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Organic farming for sustainable agriculture in India: A review

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Abstract
Organic farming ensures long-term economic security, relies mainly on sustainable crop farming practices and removes chemical inputs which are not part of the natural eco-system. It is the most critical sector for ensuring food security and protecting essential natural resources that will be completely dependent on the world's present and future generations for the survival and well-being. Due to increased understanding of food protection and environmental protection, organic farming has seen a dramatic overall growth in almost every form of crop. As naturally organic land, north-east hilly area of the country is used for a long period of time comes to fruition. Based on their experience, detailed observations, perseverance and practices for preserving soil fertility and pest management, traditional Indian farmers possess a deep insight that is found to be successful in strengthening organic production and subsequent economic growth in India. Promoting organic farming is necessary in order to mitigate both environmental and social nuisances resulting from chemical-based fertilizers. With strong environmental benefits, organic farming will lead to a greater share of the world's sustainable food. It is far more productive and can grow intentionally than conventional agriculture. Organic farming is more intrinsic to the idea than traditional agriculture. Under the right conditions, through growing family income, the market returns from organic agriculture will potentially contribute to local food security. Organic farming has paved the way for sustainable agriculture and the security of the health of individuals. In a liberal, mixed economy like India, this would lead to a better standard of living for all people, helping the nation to fulfill the dream of welfare.

Keywords: Organic farming, sustainability, conventional, food security

1. Introduction
Agriculture remains the primary field for the development of economy of most developing countries. In order to ensure food security, alleviate hunger and protect the food, it is critically necessary to protect the essential natural resources that will be entirely dependent on for the survival and well-being of present and future generations of the planet.
With the rise in crop yields from new farming practices hitting a plateau in most countries and environmental issues becoming a matter of concern due to the excessive use of chemical fertilizers and pesticides, the need for sustainable agriculture is increasingly felt throughout the world. In view of the revival of interest over the past year, organic farming in most countries has been considered a sound and viable alternative. The recommendations of the 1981 Atlanta Conference on "Organic Farming" have served as catalyst in this direction to create interest in organic farming systems worldwide (Dahama, 1997) [5]. The method of organic farming is more environmentally sustainable than intensive farming, which relies on the routine use of herbicides, pesticides, and inorganic nutrients in crop and animal production. As established by the International Federation of Organic Agriculture Movements (IFOAM), "organic agriculture is a method of production that sustains the health of soils, ecosystems, and people". Lord Northbourne first used the word Organic Farming and Lady Eve Balfour (Francis and Youngberg, 1990) invented the expression Sustainable Agriculture. The origins of organic farming date back to the late nineteenth century, when, between world wars, founders of organic farming responded to the negative environmental effects of intensified agriculture. These concepts are expressed in today's organic agriculture standards by banning the use of synthetic pesticides and fertilizers in crop production and by emphasizing animal health in livestock breeding. Genetically modified species and nano particles that are manufactured are banned as well [Kumari *et al*, 2014] [10]. This technique minimizes the use of external inputs and data and aims to increase the yield of crops production by renewing and enhancing the ecological processes and roles of agricultural ecosystems rather than optimizing them [Shukla *et al.*, 2011] [18]. Sustainability of natural resources, reducing the cost of agriculture, providing nutritious food, growing farm income and enhancing soil quality and a healthy environment are the border goals of organic farming, while organic farming requires certification in the marketplace to provide clarification on the organic argument, but broadly any system utilizing organic farming practices and being focused on organic farming. The most critical challenge considered in India's development of organic farming was the lack of firm decision-making in government policies to encourage organic farming.

2. Context of organic Farming and Sustainable Development in India
India relies on strong food-for-aid imports from western nations. Extreme food crisis had occurred in post-independent India. By 1990, the Green Revolution initiated in 1965 had shifted the situation from food importer to food exporter. According to the World of Organic Agriculture 2018 survey, India is home to 30 percent of the world's total organic farmers, but represents only 2.9 percent of the total organic cultivation area of 57.8 m ha. It is home to more than 30% of the total number of organic producers (2.7

million) in the world, with 835,000 registered organic producers. The Indian organic food market has the potential to expand more than 25 percent annually to reach $ 1.36 billion by 2020, provided there is greater awareness of these goods and regional-specific organic farming is promoted by the government to ensure consistent future growth (Rao, 2015) [10]. During 2002, organic farming production in India was around 14,000 tones, of which 85 percent was organic farming. The most critical challenge considered in India's development of organic farming was the lack of firm decision-making in government policies to encourage organic farming. In India, Gujarat, Kerala, Karnataka, Uttarakhand, Sikkim, Rajasthan, Maharashtra, Tamil Nadu, Madhya Pradesh, and Himachal Pradesh are the major states involved in organic farming.

