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Organic Farming's Impact on the Environment: The Controversy

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Abstract

Organic farming is usually regarded to be more environmentally friendly than conventional farming. On this subject, we perform a global literature review. Organic farming employs integrated production practises that reduce the environmental impact of inorganic fertilisers, herbicides, and genetically modified organisms. In terms of environmental and climate change effects, organic farming is less polluting than conventional farming when measured per unit of land. Organic cuisine is gaining popularity around the world. The main driver of increased demand is consumer concern about the detrimental impacts of conventional agriculture on the environment and human health. All across the world, various organic agricultural practises are practised. They are united by common aims of economic, environmental, and social sustainability. Many countries currently have specific legislative underpinnings for organic farming, as well as production and processing certification programmes. The expansion of organic agriculture practises and markets demonstrates how this is a viable alternative to intensification. More political will and scientific money could help realise more of this potential. In addition to developing organic agriculture, this should inform and improve the sustainability of other forms of agriculture.

Keywords: Biodiversity, climate change, environmental effects, organic agriculture

1. Introduction

The United States Dept. Of Agriculture describes organic farming like a manufacturing system maintained to comply to location constraints by combining societal, environmental, & physical approaches which promote resource cycling, ecological balance, and environmental preservation (Anonymous, 1997). Even though there are numerous definitions and interpretations of organic agriculture, they relate to the order based on conservation planning instead of foreign farm produce. By eliminating synthetic inputs such as artificial fertilizers, synthetic chemicals, animal aid, bioengineered seedlings and varieties, preserves, supplements, as well as radioactivity, the system takes into account of the possible environmental and societal repercussions. In their place, site-specific management techniques are used to control pests and diseases, maintain and improve long-term soil fertility. (Anonymous, 2020). Organic farming, a holistic approach toward production management, preserves and strengthens global health of agriculture, comprising diversification, restore the natural, and land bioactivity. Despite taking into account the need for regionally specific approaches using local factors, it prioritises the use of management strategies over the use of off-farm inputs. This is accomplished by minimising the use of synthetic materials whenever possible and instead relying on agronomic, biological, and mechanical approaches to carry out any system functions that are required. Regardless of the development stage of the country, organic agriculture is becoming more and more significant in the agriculture sector. For instance, organic agriculture now makes up a sizeable share of the food chain in numerous affluent nations (10% in Austria and 7.8% in Switzerland), while many others are experiencing growth rates that approach 20% yearly (such as the USA, France, Japan, and Singapore) (Anonymous, 1997). A few developing countries, such as Mexico and Uganda, have begun to capitalise on the lucrative increased competitiveness given by sustainable production. Some emerging countries, such as Egypt, have small domestic organic markets (Anonymous, 2020). Organic agriculture is among the world's most rapidly expanding agricultural section. "Organic" is perhaps the most well-known food trademarks, while accounting for less than 1% of global agricultural land. The initial organic ideologue theories, which envisioned agricultural practices like a naturopathic cultivation method directed initially at boosting health of the soil, that in switch resulted in better living, as well as social and cultural health, which may not be entirely integrated toward interpretation of organic production like "non-toxic" agriculture, completely void about wider sustainable fundamentals (Verena et al.,

2017). Organic farming is one of the many environmentally friendly producing techniques available (Ramesh et al., 2005). Although everyone wants sustainable agriculture, consensus on how to get there has failed to materialise. The worldwide community has become significantly more aware of the need of protecting the environment and ensuring the quality of food during the past two decades. Organic farming is finally been embraced by the general public after almost a century of development and holds immense promise from a commercial, social, and environmental standpoint. Although there is a progression of ideas from the past to the present, the modern organic movement is very different from its initial form (Santhoshkumar, 2017). The public's health consciousness and willingness to pay for the expensive produce are the main elements influencing customer interest for organic food. Due to significant market demand, a sizable price premium, and environmental concerns, customers preferring organic products are typically affluent, educated, and health sensitive (Yadav et al., 2013). Organic farming is taken into account in connection to sustainability because it is a sector that is expanding quickly worldwide (Rigby, 2001).

