

156. Second Name of Life is Organic Food

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Abstract. Organic refers to an “earth friendly” and health supportive food. Organic grown food is our best way of reducing exposure to toxins used in conventional agricultural practices. These toxins includes not only pesticides many of which have been federally classified as potential cancer causing agents, but also heavy metals such as lead and mercury and solvents like benzene and toluene. Which damage function of our body and cause disease.

Keywords: Immunity, Pesticides, Vitamins, nutrients, Non-organic, Toxin, Fungicides, minerals

Introduction

Whether one’s belief is that human life was created by the “big bang” God, our origin is directly connected to the earth below our feet. The body that contains each of us is the only one that we experience. A new one cannot be purchased with all the riches of the world. All the gold in the world will not take the place of health and happiness. Our energy comes directly from what we eat. That food, just like us, is a living entity.

But in the thirst of modernization and industrialization man has contributed pollution to the life and ecology of plants. Increased demand for food has lead to the chemicalisation of agriculture and we have reached on such a stage that modern agriculture is dependent on high yielding varieties, which can only be grown under the influence of fertilizers and pesticides.

The presence of pesticide residues have been detected in various items and in food chain. Even human breast milk is not free from DDT, which was found to have even 2.39 PPM levels. Similarly human blood was found to have a much higher concentration of 12.00 PPM as against of 0.050-PPM safe levels (no effect levels). .

Organic Food

In 1939, Lord Northbourne coined the term organic farming in his book *Look to the Land* (1940), out of his conception of “the farm as organism,” to describe a holistic, ecologically-balanced approach to farming—in contrast to what he called chemical farming, which relied on “imported fertility” and “cannot be self-sufficient nor an organic whole.”(1)

Defination

Food that is grown and produced by without antibiotics, growth hormones, pesticides or bioengineering is known as organic food.

The pros in ‘going organic’ is that organic food is free from artificial chemicals, pesticides, antibiotics, growth-promoters and fertilizers. It is produced using environmentally friendly methods and is free from genetically modified ingredients. Organic foods reduce dependence on non-renewable resources and places emphasis on animal welfare(2) Organic farming, food quality and human health:

How Do Organic Foods Benefit Cellular Health?

DNA: Eating organically grown foods may help to better sustain health since recent test tube animal research

suggests that certain agricultural chemicals used in the conventional method of growing food may have the ability to cause genetic mutations that can lead to the development of cancer(3). One example is pentachlorophenol (PCP) that has been found to be able to cause DNA fragmentation in animals.

Mitochondria: The chemicals include paraquat, parathion, dinoseb and 2-4-D which have been found to affect the mitochondria and cellular energy production in a variety of ways including increasing membrane permeability, which exposes the mitochondria to damaging free radicals, inhibiting a process known as coupling that is integral to the efficient production of ATP.

Cell membrane: Since certain agricultural chemicals may damage the structure and function of the cellular membrane, eating organically grown foods can help to protect cellular health. The insecticide endosulfan and the herbicide paraquat have been shown to oxidize lipid molecules and therefore may damage the phospholipid component of the cellular membrane.

How Non-Organically Grown Foods are Harmful?

When a large number of pesticides are present and their combined effect has not been measured; which of course will give very dangerous view. Various Pathological effects of low doses of pesticides in animals and man are as under.

Immunopathological effects: Immuno-pathological effects of pesticides in animals and man are classified under acquired immunodeficiency or immunosuppression, autoimmunity and hypersensitivity. Eczema in man was found due to maneb, 2,4-D and 2,4,5-T. DDT has also been known to cause type I hypersensitivity reaction. The dust of pesticides is cause of allergic respiratory disorders like asthma. Cutaneous allergy has been known to occur due to contact of pesticide contaminated food items.

Carcinogenic effects: Most of organochlorine pesticides like dieldrin, gamma isomer of BHC, DDT and PCB may cause cancer in liver and lung. Indirectly, a state of immunosuppression for a longer period is helpful in increasing the susceptibility of an animal for malignancy. Since many pesticides are known to cause mutation in chromosomes of man and animals, it is considered that they may also lead to carcinogenicity.

Mutagenicity: Pesticides may cause alterations in structure or number of chromosomes resulting in translocations, mutations and chromosomal breakage. The altered chromosomal number may become lethal during fetal stage. Several pesticides like DDT, Endrin, PCB and HCB are known to cause chromosomal aberrations.

Teratogenicity: There are certain pesticides which causes teratogenic defects in animals. Carbaryl, thiram, propoxur, parathion, leptaphos, 2,4-D, lindane and diazinon are having teratogenic defects in animals.

Neuropathy: Most of the organophosphates, organochlorines carbamates may cause neurotoxic effects in man and animals including increased irritation, loss of memory, in coordination of movement, ataxia, delayed response, convulsions, spasms and paralysis. Such changes appear due to demyelination of nerves in central and peripheral nervous system.

