International Journal of Plant Pathology and Microbiology

E-ISSN: 2789-3073
P-ISSN: 2789-3065
IJPPM 2022; 2(1): 22-26
Received: 10-03-2022
Accepted: 12-04-2022

Muskaan Sharma
University Institute of Agricultural Sciences, Chandigarh University, Gharuan, Mohali, Punjab, India

Pratyush Verma
University Institute of Agricultural Sciences, Chandigarh University, Gharuan, Mohali, Punjab, India

Shilpa Kaushal
University Institute of Agricultural Sciences, Chandigarh University, Gharuan, Mohali, Punjab, India

Correspondence
Shilpa Kaushal
University Institute of Agricultural Sciences, Chandigarh University, Gharuan, Mohali, Punjab, India

Human health implication and economical impact of organic food production system on adoption of organic agriculture

Muskaan Sharma, Pratyush Verma and Shilpa Kaushal

Abstract
The impact of organic food production on human health and the economy are summarized in this report. People want safe and non-hazardous food, which contributes to an increase in demand for organic agriculture, as awareness of organic agriculture and human wellness grows. Over the last 20 years, farmers' interest in organic cultivation and food and grown significantly. Organic farming is regarded to be more environmentally friendly than intensive farming, which uses pesticides, herbicides and inorganic nutrient treatments on a regular basis in the production of crops. The most pressing question is whether organic farming has the potential to feed the entire world. With an annual average growth rate of 20-25 percent in both developed and emerging countries, demand for organic food is gradually expanding. Organic farmers' systems are more diverse, making them less subject to natural and economic risks. Furthermore, eating organic food lowered the incidence of some allergy and acute disorders, as well as obesity and overweight.

Keywords: Human health implication, economical impact, organic food production, adoption, organic agriculture

Introduction
Organic farming is gaining popularity among farmers (Dangour *et al*., 2010) nowadays as it focuses on human welfare without harming the environment and also promotes agro-ecosystem health. The increasing demand of organic food is mainly accountable to the consumers fear for the future negative implications of traditional farming on human health and environment. ‘Organic’ term was first proposed by ‘Northbourbe’ in his book titled' Look at the land’ in 1940. Organic farming adheres to the principles of health, ecology, equity, and care. Organic farming is a modern concept that combines innovation, tradition, science, and technology. According to history, the movement for an organic way of life was recognised in 1905, after realising the negative effects of modern agriculture. Organic farming focuses on soil enrichment rather than plant enrichment and is based on the concept of 'Feed the soil, not the plant' (Udeshna, 2020) and aims to benefit humans. According to the reports, organic farming can reduce energy consumption per unit of land by 30.7 percent by reducing the amount of energy used to make synthetic fertilizers and pesticides, as well as by employing internal farm inputs, which minimizes the amount of fuel consumed for transportation. In 1939, Balfour performed an experiment which compares both organic and traditional food systems to investigate the link between health and the usage of chemical-based farming methods (Brantsæter *et al*., 2017). Between 1999 and 2015, the number of nations employing an organic agriculture system increased from 77 to 179, with Asia, Africa, and Latin America accounting for more than 84 percent of the producers being India, Ethopia and Mexico the main producers. India is the home of 30% of the world’s total organic production but just for 2.59 per cent of the total 57.8million hectare organic cultivation area according to the World of Organic Agriculture Report, 2018. Madhya Pradesh is the largest organic producer in India followed by Maharashtra, Karnataka, Uttar Pradesh and Rajasthan. Organic products have a higher cost and lesser yield than conventional agriculture, but the tendency to consume them is growing every year. Especially in developed countries people consider organic food to be much safer and healthier than the food which is produced conventionally (Funk and Kennedy (2016)). Organic products command a higher price because consumers believe they are healthier. Organic foods are typically more natural and processed less. Organic foods are high in antioxidants and contain few or no pesticides.

Organic food consumption may have reduced the risk of allergic diseases as well as overweight and obesity (A. Mie, 2017), however, microbial contamination in organic raw veggies may be due to the limited use of pesticides and the use of animal faces. In addition, many farmers are turning to organic or "low input farming" as a means of economic survival. Several comparisons in the Central and Northern States revealed that organic farming equals or outperforms conventional farming in terms of economic performance. But is organic food healthier? This question is answered by evaluating the substantial literature on the economic, social, and health impacts of organic farming.

Objectives

1. To examine the scientific evidence for organic food's benefits
2. To summarise the available economic data on organic farming.

