ripeness, handling always critical in both systems



Do Organic Fruits and Vegetables Taste Better than Conventional Fruits and Vegetables?
by Richard C. Thauer

September 2008

Organic Production Increases Average Antioxidant Levels

Antioxidant intakes are about one-third optimal levels


Total antioxidant capacity averages ~ 30% higher in organic foods

Individual antioxidants sometimes are 50% to 1-X higher



Elevating Antioxidant Levels in Food through Organic Farming and Food Processing
by Charles M. Benbrook
Chair, Institute, The Organic Center


January 2008



Phytochemicals in Strawberries


(units per g FW)	CON	ORG	METHOD
Polyphenols (mg gallic acid)	1.22	1.37	Folin-Ciocalteu
Flavonoids (Abs 325 nm)	14.0	15.6	HCl-methanol
Anthocyanins (μ mol)	319	350	HCl-methanol Pelargonidin-3-glucoside

Source: Unpublished findings of Washington State University Fruit Quality Project



Conclusions from WSU Apple and Strawberry Studies


- Organic yields are often lower and fruit size smaller, but fruit stores and tastes better
- Organic apples are as firm or firmer, and organic strawberries are sweeter
- Organic fruit has, on average, higher antioxidant activity and polyphenol content



“Still No Free Lunch” Critical Issue Report, September 2007

Discusses impact of rising yields on nutrient density



Highlights role of high-nitrogen systems in increasing yields and consequences of near-exclusive focus on quantity produced, not food quality



The Organic Center www.organiccenter.org
Critical Issue Report: Still No Free Lunch
September 2007

Still No Free Lunch:
Nutrient levels in U.S. food supply eroded by pursuit of high yields
by Brian Halweil

The Dilution Effect





- Yield-enhancing methods tend to decrease nutrient concentrations
- Term first used in Jarrell WM, Beverly RB, *Advances in Agronomy*, 1981; 34:197–224; brought back by Don Davis circa 2004


Comparing Nutrient Density in Conventional and Organic Systems

85+ published studies since 1980 compare nutrients in conventional and organic food

Studies need to be screened for experimental design, agronomics, soils, and analytical methods



A Rapidly Expanding Database to Compare Nutrient Density




	2007	2006	2005	2004	2003	2002	2001	2000	1999-1995	1994-1990	1989-1980	Pre-1980	Total
Number of Published Studies	10	7	15	8	4	1	5	5	14	11	8	0	88

Sept 2007-2004 = 40 45%
Pre-2004 = 48 55%

About 10-15 new studies per year likely, half in JFAC!!


Source: Unpublished findings, The Organic Center

Preliminary Findings on Nutrient Density



Among vitamins –


- Organic production typically increases Vitamin C, but often reduces beta-carotene



Among minerals –

- Organic production typically increases some minerals and reduces nitrates (a good thing), which are elevated in high-N systems


Preliminary Results on Nutrient Density



Organic production typically increases total phenolics and antioxidant activity

Often, a greater portion of phytochemicals are present in the aglycone form (no sugar attached), likely enhancing bioavailability

Impacts of Organic Farming on Food Nutritional Quality



Better understanding needed to design and manage “nutrient-dense farming systems”

Conventional (or organic) high-nitrogen production systems likely to produce higher yields and levels of protein and some vitamins, but at the expense of flavor, antioxidant capacity, and storage stability


Implications for Human Health




Consumption of organic food largely eliminates pesticide dietary exposure, clearly reducing risks of birth defects and neurological problems

How much is peace of mind worth?

Implications for Human Health



Nutrient dense organic fruit and vegetables reduce the number of calories required to meet daily nutrient needs –

- 30-X or more antioxidants per serving compared to low nutrient dense foods
- Only 10% to 15% of total caloric intake needed to meet most nutrient needs
- Possible benefits for sugar metabolism


Source: Organic Center Antioxidant SSR

Implications for Human Health




Increased levels of some antioxidants in organic produce – e.g. resveratrol – appear to help trigger satiety:


- More intense flavors in organic produce, especially when picked ripe, may also lessen tendency toward excessive caloric intake
- Better tasting fruits and vegetables reduce waste



Critical Areas of Inquiry

Impacts of organic farming on sugar levels and metabolism in plants **and** people

Do plants sometimes suffer from a diabetes-like syndrome?




Sugar Levels and Metabolism in Plants

Conventional systems dependent on high nitrogen fertilization rates produce –


- Faster growth, bigger fruit, larger average cell size – factors leading to the “dilution effect”
- Higher levels of protein and nitrates

But also less value per ounce –

- Less intense flavors and shorter shelf life
- Greater susceptibility to pathogens and insects





Environmental Benefits of Organic Farming




- Virtually eliminate ecotox impacts of pesticides
- Build soil organic matter
- Tighten nitrogen cycle and increase N-use efficiency

• Sequester carbon to slow global climate change





Final Thoughts



Many people are willing to pay a premium for the nutrient density and food safety/environmental benefits of organic food...


...but the magnitude and acceptability of the premium will change in response to whether and how conventional agriculture acts to narrow perceived differences




Looking Ahead

Taste, nutritional quality, and food safety benefits of organic farming could be eroded if organic farmers strive to attain conventional yields –

- High N organic systems are likely to also suffer from the dilution effect
- Pushing organic systems to match conventional yields will jeopardize soil quality and biodiversity-based benefits




Looking Ahead



Today's focus on comparative levels of individual nutrients is likely missing the full impact of plant breeding and alternative production systems –

- Key role of ratios and balances among nutrients in plants and people
- Organic food may present nutrients in more balanced, and bioavailable, “packages”
- More science needed to fully document and quantify the organic “premium”





Is the Organic Premium Worth It?

Consumers will provide the answer

The added value attached to organic food reflects:

- Absence of risky inputs used on conventional farms
- Greater nutrient density and better tasting food
- More humane animal care



Thank you.



More Information and Sources

Data and findings from the scientific reports of the Center, all available free from the Organic Center website:

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