In 2015, the Indian organic industry's export and domestic demand grew by 30 percent and 40 percent, respectively. Due to increased understanding of food protection and environmental protection, organic farming has seen a dramatic overall growth in almost every form of crop. The growth of the organic agricultural sector will be supported in many ways by health-conscious consumers today. India has more than 15,000 registered organic farms, according to the International Fund for Agriculture and Development 9IFAD). Sikkim, India's north-eastern district, is an organic district with 75,000 hectares of land under organic cultivation. Meghalaya, another north-eastern state of India, will also see 200,000 hectares of land converted to organic cultivation by 2030. In Kerala, the practice of organic farming is approved by more than 100,000 farmers (NPOF, 2015-16). Under the National Mission for Sustainable Agriculture (NMSA), the Indian government promotes organic farming through various schemes. In order to encourage organic farming in the country, the government has introduced Paramparagat Krishi Vikas Yojana (PKVY) and Organic Value-Added Production schemes under the NMSA. Under this system, state government will assist farmers by providing financial support for a maximum of one hectare of land, centered on a cluster of land for every 20 hectares. The Government of India has also announced an investment of nearly $44 million for the Participatory Guarantee Scheme (PGS), an organic quality assurance system that certifies producers involved in organic farming (Frick and Bonn, 2015). In addition, adequate rainfall comes to fruition as naturally organic land in the north-east hilly region of the country where few negligible chemicals are used for a long period of time. Based on their experience, detailed observation, perseverance and practices for preserving soil fertility and pest management, traditional Indian farmers possess a deep insight that is found to be successful in strengthening organic production and subsequent economic growth in India.

3. Organic farming and its objectives

The tradition in sustainable agriculture is relies primarily on the use of sustainable methods of cultivation of crops and excludes chemical products which are not part of the natural eco-system. Organic farming in developing countries contributes to substantial socio-economic and environmentally sustainable development. Organic farming, an agricultural method that uses ecological control of pest and biological fertilizers primarily Extracted from animal and plant waste and cover crops for nitrogen fixation. Organic farming mainly focused on: maintaining the genetic diversity of the production system, preserve and improve the soil's long-term fertility, promoting and improving the biological system of microorganisms, soil flora and fauna, plants and animals within the agricultural system, interacting with natural in a positive and life-enhancing way, use renewable resources in production processes that are coordinated locally, creating a harmonious equilibrium between the production of crops and animal husbandry and mitigate emissions of all forms.

4. Components of Organic Farming

- Vermicompost
- Green leaf manures
- Crop rotations
- Animal husbandry
- Bio-fertilizer

Table 1: Average Nutrient Content in Organic Manures

Manures	Nitrogen %	Phosphorous %	Potash%
FYM	0.5	0.2	0.5
Poultry manures	2	1	2
Vermicompost	0.5-1.50	0.1-0.30	0.15-0.56
Fish meal	4-10	3-9	0.3-1.5
Castor cake	4.3	1.8	1.3
Cotton seed cake	3.9	1.8	1.6
Karanj cake	3.9	0.9	1.2
Mahua cake	2.5	0.8	1.2
Coconut cake	3.0	1.9	1.8
Groundnut cake	7.3	1.5	1.3

5. Crop Rotation

The practice of sequentially planting various crops on the same plot of land to improve soil health, maximize soil nutrients, and combat pest and weed pressure.

For example: A farmer planted a rice field in the following year, he planted various crops such as cotton and planted beans again in the next year to boost soil fertility and health.

6. Animal Husbandry

Animal husbandry provides food such as milk, meat, and other products with added value, which helps poverty eradication and self-sufficiency in the field of food security. Animal husbandry also provides valuable organic manures for agriculture, thereby improving soil fertility and productivity.

