

ORGANIC FARMING: A WAY TO SUSTAINABILITY

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Abstract

India is a prominent global force in the field of agriculture. Agriculture constitutes the predominant sector of the Indian economy, employing more than sixty percent of the nation's total workforce. Previously, India was depended on imports to sustain its vast population, but now it is exporting food grains after the successful implementation of the green revolution. The Green Revolution resulted in a significant increase in food production in India. However, the ecosystem has persistently degraded, particularly in terms of soil quality, vegetation health, and water resources. India has endured significant costs in achieving food security, including the depletion of subterranean water reserves, contamination of soil, and the destruction of other natural resources. Concerns regarding the sustainability of the input intensive agriculture system have arisen due to its negative repercussions. Therefore, it is necessary to alter the cropping pattern. Organic farming is a significant practice that aims to reduce the environmental and ecological consequences of sustainable development. The utilization of a greater number of organic materials in agricultural methods might mitigate the detrimental impacts on the environment by preserving its natural cycles during the recovery process. Additionally, organic farming has the potential to boost food quality. Organic farming predominantly avoids the utilization of chemical fertilizers, pesticides, growth hormones, and feed additives in animal operations. The integration of organic farming with innovative technologies is crucial for mitigating the constraints and difficulties associated with organic farming. The primary objective of this study is to shed light on the part that organic farming plays in the process of maintaining sustainability. After reviewing a number of research papers that were published in a variety of publications on the topics of sustainability, organic farming, and sustainable agriculture, it was found that farmers ought to be encouraged to adopt organic farming because organic farming is both sustainable and productive. Many farmers are able to improve their agricultural output and quality of life in a manner that is more environmentally

friendly as a result of the innovative technologies and new approaches that are making new trends towards a sustainable farming system. In other words, organic farming is a reflection of the principles of sustainability that are underlying global agriculture.

Keywords: Green Revolution, sustainable development, organic farming, environmental degradation, sustainability.

1. Introduction

The dearth of pollution in the environment is crucial for maintaining the existence of life for every living thing that exists on the earth. All living things on the planet are experiencing problems as a result of agriculture's overuse of compounds, herbicides, fungicides, and weedicides. This is despite the fact that farming facilitated by technology is needed to sustain the increasing number of people worldwide. The only approach that has arisen to bring about sustainability in agriculture is farming that is favorable to the ecosystem. The focus of this piece of writing is on organic farming, which should establish an ecological equilibrium and a microclimate that is favorable for the development and health of soil flora, fauna, farmhands, and ultimately the large population that consumes agricultural produce. Not only does it advocate for the

cessation or restriction of the usage of insecticides, but it also forcibleness the necessity of organic farming.

2. Objective and methodology

This study intends to explain the fact that that organic farming plays a vital role in the process of sustainability. We have reviewed a number of research papers that were published in a variety of publications on the topics of sustainability, organic farming, and sustainable agriculture. Research papers were retrieved from Google scholar and findings are discussed and summarized. This paper reveals the fact that organic farming can be sustainable and productive.

3. Concept of Organic Farming

"Organic farming" is used to describe an agricultural practice that avoids the usage of any extremely dangerous chemicals, pollutants, or synthetic fertilizers. By using organic materials such as crops, livestock, and agricultural waste, containing

biological components, it adheres to stringent cultivation procedures that sustain the condition of the soil and reduce the amount of environmental degradation that arises. When referring to the soil, the organisms, plants, and creatures that comprise the food chain, the organic system puts a strong focus on preserving and enhancing the overall state of these many components. This is due to the fact that they are the primary elements of the organic system that is responsible for determining the effectiveness of the farm both in the present and in the future. The foundational goal of organic farming is to make use of inputs, such as knowledge, in a manner that encourages the development of biological systems that make use of the nutrients that are available and offer protection against organisms that are harmful. Soil is one of the most vital ingredients in organic farming, and it is also the most important aspect. Because it is considered that pesticides and fertilizers make the agricultural process more challenging, the great majority of these substances are classified as forbidden (Singh et al., 2019).

