Organic farming system in India: A review

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ABSTRACT

In the present scenario environmental conditions are adverse each and every one get affects by global warming, pollution (air, water, soil). Soil becomes infertile due to use of chemicals in the form of insecticides, fungicides and fertilizers and we get food with harsh chemicals those produce many health problems and show harmful effects on the environment. Organic production is a system that sustains soil, ecosystem and people health. Along with health benefits, organic farming has lots of benefits in our environment; ecosystem, ecological cycles and biodiversity adapted to community surroundings. Organic agricultural system joins science, innovation and tradition, to give benefit to the environment. In organic farming nano-fertilizers fulfils all requirements present as well as future generation under eco-friendly conditions.

KEYWORDS

Pollution, Pesticides, Fertilizers, Ecosystem, Sustainable, Modern Agriculture

HOW TO CITE THIS ARTICLE


More use of chemicals in the form of nutrients like phosphorous and nitrogen fertilizers affect the soil, ground water as well as crop health. As per Royal Society, nanotechnology is the technology Organic farming increases along with economic growth and provide sustainable environment. Now-a-days, farmers are more aware of chemical fertilizers and pesticides. Organic farming system is eco-friendly and helpful to reduce soil erosion, infertility issues and increase organic productivity that promotes healthy lifestyle. Organic farming involves plant cultivation and animals rearing under natural environmental conditions.

In this system biological materials is used to maintain soil fertility and balance ecological cycle by minimizing pollution not only this, organic farming system nurturing agricultural and horticultural crops without using chemicals like fertilizers and pesticides (used to control pesticides). Organic farming (a holistic system) is designed to increase the fitness and productivity of communities, such as soil micro-organisms, livestock, plants and human being. Organic agriculture system considers the medium- long term effect on agro-ecosystem which aims to produce food (healthy food free from any pesticides).
It is a method of crop cultivation which involves much more than choosing not to use pesticides, fertilizers, genetically modified organisms, antibiotics and growth hormones (Basil Hans and Raghavendra Rao, 2018). This system is soil-building approaches that keeps the soil ‘alive’ and make the soil ‘live’ and sustain fertility. Priority of all organic farming is to build live soil (fertile soil). In this system soil is fed and not the crop. The organic matter is found in the soil that develop environment for microorganisms to degrade and release nutrients (Raj Singh et al., 2016) and soil converts into fertile form.

Organic farming system highlights how to use organic matter to enhance the soil premises, accomplish closed nutrient cycles and reduce food chain related health perils. Organic farming system is a creative system that cover agriculture along with biodiversity, ecosystem and prohibit all chemical inputs. These systems avoids feed additives, pesticides, chemical fertilizers, hormones, and encourage natural techniques viz., animal manure, nutrient flow, crop rotation, plant indemnity, off-garden waste and crop decays (Priyanka and Negi, 2018).

International Federation of Organic Agriculture Movement (IFOAM) (Willer and Yussefi, 2008) give major aims of this system, these are:

- To produce high quality of food in the sufficient amount in harmony along with natural systems.
- To enhance biological cycles involving soil flora and fauna, microorganism and maintaining soil fertility and genetic diversity for long term in the system and its surroundings (plant and wildlife).
- To promote healthy water resources and create a good balance between the production of crop and animal husbandry not only this but inhibit all forms of pollution also.
- This system also includes eco-management tactics which maintain and enhance soil fertility, biological diversity, prevent soil erosion, biological diversity to be promoted and minimize risk to health and natural resources.
- Now a day there are many types of farm products that are produced organically viz., grains, fibers, flowers, dairy, meat, eggs, vegetables and fruit etc.

IFOAM-The International Federation of Organic Agriculture Movement (worldwide umbrella organization for organic agriculture) was founded during 1972 in Versailles, near Paris, by five organizations from three continents, Europe, the USA and Africa. The broad principles and practices that are expected to be followed inorganic farming as per IFOAM standards are:

- To avoid all forms of pollution
- To use possible renewable resources in locally organized agricultural systems
- To maintain genetic diversity
- To mobilize organic matter and nutrient elements locally within closed systems
- To allow livestock to express their innate behaviour
- To encourage and enhance biological cycles within the farming system
- To increase, enhance and maintain long term soil fertility
- To produce qualitative food in sufficient quantity this is acceptable socially and economically.
- To allow adequate returns to the producer.

**Organic Farming: Components**

Major components of organic farming are very effective to enhance soil fertility and crop growth which are as follows:

**Crop Residue**

Crop residues, cereals and pulses straw etc., are very helpful in recycling the nutrients in the process of organic farming. When crop residues inoculated along with fungal species, improve physico-chemical properties of soil and also increase crop yields.

**Crop Rotation**

Rotation of crops over a period of two years or more has a great potential to maintain soil fertility and insects, weed and diseases control.