7. Biofertilizers

Biofertilizers are microbe-containing substances that help to promote plant and tree growth by increasing the supply of essential nutrients to plants. It contains living species that include mycorrhizal fungi, bacteria, and blue-green algae.

Examples: Cyanobacteria, Rhizobium, Azotobacter, Azospirillium, Azolla, etc.

8. Biological Control

Biological control is a method of controlling insect pests and diseases utilizing other species that depend on predation, parasitism and herbivory, or any other natural mechanisms with active involvement of farmer management.

Table 2: Insects used for weed control

Insects	Weed Control
Crocidosema lantana busk moth	Lantana camara
Cochineal scale	Prickly pear
Flea beetle larva	Alligator weed
Neochetina burchii	Water hyacinth
Mexican gall fly	Congress grass

Table 3: Mycoherbicides

Product	Content	Weed Control
De-vine	*Phytophthora plamivora*	Milk weed vine
Collego	*Colletotrichum goleosporoides*	Joint vetch
Bipolaris	*Bipolaris sorghicola*	Johnsongrass
Biolophos	*Streptomyces hygroscopicus*	General vegetation

9. Organic Farming Through Sustainable Agriculture

The three key priorities are built into the philosophy of sustainable agriculture: environmental health, economic profitability, and social and economic equity. The idea of sustainability relies on the premise that, without undermining the capacity of future generations to meet their own needs, we must meet the needs of the present. Sustainable agriculture, according to the Food and Agriculture Organization (FAO), "is the resources to meet changing human needs while maintaining or enhancing the quality of the environment and conserving natural resources". Natural resource management is important for the agricultural sector, which ensures long-term sustainability. In its entirely, the precise dependency on inorganic fertilizers and pesticides still challenges the notion of sustainability. This bothers the climate and food chain. There are serious long-term effects on the environment from the use of chemicals in farming. Such pollutants contaminate soil and water supplies, thereby entering the food chain. In addition to this, the flesh and milk of dairy cows become highly concentrated when cattle munch of foliage containing these chemicals. In the end, it causes significant health issues for individuals who consume milk products. Organic farming evades all sorts of inorganic farming activities that harm the agroecosystem. An organic farming activity provides nutritious food while maintaining an ecological balance to avoid problems with soil fertility or pests. In order to mitigate all environmental and social nuisances resulting from chemical-based farming, the promotion of organic farming is necessary. The very specific approach to organic farming for the sustainable environment includes the following (Yadav,2017).

- The natural landscape and agroecosystem enhancement and maintenance.
- Avoidance of over-exploitation of natural resources and waste.
- Minimizing the use of energy resources that are not renewable.
- Synergies for exploitation that occur in a natural environment.
- Maintenance and enhancement of soil quality by stimulating organic manures or soil activity and avoiding pesticide damage to them.
- With a stable, clean, and healthy working climate, maximum economic returns.
- Recognition of the virtues of indigenous know-how and traditional system of farming.

Only organic farming will make long-term economic sustainability feasible, and organic farming is more profitable because of its premium market price. Organic farming guarantees long-term economic security in contrast to industrial farming dependent on artificial fertilizers and pesticides (Chandrashekar, 2010). Increases in production costs due to the use of pesticides and fertilizers in organic farming, and their negative impact on the health of farmers, have an impact on the economic balance in the community, and only the producers of these pesticides benefit. Continuous depletion of soil productivity by chemical fertilizers contributes to the loss of output and thereby raises the cost of output, rendering agriculture economically unsuitable. Implementing a strategy involving food security, rural jobs generation, poverty alleviation, natural resource conservation, the adoption of an export-oriented production system, sound infrastructure, active government engagement, and the private-public sector would help to revamp agricultural economic sustainability (Soumya,2015). Organic farming focuses more on the use of local resources, which serves to inspire farmers and the rural community. Organic cultivation results in higher returns over time by sustainable agriculture, with fewer need for high-priced and environmentally damaging inputs such as chemical fertilizers, pesticides and weedicides. Organic farming is therefore a very indigenous idea to India and gives sustainability to agriculture.

