

# Organic Products : Towards a Sustainable and Healthy Future

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## I. Introduction

In a recent study of the anticancer potential of vegetables, organic vegetables were found to have better performance in suppressing mutagenic activity of various environmental toxins than conventional vegetables (Crinnion, 2010, p. 9). The study shows that organic vegetables are able to suppress the mutagenic action of benzopyrene, a major substance in cigarette smoke that can cause cancer by thirty to fifty seven percent when compared to only five to thirty percent produced by non-organic products (Crinnion, p. 9). Indeed, health is usually among the first considerations that comes up when talking about organic products. The United States Department of Agriculture (USDA) defines organic foods as products characterized by the following : grown with extremely low level of conventional pesticides, fertilizers that do not contain any “synthetic ingredients or sewage sludge,” “bioengineering,” or “ionizing radiation” (<http://afsic.nal.usda.gov/>).

## II. Organic products in our economy

In order for products to be organically certified, producers and farmers need to follow a set of rules carefully and to meet the standards of the USDA. Due to a general impression that organic products are good for

human and environmental health, organic food consumption has become one of the fastest growing segments of the domestic food market of the United States. Data of the USDA shows that the demand for organic products has been growing continuously and that the total sales of organic foods increased from around \$11 billion in 2004 to \$28 billion in 2012 (Greene, 2013, p. 1-2). Health and a sense of responsibility for the environment are the two major reasons for choosing to buy organic products. But there is also the complaint about the higher prices of organic products and the question about the actual benefits of organic products. Evidence shows that organic production can bring about more benefits than conventional products. Thus, consumers should tolerate the higher prices of organic products since, when compared to conventionally grown products, organic products can bring health benefits, are good for environmental sustainability, and can benefit the economy.

It is argued by Aertsens et al. (2009) and Tsakiridou et al. (2008) that price is one of the most important barriers for the consumption of organic products and that more than half of the consumers view the prices of organic products as too high (as cited in Atanasoae, 2012, p. 6). Indeed, Falguera et al. (2012) display a table showing the average prices of a variety of organic and conventional food products in the United States, which indicates that organic products are more expensive than their non-organic counterparts (p. 277). The Food and Agriculture Organization of the United Nations explains some of the reasons that make organic food more expensive. First, the supply of organic food is usually lower than its demand, which drives up the price; secondly, organic farms require more labor, which increases the costs of production; third, the handling of organic production is more complex than conventional products, which increases the costs of processing and transportation (<http://www.fao.org/>). Besides

costs generated from the production side increasing the price of organic products, ethical and environmental concerns of organic production generate additional types of costs, which do not exist in the conventional production process (<http://www.fao.org/>). For example, in order to protect soil quality, organic farms practice crop rotation regardless of financial returns of the crops (<http://www.fao.org/>). Even though there are very real reasons why organics often cost more, the higher price of organic foods can still become a barrier for their purchase.

Aertsens et al. and Tsakiridou et al. seemingly have a valid point. However, consumers' willingness to pay depends on the knowledge about the benefits that can be derived from the products (Atanasoae, 2012, p. 5). This suggests that if consumers cannot distinguish how two products are different, they tend to base their purchasing decisions on the price differences between the two. Many consumers do not know how organics are different from conventional products, and they think the only difference between the two is that organic products have a fancy organic certified seal. In other words, when consumers are not aware of the benefits of organic food, they can become unwilling to pay for the higher prices for organic foods. But the unwillingness of people to pay for the higher priced organic foods can be changed. Atanasoae states that consumers also care about the quality of products and environmental benefits (p. 10). He concludes that the price barrier to the consumption of organic products can be effectively reduced by informing consumers that organic products can actually generate more benefits than their conventional counterparts (p. 13). Therefore, higher prices should no longer be a major reason to reject organic products when the benefits of organic products are clearly introduced to consumers.

