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Insight into organic farming: An intuition towards a healthy nation

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Abstract

This review paper examined that agriculture turned into a high contributing and low yielding because of uncontrolled utilization of synthetic substances that are unsafe to the environment is deteriorating the quality of food. These synthetics are man-made substance *viz.* fertilizers, pesticides, hormones, feed additives, *etc.* In the present era where the COVID-19 pandemic situation is still persists globally without any confirmatory measures and people are suggested to improve their immune system through quality food. Hence, to secure our environment the farming practiced must be readdressed without utilizing harmful synthetic substances. Therefore they must be replaced by bio-fertilizers, bio-pesticides *etc.* In order to improve the quality of food. Apart from this utilization of compound manures kills the helpful soil life forms however the organic farming can uphold the lifetime of soil bio-organism and improves soil life. Organic farming aims for human welfare without harming the environment and follows the principles of health, ecology, fairness and care for all including soil. The modern concept of organic farming combines tradition, innovation and science. Most of the organic growers have expressed that lack of support price for organically grown crops and marketing infrastructure is the major constraint in promotion of organic agriculture. The future strategy depends on advancement on research in natural cultivation, the new developing zones of human health advantages, understanding the financial aspects by considering environmental issues and carbon farming with organic farming framework models. Organic food is helpful to human wellbeing and consequently, the act of organic farming keeps the earth clean.

Keywords: Environment, human health, organic food, principles, synthetic substances

Introduction

India's agricultural sector is very important which is considered the backbone of an Indian economy. Natural cultivation improves biological sound practices in farming without the utilization of synthetic inputs and majorly relies upon the use of organic wastes to raise crops. It is a kind of agriculture that depends on numerous techniques like crop rotation, vermin-composting, manure in green form, and other bio-pest control. Organic farming is the use of organic origin fertilizers *viz.*- composting, green manuring, bone-meal that helps to richer the soil and beneficial to micro and macro organisms in the soil. Organic farming is well adopted exercise in developing countries, where animals are being used for cultivation the land, dung and residual waste things prepare the manures. Organic farming increases production as well as productivity of the crop (Auobamiri and Ahmad GA, 2014) [2]. To safeguard the crop from harmful insects, pests, and diseases, the utilization of artificial chemicals are being done by developed countries. For a span of time, synthetic chemicals are increasing the productivity of crop plant but the use of these chemicals in a system for a long time reduces the activity of soil organisms and the insects or pests and other diseases gain resistance to the chemicals and later the chemicals may not show its effect on the pests, insects and other harmful organisms to the crops. Bio-fertilizers are one of the organic items made with advantageous microbes, releasing nutrients to the soil and help in the growth of the crop and gives yield without environmental degradation (Pagnanelli *et al.*, 2010, Rao *et al.*, 2014 Bagchi *et al.*, 2015) [28, 34, 3]. Imports and exports of various food commodities *viz.* fruits, vegetables, seeds, and other crops are being taken among many countries. Among food commodities, not many of them are prohibited by the nations in light of more synthetic substances which at last influence wellbeing after utilization (Ul-Haq *et al.*, 2014) [42]. The main aim of organic farming is to get food without chemicals and also to keep up the fertility status of the soil (Sujatha *et al.*, 2014) [40].

It gives employment to agricultural labours in different kinds like weeding, composting and strip farming, *etc.* It is a substitute for traditional farming. Under organic farming, compost, manure, green manure, fish-meal, *etc.* are being used rather than non-natural chemicals. It uses organic wastes and crops are grown systematically, which makes soil in good life and long live. (Amadou Binta and Barbier, 2015) ^[11].

The organic agriculture system is growing very fast and almost 170 countries are growing organic food for commercial purposes. In India, 43.1 million hectare land is cultivated under organic agriculture, including conversion area and almost 2 million producers are producing organic crops. About 36% of the whole world's producers belong to Asia, Africa with 29 percent and Europe with 17 percent of organic producers. It is an aggregated production management complex that advances & intensifies agro-ecosystem health including biodiversity, bio-cycles and soil-microbial activity. It focuses on the use of local management practices which are on-farm rather than use off-farm inputs which are less adapted to local conditions/systems. In a pertinent examination among natural and regular trimming frameworks, ecological outcomes brought about via land-use change, for example, lost items (wood, fiber, energy, and so on.) and lost biological system administrations (sequestered carbon in the soil, untamed life, biodiversity, and so on.) must be incorporated (Holger Kirchmann 2019) ^[19]

Economic, socio-cultural and environmental changes are taken place due to the commercialization of agriculture in today's time. These all changes have adverse effects on human health like an increase in cancer cases, re-productivity problem, kidney-problem and mental retardation (Kaur and Sinha, 2013) ^[21]. The Panacea for all these problems is organic agriculture which is an environment supportive and ultimately leads to good human health.