10. Organic Farming or Conventional Farming

The fundamental difference between organic and conventional agriculture is that conventional agriculture relies on chemical intervention to fight pests and weeds and to provide nutrition for plants. That means pesticides, herbicides, and fertilizers made from synthetics. But organic farming relies upon natural principles such as biodiversity and composting. In order to meet growing demand, traditional farming has been a common practice among farmers to increase productivity. However, the high use of synthetic fertilizers, pesticides, and herbicides has been based on this form of agriculture, which has raised relevant environmental issues that affect biodiversity. In traditional agriculture, a significant amount of chemical and energy input is needed to achieve the highest possible crop yield. In order to make agriculture more efficient, conventional agriculture has been developed but achieves that efficiency at the heart of environmental causes. Maximizing the potential yield of crops is the goal of conventional agriculture. This is done by the use of synthetic substances, animals that are genetically engineered and a variety of consumer goods. This crop production is of little benefit to anyone but food security and the economy. As the aim of traditional agriculture is to increase yields, there is typically no protection of environmental health and biodiversity. Being labour intensive, organic farming also requires high salaries. With clear environmental benefits, organic farming can contribute to a greater share of the world's sustainable food. It is far more productive and grow internationally than conventional agriculture. Organic farming is more intrinsic than the traditional agriculture. Traditional agriculture does not fully fit into organic farming, since it did not require manoeuvring to achieve sustainable output of oil, plant, climate and citizens.

11. Organic farming and its impact on yield produce

The yields in comparison to comparable conventional

systems are directly related to the agricultural strength of the conventional systems that prevail. This refers not only to the comparison of regions, but also to the comparison of crops within an area, and to individual crops over time. An over-simplification of the impact on yield of conversion to organic farming suggests that:

- Organic farming reduces yield in intensive farming systems, the range depends on the degree of external input usage prior to conversion.
- Conversion to organic farming typically results in almost equal yields in the so-called Green Revolution areas (irrigated lands).
- Organic farming has shown the potential for increased yields in conventional rain-fed agriculture (with low external inputs).

A number of studies have shown that crops in organic farming systems generate substantially higher yields under drought conditions than comparable traditional agricultural crops, often generating 7-90 percent of conventional crops. Others have shown that organic systems have less variability in long-term output.

12. Organic Farming and Food Security

Modelling studies have not validated the popular argument that a large-scale conversion to organic agriculture would result in a dramatic decrease in world food supply or a large increase in the conversion of undisturbed land to agriculture. Conversion studies showed that domestic food consumption would not suffer, that exports would differ depending on the crop, but with further diversification of agriculture, the structure of agriculture would certainly change. As a result of increased investment in research and extension, widespread conversion to organic farming will lead to crop yield increases over current averages. In order to maximize the use of nutrients and the space between organisms, organic farmers cultivate a variety of crops and maintain livestock. This ensures economic benefits in all of these at the same time by low crop production or yield failure due to biotic and abiotic factors. This can have an important effect on the protection of local food. Organic agriculture has proved to outperform traditional agriculture systems under conditions of environmental stress in rain-fed systems. Under the right conditions, through growing family income, the market returns from organic agriculture will potentially contribute to local food security. Organic farmers cannot produce enough food for everyone at the global level, especially in developing countries with high population pressure and the current state of knowledge and technology.

13. Constraints of organic farming in India

- Lack of awareness.
- Lack of good policies regarding marketing.
- Biomass deficit.
- Inadequate facilities for farming.
- High farm input costs.
- Inefficient policies for agriculture.
- Lack of support in financial terms.
- Inability to fulfill the demand for exports.
- Lack of quality requirements for manure.
- Low yield.
- Lack of government measures to support organic farming.

14. Conclusion

Agriculture remains the key sector for the economic growth of most developing countries, as food and shelter should be self-sufficient for any country's development. The practice of organic farming has gained traction in India and farmers are more conscious of the fact that organic farming is a practice that can sustain India agriculture from the point of view of farmers, the question of yield and financial viability are crucial; but they remain unanswered to a large extent. Conventional agriculture has been gradually subject to stringent regulations about the environment and animal health for many years. In relation to these new technologies, the organic farming sector needs to see where it stands. There is already a paradigm shift, from mastering nature to cultivating its wealth. Without adversely affecting the soil's health and climate, organic farming can provide quality food. Suitable crops or the products that have foreign market requirements needs to be established for organic production. It will provide adequate employment opportunities and bring prosperity and peace to the region. In order to improve this field, there is therefore an urgent need for favourable policy initiatives. These policies lay a strong foundation for fostering sustainable growth, and the dream of sustainable development will become a reality. Organic farming has paved the way for sustainable agriculture and the security of the health of individuals. In a liberal, mixed economy like India, this would lead to a better standard of life for all people, allowing the country to achieve the dream of welfare.