Nephropathy: The pesticide residues bind with certain body proteins, they may become antigenic. This antigenicity is responsible for initiation of immune response in body and a continuous presence of antigen and antibodies in body may lead to the formation of immune complexes. The immune complexes when produced in excess are deposited in glomerular basement membrane leading to glomerulonephritis, commonly known as renal failure for which patient needs dialysis after a regular interval to survive.

Hepatotoxicity: The pesticide residues in food may harm liver tissue as they are metabolised here. There are instances of chronic liver disorders leading to cirrhosis. Certain pesticides are not so dangerous but their metabolites cause severe damage to hepatic parenchyma. The cirrhosis once starts; it never stops even after withdrawal of the primary cause.

Reproductive disorders: It has been observed that the pesticides are lethal to dividing cells of genitalia. They

may cause abnormalities in sperms leading to decrease their ability for fertilization(4).

On the other hand the ova becomes defective and not able to implant on the uterine surface leading to early abortion or miscarriage.

Why Should You Eat Organic Food?

With organic foods you enjoy a superior taste

Organic foods is superior to conventionally grown foods(5) Organic foods often contain less water than conventionally grown foods and thus have a more concentrated flavor. Because organic items are often grown locally, they “ripen on the vine” and are fresher than conventionally grown foods that are shipped from further away. The difference can be subtle, but it is there

You can avoid toxins by eating organic product

Pesticides: By far the largest group of toxins to be largely prohibited from organically grown foods where as Several hundred different chemicals and several thousand brand-name pesticide products are legally used in commercial food.

Heavy metals: The toxic metals cadmium, lead, and mercury enter the food supply through industrial pollution of soil and groundwater and through machinery used in food processing and packaging

. Cadmium, which can be concentrated in plant tissues at levels higher than those in soil, has been linked to lung, prostate and testicular cancers.

Despite lead’s long-recognized serious adverse impact on health, especially that of young children, lead solder is still used to seal tin cans, imparting the lead residues found in many canned foods. Even low levels of lead are harmful and are associated with decreased intelligence, impaired neurobehavioral development, decreased stature and growth, and impaired hearing. Mercury is toxic to brain cells and has been linked to autism and Alzheimer’s disease.

With organic produce you can benefit from extra vitality: Organic foods are more alive. This is a hard one to prove, but as fruits and vegetables ripen, they incorporate sunlight and nutrients from the soil and store vital energy. Your body uses this vital energy s well as the vitamins and minerals stored in the food you eat.

Environmentally, Organic Food Is Gentle On The Earth: Water and air are our most important resources. Infiltration of pesticides, herbicides, fertilizers and other soluble chemicals into surface and groundwater(6). Some herbicides actually evaporate into the air after application and drift for miles (still having bad effects on plant life!) and some agricultural chemicals bind to dust particles which you breath in during dust stormsution.(7) Organic farmers do not contribute to water pollution. Organic livestock farms are prohibited from being point sources of nitrate.

More vitamins And minerals: A review of 41 studies comparing the nutritional value of organically to conventionally grown fruits,vegetables and grains also indicates organic crops provide substaiially more of several nutrients like 27% more vitamin C 21.1% more iron 29.3% more magnesium 13.6% more phosphorus and higher phytonutrients–plant compounds that can fight cancer–than conventional food.

More nutrients: Here are a few of the nutrients that were found in higher levels in the organic foods:

- Chromium deficiency is associated with the onset of adult diabetes and atherosclerosis (hardening of the arteries). Chromium was found to be higher in organic foods by an average of 78%.
- Selenium is one of the antioxidant nutrients that protect us from damage by environmental chemicals. It is protective against cancers and heart disease. It was found to be an average of 390% higher in organic foods.
- Calcium, needed for strong bones, averaged 63% higher in organics.
- Boron, which has been shown to help prevent osteoporosis (along with calcium), averaged 70% more.
- Lithium, which is used to treat certain types of depression, was 188% higher.
- Magnesium, which reduces mortality from heart attacks, keeps muscles from spasming, and eases the symptoms of PMS, averaged 138% more.
- Aluminum has been implicated for years in the development of Alzheimer’s disease. It’s content in organic food averaged 40% less that in commercial foods
- Lead toxicity, which has been in the new a lot lately, can adversely affect our children’s’ IQ. It averaged 29% lower in organic foods.
- Mercury, which can cause neurologic damage, averaged 25% lower in organic foods.

The chemicals actually reduce the amount of nutrients in plants after application like vitamin C, beta carotene, and the B vitamins. Betacarotene has been shown to be a stimulant of the immune system, and is sometimes able to prevent lung cancer. They have very clearly shown that chemical residues in the serum and fat cells of women greatly increase the risk of breast cancer.