### III. Incentives for consumers to purchase organic

Benefits for health may provide one of the biggest incentives for consumers to buy organic foods. Higher nutrient content in organic produce is valuable to human health because with the changing lifestyle, people nowadays consume more sugar and non-essential fats which result in insufficiency of nutrient intake and malnutrition (Johansson et al., 2014, p. 3872). Such nutrient deficiency may lead to severe diseases and consequence. Johansson et al. point out that more than half of all child mortality are due to insufficient intake of vitamin A (i.e. carotenoids), iron, and other phytochemical compounds such as polyphenols (Johansson et al., p. 3872). In order to improve the nutrient intake organic foods can be more effective than conventionally produced foods because organic products contain a higher level of numbers of vitamins and minerals that are essential to human health.

A 2010 study of Crinnion shows that organic produce have 21% more iron and 29% more magnesium than their conventional counterparts on average (p. 5). He also states that higher quantities of ascorbic acid, such as vitamin C, which is an antioxidant, is commonly found in many organic fruits and vegetables than conventionally grown ones (Crinnion, 2010, p. 5). These data suggest that a small amount of organic foods can provide sufficient intake of certain nutrients while the same amount of conventional ones cannot. Furthermore, organically grown vegetables and fruits can provide larger amount of certain nutrients than their conventional counterparts. Polyphenols compounds, which can improve neuronal, cognitive brain functions, and reduce cancer risk was also found to be much higher enriched in a variety of organically grown produce (Crinnion, pp. 6-7). Crinnion states that compare to the conventional strawberries,

their organic counterparts are shown to have better performance in blocking the proliferation of colon cancer cells and breast cancer cells (p. 9). Overall, organically grown vegetables and fruits can do better than conventionally grown ones on mitigating the health problems that related to nutrients such as vitamin A and polyphenols compounds.

In addition to the benefits from organic vegetables and fruits, organically produced dairy products are also healthier than conventionally produced dairy products. It has been found that organic dairy tend to contain higher nutrients than conventional dairy products, especially in terms of Omega-3 fatty acids content (<http://www.beyondpesticides.org>). Omega-3 is a significant important nutrient for metabolism and brain development and function ; however, since omega-3 cannot be produced by human body, ingesting omega-3 through consumption of dairy products is one of the major ways (<http://ods.od.nih.gov>). Thus, getting enough amount of omega-3 is important for human health. Study shows that, the milk that produced from organically raised animal contains much more health omega-3 than conventional milk (<http://www.beyondpesticides.org>). It seems like that in order to ensure the intake of omega-3, organic dairy is a better choice than conventional diary. Thus, the nutritional superiority of organic foods is one of the most important factors to reduce the barrier that caused by high price and attract more consumers.

Organic products are healthier than conventional products not only because organic products provide higher nutritional values, but also because they contain a significantly lower level of pesticides and harmful chemicals than their conventional counterparts. Repetto and Baliga (1996) show that pesticides can reduce the number of white cells in blood and weaken the human immune system (as cited in Naik & Prasad, 2006, p. 12). Even worse, the organochlorine pesticides can contribute to the devel-

opment of cancer, Parkinson's disease, and reduced male fertility (Shan, 2006, p. 38). To ensure high yields, it is common for conventional farming to use a large amount of pesticides. As a result, farmers who are highly exposed to these pesticides are particularly vulnerable to the risks of cancer (Shan, p. 38). Thus, organic foods with a extremely low level of pesticides can not only attract consumers who care about their own health but also those who care about other people's well-being.

Another health concern that is related to conventional produce is pesticide residue. Germany found 361 pesticide substances in a careful screening for pesticide residues on foodstuff; more than half of the food sample was found to have at least one kind of pesticide residue; over 40% of the food sample was found to have pesticide residues that contain more than one kind of pesticides (Johansson et al., 2014, p. 3878). Shan (2006) also pointed out that even a very small amount of pesticide residue can accumulate in the human body and tissues and disrupt the endocrine and the metabolism of body overtime (p. 38). In other words, even though the amount of pesticide residue on one conventional piece of fruit or a vegetable is not high enough to cause immediate damage to the human body, the accumulative consumption of these products with pesticide residues can post serious health risks to human beings in the long run. Organic produce, by definition, does not use most of the types of conventional pesticide and any form of bioengineering. Experiment data shows that there are on average 82% of conventional fruits that contain pesticide residue compared to only 23% of organic produce, and less than 3% of organic foods are found to have more than one detectable residue compared to 26% of conventional foods (Crinnion, 2010, p. 8). These data shows that consumers of organic products do not have to worry too much about being exposed to pesticide residue. Overall, health risks associated with pes-

ticide can be significantly lowered by consuming organic produce.

