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Quality aspect of organic food

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Abstract

Public concern about food quality has intensified in recent years and prompted heated debate about the integrity and safety of food. Demand for organically produced food has grown rapidly. To assess the accuracy of this statement, attention must be focused on those aspects of food quality that directly affect health – biological value and nutritional quality, though when comparing foods on these aspects alone, it should be remembered that they represent only a part of a wider concept of food quality. The FDA and the USDA clearly mention that non-organic food is as healthy as organic food. Studies are ongoing about a variety of other types of organic food that may have additional health benefits compared to the non-organic varieties. Organic Facts is a strong proponent of organic food; this article will explain which aspects of organic food are actually beneficial for your health, and which ones have been misrepresented in recent years.

Keywords: Biological value, nutritional quality, organic food

1. Introduction

The sweeping public opinion that organic food is healthier than conventional food is quite strong, and is the main reason for about 30% of growth in the organic food industry over the past 5-6 years. Much of this inflated support of organic food as a healthier alternative comes from environmental groups who don't want pesticides and fertilizers to do any more damage to the environment, so promoting organic foods, which don't use those types of chemicals, seems like a good way to get the results they want. The producers of organic food are also very strong contributors to the idea that organic food is superior to other types.

Consumers actively searching for organic food develop the market. According to studies, the people who buy organic food are mainly women, families with children and the elderly (Hughner *et al.*, 2007) [15]. These groups are linked mainly by their concern for their own or their relatives' health, due to a particular physiological condition and the associated awareness of the importance of healthcare.

2. Health benefit of Organic Food

Nutritional value may be interpreted as the minimum content of impurities in food (residues of pesticides, nitrates, heavy metals, etc.) at optimum content of valuable components (vitamins, mineral elements, proteins, etc.). Many studies of organic plant raw materials indicate that they contain less nitrates and pesticide residues, but more dry matter, vitamin C, secondary substances, total sugars, certain mineral components and essential amino acids, but less β -carotene (Worthington, 2001) [34]. There is growing evidence that secondary plant metabolites have a critical function for human health and may be significant from the nutritional point of view (Lundegårdh and Mårtensson, 2003) [21].

3. Pesticides (herbicides, fungicides, insecticides): In agriculture, herbicides are used to kill unwanted plants, fungicides against fungal diseases and insecticides to protect plant against pests. However, even at low concentrations, pesticides are known to or suspected of causing many diseases and health problems, including inborn defects or tumours (Howard, 2005) [14]. Mycotoxins are poisonous compounds produced by the secondary metabolism of poisonous fungi (moulds) – *Aspergillus*, *Penicillium* and *Fusarium*, which occur in food products (Kouba, 2003) [19]. They have a negative impact on human health, i.e. are carcinogenic and disabling to the immune system.

Mycotoxin production is mainly dependent on temperature, humidity and other favourable environmental conditions. Recent studies have not shown that organic food is more susceptible to mycotoxin contamination than conventional food (Lairon, 2009) [20]. However many studies have shown that such claims are not proven. Mycotoxins have strong toxic properties, and they can get into the body not only through food but also through the respiratory system and the skin (Stepien *et al.*, 2007). It is very difficult to remove a mycotoxin once formed; this means that the best method of control is prevention (Chełkowski, 1994) [8].

4. Nitrates and Nitrites: Although nitrates themselves cause relatively little harm, they are transformed into very toxic nitrites in the body. Under the influence of intestinal microflora about $\frac{3}{4}$ of nitrates absorbed in the diet may be reduced to nitrites which are 6–10 times more toxic than nitrates (Szponar and Kierzkowska, 1990) [28]. The transformation of nitrates into nitrites may also take place during a production process and as a result of inappropriate conditions of food product storage and transportation (Szponar and Traczyk, 1995) [29]. However, recently it has been claimed that nitrates and nitrites may also play a positive role in a human body, protecting against hypertension and supporting the circulatory system (Hord *et al.*, 2009) [13]. Other authors indicate that there is poor scientific evidence of the nitrate and nitrite impact on methemoglobinemia in babies and tumours in adults, and that further dietary intervention studies on humans are necessary (Katan, 2009) [17].

5. Artificial additives and artificial colours: Organic processing standards prohibit the use of chemicals, many synthetic preservatives, artificial colourings and sweeteners and other food additives, which are widely used in the processing of conventional foods (Beck *et al.*, 2006) [3]. Organic processing aims to minimize the use of additives. Flavor enhancers and non-sugar sweeteners are forbidden (Commission Regulation..., 2008) [7]. Kobylewski and Jacobson (2010) [18] reported in their comprehensive review that many other currently approved dyes can raise health problems. In the last 50 years a number of studies and case reports have been published describing intolerance reactions to synthetic food colours (Tema Nord, 2002) [30] and effects on the behaviour of children (Overmeyer and Taylor, 1999) [23].