“Organic Agriculture is a unique production management system which

promotes and enhances agro-ecosystem health, including biodiversity, biological cycle and soil biological activity. This is accomplished by using on-farm agronomic, biological, and mechanical methods in exclusion of all synthetic off-farm inputs”- ICAR

“An ecological production management system that promotes and enhances biodiversity, biological cycles, and soil biological activity. It is based on the minimal use of off-farm inputs and management practices that restore and enhance ecological harmony.”-USDA

Organic farming entails the development of plants without the use of synthetic fertilizers and pesticides. (Singh.,2021). Organic cultivation commences with a focus on the soil and the incorporation of locally sourced naturally occurring matter into the soil. It is a method of production that, to the greatest extent possible, excludes or minimizes the use of artificial fertilizers, herbicides, growth regulators, and additives for animal feed as much as feasible. An extensive range of agricultural commodities are cultivated in an organic manner, encompassing processed foods, textiles (e.g., cotton), dairy, and eggs, as

well as produce and grains. Increasing biodiversity in the field in order to alter the environment of undesirable creatures and deliberately sustaining and replenishing soil fertility are fundamental to organic agricultural management. It adheres rigorously to cultivation techniques that preserve the health of the soil and minimize environmental damage through the utilization of organic decline including biological materials derived from crops, animals, and farms.

4. Characteristics of organic systems

The production technique known as organic farming is characterized by the prohibition of the utilization of computationally created agricultural inputs, which include fertilizers and pesticides (Chhonkar 2002). As a replacement, it makes use of it makes use of natural material (crop remnants, animal waste, grains, and environmentally friendly pesticides) with the purpose of "preserving the productivity of the soil and fertility and managing pests under conditions of stable resource conservation and an ecologically sound environment." (Howard1940)

Ensuring the soil's organic matter remains at a consistent level, boosting the reproduction of soil microbes, and applying

cautious mechanical methods to preserve the soil's long-term fertility. (Singh et al., 2019; Naik et al., 2022).

With the utilization of relatively insoluble nutrient sources that soil microorganisms make accessible to plants, the process of indirectly supplying nutrients to crops is being utilized. (Singh et al., 2019; Naik et al., 2022).

The holistic management of cattle, taking into consideration their behavioral requirements, environmental adaptability, and requirements for consuming food, health, and rearing, with a focus on animal welfare. (Singh et al., 2019; Naik et al., 2022).

The Organic farming promotes crop rotation, use of crops residues, compost, outside the farm organic matter, solid class rock extras, and biological procedures for nutrient activation and plant protection. These procedures are followed to preserve the fertility of the cultivated land.

The system is comprised of several components, each of which performs a specialized function that is interconnected with the others. To enhance the fertility of the soil, increase the amount of biological activity, and ensure long-term wellness of

the soil, it is recommended that the utilization of weeds, natural compost, manures from animals, rotations of crops, mixed farming, organic waste, and Compost be utilized. The management of weeds is accomplished in a similar manner through the use of crop rotations, proper crop husbandry, and biological controls.

5. Present Scenario in India

The organic agricultural sector in India has grown significantly since its beginning in 2003–2004, and it is projected to cover 2.8 million hectares by the time the financial year 2020–21 rolls around. When compared to the early commencement, which consisted of only 42,000 hectares, this indicates an enormous expansion. According to the conclusions of FiBL and IFOAM (2021) this accounts for around two percent of the total 142 million hectares cultivated area of the country, Across the continent of Asia, there are around two million organic farmers, with India having the biggest share of these farmers. In addition, India does have the greatest number of organic producers (1.6 million, which is a rise from just 2.0 lakh in 1999), and it is placed sixth in terms of the area that is entirely devoted to the practice of

organic farming. In last ten years, organic production in India has had a significant growth, which has resulted in an increase of 194% in the total land area available for cultivation. (Naik et al., 2022).

As on March, 2023, the total area that is covered by the National Program for Organic Production and under the organic certification system is 10.17 million hectares. In addition to the 4780130.56 hectares that have been designated for the acquisition of wild harvest, this comprises a total of 5391792.97 hectares of land that is suitable for production. In India, Madhya Pradesh, Maharashtra, Gujarat, and Rajasthan are the states that have the highest proportion of land under the organic certification. A total of about 2.9 million metric tons certified organic goods are produced in India between 2022 and 2023. A wide variety of food items, such as oil seeds, cellulose, grains and millets, fruits and vegetables, processed meals, and so on, are included in this category. In addition to the work that is done in the kitchen, there is also the manufacture of functional food products, organic cotton fiber, and other things. Madhya Pradesh has the 1st rank in

the production of organic food, followed by Karnataka, Rajasthan, and Odisha.

6. Organic farming and Sustainability

Organic farming is environmentally sustainable (Doran 1997). It poses no environmental danger. Modern farmers utilize synthetic fertilizers in modern agriculture. Synthetic fertilizers are produced by the combustion of fossil fuels. Reducing the use of synthetic fertilizers leads to a decrease in environmental pollution.

