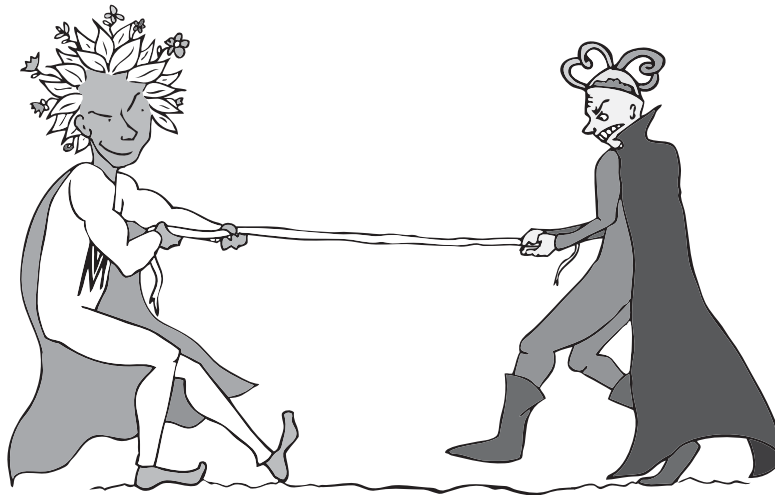


~ Chapter 4 ~

## Reclaiming the Food Value That We've Lost



**“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.”**

*~Dr. Neal Davies, School of Pharmacology professor,  
Washington State University*



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Over the last half-century, farmers have doubled or tripled the yield of most major grains, fruits and vegetables. They have done so by capitalizing on the work of agricultural scientists, crop breeders and companies manufacturing a wide range of inputs—from fertilizer to water, pesticides, sophisticated machinery and diesel fuel. Yield increases per acre have come predominantly from two sources—growing more plants on a given acre, and harvesting more food or animal feed per plant in a given field... But American agriculture's single-minded focus on increasing yields...created a blind spot where incremental erosion in the nutritional quality of our food has occurred. This erosion, modest in some crops but significant in others for some nutrients, has gone largely unnoticed by scientists, farmers, government and consumer.

—Executive Summary, “Still No Free Lunch”  
by Brian Halwell (Organic Center Critical Issues report,  
September 2007)



The term “factory farming,” while usually used to describe large-scale beef, hog and poultry operations that keep animals in closely confined quarters, is also an appropriate description of the approach now being taken by large growing operations when raising and harvesting crops. Such modern growing methods are very much akin to the mass-production techniques used in today’s industrial plants, the purpose of which is to assemble as many



units of whatever is being manufactured as conditions will allow. Things like pesticides and nitrogen-based fertilizers are being used in crop growing for essentially the same reason: to foster the highest possible yield of a particular commodity in whatever space has been set aside to produce it.

But, as so often happens when we meddle with nature, the increased intrusion of pesticides and certain fertilizers has had some unintended consequences on the quality of most of the fruits and vegetables being trucked to our supermarkets.

### **WHY GRANDMA GOT A LOT MORE FOR HER GROCERY MONEY**

One of the chief consequences of the high-intensity, synthetically accelerated crop production common to today's factory-type farming is the insidious reduction in the health benefits we can expect from these seemingly natural foods. Just as increased industrial emissions are dangerously raising the temperature of the Earth, chemical and biological methods used to maximize agricultural yields are negatively impacting our nutritional climate.

While modern farming methods may have enabled us to mass-produce crop commodities on a scale never seen before, the processes used to maximize output per acre have also resulted in a significant decline in quality, reflected by substantial drops in actual nutrient levels in crops from the mid-20th century up to the present day.



“Government data from both America and the United Kingdom have shown that the concentration of a range of essential nutrients in the food supply has

declined in the last few decades, with double-digit percentage declines of iron, zinc, calcium, selenium and other essential nutrients across a wide range of common foods,” noted Brian Halwell in the report “Still No Free Lunch,” published in September 2007 by The Organic Center. “Substantial data show that in corn, wheat and soybeans, the higher the yield, the lower the protein and oil content. The higher tomato yields (in terms of harvest weight), the lower the concentration of vitamin C, levels of lycopene (the key antioxidant that makes tomatoes red) and beta-carotene (a vitamin A precursor).”<sup>49</sup>

That seems to be because plants have only so much energy to keep them going, and, as Halwell pointed out, chemical enhancement and augmentation of crops—something that essentially forces plant life to grow larger or with greater intensity—diverts energy from the other natural functions plants must perform, such as “sinking deep roots and generating health-promoting compounds known as phytochemicals, many of which are antioxidants and vitamins.”<sup>50</sup>

The consequence is that with all our technological advances, when it comes to plain old-fashioned food value—meaning an abundance of “Mighty Micronutrients”—our grandmothers were probably getting a lot more of it for their money.