Yvon Chouinard quoted that there is no such thing as sustainability. There are simply levels of it. It's a process, not a real goal. Everything you can accomplish is to pursue it. There is nothing of the sort as any manageable economy. The only thing known that's even close to sustainable economic activity would be organic farming on a very small scale and manufacturing, you end up with the way more waste than you end up with the finished product. It's wholly unsustainable. It's just as it is.

Organic Agriculture in India

The system of organic farming in India is an old concept and followed since ancient times. According to the United States Department of Agriculture "Organic farming is a framework which avoids the utilization of unnatural sources like fertilizers, pesticides, hormones, feed added substances and so on and to the greatest degree, it depends upon crop turn

practice, crop buildups, animal excrements, off-ranch natural waste, mineral stone added substances and organic arrangement of supplement preparation and plant protection" (USDA, 2016) ^[43].

Agriculture has been playing a big role in developing countries like India. It is a primary sector of the economy and contributes a lot to economy along with the food requirement of the growing population. The green revolution technology was adopted in India, during mid 1970s and further it has increased the crop yield of wide varieties of agricultural crops which further increases 12-13 percent food supply in developing countries (Yadav, 2015) ^[46]. Agricultural inputs like improved high yielding seeds, fertilizers, pesticides and irrigation facilities contributed a lot. But, still population has not come out from 'food insecurity' and poverty in the country. Even though, the green revolution caused great changes in agriculture but use of chemical/synthetic fertilizers caused a problem to the environment and also to human health. Vermicomposting has been playing a great role and has a positive impact on plant growth & health and environment.

The Agricultural and Processed Food Products, Export Development Authority (APEDA) promoted a National Program for Organic Production (NPOP) in 2001 to enhance organic agricultural practices. The standards under NPOP were developed with guidelines of international organic production standards such as the CODEX and International Federation of Organic Agricultural Movement (IFOAM). The NPOP guidelines have been perceived by the European commission and Switzerland for creation and accreditation framework which are equal to their nation's norms. On the same line, USDA has recognized NPOP to that of U.S. standards. Indian organic items are properly confirmed by the Indian licensed affirmation bodies which are acknowledged by the bringing in nations (Deshmukh and Babar, 2015). Along with these, the Ministry of Agriculture and Farmers Welfare, the Government of India also started various promotion schemes for small farmers. Since 2004, fifteen states have adopted their own policy of organic farming in India (Pant *et al.*, 2013) ^[29]. (Chandrashekar, 2010) ^[10] stated that in countries like India where abundant availability of labour and relatively cheaper labour is found, organic farming may be a better option for cost-effectiveness as contrast to chemical farming. The Indian organic food industry with its focus on Agri-exports (Table 1) have two basic causes, *i.e.*, raising demand in developed countries for organic food products and huge support of the Indian Government to organic food products. However, the market of India is not flourished with organic food products for consumers as compare with the western countries like Europe, U.S., *etc.*

Table 1: Significant organic crops traded from India

S. No	Type of Commodity	Products
1.	Spices	Cardamom, Ginger, Turmeric, Chilli, Clove and Vanilla Black pepper, Nutmeg
2.	Plantation	Cocoa, Tea, Coffee,
3.	Pulses	Black gram, Red gram
4.	Fruits	Passion fruit, Orange, Cashew Mango, Banana, Pineapple
5.	Vegetables	Okra, Potato Brinjal, Onion, Tomato
6.	Oilseeds	Sesame, Castor, Sunflower
7.	Others	Herbal extracts, Cotton,

Source: Agricultural and Processed food products, Export Development Authority (APEDA) 2018-19.

Principles of Organic Farming

Organic farming should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible. Organic farming has few fundamental principles (Fig:1) which ensures sustainable development (Luttikholt, 2007) [24]. Following are the principles:

The principle of health: Organic creation ought to be solid in farming. Solid soils produce sound yields that encourage the soundness of creatures and individuals. It must add to the wellbeing and wellness of soil, vegetation, creatures, buyers, and the land. Other than giving security and wellness, additionally feeds the psychological, physical, biological and social prosperity of the entire condition.