An important benefit of organic food production is the ability for farmers to mitigate the release of greenhouse gases, including methane and nitrous oxide, into the environment. Additionally, it maintains cultural and agricultural practices while offering more nutritious food options. (Gamage et al.2023). There are some facts that reveals that how organic farming can be sustainable.

1. Soil and Nutrients

An essential tenet of organic farming is the efficient regulation of organic nutrients and carbon levels in the soil. It improves the composition of soil organic matter. Multiple studies in the domain of organic management systems have demonstrated

that the inclusion of organic manures, cultivation of beans, implementation of crop rotation, use of bio fertilizers, and utilization of compost all result in improved physical, chemical, and biological properties of soil. It enhances the accessibility of both macro and micro nutrients. (Edwards et. al. 1974 and Dadhwal at al.2011)

Organic farming emphasizes in semi-arid and arid dry land soils since. These types of soils have a content and an inadequate capacity to absorb water. As a result, organic farming is receiving a lot of attention in these soils. Furthermore, the depth of the soil creates a barrier in a few particular locations due to its presence. Organic farming improves the soil's physical condition and increases the soil's capacity to provide nutrients to plants. It is beneficial to the plants. Drylands are also rich in natural resources which are advantageous to organic agriculture techniques. Drylands are particularly plentiful in the use of animal waste (Tamaki et al. 2002).

2. Water

It has been demonstrated that Organic farming minimizes the chance of erosional

work of water; this is accomplished by the use of a wide range of conservation strategies, including rotation crops, cover crops, intercrops, and compost. This is a widely held and well accepted notion. As a result of their existence, they either directly or indirectly improve the quality of soil, encourage water penetration, and limit the amount of nutrient runoff and erosion that occurs (Onduru et al. 2002). The cause of organic farming on the efficiency with which India uses water, on the other hand, has not been the topic of any systematic investigation, and this is a matter that ought to be the subject of more research.

3. Air pollution & climate change

Even so, it is believed that the indirect and less apparent consequences of air pollution are expected to cause the most significant economic damages. The public tends to prioritize the conspicuous evidence of agriculture's impact on the environment. The emission of methane from rice and animal production, nitrous oxide from fertilizers and manure, and ammonia from dung and urine are the four main avenues via which agriculture affects air quality and the composition of the atmosphere. Land clearance by fire, particularly in rangeland

and forest areas, leads to the production of particulate matter and greenhouse gases. Additionally, the burning of rice leftovers also contributes to this environmental impact.

4. Pollution from biomass burning

Biomass burning during agricultural clearing releases soot, dust, and trace gases. Tropical "slash and burn" farming, pasture lands igniting Savannah lands to boost fodder growth, and removing fallow land and disposing of crop leftovers, especially rice, include burning. Major worldwide repercussions including tropical air pollution from this burning have occurred far from the fires. Two developments should significantly reduce biomass burning air pollution. Burning or fire after wood harvest deforests. Proposed deforestation reduction will limit air pollution increase. The change from extensive to intensive livestock production may minimize rangeland burning under extensive grazing, although the latter will likely stay dominant. Organic agriculture uses renewable resources and recycles waste nutrients. Organic livestock production prioritizes animal care and natural feeds. Organic farming uses the

environment's natural pest and disease control systems to grow crops and raise livestock without synthetic pesticides, herbicides, fertilizers, growth promoters, gene manipulation, antibiotics, or zoo hormones. Thus, organic farms adopt several methods to protect ecosystems and prevent pollution.

5. Organic farming and biodiversity

When it comes to organic farming, biodiversity serves as both an instrument and an objective. The key to its success is maintaining a natural biological balance both below and above ground. Having a diverse range of plants and animals on land helps to avoid the spread of diseases and pests, and a healthy soil is the foundation upon which food production is conducted. In spite of the fact that organic agriculture is dedicated to the preservation and improvement of biodiversity, many systemic approaches continue to be restricted to the substitution of inputs. A stronger move towards a systems approach, which is based on increased knowledge of ecosystem processes, is required in order to unlock the true potential of organic agriculture with regard to biodiversity. The following presentation delineates the

encouraging outcomes that have been seen in organic agricultural systems, despite the fact that they are still scattered. Soil systems, farming systems, and the greater ecology are all discussed in relation to the food chain. When it comes to soil biodiversity, genetic resources for food and agriculture, and wildlife biodiversity, this includes discussions of the influence that organic management has on these areas.