15. References

1. Ashraf I, Ahmad I, Nafees M, Yousaf MM, Ahmad B. A review on organic farming foe sustainable agricultural production. Pure and Applied Biology. 2016; 5(2):277.
2. Barik A, Sarkar N. Organic Farming in India: Present status, Challenges and Technological Break Through. International Journal of Economic Plants. 2017; 4(4):182-189.
3. Bond W, Grundy AC. Non-chemical weed management in organic farming systems. Weed research. 2001; 41(5):388-405.
4. Chandrashekar HM. Changing scenario of organic farming in India: An overview. International NGO Journal. 2010; 5(1):34-39.
5. Dahama AK. Organic farming for sustainable agriculture. Agro Botanica, 1999, 147-153.
6. Stockdale EA, Lampkin NH. Agronomic and environmental implications of organic farming systems. Advances in Agronomy. 2001; 70:261-327.
7. Francis CA. Sustainable agriculture: myths and realities. Journal of Sustainable Agriculture. 1990; 1(1):97-106.
8. Halberg N, Sulser TB, Hogh-Jensen H, Rosegrant MW, Knudsen MT. The impact of organic farming on food security in a regional and global perspective. Global development of organic agriculture: Challenges and prospects, 2006, 277-322.
9. Haldhar SM, Jat GC, Deshwal HL, Gora JS, Singh D. Insect pest and disease management in organic farming towards Organic Agriculture. Today & Tomorrow's Publishers, New Delhi, 2017, 359-390.
10. Kumari KA, Kumar KN, Rao CN. Adverse effects of chemical fertilizers and pesticides on human health and

environment. Journal of Chemical and Pharmaceutical Sciences. 2014; 3:150-151.
11. Lockeretz W, Shearer G, Kohl DH, Klepper RW. Comparison of organic and conventional farming in corn belt. Organic farming: current technology and its role in a sustainable agriculture. 1984; 46:37-48.
12. Nandwani D. Organic farming for sustainable agriculture (Vol. 9). Springer, 2016.
13. Pandey J, Singh A. Opportunities and constraints in organic farming: an Indian perspective. Journal of Scientific Research. 2012; 56:47-72.
14. Reddy BS. Organic farming: status, issues and prospects- a review. Agricultural Economics Research Review. 2010; 23:343-358.
15. Rigby D, Caceres D. Organic farming and sustainability of agricultural systems. Agricultural systems. 2001; 68(1):21-40.
16. Ramesh P, Panwar NR, Singh AB, Ramana S, Yadav SK, Shrivastava R, *et al*. Status of organic farming in India. Current Science, 2010, 1190-1194.
17. Sofia PK, Prasad R, Vijay VK. Organic farming-tradition reinvented. Indian Journal of Traditional Knowledge. 2006; (5):139-14
18. Shukla A, Patel BR, Patel AN, Patel AR. Organic farming for sustainable agriculture. Kisan World. 2011; 38(3):39-42.
19. Seufert V, Ramankutty N, Foley JA. Comparing the yield of organic and conventional agriculture. Nature. 2012; 485(7397):229-232.
20. Chandra S, Chauhan SK. Prospects of organic farming in India. Indian Farming. 2004; 52(2):11-14.
21. Soumya YKM. "Organic Farming: An effective way to promote sustainable development in India", IOSR Journal of Humanities and Social Sciences. 2015; 20(6):31-36.
22. TeBeest DO, Templeton GE. Mycoherbicides: Progress in the Biologic. Plant disease. 1985; 69(1):7.
23. Willer H, Lernoud J. The world of organic agriculture. Statistics and emerging trends 2019. Research Institute of Organic Agriculture FiBL and IFOAM Organics International, 2019, 95-104.
24. Yadav M. Towards A Healthier Nation: Organic Farming and Government Policies in India. International Journal for Advance Research and Development. 2017; 2(5):153-159.
25. Gaur AC. "Bulky organic manures and crop residues in fertilizer organic manures recyclable waste and bio-fertilizers". Fertiliser Development and Consultation Organisation, New Delhi, 1992, 32-36.