The principle of ecology: Organic Agriculture ought to be founded on living biological frameworks and cycles, work with them, imitate them and help support them. This rule

roots organic farming inside living environmental frameworks. It states that production is to be based on ecological processes, and recycling. Organic management must be adapted to local conditions, ecology, culture and scale.

The principle of fairness: Organic Agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities. It emphasizes on conducting human relationship in such a way which guarantees decency at all levels and to all gatherings *i.e.*, ranchers, laborers, processors, merchants, brokers and shoppers.

The principle of care: according to this principle, precautions and responsibilities are the principle worries in the executives, improvement and innovation decisions in organic agriculture.

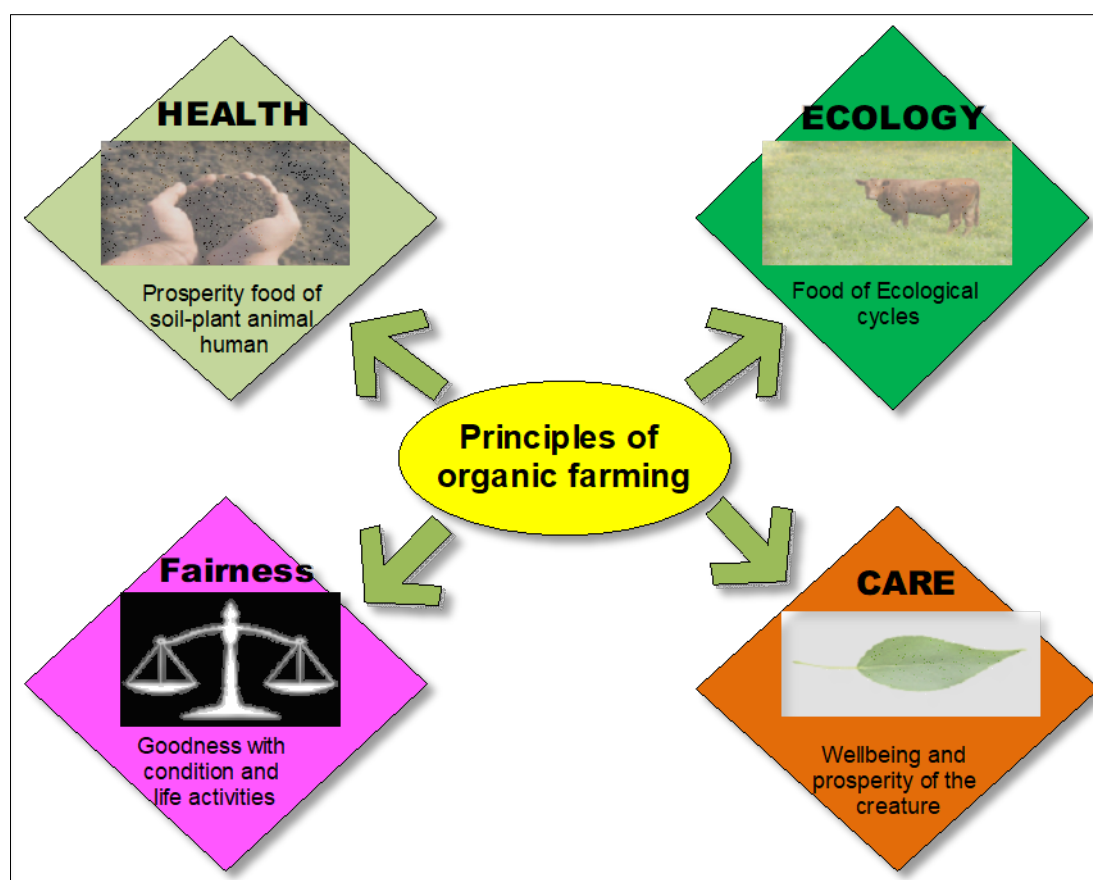


Fig 1: Principles of organic farming

Organic farming is a system of traditional farming where soil health must be maintained. The soil is living component. The microbe's population in the soil must be maintained naturally. Soil cover plays a wide role in organic farming and must be preserved for the soil environment. It shows that organic farming is a big approach to the mere rejection of agrochemicals. Organic farming has some disadvantages but, useful and eco-friendly form of agriculture (Begum *et al.*, 2010) [4]. The move towards regular practices in natural homeste4ads was distinguished in southern Spain (Garcia *et al.*, 2018) [18]

