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ORGANIC AGRICULTURE AND ORGANIC FOOD: A NEED OF NATIONS HEALTH

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ABSTRACT

This review summarizes existing evidence on the impact of organic food on human health. It compares organic vs. conventional food production with respect to parameters important to human health and discusses the potential impact of organic management practices with an emphasis on EU conditions. The premise of organic agriculture is that we cannot poison our way to prosperity. Organic food is produced without the use of the synthetic fertilizers and pesticides. The German supermarket chain, Aldi describe organic food as; “grown as nature intended with no chemicals or additives, altogether a better way to eat.” Food quality and safety are two important factors that have gained ever increasing attention in general consumers conventionally grown foods have immense adverse health effects due to the presence of higher pesticides residue, more nitrate, heavy metals, hormones, antibiotic residue, and also genetically modified organisms. Moreover, conventionally grown foods are less nutritious and contain lesser amounts of protective antioxidants. In the quest for safer food, the demand for organically grown foods has increased during the last decades due to their probable health benefits and food safety concerns. Organic food production is defined as cultivation without the application of chemical fertilizers and synthetic pesticides or generally modified organism, growth hormones and antibiotics. Organic farming also protects the environment and has a greater socio-economic impact on a nation. India is a country that is bestowed with indigenous skills and potentiality for growth in organic agriculture.

Keywords: Food Safety, Organic Food, Biodiversity, Sustainable Farming, Conventional Farming, Human Health.

INTRODUCTION

Organic farming is native to India. The farmers of ancient India are known to have evolved nature friendly farming systems and practice such as mixed farming. The first “Scientific” approach to organic farming can be quoted back to the Vedas of the “later Vedic period” 1000 BC to 600 BC. Organic movement owns its origin primarily to the work of Sir Albert Howard, often referred to as the father of modern organic agriculture, who believed that a shift from nature’s methods of crop production to adaptation of newer methods leads to the loss soil fertility. Conventional farming in the face of the Green- revolution system allows the agricultural production capacity to be significantly increased, leading to the highest possible yield per hectare. Food quality and food safety are two vital factors that have attained constant attention in common people. Growing environmental awareness and several food hazards (e.g., Dioxins, bovine and bacterial contamination) have sustainability decreased the consumers trust towards food quality in the last decades. Intensive conventional farming can add contamination to the food chain. For these reasons, consumers are quested for safer and better foods that are produced through more ecological and authentically by local systems. Organically grown food and food products are believed to meet these demands. In recent years, organic farming as a cultivation process is gaining increasing popularity. Organically grown foods have become one of the best choices for both consumers and farmers. Organically grown foods are part of go green lifestyles. The term ‘organic’ was first coined by North Bourne in 1940, in his book entitled ‘Look to the land’. According to winter and Davis, ‘it is based on minimal use of off-farm inputs and on management practices that restore maintain and enhance ecological harmony’. They mentioned that organic produces are not grown with synthetic pesticides, antibiotics, growth hormones, application of genetic modification techniques (such as a genetically modified crops), sewage sludge, or chemical fertilizers.

BACKGROUND

The long-term goal of developing sustainable food systems is considered a high priority by several intergovernmental organizations. Different agricultural management systems may have an impact on the sustainability of food systems, as they may affect human health as well as animal wellbeing, food security and environmental sustainability. In this paper we review the available evidence on links between farming system (conventional and organic) and human health. In 2015, over 50.9 million hectares, in 179 countries around the world, were cultivated organically, including areas in conversion.

RESEARCH ON ORGANIC FARMING

Keeping in view the ever-increasing negative impacts on human health and ecology due to present commercial farming systems following intensive usage of synthetic inputs, researchers and policy makers are focused to find out alternatives way of farming. Organic farming is one such system which provides healthy and safe food without ecological harm. Hence the government providing organic



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farming through various schemes like National project on organic farming (NPOF), National Horticulture mission (NHM), Horticulture mission for North East & Himalayan States (HMNEH), National project on management of soil Health and Fertility (NPMS&F), and Rashtriya Krishi Vikas Yojana (RKVY). The interest of several states in promoting of organic farming indicates that organic agriculture is being viewed as a precursor to dynamic change for an otherwise stagnant agricultural sector.