2. The Idea of Organic Agriculture

The expansion of organic farming has been significant around the world since the turn of the twenty-first century. There is growing interest in organic food. Consumer concerns more about adverse consequences of traditional farming here on human health and ecosystem are driving up desire. Organic agriculture has been practised in India for thousands of years. The whole agricultural industry in traditional India used organic methods, with plant and animal products being used as fertilisers, insecticides, and other agricultural chemicals. In addition to milk, the cow also produced bullocks for use in farming and manure, which was used as fertiliser. Also, the development status of organic farming on a global scale was examined in terms of the amount of land managed organically, the area of land managed organically as a percentage of all agricultural land, and the global markets for organic products (Shi-ming, 2006). Organic farming uses integrated production methods that minimise the harmful effects on the environment of synthetic fertilisers, herbicides, and genetically modified organisms. Among the wide range of environmentally friendly manufacturing techniques is organic agriculture. For the majority of developing countries, agriculture continues to be the dominant sector for economic development. For the sake of guaranteeing food security, reducing poverty, and preserving the essential natural resources that generations to come will depend for survival and welfare, it is crucial (Behera et al., 2011). The amount of land used for certified organic farming worldwide has crucially expanded during the previous 15 years, rising over fifteen thousand acres during 2000 to 2.65 mha in 2021. However, just 1% of the world's agricultural land is used for organic farming. Australia is the nation with the greatest certified organic acreage, with approximately 23mha; the majority of the organic territory in Australia is extensively maintained grassland. Numerous nations recorded a large rise, such as India (18.6% increase; more than 0.36 million hectares extra) & France (10.1% increase; almost 0.21 million hectares more). Additionally, México (approximately 0.12 million ha more) and Ukraine (51.4 % rise; nearly 0.16 million ha more) showed notable gains (Helga and Claudia, 2022) (Figure 1).

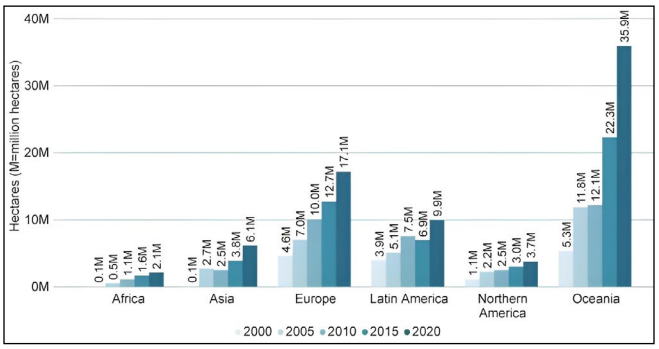

Figure 1: Shows the world growth of the agricultural land by the continents from 2000-2020. (Helga et al., 2022)

The decision of farmers in industrialised and developing nations to move from conventional to ecological agriculture practises had been examined in various studies. Government subsidies often are the major factor for organic farming (Lakner et al., 2016). Due to the much greater cost of organic products, poor people virtually can buy them. According to (Seufert et al., 2017), the fare gap amidst conventional and organic items is typically greater for animal products than for fruits, vegetables, and processed meals. On average, organic products are priced 50% higher than conventional ones (Carlson and Jaenicke, 2016).

2.1. Organic farming's prevailing state

India always embraced organic cultivation however modernity, in particular the technologies of green revolution, has resulted in an increase in the usage of chemicals. But in recent years, the drawbacks of excessive irrigation and chemical use in agriculture have become clear, and interest in organic farming has resurged. The rise in interest in organic farming is primarily driven by two issues: the decreasing agricultural productivity in some regions as a result of, among other things, overuse of chemical inputs, declining soil fertility, and environmental consciousness. Exports were important, though maybe to a smaller extent than in other nations. promoting integrated pest management (IPM), integrated nutrient management, and organic farming that uses organic wastes (INM) techniques, was encouraged by the 10th Five-Year Plan (Prusty et al., 2021). Even the 9th Five-Year Plan placed a strong emphasis on the use of organic and bio-inputs in spices, condiments, and plantation crops to promote organic food in order to safeguard the environment and advance sustainable agriculture. A number of central and state government ministries and departments, as well