6. Organic agriculture nurtures soil biodiversity

A fundamental component of organic farming is the cultivation of fertile soil. By utilizing crop rotations and strip cropping, green manuring and organic fertilization (animal manure, compost, crop residues), low tillage, and avoiding the use of pesticides and herbicides, organic methods provide circumstances that are favorable for the biotic and abiotic resources that are found in the soil. Biological activity, total density, and variety of soil microorganisms have all been shown to be greatly increased in soils that have been treated organically, according to research conducted in Europe. The recycling of nutrients and the structure of the soil are both improved by such diversification. (Acton et al. 1995)

7. Organic agriculture and nature conservation

Undoubtedly, farmers play a crucial role as the primary stewards of natural resources. There are several feasible alternatives for classifications of protected areas where human activities are permitted. Crucially, the vast expanse of land around protected areas necessitates an agro-ecosystem management approach that safeguards the security and wholeness of the landscape. By implementing organic practices on the farmland that surrounds and links protected areas, there is no need to be concerned about the endangerment of wildlife or the pollution of air, water, and soil. Buffer zones are essential for the effectiveness of conservation efforts in protected areas. Organic agriculture promotes the coexistence of humans and environment, while also allowing them to get economic advantages from their land. Given that the majority of protected areas were historically owned by local villagers, organic agriculture enables these individuals to retain a degree of authority over their land. Through their farming methods, they can safeguard the land and its biodiversity, while also reaping the

advantages for their own benefit. Simultaneously, they can preserve and enhance the natural environment. The ecological effects of organic agriculture are evident at several levels, including within the farm, at the edges of the farm, and across the entire ecosystem. Although the previous parts have covered on-farm biodiversity, the upcoming sections will focus on the relationship between organic agriculture and the broader landscape, namely protected areas and buffer zones.

8. Organic farming and rural development

Not only do organic farming and integrated farming give genuine prospects on several fronts, but they also make a significant contribution to the sustainability of rural economies. Indeed, the expansion of the organic sector has already resulted in the creation of new job possibilities in the fields of agriculture, processing, and other activities associated to the industry. The economic well-being and social cohesiveness of rural regions may both be significantly improved by these agricultural methods, in addition to the environmental benefits that they provide. This is done with the intention of assisting the industry in growing even further and supporting

connected companies across the food chain.

The availability of financial support and other incentives for farmers to switch to organic farming allows for this.

9. Organic food and conventional food

The conclusive study has not been done since there are too many variables to compare organic and conventional diet correctly. These include crop variety, period after harvest, post-harvest treatment, soil type, and climate, which might affect nutritional quality. After excluding long-banned persistent pesticides, organic food had 13% pesticide residues compared to 71% for conventional food in a 2002 study. Like other foods, organic food is safe. Before eating, wash vegetables like any other to maintain cleanliness. Organic vegetables have much less pesticide residues than conventional produce. The idea that raw manure increases the danger of E. coli contamination in organic food is unfounded. Conventional farms also apply tons of raw manure without control. Organic agricultural regulations require manure to be composted or applied at least 90 days before harvest to allow microbial breakdown of diseases.

7. Challenges in the way of organic farming

The incapacity of the government to make clear decisions at the policy-making level that would encourage organic farming is the fundamental obstacle that is preventing the expansion of organic farming worldwide. Until there is a clear and unequivocal direction, from the Centre down to the Panchayath levels, in terms of assistance in both the financial and technical domains, just drafting laws will not be successful. This is because there is a lack of clarity and understanding. After careful consideration, it has been established that the following are the primary challenges that are preventing the growth of organic farming in India:

1. Lack of sufficient knowledge

In India, organic farmers do not have the necessary competence to engage in organic farming, which is a truth that cannot be denied. It is not sufficient that they have a sufficient degree of information regarding organic farming and the advantages that it provides in comparison to conventional farming tactics. It is of the utmost importance that those involved in farming be not only aware of bio-pesticides and bio-fertilizers, but also eager to make extensive use of these products. Acquiring knowledge

about the availability of extra nutrients and the efficacy of these nutrients in complementing the structure of the soil is also essential for the objective of enhancing production. During potentially dangerous stages of the farming process, an individual organic farmer who does not possess the necessary expertise will not be able to safeguard his crop for the duration of the process. They are required to have a comprehensive understanding of the climate, ecology, and localized soil systems, in addition to having an in-depth knowledge of the various elements that impact the development of crops. (Harish 2020 and Manisha et al.2023.)