Despite the initiatives and rapid progress, apprehension about the economic viability and environmentally and human health benefits of organic farming continue to bother agricultural researchers and policy makers. Indian council of agriculture research (ICAR) initiated a network project on organic farming in 2003 -04 under the project directorate for farming systems research (PDFSR), Modipuram to study productivity, profitability, sustainability, quality and input use efficiencies of different crops and cropping systems under organic farming in different agro ecological regions. The survey conducted during 2008-09 in Maharashtra, Karnataka, Tamil Nadu, Kerala, and Uttarakhand involving 50 certified organic farms and 50 comparable conventional farms revealed that organic farming in spite of the reduction in crop productivity by 9.2% provided higher net profit to farmers by 22.0% compared to conventional farming.

ORGANIC FARMING PROCESS

Organic farming and food processing practices are wide ranging and necessitate the development of socially, ecologically and economically sustainable food production system. The Internationally Federation of Organic Farming. I.E., the principles of health, ecology fairness, and care. The main principles and practices of organic food production are to inspire and enhance biological cycles in the farming system, keep and enhance deep-rooted soil fertility, reduce all types of pollution, evade the application of pesticides, synthetic fertilizers, conserve genetic diversity in food, consider the vast socio-ecological impact of food production and produce high-quality of food in sufficient quantity, High- quality of food in sufficient quantity.

According to the national organic programme implemented by USDA organic food production act (OFPA, 1990), agriculture needs specific prerequisites for both crop cultivation and animal husbandry. To be acceptable as organic crops should be cultivated in lands without any synthetic pesticides, chemical fertilizers and herbicides for 3 years before harvesting with enough buffer zone to lower contamination from the adjacent farms. Genetically engineered products, sewage sludge, and ionizing radiation are strictly prohibited. Fertility and nutrient content of the soil are managed primarily by farming practices, with crop rotation and using cover crops that are boosted with animal and plant waste manures.

BENEFITS OF ORGANIC FARMING

1. NUTRITIONAL BENEFITS AND HEALTH SAFETY

According to a study conducted by AFSSA (2003), organically and conventionally grown foods, especially leafy vegetables and tubers, have higher dry matter as compared to conventionally grown foods. Although organic cereals and their products contain lesser protein than conventionally cereals, they have higher quality proteins with better amino acid scores. Lysine content in organic wheat has been reported to be 25% - 30% more than conventional wheat. According to a review of Lairon which was based on the French Agency for food safety (AFSSA) report, organic products contain more dry matter, minerals and antioxidants such as polyphenols and salicylic acid. Organic foods contain no pesticides residues in comparison to conventionally grown foods. Therefore, organic foods ensure better nutritional benefits and health safety.

2. ENVIRONMENTAL IMPACT

Organic farming has a protective role in environmental conservation. The effect of organic and conventional agriculture on the environment has been extensively studied. It is believed that organic farming is less harmful to the environment as it does not allow synthetic pesticides most of which are potentially harmful to water, soil and local terrestrial and aquatic wildlife. In addition, organic farms are better than conventional farms at sustaining biodiversity due to practices of crop rotation. Organic farming improves physico-biological properties of soil consisting of more organic matter, biomass, higher enzymes, better soil stability, enhanced water percolation, holding capacities, lesser water, and wind erosion compared to conventionally farming soil. In addition, organically managed soils are of greater quality and water retention capacity, resulting in higher yield in organic farms even during the drought years.

3. SOCIO-ECONOMIC IMPACT

Organic cultivation requires a higher level of labour hence produce more income generating jobs per farm. According to winter and Davis (2006), an organic product typically costs 10% - 40% more than the similar conventionally crops and it depend on the output arms. On the inputs side, factors that enhance the price of organic foods include the high cost obtaining the organic certification, the high cost of manpower in the field, lack of subsidies on organics in India, unlike chemical inputs. But consumers are willing to pay a high price as there is increasing health awareness. Some organic products also have short supply against high demand with a resultant increase in cost. Organic food has a longer shelf life than conventional foods due to lesser nitrates and greater antioxidants. Nitrates hasten food



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spoilage, whereas antioxidants help to enhance the shelf life of foods. Organic farming is now an expanding economic sector as a result of the profit incurred by organic produce and there by leading to a growing inclination to words organic agriculture by the farmers.