### **WHERE TO FIND THOSE MISSING ‘MIGHTY MICRONUTRIENTS’**

The discovery of a significant decrease in nutritional content of chemically cultivated food crops over the past several decades was originally noted in



### *Chemical-Free Kids: The Organic Sequel*

*Chemical-Free Kids*. Under the heading “the Case of the Missing Nutrients,” the book presented an analysis of U.S. Department of Agriculture data performed by the Kushi Institute of Becket, Mass. The analysis found that the nutritional value of vegetables grown at the end of the 20th century was significantly lower than that found in the same crops cultivated a quarter century earlier.

The book went on to cite similar results from a magazine report on food crops grown in Britain during the half-century between 1930 and 1980. The report’s author, Anne-Marie Mayer, theorized that the decline in nutrient value was related to changes in growing practices and conditions, such as the use of agricultural chemicals, soil compaction, and the loss of organic matter in soil.

A form of collateral damage done by artificially intensifying the agricultural output of a given acre of land is uncovered in a 37-year study done by the University of Wisconsin-Madison, which concluded that the over-application of nitrogen fertilizers had actually depleted the fertility of the soil, causing it in effect to age the equivalent of 5,000 years.

As it turns out, those results have been consistently corroborated by research conducted during the last few years, both here and abroad—research that has also borne out the book’s claim that organically grown commodities were far more apt to have their vitamin and mineral assets remain intact.

### **Studies Confirm Nutritional Superiority of Organic Food**



The most recent confirmation came at the beginning of 2008, when the results of a comprehensive review



of 97 published studies comparing the nutritional quality of organic and nonorganic foods were released. The studies showed that organic fruits, vegetables and grains contain higher levels of eight of 11 nutrients studied, including significantly greater concentrations of polyphenols and antioxidants. The team of scientists that analyzed the data



*Chemical-Free Kids: The Organic Sequel*

from the gathered studies—Charles Benbrook, chief scientist for the Organic Center, Xin Zhao, University of Florida, and Washington State University (WSU) scientists Jaime Yanez, Neal Davies and Preston Andrews—concluded that organically grown, plant-based foods are, on average, 25 percent more nutrient dense than their conventionally grown counterparts.<sup>51</sup>

But all that should have come as no great surprise, considering how the evidence has been stacking up over the past decade.

In 2001, some 41 previous studies of the nutritional value of organic foods were reviewed for a doctoral dissertation by Virginia Worthington at Johns Hopkins University. Her research, which included the analysis of farm and market basket surveys, field trials and greenhouse pot experiments, provided comparisons of various micronutrients in both organic and conventionally grown commodities. Worthington found that when all these studies were taken together, the organic produce contained substantially higher nutrient levels, including 29.3 percent more magnesium, 27 percent more vitamin C, 21 percent more iron and 13.6 percent more phosphorous. The organic items also had 15.1 percent fewer nitrates, which are a far less desirable ingredient.

Worthington also observed that five servings of organic lettuce, spinach, carrots, potatoes and cabbage provided the recommended daily intake of vitamin C for men and women, while the same amounts of conventionally grown vegetables failed to do so.<sup>52</sup>

More recently, a four-year study of the effects that modern high-intensity agriculture is having on the caliber of commodities ranging from tomatoes to milk was completed on a 725-acre farm—attached to Britain’s Newcastle



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University—and at additional sites in Europe. The study areas had adjacent organic and nonorganic growing areas.

A follow-up analysis, funded by the European Union, compared the organic and nonorganic yields from the study. It revealed that organic fruits and vegetables contained up to 40 percent more antioxidants than conventionally grown produce, as well as having higher levels of such beneficial minerals as iron and zinc.

Possibly the most dramatic finding from the analysis was the difference between the milk from organically and conventionally raised herds, both of which grazed in neighboring pastures. Milk produced by the organically raised cows was found to be up to 90 percent higher in antioxidant level.

Another striking contrast was seen in the quality of organic tomatoes grown in Greece. When compared with nonorganically grown tomatoes, they contained substantially higher amounts of antioxidants, including flavonoids, which are credited with reducing the risk of heart disease.

Such results prompted the EU project's coordinator, Professor Carlo Leifert, to observe that eating organically increases the likelihood of achieving the recommended daily amounts of nutrients. Just four servings of organic fruits and vegetables containing 20 percent more antioxidants than nonorganic varieties, he noted, might well have the same nutritional value as the five servings usually called for.