**Organic Manure**

Organic manure can be obtained from many biological sources like plants, animals and human residues, bio-fertilizers, green manures, see weeds, fish manures. Crop growth may improve through organic farming directly by improving the uptake of biological sources and indirectly increasing soil fertility by enhancing the availability of major and minor plant nutrients through soil microorganisms (Santhosh Kumar et al., 2017, Agera et al., 2019).
Integrated Pest Management (IDM)

Cultural, biological (natural enemies of pest and bio-agents/ microbial pesticides) and non-chemical (herbal pesticides) methods improves crop yield and also maintain soil quality.

Benefits of Organic Farming to the Environment

Many changes observed in the environment which are long term, occurs very slowly over time. This system considers the medium to long term effect on agro-system which aims to produce food by indicating an ecological equilibrium to cure soil fertility and pest problems. Soil building applications like inter-cropping, crop-rotations, symbiotic associations, organic fertilizers and minimum tillage are principle organic practices. These stimulate soil flora and fauna and improve soil structure and formation and create more well-built systems.

Organic systems is better nutrient recollective quality and reduce the risk of pollution of groundwater. Organic agriculture system imparts to decrease the effect of greenhouse gases and global warming. Many management tactics are used by organic agriculture system like returning crop residues to the soil, minimum tillage, the use of cover crops and rotations, the greater integration of nitrogen-fixing legumes, increase the return of carbon to the soil, raising productivity and favouring carbon storage.

Types of Organic Farming

Pure Organic Farming

It involves keep off all conventionalized chemicals (Chemical fertilizers and pesticides).

Integrated Organic Farming

It involves integrating techniques such as integrated pest management and nutrients management that are aimed to achieve economic demands and ecological requirements.

Nutrients Management in Organic Farming

Organic farming is a well preserved method of farming for both consumers as well as crops. In this method, composted organic manure is used to provide nutrition for crops and enhance the organic content and soil fertility. Apart from manures, biofertilizers containing bacteria and fungi (antagonistic organisms) can be used to enhance the soil nutrients.

Weed and Pest Management

Organic, mechanical and bio-control, mixed cropping, crop rotation etc., are used in organic farming system to maintain pest-weed control and soil fertility also. These management strategies and soil protection overdo organic farming system the in comparable mnemonics. Organically approved pesticides like neem products are also used. Diseases (from fungi, bacteria and virus) can be a major concern for organic farmers as it might be reduce the crop yields. So, supplying important macro and micronutrients and adopting crop rotation is crucial to prevent various plant diseases. Even the soil is enriched with useful microbes, fungi, and bacteria to prevent harmful organisms. Plant products like neem products and other green materials are able to fight and minimize the risk of phyto-pathogens (Anju Rani et al., 2006). Not only organic fruits and vegetables but dairy products and livestock are the examples of successful organic products.

Many practices like hormones and genetic engineering practices are used to produce high yield of organic products. Organic farming system improves soil fertility, prevents soil erosion, degradation and crop failure. Organic agriculture maintains biological diversity. Organic system is very good for the environment and crop yields. Organic agriculture decreases pollution and improves fertility of soil and enhances its chemical and physical properties of soil and the whole farming system can easily rely on renewable energy sources. If we want to grow healthy fruits and vegetables, our soil must be healthy by treating biopesticides as well as biofertilizers and if we do not so than the soil become more polluted, beneficial microorganisms die and soil become infertile by using harmful pesticides and chemicals. Beneficial microorganisms which are found in the soil not only decompose the dead and decay matter but also have inhibitory effects against many phytopathogens due to presence of secondary metabolites (Anju Rani et al. 2007). To conserve soil health and living being health natural cultivation practices are much better than chemical soil management. A large by USDA Agricultural Research Service (ARS) studied nine-years and shows that organic farming system builds up organic soil matter better than conventional no-till farming.
As per the research of Dr. Elaine Ingham, only one teaspoon of organic compost rich soil may have approximately 600 million to 1 billion beneficial bacteria out of 15,000 species. While, one teaspoon of the soil which is treated with chemicals (pesticides and fertilizers) may carry only 100 beneficial bacteria.

Organic farming system also prevent soil erosion. Soil erosion is extremely serious issue in the environment that affect the land, supply of good food to humans as well. However, organic farming agriculture is helpful to discourage soil erosion from occurring. Organic farming system promotes not only environmentally but socially and economically as well to produce food and fibers (Ramesh et al. 2009). As people are aware to consume herbal products, the protection environment through the sustainable consumption is now quit possible. Organic foods that are produced by this system, established and promote balance among human beings and animals with nature. Organic farming method checks more use of chemicals along with harmful active ingredients (a.i.) and there-by ensures health (Stanhill, 1990, Raahinipriya and Rani R Jansri, 2018). Since when awareness spreads about the effect of harmful chemicals on health, environment & soil etc., is increasing chemical farming system is shifting towards organic farming system. Now a day’s India has great potential for organic farming (Santhosh Kumar et al., 2017).