Table.1 Trace elements present in organic and non organic food

Percentage of Dry Weight Grams Dry				Quantities per 100				Trace Elements. Parts per million Dry matter			
Veg- etable:	Mineral	Phos- phorus	Cal- cium	Weight Mag- nesium	Potas- sium	So- dium	Boron	Man- ganese	Iron	Cobalt	Copper
Snap	Ash										
Beans	10.45	0.36	40.5	60	99.7	8.6		60	227	69	0.26
Organic	4.04	0.22	15.5	14.8	29.1	73		2	10	3	0
Non- organic						0.9					
Cabbage						10					
Organic	10.38	0.38	60	43.6	148.3			13	94	48	0.15
Non- organic	6.12	0.18	17.5	13.6	33.7			2	20	0.4	0
Lettuce						20.4					
Organic	24.48	0.43	71	49.3	176.5	42		169	516	60	0.19
Non- organic	7.01	0.22	16	13.1	53.7	0.8		1	9	3	0
Toma- toes						7					
Organic	14.2	0.35	23	59.2	148.3	12.2		68	1938	53	0.63
Non- organic	6.07	0.16	4.5	4.5	58.8	37		1	1	0	0
Spinach						6					
Organic	28.56	0.52	96	203.9	237			117	1584	32	0.25
Non- organic	12.38	0.27	47.5	46.9	84.6	6.5		1	49	0.3	0.2
						36					
						0					
						3					
						69.5					
						88					
						0					
						12					

Recovery from cancer: Tests with people and animals eating organic food show it makes a real difference to health, and alternative cancer therapies have achieved good results relying on the exclusive consumption of organic food. The review [19] cites recent clinical evidence from doctors and nutritionists administering “alternative” cancer treatments, who have observed that a completely organic diet is essential for a successful outcome.

Quality of soil: This was attributed primarily to differences in soil fertility management and its effects on soil ecology and plant metabolism. Organic crops contained significantly more nutrients -vitamin C, iron, magnesium and phosphorus - and significantly less nitrates (a toxic compound) than conventional crops(6).

Antioxidant: The data show that organically grown fruits, and, to a lesser extent, vegetables, contain higher levels of secondary metabolites known as antioxidants and polyphenolics than conventionally grown fruits and vegetables.(8) Current available research shows that these chemicals may prevent heart disease, certain types of cancer, and other mutagenic, oxidative disease processes of the human body.

Protect children: In the aftermath of the Alar scare of the 1980's, a study concluded that the average child is exposed to four times as many cancer causing pesticides in food than are adults, based on the types of foods children

are most likely to eat.(9) Food choice can have a substantial effect on a child’s future health.

Saves energy: Organic farming is accomplished by less energy consumption. Inputs like fertilizer are naturally occurring and require less processing than substances manufactured by huge chemical companies. Organic food generally travels less miles from farm to market saving energy in transport. Whereas organic farmers incorporate alternative and renewable energy sources into their farming/home stading systems(10).

Many hidden costs are involved with the buying of conventionally produced food products. These hidden costs include billions of dollars in federal agriculture and energy subsidies favoring big business. Chemical regulation and testing, hazardous waste disposal, environmental damage, cleanup, illnesses and hospitalizations are other hidden costs. Low prices of conventional foods are also a signal that the farm workers did not receive a fair wage.

Yield: One study found a 20% smaller yield from organic farms using 50% less fertilizer and 97% less pesticide. [Studies comparing yields have had mixed results. Supporters claim that organically managed soil has a higher quality[11] and higher water retention. This may help increase yields for organic farms in drought years.

Pesticides and Farmers

There are studies detailing the effects and side effects of pesticides upon the health of farm workers as abdominal pain, dizziness, headaches, nausea, vomiting, as well as skin and eye problems.[12] In addition, there have been many other studies that have found pesticide exposure is associated with more severe health problems such as respiratory problems, memory disorders, dermatologic conditions,[13]18 cancer, depression, neurologic deficits, miscarriages, and birth defects.

Table 2. Differences between food grown in an organic manner and food grown by conventional farming

Fact	Non Organic Food	
Organic Food		
Nutrients	During processing, non organic foods lose some nutrients and such nutrients have to be artificially added back to the food.	Organic foods contain more nutrients, that is, a higher amount of minerals and vitamin C.
Fertilizers	Chemical fertilizers are used to provide nutrients for the growth of crops in conventional farming.	Natural fertilizers like green manure and compost are used for the plants and soil in organic farming.
Pesticides	In conventional farming, there are over 450 pesticides which are permitted for use.	Pesticides are not allowed in organic gardening or farming
Herbicides	Many of these pesticides are toxic. Herbicides are used in non organic farming to protect crops from insects and weeds. Herbicides sometimes leave a harmful toxic residue on the plants.	Methods like crop rotation and hand weeding are used instead of herbicides in organic gardening and farming.
Sewage Sludge	Human waste is used as a fertilizer to grow crops in conventional farming. This contaminated sewage sludge may cause diseases.	Use of sewage sludge is not permitted in organic farming.
Nitrate Amount	Fertilizers contain nitrate as a common ingredient and this nitrate gets converted to nitrosamines, which may be retained in the food and be cancer causing.	Organic food contains lesser amount of nitrates in it.