Background

The concept of organic agriculture has developed in the early 20th century in the ambience of urbanization and the increasing use of chemicals in farming. The organic movement started in English and German countries and was affected by the groups promoting the use of biological fertilizers and rural traditions (Vogt 2007) [2]. The movement of organic agriculture remained very small for several decades, but it become popular since 1970's with the rise in concerns of public about environmental and health effects of farming (Lockeretz 2007) [3]. Several intergovernmental organizations regard the long-term objective of building a sustainable food system to be a top priority (Frick and Bonn 2017). In 1940, The destruction of soil is highlighted in Howard's Agricultural Testament. Bernward Geler (1999) is of the opinion that Organic agriculture is the only farming practise that is so clearly governed by standards and rules. Organic farming uses less chemicals, such as fertilizers and pesticides, and is focused on a holistic approach to farming.

Outcome

The popularity of organic food increase drastically as consumer aware about organic food which is much healthier and safer as compare to inorganic. Organic farming is more eco-friendly, keeps soil healthy and maintain polluted free environment. the organic produced product is the fastest growing market all over the world including India. At present India is world largest organic producer with the conclusion that we can create a nation that is nutritionally, environmentally, and economically healthy.

Pesticides use and exposure

Because animal and other experimental studies address a wide range of toxicological effects, the risk evaluation of pesticides currently in use in the EU is extensive. However, this risk assessment has raised concerns that it is insufficient for dealing with mixed exposures, particularly those with carcinogenic, endocrine-disrupting, and neurotoxic consequences. There are also worries that test techniques lag behind independent research, that independent scientific studies are not taken into account properly, and that data gaps are frequently accepted. The main causes of concern are the long-term effects of exposure and the long-term consequences of acute exposure, which are more difficult to detect than the short-term effects. The bulk of studies concentrate on pesticide metabolite excretion in the urine, with the assumption that the individuals rather than the metabolites, were exposed to the parent substances. The eating of a lot of fruits and vegetables has been proved to give a lot of health benefits. Pesticide residues, on the other hand, may jeopardise these benefits, as proven recently by effects on sperm quality. When the benefits of a contaminant are outweighed by the disadvantages of a pollutant, inverse confusion arises, which can be difficult to remedy. Of course, the potential for dietary pesticide residues to cause harm to one's health should not be used to excuse a reduction in vegetable and fruit consumption. Pesticide exposure should not be justified based on nutrient content. Exposures related to conventional crop production have been related to an increased incidence of diseases including Parkinson's disease, type 2 diabetes, and cancers like non-Hodgkin lymphoma and childhood leukaemia or lymphomas, for example, after occupational or residential pesticide exposure during pregnancy or infancy. It's unknown to what extent these findings apply to pesticide residues in food exposures. However, neurotoxic and endocrine disrupting substances is most dangerous during pregnancy and early childhood. In a Danish study of greenhouse workers' children, even brief occupational exposure in the first few weeks of pregnancy, before women are aware that they are expecting, has been linked to negative long-term consequences on the growth of their children, cognitive functioning, and sexual maturation.

Effects of an organic diet on conception and pregnancy

The association between organic food consumption and male reproductive development was investigated in two case-control studies and one prospective study. In Denmark, 306 moms of boys who had hypospadias surgery and 306 mothers of healthy boys participated in a case-control study. Hypospadias in kids was linked to moms who used organic butter and cheese in this study. The moms were asked to recollect their prenatal intake of fruits, vegetables, milk, dairy products, eggs, and meat, as well as whether they utilised organic substitutes regularly, occasionally, or never. Other organic food groups showed no correlations. The authors speculated that conventionally produced butter and cheese may have greater pesticide residues than organic counterparts, but they lacked the data to back up their claim.

Risk of microbiological contamination

Because numerous factors, including cropping system changes, may contribute to the proliferation of microorganisms, the relationship between microbiological risk and organic output is yet unknown. Animal dung is used in organic farming, which naturally raises concerns regarding microbiological safety. Because the chemicals allowed in organic farming are limited, there is a possibility of microbial contamination when this kind of fertilisation is utilised, providing a greater risk to public health. Although several scientific studies revealed no increased risk with organic food intake, organic food has been related to multiple foodborne disease outbreaks. A Shiga toxin-producing Escherichia coli O157:H7 outbreak connected to organic spinach eating was reported in five states in 2012, affecting 33 persons. There were no reported deaths; however, two people developed haemolytic uremic syndrome (HUS).