Elements of organic farming

It constitutes numerous eco-friendly techniques which conserves the soil fertility for a long time. Vermi-composting, kitchen waste, and sludge, green leaf manures, crop rotation, biological management, animal husbandry, bio-fertilizers, bio-pesticides and manures are few of the important elements (Table 2) and Fig:2. These are much useful in maintaining soil health and texture and have been proved and also provide employment to agriculture labors. Their utilization is eco agreeable and helps being developed of supportable farming.

Organic farming is low input farming and uses natural sources of nutrients. These sources of nutrients include compost, crop residues and manure, and natural methods of crop and weed control, instead of using synthetic or inorganic agrochemicals. (Gao *et al.*, 2017) ^[17]. Organic farming provides employment to agricultural labors today's time, machines are replacing the human force and making them to jobless however organic farming gives a business to labour as different operations are being operated from manure preparation till harvesting of

crop. (Shelar *et al.*,2012) ^[39]. Due to the higher information prerequisites in natural cultivation, right now watched yield gaps among natural and conventional strategies may additionally increment if a bigger number of ranchers would change to natural practices. Ranchers can profit too when they are connected to certified markets in which buyers are capable and ready to pay a significant price premium for naturally created foods (Meemken and Qaim, 2018) ^[27]

Table 2: Organic farming is depended upon the variety of different elements

Elements	Role and Impacts
Vermicomposting, Kitchen waste and Sludge	<ul style="list-style-type: none"> Nutrients enrichment to soil. Pathogen Inhibition. Improve biological and physiochemical properties of soil. Helps in restoration of friendly microbial species. Improve soil aeration. Cost effective technology for improving soil health. The composting is an organic matter i.e. plant residues and animal residues, it has been rotted down by the other organisms and bacteria for a period of time. (Ushakumari <i>et al.</i>, 2005) ^[44]
Green leaf manures	<ul style="list-style-type: none"> Helps in mineralization of insoluble plant minerals. Act as a carbon source for soil microorganisms. Enhance water holding capacity. Regulation of soil-temperature. Act as buffering agent. (Singh and Rengel, 2007).
Crop Rotation	<ul style="list-style-type: none"> Helps in pest control. Control of weeds and crop-diseases. Maintenance of soil-fertility. Improve soil stability. Higher yields. Water Conservation. The healthy environment for biotic and a-biotic interactions in soil. The reduction in soil and water contamination. Lesser dependency on chemical-fertilizers. (Bullock ,1992, Florentín <i>et al.</i>,2011) ^[8, 15].
Biological management Nitrogen Fixing Microorganisms 1. Free living 2. Symbiotic	<ul style="list-style-type: none"> Free-living (<i>Cyanobacteria</i>, <i>Nostoc</i>, <i>Anabena</i>, <i>Clostridium</i>, <i>Azotobacter</i>) and Symbiotic bacteria (<i>Rhizobium</i>, <i>Frankia</i>, <i>Azospirillum</i>) initiates root nodule formation. Helps in the conversion of Ammonia to Nitrate and finally to Nitrogen. Therefore, ensuring nitrogen availability in soil. (Wagner, 2011) ^[45].
Animal husbandry	<ul style="list-style-type: none"> Livestock is often the central point around which the organic farm operates and a major factor contributing to its success. Animal husbandry is important to organic agriculture, since it stabilizes the agro-ecological system and makes this more productive as it Contribute - towards closing the nutrient cycles and also towards higher yields.
Bio-fertilizers	<ul style="list-style-type: none"> Enhance uptake of nutrients in the rhizosphere of plants. Regulate the nutrient balance of soil. The conversion of insoluble phosphate in soluble- forms. (Mishra <i>et al.</i>, 2013) ^[26].
Bio-pesticides	<ul style="list-style-type: none"> The eco-friendly approach to pest management. Protect plants from a variety of diseases. Helps in controlling soil born fungal pathogens. Less toxic with high-specificity. (Sarkar, 2009) ^[36].
Manures	<ul style="list-style-type: none"> The manure is derived from biological sources like plant, animal and human residues. Organic manure act in many ways in augmenting crop growth and soil productivity. The direct effect of organic manure relates to the uptake of humic substances or its decomposition products affecting favourably the growth and yield of plants. Indirectly, it augments the beneficial soil microorganisms and their activities and thus increases the availability of major and minor plant nutrients.