as numerous states and private organisations, are now working to promote organic farming in India. In 2001, the Indian government also introduced the National Programme for Organic Production (NPOP). The European Commission and Switzerland have recognised the NPOP standards for manufacturing and accreditation system as being similar to their national standards. In terms of the overall area under organic agriculture, India is now ranked 33rd, while its proportion of agricultural land used for organic crops is 88th. According to the Agricultural and Processed Food Product Export Development Authority (APEDA), there are approximately 2.8 mha of cultivated land that are currently certified, with one million hectares of that area being under cultivation and the remaining two million hectares being covered by forest (wild collection). However, it is estimated that 69 mha is currently cultivated without the use of chemical fertilisers and may be eligible for certification provided certain procedures are followed or small improvements are made. However, certifying these farms continues to be challenging because many of them are small holdings (Reddy, 2010). The below given table 1 shows the total organic produce with other factors such as total area, total export and import etc.

Table 1: India's Organic Farming produce: 2020–2021 (Source: Anonymous, 2021)

Total area designated as organic	4339184.93 ha
Total organic production	3496800.34 mt
Total export volume	888179.68 mt
Total export value	₹ 707849.52 (8672.04 $)
Total farmers	835000

2.2. Organic agricultural land and organic share of land in 2019–20

Approximately 1.5% of the world's agricultural land is organic. By geography, Oceania has the highest organic share of all agricultural land (9.6%), succeessed by Europe (3.3%) and South America (1.2%). In the Europena Union, 8.1% of all farmland is used for organic farming. The percentage is less than 1% in the other regions. However, the organic proportion is substantially higher in several particular nations, and in 16 nations, at least 10% of the agricultural land is used for organic cultivation (Helga and Claudia, 2022). The table 2 shows the organic agricultural land with their organic share of land.

Table 2: Global organic Agricultural area with their organic share of land of 2019–20 (Helga et al., 2022)

Region	Organic agricultural area (ha)	Share of total agriculture land
Africa	2'030'830	0.2%
Asia	5'911;622	0.4%
Europe	16'528'677	3.3%
Latin America	8'292'139	1.2%
North America	3'647'623	0.8%
Oceania	35'881'053	9.6%

3. Feeding the World with Organic: Challenges

The yield of the organic movement is a frequent topic of inquiry (Trewavas, 2004). Is conventional agriculture successful in feeding the globe, one may ask in response. Even high-input, high-yielding systems are currently failing to feed the world due to problems with food distribution, social structure, and serious concerns about poverty, racism, and gender (Woodward, 1996). Due to yield losses during the conversion period, converting land from inorganic to organic farming will result in less food being available. Such organic food is only available to the privileged who can afford to buy it. As a result, the impoverished have limited access to food. The cost of the food they can purchase rises. Issues with equity result from this. Despite, organic farming is profitable and environmentally friendly (Reganold et al., 1993, Mader et al., 2002, Murata and Goh, 1997; Letourneau and Goldstein, 2001). Farmers largely migrate to organic farming as a result of their discomfort with the current farming system, which is heavily dependent on chemicals. Some farmers think their own health is at risk from employing pesticides in agriculture. But there are other benefits to organic farming than better health. Only by drastically increasing synthetic chemicals can farmers in Punjab, Haryana, and Eastern Uttar Pradesh maintain consistent production levels. Since crop yields are improved by artificial fertilisers and it takes time for the soil fertility to be increased, yields in irrigated farms may decrease during the transition from conventional to organic farming. However, after conversion, yields will be comparable to or even better than those obtained by conventional farming (Reddy, 2010).

Many farmers are taken advantage of because they are ignorant of the differences between chemical farming and organic farming. Farmers opt to use chemical farming even though they are aware that organic farming requires more input than chemical farming does because of this. Because chemical farming currently yields a high yield in a short amount of time. Farmers are encouraged to employ synthetic materials in farming as a result of ineffective and improper agricultural policy. Farmers' main worry about employing organic farming is that it yields less than chemical farming. In chemical farming, the rate of yield is high and the time required is minimal because synthetic ingredients react with the hormones that plants utilise to grow, but in organic farming, plants are allowed to grow naturally without being forced to grow quickly. Biomass serves as the main nutritional source for organic farming. Farmers are unable to access resources as a result of incorrect waste management. It becomes extremely difficult for farmers to meet export requests due to the relatively low yield produced by organic farming (Singh, 2020).