Organic food consumption and sustainable diets

Organic foods are popular among customers because they are associated with a environment friendly and healthy lifestyle. Some buyers are ready to pay more for organic items with additional ethical aspects. They select the food based on their beliefs or concerns about safety (such as antibiotics or pesticide residues). Dietary habits are shifting all around the world. These shifts have important ramifications for the human health, environment and societies since environmental sustainability and human health are linked by nutrition. It is not enough to focus solely on production for the future development of healthy and environmentally sustainable food systems; rather, production and consumption must be considered together must be viewed as a whole food system. The social environment of food consumption and dietary habits, in particular, have been identified as important component of a long-term food system. According to the concept of sustainable diets, "those diets with low environmental impacts that contribute to food and nutrition security, as well as a healthy lifestyle for current and future generations. "Sustainable meals are biodiversity and ecosystem friendly, accessible, culturally acceptable, economically egalitarian, and low-cost, nutritionally adequate, healthy and safe, and they maximise human and natural resources". Currently, it is difficult to assess a food system's overall sustainability. However, food systems can be compared in terms of health or environmental factors.

Human studies on organic food's influence on health

The PARSIFAL study used a cross-sectional plan and enrolled around 14,000 kids between the ages of 5 to 13 from five nations of Europe (Germany, Austria, Netherlands, Switzerland and Sweden). The youngsters were chosen from farming households, families living an anthroposophic lifestyle (at Steiner schools), and a control group. The restricted use of immunizations and antibiotics, as well as precise food patterns, characterise an anthroposophic lifestyle.

Although this conclusion was not uniform across all nations, children attending Steiner schools had a lower rate of allergy sensitization and symptoms. Because there was a possible difference in the level of organic diet adoption among anthroposophic households, the authors stressed that it was tough to connect these findings to organic food intake. This type of protective effect could be attributed to a person's entire lifestyle rather just organic food consumption. Despite the fact that it was unable to draw a causal conclusion due to the study's cross-sectional methodology, it does raise an intriguing possibility that deserves additional exploration.

The KOALA research is a longitudinal birth cohort study that followed over 2,700 women and infants in the Netherlands. Organic food consumption (including meat, eggs, fruit, and vegetables) or the quantity of these foods in the diet was not linked to an increased incidence of eczema or atopic sensitisation in this investigation, contradicting the findings of the PARISFAL trial. However, the mother's sole Organic dairy product consumption during pregnancy and infancy was linked to a 36 percent lower incidence of eczema by the age of two. Such findings have been attributed to organic milk having a higher amount of particular fatty acids like vaccenic acid and conjugated linoleic acid. Indeed, a research of the same group found that by substituting organic animal products for conventional animal products, the quantity These components in human milk might change.

The ALADDIN prospective birth cohort, which included 330 children, was established in Sweden from anthroposophic (with a preference for organic food) and conventional families to study allergy illness in infancy. Children were monitored from conception to two years of age. Children from anthroposophic families participated in this study had a 75 percent lower chance of sensitisation throughout the first two years of life in children from non-anthroposophic homes. It has recently been discovered that leading an anthroposophic lifestyle is linsked to a lower risk of self-reported food sensitivities and recurring food allergies. There was no link found between lifestyle and eczema risk. It's worth noting that in this study, the importance of organic food and other anthroposophic lifestyle factors is difficult to separate. The ALADDIN study's and findings show that during the first year of life, an anthroposophic lifestyle has a greater impact on allergy sensitisation.

Yield effects

Crop yields in the organic agricultural industry are often lower than those in conventional farming (Moudery *et al*. 2008). Organic farming may produce poorer yields., require more acreage to produce the same amount of food as conventional farms, leading in widespread deforestation and biodiversity loss, undermining the environmental benefits of organic operations (Trewavas 2001) [15]. It's essential to compare output of food per unit of area and time when comparing nonorganic yields, because organic rotations frequently include additional non-food crops such leguminous fodder crops. However, according to the meta-analysis, research utilizing longer periods of non-food crops in the organic rotation than conventional systems have similar yield ratios to studies using shorter periods of non-food crops. As a result, organic rotations do not appear to demand longer non-food crop times, which is supported because the vast majority of studies (76%) utilise identical non-food crop lengths in organic and conventional systems (Cassman *et al*.. 2008) [16] crop yields on organic and conventional farms were compared. Grain crop yields were reduced by 21–37 percent on organic farms, while fodder beet, grass, and clover yields were reduced by 12–18 percent. Differences in climatic conditions and soil types have been blamed for the disparities (Halberg and Kristensen (1997) [18].