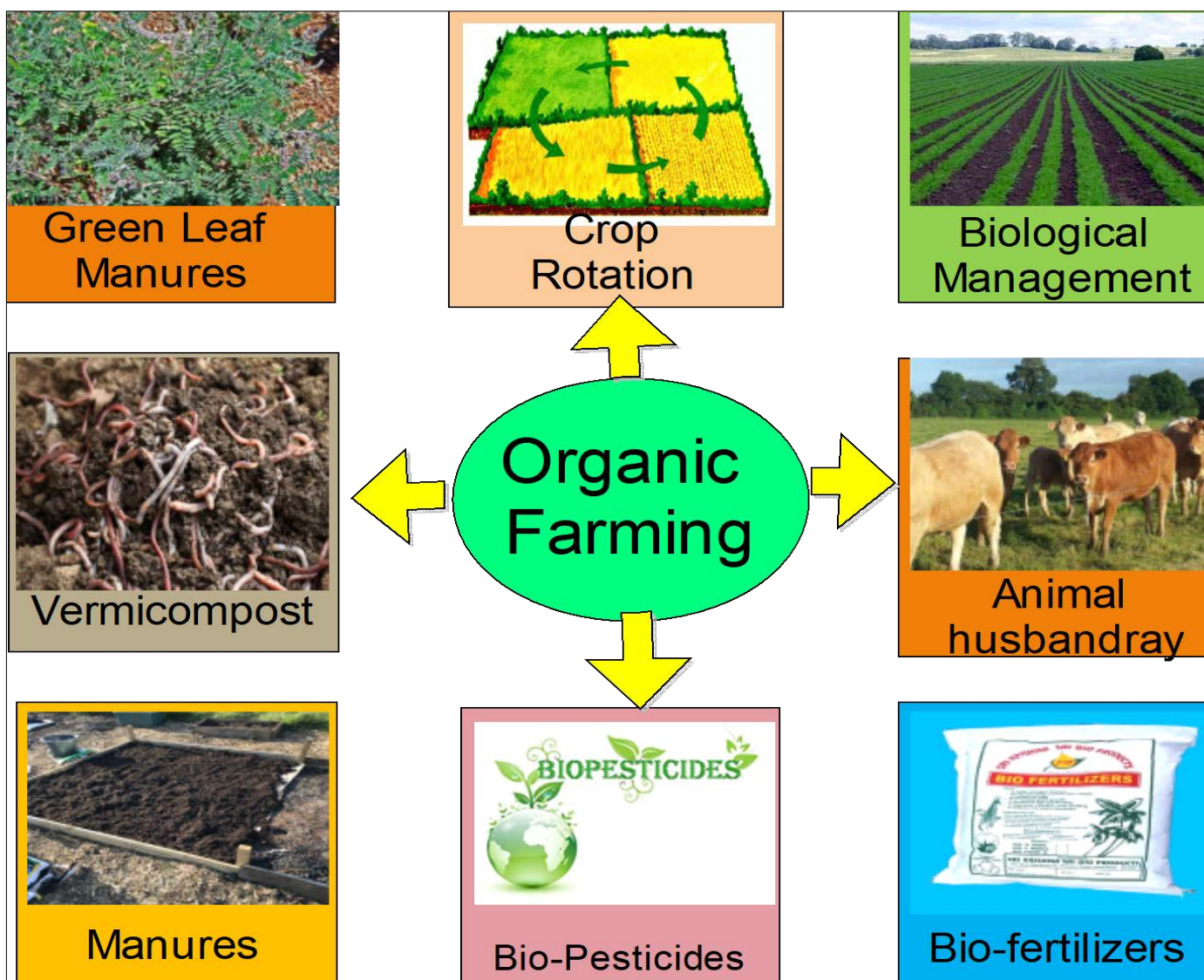


Fig 2: Core elements of organic farming

Benefits of Organic Food: Whenever there is a food scare or health scare, consumers look at disease prevention and improving nutrition. Organic foods get a sales boost as they are perceived to be healthier and safer than conventional foods.

