

# ORGANIC FOOD:

HEALTHY OR NOT?



BY JACK ZHOU

“Organic” foods are often portrayed as the obviously healthier, safer, and smarter choice than their conventional counterparts that are grown with synthetic pesticides and growth hormones. Sales of organic products in the United States have climbed sharply, increasing from \$3.6 billion in 1997 to \$24.4 billion dollars in 2011 (1). Consumers are inclined to pay more to be healthier and more environmentally friendly. But what if, after all this attention, organic foods are not actually any more nutritious than conventional foods? There has been no solid scientific evidence that organic foods carry more nutritional value; rather, recent scientific studies suggest there is little difference at all.

What exactly is “organic”? In many ways, the difference between ‘organic’ and non-‘organic’ is difficult to discern for the average consumer in the grocery store. According to guidelines set by the United States Department of Agriculture (USDA), organic foods are those produced without synthetic pesticides, antibiotics, or growth hormones. There are three labels of organic foods that can be found when one shops at a supermarket: 100% Organic, Organic, and Made with Organic Ingredients. Each label is a level of how organic a product is. 100% organic describes a product made with 100% organic ingredients. Organic means a product was made with at least 95% organic ingredients, and Made with Organic Ingredients means a product was made with at least 70% organic ingredients (2).

The production of organic crops is also very environmentally friendly. According to a recent study published by Jonason, Andersson, et al. in 2011 in the *Journal of Applied Ecology*, organic farming has the potential to increase the biodiversity of plants and insects in agricultural landscapes. By examining farms that had been under organic management between 1 and 25 years and recording the richness and abundance of herbaceous plants and butterflies, the researchers analyzed the long-term effects of organic farming on agricultural land. They discovered that organic farming increased species richness for plants and butterfly species, with biodiversity improving rapidly before remaining constant after organic management began on the land (3).

A common misconception of organic foods is that they are pesticide-free. However, organic farmers in most states are allowed by law to use a wide spectrum of chemical sprays on their crops. These pesticides must be derived from natural sources and not synthetically manufactured like most commercial pesticides are. Although organic pesticides are natural chemicals, studies have shown that many of them are carcinogenic (4). A study done by Ames, Profet, and Gold at University of California-Berkeley in 1990 tested 52 natural pesticides in high-dose animal cancer tests. Ames and his colleagues showed that 27 of the 52 natural pesticides were rodent carcinogens and concluded that natural chemicals were just as likely to cause cancer as synthetic chemicals. Even the effectiveness of natural and synthetic pesticides has been compared. This same study compared a rotenone-pyrethrin mixture, two common organic pesticides, with a synthetic pesticide known as imidan. The study found that seven applications of the mixture were

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needed to get the similar level of protection that two applications of imidan offered. Because rotenone is especially toxic to aquatic life, having seven applications of the mixture is much more dangerous than only two applications of imidan. Thus, this study raises questions on whether natural pesticides are truly better for the environment than synthetic pesticides (5). Still, some organic farmers have abandoned the notion of pesticides entirely in favor of using mechanical and environmental methods such as predatory insects and birds and insect traps. To manage weeds, these farmers rotate crops or even hand weed (6).

A bigger question has been raised by a recent study conducted at Stanford University by Smith-Spangler, Brandeau, et al.: are organic foods nutritionally any better than conventional foods? After reviewing thousands of previous studies, the Stanford research team included 240 past studies of organic foods in their study. What they concluded from their analysis was surprising for the general public: there is no robust evidence that supports the perception that organic foods are more nutritious than conventional foods (7).

So what are the differences between organic foods and conventional non-organic products? Smith-Spangler and his colleagues reported that non-organic foods do have a 32% higher risk of pesticide contamination than their organic counterparts. The study also found that children who regularly ate organic foods had fewer traces of pesticides in their urine than children eating conventional foods. While this may seem like good news for the organic buyer, pesticide use is nonethe-

less highly regulated by the government for all produce, both organic and non-organic. As a result, most non-organic produce does contain levels of pesticides lower than the level needed to do harm to the body. Still, Stanford researchers found that non-organic pork and chicken had a higher risk for bacterial contamination than organic foods (7).

Smith-Spangler, Brandeau, et al. found that out of all the nutrients evaluated, only phosphorus was found to be superior in organic foods than conventional foods. However, higher levels of phosphorus are of marginal benefit because daily dietary levels of phosphorus are easily attained from many different sources of food. The researchers also found in organic produce relatively higher levels of omega-3 fatty acids and phenols, which are said to prevent cancer, but these results require further study for greater validation.

On the other hand, different studies have concluded that organic produce contains higher amounts of certain important vitamins than conventional produce. For instance, a recent study conducted by researchers, Reganold, Andrews, et al. at Washington State University in 2010 evaluated thirteen pairs of commercial organic and conventional strawberry farms in California. Based on their data, they concluded that organic strawberries had greater nutritional content, including vitamin C, and that the higher quality soil was used for organic strawberries (8). Another study conducted by Wang, Chen, et al. in 2008 at Genetic Improvement of Fruits and Vegetables Laboratory examined differences in nutritional quality between organically and conven-

tionally grown blueberries. The study concluded that blueberries grown organically yielded much higher levels of sugars and antioxidants than those grown conventionally (9).

Understanding the health effects of organic foods is experimentally a challenging task. Scientists have difficulty controlling the large number of factors, such as orientation towards the sun and soil quality, that likely play a substantial role in the quality of produce. Even more, it is difficult to measure how the body will absorb nutrients from organic products because everyone's body functions differently (10).

The question remains: should consumers buy organic products? Given their undetermined health effects and high cost, consumers may not be getting what they are paying for. While organic products may have fewer pesticides, contain higher levels of phosphorus, and less bacterial contamination, the health benefits have not yet been confirmed. While the Stanford study has reviewed hundreds of past studies and compiled all their results, it has some severe limitations, such as produce studies used did not readily reflect actual organic practices. Future studies must be done to further understand the benefits of organic produce versus conventional produce. Until then, it is up to the consumer to choose.

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