Socio-economic implications of Organic farming

When compared to traditional farming, organic farming delivers lower yields, requires more inputs, and has higher output prices. This calls for a greater reliance on organic pest control. Because of diversification, organic farms are less sensitive to the same pests or unfavourable weather conditions, which reduces pesticide and fertilizer use. As a result, income becomes more balanced, and the seasonal distribution of both inputs and outputs improves. Organic farming, on the other hand, demands greater organizational abilities. Organic farming has genuine environmental benefits on the farm, however it is frequently difficult to quantify and compare organic to conventional farming (Langer 1986). Organic yields are 10% lower than conventional yields on average. This is higher in nations

where conventional farming is more intense, such as Europe, and for animal products (roughly 20 percent). The profit differential between organic and conventional systems can be as much as 20%. Lower operating costs, greater weather resilience, a shorter supply chain and a higher price premium are all advantages of organic production (Mac Rae *et al*. 2007). Conventional crop yields were higher under normal weather conditions. In drought conditions, organic systems performed far better (by roughly 30%). Over the 10-year study period, corn yields were only 3% lower on average. Organic farming has a lower total cost of production due to higher seed and machinery costs, as well as lower fertiliser, pesticide, and labour costs. Although organic farming often requires more labour, peak seasons differ from conventional farming. As a result, a lower-cost labour is available. Despite the large price premium, organic corn was 25% more lucrative than conventional corn over a 10-year period (up to 140 percent) (Pimental *et al*. 2005).

Farming Production losses

Yield gap: Organic food and agricultural systems offer lower yields and require more area to produce the same amount of food, which may have significant environmental and food security consequences. However, in the absence of price premiums, poorer yields may result in greater unit costs of production and reduced revenues for farmers (Di ponti *et al*. 2012) [8] Economy penelize diversity - Current policies and markets encourage the mass production of single commodities that are then sold at artificially cheap rates at the expense of the environment and humanity (Soaan 2013) [9]

Profitability and Income

Organic agriculture will become increasingly important as a creative agricultural practise that meets several sustainability goals in global food and ecosystem security (International Assessment of Agricultural Science and Technology for Development 2009) [10]. Organic agriculture is the world's most popular alternative farming method, with global sales of organic foods and beverages increasing 170 percent to $63 billion between 2002 and 2011 (Willer *et al*. 2013) [13] Ongoing negotiations and international agreements. The major elements determining organic agricultural profitability are the possibility for reduced income during the organic transition period and possible cost savings from reduced use of nonrenewable resources, Crop yields, labour costs, organic -product price premiums, and purchased inputs (Zentner *et al*. 2011) [11].

There were no statistically significant changes in total costs, variable costs, or fixed costs between organic and traditional farming. Organic crops (13%) and systems (7%), both of which are part of variable costs, had much higher labour costs. Organic farms, on the other hand, were able to offset their higher labour expenses by reducing their use of nonrenewable resources and purchased inputs like chemical fertilisers and pesticides. Organic farms have higher labour expenses because they invest more in mechanical pest management, have a wider range of businesses, or need to develop new marketing and processing activities (Padel *et al*. 1994) [12].

Advantages of organic farming

High premium: Since organic food is the standard and is typically cost 20 to 30 percent more than traditional food, there is significant chance for a mediocre farmer whose income is just enough to feed his family one meal to acquire a large premium and thrive.

Low investment: When compared to standard chemical farming practises, organic farming requires a lower initial investment. Furthermore, no complicated processes are required for the manufacturing of organic fertilizers. Furthermore, because organic fertilizers and insecticides may be manufactured locally, the farmer's annual costs are cheap. Because agriculture is heavily influenced by outside causes such as climate, pests, and diseases, and is also dependent on climatic factors such as rain, small farmers who practise organic farming suffer less in the pest attack, irregular rainfall and natural calamity, resulting in crop failure.

Synergy with living things: Synergy with various plant and animal life forms is an important part of organic farming. Small farmers may quickly comprehend this synergy and, as a result, find it simple to put into practise.

Less dependence on money lenders: Farmers' suicides are a common occurrence in India, owing to massive debt. Farmers are not reliant on money lenders because chemical inputs, which are prohibitively expensive, are not required in organic farming. Crop failure, as a result, does not force the farmer to take drastic measures.