Organic foods avoid synthetic pesticides and agro-chemicals and are therefore considered to have less harmful chemicals than conventional foods. (Katy Askew, 2020 and Subhash Chand *et al*, 2020) ^[9] show that organic foods have more nutrients than conventional foods. Consumers therefore buy organic foods as they are considered safer and more nutritious

than conventional foods.

Organic food is extremely popular and everyone wants to know about its benefits. The broad popular supposition that organic food is healthier than conventional food is quite strong and is the main reason for the increase in its demand over the past 5-6 years. Organic Facts is a strong proponent of organic food. In general, organic food consumers, manufacturers, and farmers strongly believe that organic food has the following (Fig: 3) benefits compared to conventional food.

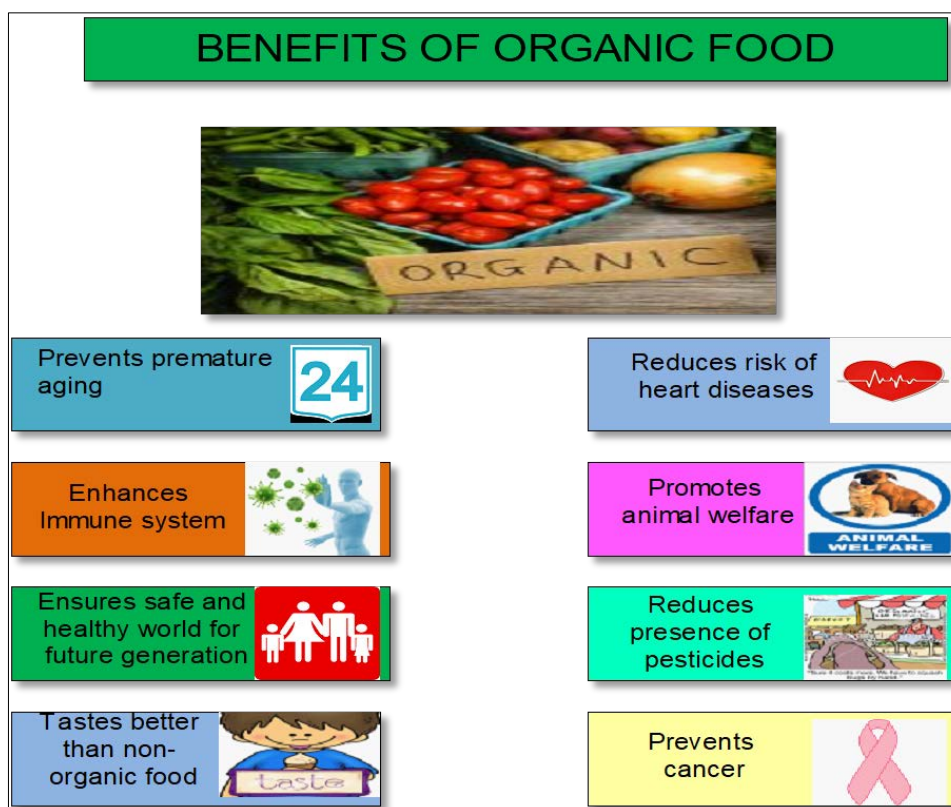


Fig 3: Possible benefits of organic food consumption

Potential benefit of organic farming cultivation

It is a kind of agriculture practice which is useful to human also as an ecosystem. The subsequent advantages are: (Gandhi and Sundari, 2012, Brar and Sarma, 2012, Khan *et al.*, 2012) ^[7, 16, 22]. Organic agriculture dispenses with ongoing and intense introductions to harmful pesticides among farm laborers, customers just as encompassing amphibian and earthbound environments. (Mie, *et al.*, 2017) ^[25]

Nutrition

Organic foods are nutritional richer and free from hazardous chemicals. It also enhances nutrients to the soil which leads to the consumption of healthier crops. The healthy benefit of a food thing is controlled by its mineral and nutrient substance. Organic cultivation improves the supplements of the soil which is given to the plants and creatures. (Sreerag and Jayaprakas, 2015) ^[41]

Free from chemicals

Organic farming does not require chemicals to use which protects the consumer from harmful diseases like cancer and others. It also does not include toxic chemicals. In the long term, organic farms save energy and protect the environment. (Kumar, 2015). The "higher substance of bioactive mixes and lower substance of undesirable substances" organic foods contribute to maintaining an ideal wellbeing status and diminishing the danger of persistent degenerative non-transferable ailments. (Di Renzo *et al.*, 2020) ^[12]

Quality food

The nature of food is likewise dictated by its taste. Organic food frequently tastes in a way that is better than other food. The sugar content in naturally developed foods grown from the ground gives them additional taste. Organic foods are

qualitative in nature and give better taste than grown by using non-natural chemicals (Sarma and Brar, 2015) ^[37].

