Organic Farming Can Increase Antioxidant Levels

The Organic Center’s second State of Science Review concludes that organic farming methods have the potential to elevate average antioxidant levels, especially in fresh produce. Charles Benbrook, Ph.D., compiled and analyzed existing scientific information for his report, “Elevating Antioxidant Levels Through Organic Farming and Food Processing.” The report reveals that, on average, antioxidant levels were about 30 percent higher in organic food grown under the same conditions.

The report’s findings are particularly useful for consumers who wish to consume higher levels of antioxidants in fresh fruits and vegetables without additional caloric intake. The U.S. Department of Agriculture is currently recommending higher daily intakes of fruits and vegetables, especially those that are antioxidant-rich.

The report’s tables include rankings of common foods according to their total antioxidant capacity per calorie and per typical serving. Consumers who seek out foods high in antioxidant content can meet recommended antioxidant intake levels with less than 10 percent of their daily caloric intake.

"Because of the many potential health benefits associated with antioxidant consumption, increasing average daily antioxidant intake through the diet has emerged as an important health goal," says Dr. Benbrook. "This goal was a major factor shaping the new U.S.D.A. Dietary Guidelines for Americans, which increase the average recommended intake of fruits and vegetables to at least nine servings per day from the original five. By generating higher concentrations of antioxidants in fresh produce and other organic foods, organic farming can help people increase their daily consumption of antioxidants without a proportional increase in calories."

This report reviews, among other data, 15 quantitative comparisons of antioxidant levels in organic versus conventional fruit and vegetables. Organic produce demonstrated higher levels in 13 of 15 cases. The organic crops contained about one-third higher antioxidant or phenolic content than comparable conventional produce.

Several studies found levels of specific vitamins, flavonoids, or antioxidants in organic foods to be two or three times the level found in matched samples of conventional foods. In studies making direct comparisons, levels of antioxidants in organic versus conventional produce, higher levels are often found in organic produce, but the converse is rarely true.

Organic Farming Techniques Can Increase Antioxidant Content

A wide range of factors can influence the mix of antioxidants that a plant manufactures as well as the levels the plant produces at any given point. In general, factors that impose stress on plants tend to trigger a plant’s innate defense mechanisms and these mechanisms are driven by or entail the synthesis of antioxidants.

The studies reviewed provide evidence that several core practices on organic fruit and vegetable farms—such as using compost, cover crops, slow-pressing forms of nitrogen—can increase antioxidant and polyphenol content compared to conventional practices that depend on commercial fertilizers and pesticides. The prohibition of pesticides in organic farming practices provides additional benefits to consumers.

"Harvesting fruits and vegetables at optimal ripeness and consuming them in less-processed forms, without removing skins or peels, will preserve a greater portion of their antioxidants," says Dr. Benbrook. "The outer layers of fruits and vegetables generally contain the highest concentrations of antioxidants, but many consumers peel their conventionally grown fruits and vegetables to help reduce levels of pesticide residues. Seeking out organic produce can therefore deliver a dual benefit to consumers by maximizing antioxidant intake and minimizing pesticide dietary exposure."

Some of these differences are known to affect antioxidant levels.

For example, the synthetic chemical hexane is often used in extraction of oils from crops in conventional oil processing plants, and it is prohibited in organic oil processing. Hexane promotes the removal of certain antioxidants.

High-temperature and high-pressure processing techniques also tend to remove significant portions of the antioxidants present in fresh foods. Organic processing plants often use lower pressure, cold-pressing methods to extract juices and oils. The resulting food products are generally richer in flavor and retain more nutrients, including antioxidants.

(Sources: Organic Center for Education and Improvement, January 26, 2005; U.S.D.A.)

Lycopene Supplements May Suppress Cancer Growth

A study published in the Fall 2004 issue of Journal of Medicinal Food demonstrated that lycopene supplements decreased the proliferation of cancer cells at certain intervals of the study.

Many studies on cancer now test apoptosis, the natural elimination of harmful cancer-causing cells. In this study, researchers treated LCNaP human prostate cancer cells with a lycopene supplement to determine whether lycopene would induce apoptosis to eliminate the cells or even simply suppress their growth. Treatment included 0.1-, 1-, and 5-micro-mole (μM) doses of lycopene, followed by examination after 6, 24, and 48 hours. The scientists also looked for changes in the cell cycle to identify any slowing down or speeding up of cell growth resulting from the lycopene.

Researchers saw an inhibition rate of 31 percent in cancerous cell growth in lycopene-treated cells, when compared with the placebo-treated cells after 48 hours of treatment with the 1-μM lycopene formulation. The maximum inhibitory effect, however, was seen with the 5-μM dose at each time interval: Apoptosis was present at the 5-μM formulation at all time points and was heightened during the 24-hour and 48-hour treatments.

The scientists observed no changes in the cell cycle of the placebo-treated groups, whereas they noted a dramatic 16 percent reduction of cancerous cells in the lycopene-treated cells during a significant cell-growth phase (the S-phase).

The results indicate that lycopene supplements decreased the number of cancer cells, probably by increasing apoptosis and slowing cancer cell growth cycles. These findings suggest that supplements containing lycopene may have cancer-fighting abilities.

Lycopene is considered one of the most potent antioxidants available in nature. This natural plant pigment provides foods such as tomatoes, pink grapefruit, watermelon, and guava with their natural red hues.

(Results: Gorenman et al., 2004; Journal of Medicinal Food.)

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