6. Artificial flavor enhancers: Monosodium glutamate (MSG) is a substance widely used as a flavouring agent in the whole world. According to the Bellisle (2006) [4] sensory evaluation tests have shown that both traditional and novel foods get higher palatability ratings if MSG is added at an appropriate dose. Organic vegetables are safer than conventional ones in terms of their nitrate content and from the consumer's viewpoint.

7. Authenticity

An authenticity criterion of food product may be interpreted in two ways. First of all, there is traceability, i.e. the ability to check whether the characteristics of the product examined actually correspond with the features attributed to it; for example, checks on whether products offered on the market as organic actually come from organic production (Kahl *et al.*, 2010) [16]. More and more people are looking for safe food, locally produced by a producer they know. Nowadays, food products are remotely transported – from the production area, through a processing stage to reach the sales point. On route, products can lose their authenticity. Consequently, many

consumers seek minimally processed products, from familiar and safe sources, e.g., bought locally and directly from a farmer.

8. Ethical Value

The ethical value of food quality is made up of three aspects: environmental impact, social and economic aspects and animal welfare. One of the main factors affecting product quality is the quality of the environment. Organic production methods protect against pressures agriculture exerts on different aspects of the environment. Research has shown organic farming is less energy-intensive. Research has shown a tendency towards more favourable parameters of fertility and immunity of small mammals fed with organic pasture compared to conventionally fed animals. Nevertheless, further thorough studies in this field are necessary (Padel, 2005) [24].

The food ethical value is becoming a more important criterion, since consumers more often pay attention to the environment, social and humanitarian aspects. High ethical advantages of organic food result from the fact that its production allows maintenance of biodiversity which is vanishing from the Earth; besides it supports a fair production and distribution chain (fair trade), and cares about farm animal welfare.

9. Nutritional value of Organic vs. Conventional Food Products

The market for organic produce continues to grow (Willer, 2011) [33], as consumers are alienated by nutritional scandals from products manufactured by industrial methods and seek safe and controlled food products (Hughner *et al.*, 2007) [15]. Organic Peach contain high polyphenols level than conventional peach (Carbonaro and Mattera, 2001) [5]. Organic Apple contain high amount of polyphenols (Weibel *et al.*, 2000) [32]. Organic Blueberry have high polyphenols content (Wang *et al.*, 2008) [31]. Organic orange peel and papaya peel have high polyphenols content (Faller and Fialho, 2010) [11]. Organic tomato low polyphenols content than conventional tomato (Barrett *et al.*, 2007) [2]. Organic welsh onion contain high level of flavonoids (Ren *et al.*, 2001). Similar content of quercetin in organic strawberry (Anttonen *et al.*, 2006) [25]. Lycopene content Higher in organic tomato (Caris-Veyrat *et al.*, 2004) [6]. Similar content of α - and β -carotene in organic carrot (Stracke *et al.*, 2008). Total carotenoids and lutein higher in organic Pepper (Hallmann *et al.*, 2007) [12]. Phenolic acid concentration in organically and conventionally cultivated spring and winter wheat was investigated by Zuchowski *et al.* (2011). To the contrary, the experiment conducted by Dimberg *et al.* (2005) [10] with organic and conventional oats did not show any differences in phenolic compound concentration. Magkos *et al.* (2003) [22] showed in their review that organic wheat, rye and corn tend to contain a lower amount of amino acids, but at the same time a higher proportion of essential amino acids. Higher level of Poly Unsaturated Fatty Acid in organic milk (Dewhurst *et al.*, 2003) [9] Lower level of Saturated Fatty Acid and Mono Unsaturated Fatty Acid in organic milk (Słoniewski *et al.*, 2005) [26]

10. Conclusions

Ecological criteria of food quality are much wider than strictly analytical. They comprise not only the composition of the food, but also the production system in its environmental, social and ethical context. World agriculture plays many roles, not only food production, so ecological and holistic criteria should be used when considering the food production chain and food quality.

Studies can be stated that organic plant products contain generally more phenolic compounds and vitamin C. However, the level of carotenoids is often higher in conventional plant products. Studies show higher content of dry matter, total sugars and mineral components, but due to the limited number and variable results of the studies it is difficult to make general conclusions. An elevated content of bioactive substances, desirable from a health point of view, in organic raw materials allows the conclusion that such food can contribute to better health. There are several studies confirming this thesis, based on analyses performed on animals. The superiority of organic food is more probable if the producing and processing are in accordance with regulations. There is a common understanding that all fertilizers and pesticides are forbidden in producing organic products. The fact is that in organic food production it is necessary to keep the soil fertile and to feed the plants as well, only by the use of natural fertilizers. There are biopesticides allowed to use for plant protection in organic agriculture. They are environmentally friendly, they do not leave harmful residues in plants and their long-term use can be as effective as chemical pesticides. It is important for farmers to be informed about novel methods and products allowed in organic agriculture to reduce food producing and processing costs.

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