

**Health & Nutrition Organic nutritionally better
New Evidence Settles a Lingering Question - Is Organic Food More Nutritious?
Forty New Studies Published in Last Six Years Provide a Firm Foundation for Some
Clear-cut Answers:
Yes, Organic Plant-Based Foods ARE More Nutritious, and Provide on Average a
25% Nutrition Premium**

BOULDER, Colo. – March 19, 2008 /Natural Newswire/ – A comprehensive review of 97 published studies comparing the nutritional quality of organic and conventional foods shows that organic plant-based foods (fruits, vegetables, grains) contain higher levels of eight of 11 nutrients studied, including significantly greater concentrations of the health-promoting polyphenols and antioxidants.

In this first comprehensive review of the scientific literature comparing nutrient levels in organic and conventional food completed since 2003, a team of scientists conclude that organically grown plant-based foods are 25% more nutrient dense, on average, and hence deliver more essential nutrients per serving or calorie consumed.

Nutrient levels were studied in 236 matched pairs of foods with scientifically valid results on the levels of 10 nutrients, plus nitrates (high levels are undesirable because of food safety risks). Each matched pair contains, for example, an apple crop grown organically and another apple crop from a nearby conventional farm with similar soils, climate, plant genetics, irrigation systems, nitrogen levels, and harvest practices.

The new report is published as a “State of Science Review” by The Organic Center and is entitled “New Evidence Confirms the Nutritional Superiority of Plant-based Organic Foods.” The co-authors are Charles Benbrook, the Center’s Chief Scientist, Xin Zhao of the University of Florida, and three Washington State University (WSU) scientists Jaime Yáñez, Neal Davies, and Preston Andrews. Dr. Andrew Weil, a Center board member, wrote the “Foreword.” The full report and its executive summary are freely accessible on the Center’s website (http://www.organic-center.org/science.nutri.php?action=view&report_id=126).

Selecting Scientifically Valid Studies

The team reviewed the study design and analytical methods used in 97 published, peer-reviewed studies appearing since 1980. Earlier studies were excluded because of the lack of clear, binding definitions of organic farming, changes in analytical methods, and the recent recognition of the importance of antioxidant plant phytonutrients. Studies before 1980 rarely reported data on total antioxidant activity or total polyphenols.

Many of the 97 studies covered more than one crop or food. Out of a total of 135 study-crop combinations, 70% were deemed “acceptable” or “high quality” based on a five-point screening system. Dr. Xin Zhao of the University of Florida helped design the screening system in order to “assure the organic and conventional crops were grown on

the same type of soil, using similar tillage and planting methods, the same plant variety, and well-defined and established organic and conventional farming systems. “

In addition, the team assured that the crops were picked at a comparable level of maturity, handled the same way after harvest, and tested in the same form using the same methods.

The 94 “acceptable” study-crop combinations were then reviewed for the reliability of the analytical methods used to quantify nutrient levels. On average, each study measured about ten nutrients using, on average, about six methods (some methods are able to quantify levels of several nutrients). Out of the approximate total 560 study-crop-method combinations, about 10% (55) were deemed “invalid” based on the criteria established by the team.

Team member Dr. Jaime Yáñez of WSU emphasizes that “while analytical methods have steadily improved over the years, we found that some recently published high-profile papers utilized analytical methods that were ranked ‘high quality,’ while other methods in the same papers were ‘invalid’ based on our explicit criteria. ”

Comparing Nutrient Levels

The team identified eight or more valid matched pairs for 10 nutrients, plus nitrates including

Four measures of antioxidant activity;
Precursors of three vitamins A, C and E;
Two minerals (phosphorous and potassium);
Nitrates (higher levels are undesirable), and
Total protein.

There were 191 matched pairs in which the antioxidant, vitamin and mineral levels were compared. The organic food was more nutrient dense in 119 of these pairs, or 62%, compared to 36% of the conventional matched pairs with more nutrients. There were no differences in 2% of the pairs.

The conventional samples contained modestly higher levels of protein in 85% of 27 matched pairs (an advantage), but also much higher levels of nitrates in 83% of 18 matched pairs (a nutritional and food safety disadvantage).

Matched pairs comparing potassium, phosphorous, and total protein accounted for over 75% of the 87 matched pairs in which the conventional food was more nutrient dense. In general, compared to vitamins and antioxidants, these three nutrients are of less importance because they are present in the average American diet at adequate to excessive levels.

The organic food was more nutrient dense in 75% of the matched pairs comparing total antioxidant capacity, total polyphenols, and two key flavonoids, quercetin and kaempferol. The typical American diet delivers barely half the recommended levels of these important, health-promoting nutrients, which is, according to co-author Dr. Benbrook, “a major reason why the federal government recommended such a significant increase in the number of daily servings of fruits and vegetables as part of the new USDA dietary guidelines that were issued in 2005.”

The report also describes some of the reasons rooted in plant physiology that explain why several nutrients tend to rise or fall together in organic versus conventional crops grown under comparable conditions. Co-author Dr. Preston Andrews, an expert in horticultural plant growth and development at WSU, explains that “In most well-designed comparison studies, we see marginally to markedly elevated levels of Vitamin C, total phenolics, antioxidant activity, and certain flavonoids in organic samples, coupled with generally lower levels of protein, nitrates, and beta-carotene, the precursor of Vitamin A. In most cases the explanation is rooted in the forms of nitrogen available to the plant and how the plant responds to excessive levels of readily available nitrogen.”

Magnitude of Differences Heavily Favors Organic Foods

Several methods were used to place the magnitude of the differences in nutrient levels between organic and conventional foods into perspective. In two-thirds of the matched pairs favoring the conventional food, the differences in favor of conventional were under 10%, compared to 26% of the matched pairs in which the organic food was more nutrient dense by a margin under 10%.

The premium in favor of the conventional food was 21% or greater in just 15% of the matched pairs in which the conventional food was more nutrient dense, whereas in the more nutrient dense organic food matched pairs, 41% favored organic by 21% or more, and 24% of the pairs were 31% or more nutrient dense.

The largest differences were in the case of the flavonoid quercetin, where the organic foods were 2.4-times more nutrient dense on average, and nitrates, where levels were 1.8-fold lower in organic foods (a desirable nutritional feature).

The consistency of the differences observed, the relative importance of the nutrients for which the organic samples tended to be markedly higher, and the sizable advantage in many of the organic foods within matched pairs lead the team to conclude –

“Yes, organic plant-based foods are, on average, more nutritious in terms of their nutrient density for compounds validated by this study’s rigorous methodology.”

Commenting on the results, Dr. Neal Davies, a professor in the School of Pharmacology at Washington State University, and a study co-author, said “We have carried out many careful comparisons of both nutrient levels and biological activity of antioxidant polyphenols in organic and conventional foods over the last five years. Not only are we

seeing a general trend in favor of the nutrient density of organic food, but also evidence that nutrients are often present in organic foods in a more biologically active form.”

The last page of the report provides further information on the co-authors. Contact information follows:

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About The Organic Center

The Organic Center, based in Boulder, CO, is a 501(c)(3) nonprofit organization founded in 2002 to generate and advance credible, peer-reviewed scientific research and information on the health and environmental benefits of organic food and farming – and to communicate those benefits to the public through education, resources and information. By doing so, it helps promote the conversion of more farmland to organic methods, improve public health, and work to restore our natural world through more sustainable and ecological practices. All of The Organic Center’s research reports and publications are available free at www.organic-center.org. Individuals can also sign up for our free monthly e-newsletter, The Scoop. For information about The Organic Center, its current programs and scientific reports please visit www.organic-center.org or call 303.499.1840.