“The evidence...will end years of debate and is likely to overturn government advice that eating organic food is no more than a lifestyle choice,” noted an article on the



*Chemical-Free Kids: The Organic Sequel*

EU study published in *The Sunday Times* of London on Oct. 28, 2007.<sup>53</sup>

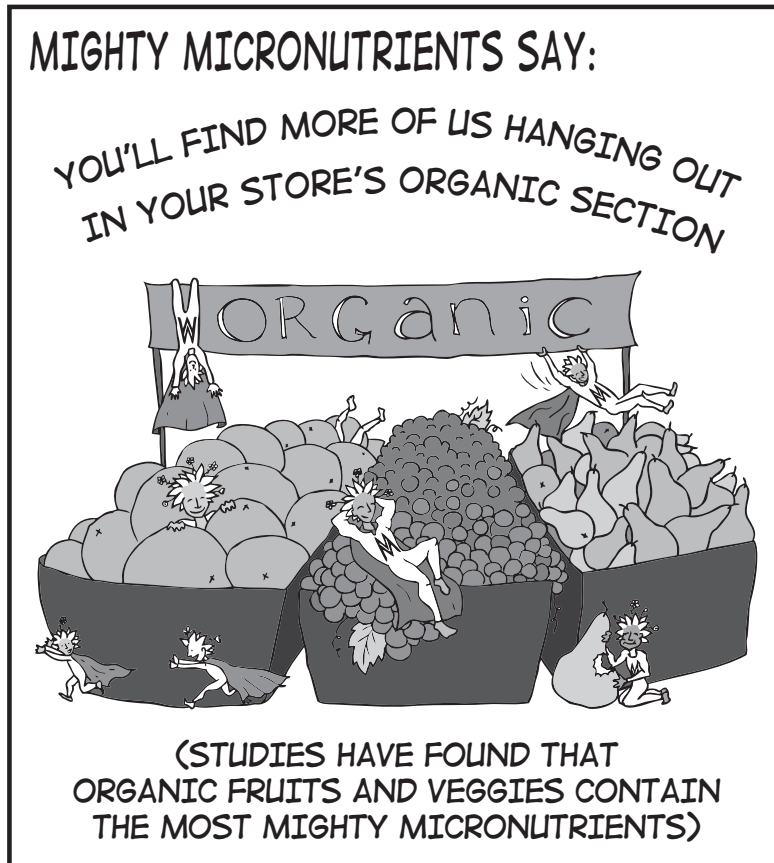
Additional evidence of the superior nutritional value of organically grown crops has been produced by research on some other produce as well. Melons are one example.

According to a report issued by a group of Colorado State University researchers at the 2007 meeting of the American Society for Horticultural Science, a two-year comparative study of organic and conventional melon production indicated that organic varieties contained greater amounts of vitamin C and polyphenols, antioxidants that are believed to aid in the prevention of both heart disease and cancer.<sup>54</sup>

In another study done by Italy's National Institute of Food and Nutrition Research, organic pears, peaches and oranges were found to have higher antioxidant levels than chemically cultivated ones.<sup>55</sup> And while nonorganic citrus fruit may not tend to contain high pesticide residues, a study done at Missouri's Truman State University revealed that organically grown oranges contained up to 30 percent higher levels of vitamin C than much larger, conventionally raised oranges. "We were expecting twice as much vitamin C in the conventional oranges," said visiting chemistry professor Theo Clark, who led the study.<sup>56</sup>

Similar findings have been made by researchers from the University of California at Davis in regard to antioxidant levels in corn, strawberries and marionberries. In those studies, organic corn exhibited 58.5 percent higher levels, organic marionberries approximately 50 percent more, and organic strawberries were about 19 percent richer in antioxidants than nonorganic varieties.





### **Further Proof of How Bigger Isn't Always Better**

Such data are, in fact, consistent with what has long been known to many whose livelihoods are derived from the land: a less crowded, less artificially protected environment is more conducive to cultivating desirable qualities in plants.

The explanation of this phenomenon is one that's perhaps best summed up by The Organic Center in



its 2006 compilation of research on organic agriculture, “Core Truths”:

“Evidence suggests that high yields in some crops can dilute the concentration of vitamins and antioxidants in plants, changes that can reduce nutritional quality and diminish flavor. This is why winemakers look for grapes from vines that have dealt with a certain level of stress during the growing season. Grapevines managed for maximum yields produce more grapes per acre, but less flavorful, lower quality wines.”<sup>57</sup>

As organic agriculture has grown in popularity, its critics, most of whom speak on behalf of petrochemical and large-scale agricultural interests, have used various ploys to attempt to discredit it.

A few years ago, television news personality John Stossel hosted an ABC report, “The Food You Eat,” alleging that organic produce might be hazardous to our health, which relied heavily on information supplied by an industry lobbyist. Among the distorted claims Stossel made, as reported by *The New York Times*, was a statement that “it’s logical to worry about pesticide residues, but in our tests, we found none on either organic or regular produce.”