CHALLENGES AND OPPORTUNITIES FOR DEVELOPMENT OF PLANT ORGANIC FARMING RESEARCH

1. ORGANIC FARMING AND BIODIVERSITY:

The intensive agricultural systems disturb natural habits and their heterogeneity, which results in less biodiversity. Both organic and low input farming could minimize this negative impact so as to maintain biodiversity and control weeds, insects and other pests through natural approaches. Letourneau and Bothwell presented evidence for enhanced insect pest control as a consequence of greater biodiversity in organic farms. Furthermore, organic farming may help to reverse the declines of the habitual species in regions, where conventional agriculture is traditionally applied. The positive impact on biodiversity is one of the advantages of organic farming that is most frequently pointed out in comparison to the conventional production system. In spite of the expressed opinion for the need of prolonged investigation of the effect of organic farming on biodiversity, some studies have shown that, at the farm scale, this effect is highly heterogeneous. A growing amount of published research evidence indicates that the effect of organic farming in increasing biodiversity is obviously promising. Generally, the biodiversity in organic farming is between 10.5% and 30% higher than in conventional farming.

2. ORGANIC FARMING AND SOIL FERTILITY

Badgley et al express an opinion that organic systems for food production can contribute substantially for feeding the fast-growing human population on the current agricultural land base, while maintaining soil structure and fertility. The so-called conservation agriculture is being widely promoted in many areas mostly for the recovery of degraded soils. This practice aims to improve farm productivity, profits and food security based on three principles: minimum mechanical soil disturbance, permanent soil cover and crop rotation. In future, soil metagenomics would be part of the needed innovations in organic agriculture and would help to better understand the biology underlying pathogen suppressive soils, may be leading to possible engineering of such suppressive soils.

The soil fertility is improved by increasing the populations of beneficial species grazing microbial films and thus stimulating soil nutrient mineralization. Therefore, many authors pay particular attention to mycorrhizal fungi as a source of innovation in organic farming practices for improvement of nutrient uptake, biocontrol and microbial ecology. Arbuscular mycorrhizal fungi (AMF) are a large group of soil-borne microorganism that plays important role in agricultural ecosystems.

It is known that the availability of nitrogen in the soil is one of the most important yield determining factors. In organic farming, nitrogen is derived only from the leguminous plants, crops residues, manure and compost, which do not supply enough nitrogen and this causes lesser crop yield in comparison to the conventional farming. According to Goklany, the reduction of crop yield in organic farming could be compensated with almost the same percent more arable land to ensure the necessary yield.

3. ORGANIC FARMING AND RELEVANT PLANT BREEDING

Research and innovation are expected to play a very important role in solving the existing technical gaps in organic production, processing and marketing. The use of innovative methods and technologies in organic farming depends not only on purely technical aspects, but also on the effective interaction between creativity and diversity in the perspectives of researchers and farmers, social networks and institutions involved.

Genetic variation for nitrogen use efficiency has been reported for crops relevant to organic agriculture, including potato, wheat and barley. This proves that the nitrogen use efficiency in organic farming systems could be improved by breeding.

Targeting plant breeding for organic agriculture can contribute to reduce the yield gaps between the conventional and the organic agriculture production systems. The genotype-by environment interaction is a common situation that plant breeders have to deal with and, if exploited correctly, it is still possible to make important progress in crop improvement. Hence, from the pure plant breeding perspective, organic agriculture can be considered as a separate environment with a strong component of local adaptation, in which the necessary traits and selection method should be incorporated.

Organic plant breeding is considered part of the whole production chain, it should comply with the underlying principles of health, ecology, fairness and care. Hence organic plant breeding is restricted to specific conventional breeding practices; in general, the crossing method should not break the reproductive barriers between species and evaluation and selection should be done on the basis of whole plant performance. Therefore, remote hybridization, protoplast fusion and in vitro selection are not allowed, leaving meristem culture as a single in vitro method allowed in organic plant breeding. According to the latest evaluation of plant breeding methods for organic



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agriculture, the critical issues with experimental mutagenesis with organic agriculture, the critical issues with experimental mutagenesis with organic agriculture are the use of synthetic chemicals in chemical mutagenesis and violation of the genome integrity by chromosome breakage caused by radiation. Varieties derived from conventional plant breeding that are suitable for organic farming with the exception of genetically modified varieties (conventional breeding, organically propagated, or, if necessary, derogations are made for conventionally propagated but post-harvest untreated seeds).