In addition to the concern of pesticide residues on foods, the over-use of growth hormones and antibiotics on livestock is another issue that may cause health risks for human beings. Cummins (1999) argues that growth hormones such as bovine growth hormone in cows, which are prohibited in organic production, can increase the hazards of developing breast, prostate, and colon cancer (as cited in Shan, 2006, p. 39). Since the use of growth hormones can lead to such terrible health issues, it is probably better for consumers to buy the meat of organically raised animals that are guaranteed to be free of growth hormones. Traditionally raised animals are usually kept densely in small spaces, it is therefore a common practice to use a large amount of antibiotics to prevent the outbreak of disease which can cause the proliferation of antibiotic-resistant bacteria (Campbell, 2012, p. 8). However, David Wallinga states that nearly 70% of all uses of antibiotics in agriculture are being abused (<http://organic-center.org>). Thus, consuming meat products of animals treated with excessive antibiotics can increase the possibility of developing antibiotic resistance, which can lead to serious health problems. Data of the Center for Disease Control shows that over 23 thousand deaths in 2013 were caused by antibiotic resistance (<http://organic-center.org/>). On the contrary, animals raised organically are not fed with forage containing hormones and antibiotics and therefore is less likely to develop resistance to antibiotics (Campbell, p. 8). Therefore, in order to avoid health risks generated by harmful chemical substances such as pesticide, growth hormones and antibiotics, buying organically grown products is a great option.

#### **IV. Environmental concern & sustainable development**

Organic products not only can bring health benefits to consumers, such products can also be a good choice for consumers who care about the environment because organic farming is good for the environmental sustainability. Compared to conventional farming, which uses many chemical substances to boost yields, organic farming enhances biodiversity and is better for agriculture sustainability. The Food and Agriculture Organization of the United Nations defines organic farming as “a holistic production management system which promotes and enhances agroecosystem health, including biodiversity, biological cycles, and soil biological activity” (Johansson et al., 2014, p. 3871). Tuck et al. (2014) reveal that there is an average of 30% increase in species richness in organic farming compared to conventional farming (p. 746). The data suggests that the decrease of biodiversity caused by conventional agriculture can be mitigated by organic farming. The reason biodiversity is important to agricultural sustainability is that species richness can provide essential ecosystem functions such as pollination and pest control, which can lead to a higher yields (Tuck et al., p. 747). An experiment on the effects of conversion from conventional to organic farm on the successful pollination of strawberries shows that after transitioning from conventional farming to organic farming, the number of pollinators increased rapidly and a higher proportion of successfully pollinated strawberries was exhibited under organic farming (Andersson et al., 2012, p. 2). As a result, full pollination will increase the quantity of strawberries that meet the quality for the market, which can benefit consumers as well as growers. Overall, the practice of organic farming can enrich biodiversity and benefit agriculture production and sustainability.



Not only is organic farming beneficial for biodiversity, it can also improve water quality. Pollution results from nutrient runoff from the use of fertilizers has become a major threat for water quality (Dimitri et al., 2011, p. 7). Nitrogen and phosphorous are two major chemicals contained in fertilizers that pollute the water body. Too high of a concentration of these two substances in water can result in massive algae blooms which create hypoxia zones that kill aquatic life (Jeffords, 2011, p. 2). In other words, hypoxia and water pollution resulting from nutrient runoff can impact fisheries and the market supply of fresh fish by reducing the population of fish in water body. Fish that are contaminated by chemicals from fertilizers can also threaten people's health. On the other hand, Organic farming can reduce water pollution resulting from nutrient runoff by using bio fertilizers. Bio fertilizers can increase the carbon content and microbial activity of soils to improve the ability of soils to hold more water and become more resistant to erosion (Jeffords, p. 3-4). As a result, organic farming can effectively address the problem associated with nutrient runoff by improving soils' ability to retain more nutrients so that the amount of nutrients go into waters will be reduced.