4. Environmental Impact of Organic Farming

Agriculture's contribution to environmental issues like climate change, biodiversity loss, degraded soil, and water pollution is numerous. Many governments subsidise the organic industry because it is widely held that organic agriculture has less of an adverse environmental impact than conventional agriculture (Meemken et al., 2018). Farmers have relied on synthetic pesticides and fertilisers to increase crop yield for the past 50 or so years. While these dangerous fertilisers and chemicals make the produce hazardous on the one hand, they also seriously destroy the soil, ecology, and entire eco system. Here, organic farming has repeatedly shown how beneficial it is to the environment, human health, and well-being. At its core, organic farming inhibits the use of potentially dangerous chemicals and pesticides, which in turn helps to preserve the environment. According to research and surveys, organic farming can prevent the environmental entry of 500 million pounds of chemicals and pesticides. Lack of chemicals and pesticides improves biodiversity, improving soil quality and reducing pesticide and fertiliser contamination. Organic farming considers the short- and long-term impacts of agricultural activities on the environment. Organic farming employs a preventative strategy as opposed to responding to issues as they arise.

4.1. Detrimental aftermath of synthetic fertilizers

As crop plants are harvested, the amount of minerals in the soil is reduced over time. These nutrients are then restored through fertiliser application or biological disintegration. However, even though chemical fertilisers are a major factor in the globe's ability to generate enough food to everybody, one's excessive use is posing massive issues for both the present and the next propagation, including air, water, and soil pollution, deteriorated plains, exhausted loam, as well as higher emissions of greenhouse gases. There are countless more innovations that have been slowly or all of these potential solutions controlled dispersed fertilisers, granular fertiliser, nitrification inhibitors, nano-fertilizer etc. can assist us in navigating such significant obstacles but also preserve both our surroundings and indeed the planet.

Overuse of agrochemicals on crops can result in yellowing or browning of the leaves, harming the vegetation but also lowering agricultural production. Excess nitrate or nitrite accumulation in plant components eaten by people or animals are anticipated to have similar bad impacts as nitrate contamination of water sources. Ammonia build-up in woods and streams reduces diversification due to overfertilization implications. Due to high N fertilisation, they decrease the mycorrhizal root invasion and prevent rhizobia from fixing N symbiotically (Kumar and Prakash, 2019).

4.2. *Are organically produced food healthier and more nutritious than conventionally produced ones?*

The decreased productivity of organic crops, the produce and food utilization have continuously increased over the past ten years. People do believe that organic food has healthy qualities. Despite there being currently a lack of solid scientific data, organic farming appears to help people stay in excellent health and reduce their risk of contracting chronic illnesses. This may be because organic meals of plant origin contain more bioactive components than traditional agricultural goods and less harmful substances like cadmium, synthetic fertilisers, and pesticides. Therefore, extensive abiding intervention studies are required to establish if a diet consisting of organically cultivated food is healthier than a diet consisting of conventionally farmed food (Hurtado et al., 2019). According to a review of the secondary metabolite concentration in organic goods, it will still be early to say how an organic production system is superior to a conventional one in terms of nutritional composition (Baranski and Iversen, 2017).

Organic cultivation may fall short of its promise of sustainability in a variety of other ways as well. Researchers at Oxford University in the United Kingdom examined 71 earlier studies in 2012 to compare the effects of conventional and organic farms on the environment. They found that organic farms generally sustain 30% more biodiversity and have less of an environmental effect per unit of land. Although organic farming of cattle and olives is more ecologically benign than conventional farming, organic farming of pigs, dairy, and grain actually produces more greenhouse gases (GHG) unit^{-1} of product (Anonymous, 2022).

5. Conclusion

Organic agriculture was an idea bought into action for the betterment of the environment, a path better than conventional farming. But the doubt many people still question is that 'does organic farming not at all cause harm to the environment in any way, that all of us still consider it to be the supreme solution for no toxic, free from synthetic pesticides and fertilizers; as like an all in all solution from conventional farming.

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