STATUS OF ORGANIC FARMING IN INDIA: PRODUCTION, POPULARITY, AND ECONOMIC GROWTH

Organic food and farming have continued to grow across the world. Since 1985, the total area of farmland under organic production has been increased steadily over the last three decades (Willer and Lernoud, 2019). By 2017, there was a total of 69.8 million hectares of organically managed land recorded globally which represents a 20% growth or 11.7 million hectares of land in comparison to the year 2016. This is the largest growth ever recorded in organic farming. The countries with the largest areas of organic agricultural land recorded in the year 2017. Australia has the largest organic lands with an area of 35.65 million hectares and India acquired the eighth position with a total organic agriculture area of 1.78 million hectares.

In 2017, it was also reported that day to day the number of organic produces increases considerably all over the world. Asia contributes to the largest percentage of organic production in the world and India contributes to be largest number of organic producers.

The growth of organic farming in India was quite dawdling with only 41,000 hectares of organic land comprising merely 0.03% of the total cultivated area. In India during 2002, the production of organic farming was about 14,000 tonnes of which 85% of it was exported. The most important barrier considered in the progress of organic agriculture in India was the lacunae in the government policies of making the firm decision promote organic agriculture. Recently, the Government of India has implemented a number of programs and schemes for boosting organic farming in the country.

Zero Budget Natural Farming (ZBNF) is a method of farming where the cost of growing and harvesting plants is zero as it reduces costs through eliminating external inputs and using local resources to rejuvenate soils and restore ecosystem health through diverse, multi-layered cropping systems. Indian Competence Center for Organic Agriculture cited that the global market for organically grown foods is USD 26 billion which will be increased to the amount of USD 102 billion by 2020. The major states involved in organic agriculture in India are Gujarat, Kerala, Karnataka, Uttarakhand, Sikkim, Rajasthan, Maharashtra, Tamil Nadu, Madhya Pradesh, and Himachal Pradesh.

India ranked 8th with respect to the land of organic agriculture and 88th in the ratio of organic crops to agricultural land as per Agricultural and Processed Food Products Export Development Authority and Report Research Institute of Organic Agriculture.

FUTURE PROSPECTS OF ORGANIC FARMING IN INDIA

India is an agricultural-based country with 67% of its population and 55% manpower depending on farming and related activities. Agriculture fulfills the basic needs of India's fastest-growing population accounted for 30% of total income. Organic farming has been founded to be an indigenous practice of India that practiced in countless rural and farming communities over the millennium.

Even developing countries like India, the demand for organically grown produce is more as people are more aware now about the safety and quality of food, and the organic has the massive influence on soil health, which devoid of chemical pesticides. Indian traditional farmers possess a deep insight based on their knowledge, extensive observation and practices for maintaining soil fertility, and pest management which are found effective in strengthening organic production and subsequent economic growth in India. The progress in organic agriculture is quite commendable. Currently, India has become the largest organic producer in the globe and ranked eighth having 1.78 million has of organic agriculture land in the world in 2017.

Inhana Rational Farming Technology developed on the principle 'Element Energy Activation' is a comprehensive organic method for ensuring ecologically and economically sustainable crop production and it is based on ancient Indian philosophy and modern scientific knowledge.

CONCLUSION

Organic farming yields more nutritious and safe food. The popularity of organic food is growing dramatically as consumer seeks the organic foods that are thought to be healthier. Thus, organic food perhaps ensures food safety from farm to plate. The organic farming process is more eco-friendly than conventional farming. Organic farming keeps soil healthy and maintains environment integrity thereby, promoting the health of consumers. Moreover, the organic produce market is now the fastest growing market all over the world



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including India. Food quality and safety are two important factors that have gained ever increasing attention in general consumers conventionally grown foods have immense adverse health effects due to the presence of higher pesticides residue, more nitrate, heavy metals, hormones, antibiotic residue, and also genetically modified organisms. India is a country that is bestowed with indigenous skills and potentiality for growth in organic agriculture.

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