Just as the pollution can be caused by the use of fertilizers, it can also be produced by the wide use of pesticides. The total world use of pesticides exceeded 5 billion pounds in 2011, but only 0.1 percent of those actually killed pests; a large amount of the remaining 99.99 percent, however, ended up in the atmosphere (Crinnion, 2010, p. 6). As a result, these pesticides can pollute waters through precipitation. Rouvalis et al. (2009) investigated the occurrence of pesticides in rainwater in Western Greece and found that over half of the rainwater samples collected in rural areas were contaminated by phosphamidon, an organophosphorus pesticide that is highly dangerous to mammals (p. 832). The same toxin, how-

ever, was only shown active in 13% of samples collected in urban areas (Rouvalis et al., p. 832). It seems that the difference noted by Rouvalis et al. can be explained by the extensive presence of agricultural activities in rural areas. When the large amount of toxic pesticides used in agriculture enter the atmosphere and return back to the ground through precipitation, they pollute both the surface water and groundwater and pose health risks to animals and humans. Organic farming, on the other hand, prohibits the use of most harmful pesticides and thus minimizes water pollution caused by toxic rainfalls. By improving nutrient retention in soils and reducing pesticide emissions, organic farming can protect the aquatic ecosystem. Informing consumers, who care about the environment, the benefits that organic farming brings to biodiversity and water quality can improve their willingness to pay for higher prices for organic foods.

Just as there is compensation for the higher prices of organic products in the form of environmental benefits, so also is there compensation for the higher prices in the form of economic advantages. The continuous growth of organic food market also brings vitality to the economy since it is more profitable and creates more jobs. Aulová and Frýdlová (2012) investigated the economic performance of a number of organic and conventional farms in the Czech Republic from 2006 to 2010 and found that organic farms selected had considerably better performance of economic value added (EVA), the estimate of the profit of a firm, with increasing earnings before interest and tax (p. 9). Such results show that organic farming can be more profitable than conventional farming. Many dairy farmers in Vermont also admitted that converting to organic farming saved them from going out of business (O'Hara & Parsons, 2013, p. 6118). O'Hara and Parsons examined the economic impacts of organic and conventional farms and found that with a hypothetical \$5 million sales rev-

enue, organic farms in both Minnesota and Vermont can generate greater output, gross state product, and labor income than conventional farms (pp. 6123-6124). Argilés and Brown (2010) also compared the economic performance of organic farming with conventional farming in Spain and found similar results indicating that organic farming has higher output and profit (p. 77).

Not only is organic farming more profitable, it also generates more employment. In terms of costs, Argilés and Brown (2010) point out that organic farming has significantly higher labor costs, almost 18% of total costs compared to 4.8% of conventional farming (p. 80). This is because organic farming requires more workers to perform tasks such as planting cover crops and attracting birds to substitute for pesticides (Dimitri, 2011, p. 5). Therefore, the higher profitability of organic farming and its ability to provide more employment opportunities make organic farming more attractive. Since economic development and employment are closely related to the well-being of every individual in society, people who want to make a contribution to a healthy economy are likely to support the organic food market. These two studies suggest that not only is organic farming more profitable, it also generates more employment.

## **V. Conclusion**

In conclusion, the increasing popularity of organic produce is largely a result of consumers' concerns about health and the environment. On the one hand, people want environmentally friendly products with minimum chemical substance residues to avoid potential health risks; on the other hand, many are scared away by the high price of organic foods. The price barrier to the consumption of organic foods, however, can be ef-

fectively reduced by informing people the benefits of organically produced products over conventionally grown products. Organically produced products are healthier than conventional foods because they contain more nutrients and significantly less harmful chemical substances. Organic farming is considered more environmentally friendly since it enhances biodiversity and increases water quality. Moreover, organic farming makes greater contribution to the economy by generating more output and employment opportunities than conventional farming.

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