Environment Pollution	Use of pesticides damages aquatic life. Herbicides and pesticides contain toxic chemicals, which has resulted in lesser number of birds, insects and wild plants on the farmland. Earthworms are essential for good soil health and using pesticides and insecticides reduce earthworm population. This leads to increased dependence of the soil, on pesticides.	Organic farming uses crop rotation to prevent pests, by creating a more diverse ecological system to naturally grow the pest's predators. For increasing the quality of soil, natural manure and composting is done. Thus, the benefits of organic farming are more long term and benefit in fighting problems like degradation of the environment.
Food Safety	Many a times harmful preservatives are added to non organic foods.	Organic foods are safer and better, as they don't use any toxic chemicals.
Number of Consumers	Maximum consumers buy non organic food, as it is cheaper and easily available.	Consumers are shifting towards buying organic foods, with growing awareness.

Cost: Most organic food costs more than conventional food products. Higher prices are due to more expensive farming practices and lower crop yields. but the costs of not eating organic can be even bigger as you will likely have higher healthcare bills and a lifetime of disease and illness. These and many other health benefits of organic foods have been brought to the attention of the UK government (14) Over the course of weeks, months, years, and decades, the toxins accumulate and the consequences can be drastic. If and when you reach the point of disease, you may wonder why you're suddenly sick. However, it wasn't sudden at all and maybe that's something you should consider next time you're buying food. So eat organic food, keep healthy and live a long life.

References

1. Heaton S. Organic farming, food quality and human health: A review of the evidence, Bristol: Soil Association 2001
 2. Paull, J. & Lyons, K. (2008), Nanotechnology: The Next Challenge for Organics, Journal of Organic Systems, 3(1) 3–22
 3. Daniels JL, Olshan AF, Savitz DA. (1997). "Pesticides and childhood cancers". Environmental Health Perspectives (Brogan & #38) 105 (10): 1068–1077. doi:10.2307/3433848. PMID 9349828. PMC 1470375. <http://jstor.org/stable/3433848>
 4. Tielemans E, van Kooij E, te Velde ER, Burdorf A and Heederik D. Pesticide exposure and decreased fertilisation rates in vitro¹, The Lancet 1999, 354, 484-485.
 5. Williams, C. M. February 2002. Nutritional quality of organic food: shades of grey or shades of green? Proceedings of the Nutrition Society. 61(1): 19–24
 6. Worthington V. Nutritional quality of organic versus conventional fruits, vegetables, and grains¹, The Journal of Alternative and Complementary Medicine 2001
 7. Stolze, M.; Piorr, A.; Häring, A.M. and Dabbert, S. (2000) Environmental impacts of organic farming in Europe. Organic Farming in Europe: Economics and Policy Vol. 6. Universität Hohenheim, Stuttgart-Hohenheim.
 8. Carbonaro M, Mattera M, Nicoli S, Bergamo P and Cappelloni M. Modulation of antioxidant compounds in organic vs conventional fruit (Peach, *Prunus persica* L., and Pear, *Pyrus communis* L.), J. Agric. Food Chem. 2002, 50, 5458-5462
 9. Curl CL, Fenske RA and Elgethun K. Organophosphorus pesticide exposure of urban and suburban preschool children with organic and conventional diets¹, Environmental Health Perspectives 2003, 111(3), 377-382.
 10. Reganold et al.; Glover, JD; Andrews, PK; Hinman, HR (April 2001). "Sustainability of three apple production systems". Nature 410 (6831): 926–930. doi:10.1038/35073574. PMID 11309616
 11. Johnston, A. E. (1986). "Soil organic-matter, effects on soils and crops". Soil Use Management 2: 97–105. doi:10.1111/j.1475-2743.1986.tb00690.x
 12. Ecobichon DJ. 1996. Toxic effects of pesticides. In: Casarett and Doull's Toxicology: The Basic Science of Poisons (Klaassen CD, Doull J, eds). 5th ed. New York:MacMillan, 643–689
 13. O'Malley MA (1997). "Skin reactions to pesticides". Occupational Medicine 12 (2): 327–345. PMID 9220489
- Novotny E. Report IV - The Wheel of Health¹ (in the Chardon LL T25 maize hearing listings) 2002, <http://www.sgr.org.uk/GMOs.html>
- Novotny E. Letter to MSPs on the Organic Farming Targets

Bill, 2003, <http://www.sgr.org.uk/GMOs.html>