Conclusion

According to the existing research, organic food production and consumption result in fewer pesticide exposure, are more environmentally friendly, and may be better for animal welfare. The influence of low-level pesticide exposure from conventionally produced foods on human health, on the other hand, is uncertain. Although some research indicates that organic foods have higher nutritional profiles than conventional foods, the differences are usually modest and may not be feasible in well-nourished people. Only a few studies have been conducted to investigate the potential health benefits of eating organic foods in humans. While evidence is limited, it is insufficient to determine if organic food is healthier. Although the health benefits of vegetables, fruits, and other foods in a well-balanced diet have been thoroughly demonstrated, the jury is still out on whether organic alternatives would provide further benefits. The current dietary guidelines, which advise eating more fruits, vegetables, and plant foods and less meat, are based on multiple studies and are valid whether the product is organic or not. It's important to recognize that buyers prefer organic food for reasons other than health. According to some, organic food production and consumption may provide a variety of advantages as a supplement to traditional food systems.

References

1. Eva-Marie Meeken and Matin Qiam Annu. Rev. Resour. Econ. The Annual Review of Resource Economics. 2018;10:30-63.
2. Vogt G. The origins of Organic Farming. In Organic Farming: An International History, ed. W Lockeretz, pp. 9-29. Walling ford, UK: CABI, 2007.
3. Lockeretz W. What explains the rise of Organic Farming? In Organic Farming: An International

History, ed. W Lockeretz, Walling ford, UK: CABI, 2007, 1-8.
4. Anne Lise Brantsæter, Trond Ydersbond A, Jane Hoppin A, Margaretha Haugen, Helle Margrete Meltzer Vanessa Vanderléia Merlini, *et al.* Microbiological Quality of Organic and Conventional Leafy Vegetables, Journal of Food Quality, 2018, 7p. Article ID 4908316. https://doi.org/10.1155/2018/4908316
5. Huber M, Rembiałkowska E, Średnicka D, Bügel S, van de Vijver LPL. Organic food and impact on human health: Assessing the Status quo and prospects of research, NJAS: Wageningen Journal of Life Sciences. 2011;58(3-4):103-109. Doi: 10.1016/j.njas.2011.01.004
6. Marcin Barański, Leonidas Rempelos, Per Ole Iversen, Carlo Leifert. Effects of organic food consumption on human health; the jury is still out!, Food & Nutrition Research. 2017;61:1.
Doi: 10.1080/16546628.2017.1287333
7. Anne Lise Brantsæter, Trond Ydersbond A, Jane Hoppin A, Margaretha Haugen, Helle Margrete Meltzer. Annual Review of Public Health. 2017;38(1):295-313
https://www.annualreviews.org/doi/abs/10.1146/annurev-publhealth-031816-044437
8. De Ponti T, Rijk B, Van Ittersum MK. The crop yield gap between organic and conventional agriculture. Agricultural Systems. 2012;108:1-9.
9. SOAAN. Best Practice Guideline for Agriculture and Value Chains. Public version 1.0 - December 2013. Sustainable Organic Agriculture Action Network/International Federation of Organic Agriculture Movements (IFOAM - Organics International), Bonn, 2013. Available at www.ifoam.org/sites/default/files/best_practice_guideline_v1.0_ratified.pdf
10. International Assessment of Agricultural Science and Technology for Development Agriculture at a Crossroads: Global Report (Island Press, Washington, DC), 2009.
11. Zentner RP, *et al*. Effects of input management and crop diversity on economic returns and riskiness of cropping systems in the semi-arid Canadian Prairie. Renewable Agriculture and Food Systems. 2011;26(3):208-223.
12. Padel S, Lampkin NH. The Economics of Organic Farming: An International Perspective, ed Lampkin NH (CABI, Wallingford, UK), 1994, 201-219.
13. Willer H, Lernoud J, Home R. The World of Organic Agriculture: Statistics and Emerging Trends 2013, eds Willer H, Lernoud J, Kilcher L (FiBL-IFOAM, Bonn), 2013, 26-33
14. Moudrý J, Moudrý J (Jr), Konvalina P, Kopta D, Šrámek J. Ekonomická efektivnost rostlinné bioprodukce. JU ZF, České Budějovice, 2008.
15. Trewavas A. Urban myths of organic farming. Nature. 2001;410:409-410.
16. Cassman KG. Editorial response by Kenneth Cassman: can organic agriculture feed the world-science to the rescue? Renew. Agr. Food Syst. 2007;22:83-84.
17. Connor DJ. Organic agriculture cannot feed the world. Field Crops Res. 2008;106:187-190.
18. Halberg N, Kristensen IS. Expected crop yield loss when converting to organic dairy farming in Denmark. Biological Agriculture & Horticulture. 1997;14:25-41.