Long Time Store

Organic foods could be stored for a longer duration due to its metabolic and structural integrity than crops grown using artificial chemicals. This enables storage of organic food for a longer time. (Pavan Kumar and Satyanarayana, 2014) ^[31].

Low input cost

Farmers can minimize the input creation costs since they don't have to purchase costly synthetics and composts. It requires low input costs as land is tilled by animals and domestically grown farm yard manure and bio-fertilizers are utilized in the sector. (Densilin *et al.*, 2011, Brar *et al.*, 2012, Pandit *et al.*, 2012) ^[7, 13, 30].

Limitation of organic farming cultivation

Time Consuming

It takes much time to give results which is less preferable to farmers. As organic farming is more laborious, time-consuming and less convenient, organic food are more expensive to the consumer. There is a high measure of rancher association time with their harvests. Regardless of whether it to guarantee that the plants remain bother free in a natural manner, or to go about as weed avoidance, the time required is altogether higher than plants and harvests created mechanically.

More Labour

Production costs are higher because farmers need more workers. It is labour intensive technique and requires frequent observations as compared to conventional farming.

Trained Farmers

Requires considerably more skill and knowledge on how to sustainably grow organic foods. It takes a ton of difficult work to effectively develop crops naturally. It requires skilled workers which must be trained time to time for farming. (Bekele *et al.*, 2014, Prasad *et al.*, 2015.)^[5, 33].

Low productivity

Low productivity is seen in this type of farming as compared to conventional farming. In organic farming is the lack of marketing of the products and inadequate infrastructure. Though it has many disadvantages in many aspects, but beneficial form of doing agriculture in respect of ecosystem and consumers as well and also increases the fertility of soil by injecting nutrients for longer duration. (Das *et al.*, 2014, Poopathi, 2014)^[11, 32].

Future Prospects

In today's time, within the world, most of the consumable foods contain harmful chemicals which are the causes of many diseases unknowingly, but this could be reduced by the use of organic farming foods (Sarkar and Brandt 2013, Zaini and Normala, 2013)^[35]. By the usage of synthetic chemicals, agriculture lands are being useless or unproductive and will be not able to provide quality food to consumers. To prevent this, it requires organic farming with great skill and need patience. India has vast barren land which could be utilized for organic farming. Sikkim is the first state in the country that adopted 100 per cent organic farming with 75,000 hectares of agriculture land. Other North-East states of India are also following the same practice in today's time and in the near future.

Suggestions and Recommendation

- The farmers should be made aware of scientific information about organic agriculture.
- Government should provide subsidies in organic produce to the farmers and facility of easy credit with the lower rate of interest.
- Higher prices should be determined by the government for organic produce than the conventional produce.
- Agriculture universities should encourage research in the field of organic farming.
- Government, NGO's and extension workers should organize various workshops, seminars, conferences, etc. with the help of the subject matter specialist for farmers.
- Private companies should invest in organic food projects.
- At an individual level, should promote the use of organic produce by going for organic agriculture in their kitchen garden, buying organic products available in the market.
- More agricultural policies at the National and state level which are in favour of growth of organic farming need to be framed.
- The improved certification system will boost the sale of organic food.

Conclusion

This review paper concluded that traditional type of agriculture is embraced by a large portion of the ranchers as this strategy gives greater efficiency and during a limited capacity to focus time in any case, diminishes the soil fruitfulness steadily and on the off chance that this cycle proceeds for an all-inclusive time, at that point, is eventually

land gets useless for farming. The panacea to all these problems is shifting to organic farming which would enhance soil fertility, reduces the environment degradation and also healthier to consumers. Though, it has some disadvantages but, useful and eco-friendly form of agriculture. An environmentally sustainable system of agriculture like organic agriculture will be able to maintain a resource balance, avoid overexploitation of resources, conserving soil nutritional quality and soil health, and biodiversity.

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