Global Scenario

The global organic food industry was valued at about US$ 88.1 billion in 2015 and is expected to grow at a CAGR of 12.1 percent to reach US$ 156.3 billion by 2020. Major markets continued to show dual-digit growth rates and the French market of organic agriculture grew by 22 % in 2016. The excessive per capita occupying was 274 Euros in Switzerland, but highest organic market share (9.7 % out of the whole food market) in Denmark. In Russia organic sector could be developed being a part of protection. By 2014 - 15 total land under organic farming system nearly doubled to a total of 385,000 hectares and the market value of organic products grew by 10 times more. In the Russian Super markets mostly “premium” stores are no special shelves for organic food & their products but placed in the “healthy foods” section. Consumer’s attention is not focused on specific labels but they believe healthy life style. Buyvolova Anna and Mitusova Yulia (2018), Emelyanova and Novikov (2016) Himalaya Herbals tried used to increase visibility of the system by investing in “shop-in-shops” system, which allows brand to setup as tall within a departmental store. Along with the big and the small markets, hybrid markets also have a space in India that given nature of the economy.

The retail and e-tail market can coexist in India (Rao and Basil, 2015). As per latest FiBL survey on organic farming system globally, this system increased sustainability, and number of organic retail as well as producers increasing day by day and reaching another all-time high, as shown by the data from 181 countries (data as of the end 2017). The annual survey on organic system globally is supported by the Swiss State Secretariat for Economic Affairs (SECO), the International Trade Centre (ITC), the Sustainability Fund of Coop Switzerland, and Nürnberg Messe, the organizers of the BIOFACH fair for organic food, in Nuremberg, Germany. The statistical year book “The World of Organic Agriculture” will be launched on Wednesday, February 13, 2019, in Hall Shanghai, NCC East.

Current Scenario in India

Growing awareness of environmental as well as health issues increasing day by day due to that demand of organic foods across the world. Globally 1.6 million agriculture cultivars produces crops by use organic farming system and approx. 80 % of these cultivars are in developing countries. In the year 2012, estimated global market of organic products was approx. 70.1 billion US dollars. In India organic farming is an inherited practice that holds the key for organic producers to tap the market which is steadily growing at 15-25 % in the domestic market. In Indian market of organic food is about of INR 5.6 billion and is an emerging option for employment and income at village level. In India the total area under organic farming stood at 14,90,000 ha in 2016. Currently India ranks 33rd in terms of total land under organic cultivation and 88th in terms of the ratio of agricultural land under organic crops to total farming area. Today organic cultivation land is about 4.43 million ha and is increasing day by day. About 2.59 % (1.5 mha) of the total organic cultivation area of 57.8 mha areas, as per World of Organic Agriculture 2018 report (Kiran Pandey and
now a day due to more awareness towards organic farming, organic food production has moved out of the people eye. Currently organic farming is gaining popularity and public all over the world has accepted this system. Consumer market is naturally growing due to encouraging the farmers towards organic agricultural cultivation (Kumar and Jain, 2003). Due to increased consumer awareness about issues related to food safety and environment has contributed more and more to the growth in the field of organic farming over the last few years. (Yadav et al., 2013)

![Organic Agriculture: Key Indicators and Top Countries](image)

**Fig 1. Organic Agriculture: Key indicators of top countries**

**Table 1. Major organic crops exported from India**

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Type of Commodity</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Plantation</td>
<td>Tea, coffee, cocoa</td>
</tr>
<tr>
<td>2.</td>
<td>Spices</td>
<td>Cardamom, black pepper, Ginger, turmeric, nutmeg, chilli, clove and Vanilla</td>
</tr>
<tr>
<td>3.</td>
<td>Nut</td>
<td>Walnut</td>
</tr>
<tr>
<td>4.</td>
<td>Fruits</td>
<td>Pine apple, passion fruit, Mango, banana orange, cashew</td>
</tr>
<tr>
<td>5.</td>
<td>Pulses</td>
<td>Red &amp; black gram</td>
</tr>
<tr>
<td>6.</td>
<td>Oil seeds</td>
<td>Sesame, castor, sunflower</td>
</tr>
<tr>
<td>7.</td>
<td>Vegetables</td>
<td>Okra, brinjal, onion, tomato, potato</td>
</tr>
<tr>
<td>8.</td>
<td>Others</td>
<td>Cotton (world’s largest grower, 50 % of the total world’s largest organic cotton), plant extracts</td>
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Source (APEDA. 2014-15)

**Conclusion**

Organic farming system enhance food and fiber products that are environmentally, socially safe and maintain economy. As the awareness increases day by day about hazardous effects of chemicals in the form of pesticides and fertilizers on environment, human beings and animals health, soil, etc., due to this inorganic farming system is shifting towards organic farming system. Diverse agro-climatic conditions found in India that has great potential for organic farming and many products are produced organically in India. The price of organic products is very high and also there is lack of proper marketing of the organic products even within the domestic markets. This is the main and major constraints in organic farming in India.
Acknowledgement

I express my profound sense of gratitude to Professor (Dr.) P. K. Sharma, Dean Faculty of Science, Swami Vivekananda Subharti University, Meerut for their ever encouraging suggestions, besides providing me all the necessary facilities to complete this significant work. I express my profound thanks to my friends and colleagues for their co-operation and assistance in this work.

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