The only problem with that statement, as the two scientists whom ABC hired, Lester Doyle and Michael Crawford, subsequently acknowledged, was that the produce was never tested for pesticide residue, but only for bacteria. In



**ORGANIC FOODS—A SOURCE OF  
ABUNDANT ANTIOXIDANTS**

Breathing, eating, exposure to chemicals and daily life in general all promote the production of free radicals—unstable molecules that can damage cells and promote numerous diseases. Antioxidants from whole food sources are potent agents that help your immune system stay strong and protect your body from these free radicals.

Most foods high in antioxidants can be recognized by their bright colors—blueberries, cranberries and strawberries, for example. Others might surprise you. Potatoes, pinto beans, artichokes and asparagus are also in the group of foods with the highest antioxidant punch per serving.

With the news that organically grown foods can have up to 40 percent more antioxidants than conventional ones, eating organic is an easy way to get more of all the benefits and protection that antioxidants offer.

addition, as the Environmental Working Group pointed out, the show failed to make a distinction between pathogenic and harmless bacteria.<sup>58</sup> Under pressure from critics who took their case to the media, the network was eventually forced to retract the allegations made in that pseudo-documentary after they were shown to be false and misleading.

Now that more and more is becoming known



*Chemical-Free Kids: The Organic Sequel*


about the benefits of organic products, the drawback that some critics would like to call to public attention is that of lower yields. Organic farmers, they say, just can't reap the same volume of fruits at harvest time as can their nonorganic counterparts. But that criticism, it turns out, is actually one of the beneficial aspects of organic agriculture—the fact that it does not create overcrowded conditions in the fields and does not deplete the soil of nutrients. It's what makes organic products so much richer in nutritional value and better tasting.

As Richard Drucker put it in a 2006 article in *Dynamic Chiropractic* magazine, "Our soils are depleted and depleted soils do not produce healthy, nutrient-rich plants. It's also a fact that crops produced in depleted soils are more prone to the invasion of insects, viruses, fungi, etc. Insects and infectious organisms were designed to get rid of unhealthy vegetation and they do not typically attack truly healthy plants. Much of the modern world is now aware that our industrialized methods of farming have depleted the soils and created a cycle that requires pesticides to protect the unhealthy crops grown on depleted soils."<sup>59</sup>

When it comes to the cultivation of crops, less volume definitely translates into more value.



*Wholesome!* **Trickster**  
*PURE!*  
*Nutritious!*  
*Natural!*




**HOW A TOXIC TECHNIQUE CAN BRING ABOUT A TOXIC RESULT**

The depletion of nutrients isn't the only adverse "side effect" to result from the methods used to increase yields of crops. Another, as it turns out, may be the greater likelihood of exposure to a naturally occurring mycotoxin called deoxynivalenol, or DON for short.

DON is produced by *Fusarium* fungi commonly found in wheat and grain fields. Its common name, vomitoxin, provides a more apt description of its nasty nature. In addition to producing gastrointestinal problems in mammals, it has been found to stunt growth and is reported to be capable of hindering the immune system.

According to the Organic Consumers Association, a recent study performed in the United Kingdom detected the presence of DON in the urine of 99 percent of some 300 humans tested, with grain-based products—particularly bread—identified as the source.

In addition to wet conditions at harvest time, the key factors that have been identified as helping *Fusarium* to proliferate are two common components of high-yield agriculture: the presence of high levels of



nitrogen fertilizer and the use of synthetic fungicides. The latter is particularly ironic, because conventional wisdom would suggest that the application of fungicides ought to protect a crop from a condition caused by a fungus. But multiple studies performed in the European Union, where these chemicals are routinely applied to wheat crops, as well as in the United States, where fungicide use on wheat is minimal at best, have shown that fungicides do not kill all *Fusarium* fungi, but do stress them –and that when fungi are stressed, the likelihood of their forming dangerous mycotoxins is increased.<sup>60</sup>

Here again is an example of how organic foods can make a significant difference. In a 2005 State of Science Review titled “Breaking the Mold—Impacts of Organic and Conventional Farming Systems on Mycotoxins in Food and Livestock Feed,” the Organic Center analyzed a number of studies (mostly done in Europe) comparing the presence of DON and other mycotoxins in organic and nonorganic foods. It found that the conventional products had both twice the frequency and twice the levels of such substances as the organic ones.<sup>61</sup>

Like the depletion of nutrients, the increase in vomitoxin levels brought about by fungicide applications is yet another illustration of the law of unintended consequences taking effect whenever toxic chemicals are used in an attempt to increase crop yields. Like pesticide applications that add poisons to our food while bringing about the emergence of stronger insects that are impervious to them, the use of such “quick fixes” has ended up actually helping to promote the very conditions they’re intended to alleviate.