2. Challenges pertaining to output marketing

Prior to initiating the growth of organic crops, it is crucial to verify their marketability to guarantee they can be sold at a higher price compared to conventional food. Due to the increased time necessary to achieve equivalent production levels compared to traditional crops, it will not be feasible to increase the rates of charging. This adjustment will have one of the negative consequences. Based on the disclosed data, it was found that farmers in

Haryana who cultivated organic wheat received lower prices compared to those who cultivated conventional wheat. Consumers of wheat were unwilling to pay a premium for the organic variant of the product due to the absence of additional expenses associated with marketing both kinds of products. (Heena et al., 2022)

3. Insufficient supply of organic matter

When it comes to the capacity of organic material to give all of the necessary quantities of nutrients, there is a significant lot of confusion among both agricultural producers and industry professionals. They are of the opinion that there is not quite enough biological material available to satisfy the criteria. The acquisition of organic manures is substantially more challenging for small and marginal farmers than the acquisition of artificial fertilizers, which can be obtained with relative ease. In addition, the cost of organic manures is considered to be higher than that of chemical fertilizers. On the other hand, they have two choices: either they can make organic manures by making use of the biomass that they already possess, or they may purchase organic manures from the location that takes the least amount of labor

and money. Both of these alternatives are available to them. (Manna et al., 2018).

4. Costs of production that are higher

As a kind of organic farming, the old farming approach has been utilized by farmers in India who are considered to be small business owners. Their agricultural practices are carried out in an atmosphere that is favorable to the environment, and they make use of renewable resources sourced from their own farm or from farms located in the surrounding area. The price of organic inputs has, unfortunately, lately increased in comparison to the price of chemical pesticides and fertilizers that are created in industrial settings, as well as the price of other inputs that are utilized in conventional agricultural systems. It is becoming increasingly difficult for small farmers to buy organic manures such as groundnut cakes, neem cakes and seeds, vermin compost, silt, cow dung, and other manures that are utilized as organic manures. (Harish, 2020)

5. Marketing Problems

Bio-pesticides, bio-fertilizers, and organic inputs have not yet received widespread acceptance over the entirety of the nation. Insufficient attempts are being made to

market and distribute these items since many stores are not interested in stocking them because of the poor demand for them. In addition to the lack of awareness on the part of the farmers, the situation is further complicated by the unpredictability of the supply. A number of additional important issues are having an influence on the markets for organic inputs in India. These problems include increased profit margins for chemical pesticides and fertilizers that are sold at retail, as well as effective promotional efforts that are being deployed by manufacturers and dealers. (Heena et al., 2022; Harish, 2020)

6. Lack of an Appropriate Agriculture Policy

The following are some of the important issues that need to be addressed by an appropriate agriculture policy for organic farming: the development of organic farming for both domestic and international markets; the needs of thousands of low-income people to ensure that they have access to food; the sustainable production of food; the availability of products and inputs; and a few other issues. It will need consistent effort and the backing of the entire nation in order to find a solution to

these serious difficulties, which will demand a lot of labor. A proper agricultural strategy that tackles these challenges has to be devised in order to make considerable progress in organic agriculture. An appropriate agricultural plan that takes into account these issues have to be developed in order to make considerable progress in organic agriculture.

7. Low Production

When farmers transition from conventional to organic farming, they often experience a decrease in crop yields as a result of discontinuing the use of synthetic inputs. The process of fully restoring the biological functions of legumes, such as nitrogen fixation, the growth of beneficial insects, pest management, and fertility improvement, may need a significant amount of time. The decreased production rates during this transitional period are a consequence of these ongoing efforts. There is a possibility that the farm may not be capable of producing organic food for an extended period of time. Small and marginal farmers have financial constraints while transitioning to organic farming, as they cannot bear the loss of earnings during the initial two to three years of conversion.

The price premiums for organic products will have limited impact (Ramesh et al., 2010) since they will disappear once significant quantities of organic agricultural commodities become available. Harish (2020)

8. Findings of the paper

The soil of India has been blessed by God with a wide range of naturally occurring organic forms of nutrients that are beneficial to the development of organic farming practices. There is a wide range of climates, and the ecosystem contributes to the preservation of an environment that is sustainable. Given the availability of organic infrastructure, the low conversion effort that results from the limited utilization of chemical agricultural technology, and the cap on public investment, it is conceivable to gradually implement organic farming through a gradual process. There is a need to explore and incorporate organic farming practices into the cultivation of potential places and crops that satisfy the aforementioned parameters.

Organic farming has the potential to yield larger yields, making it a more advantageous agricultural method for

farmers. Furthermore, it can lead to new job opportunities for people in a range of industries, such as technical specialists, transportation media, companies that store and process materials, and so on. This may also be helpful in assessing the migration rate given that many individuals move, either temporarily or permanently, in search of work. Crop rotation, using naturally occurring predators, hardy cultivars, and little—ideally, nonexistent—intervention from chemical, biological, and thermal agents are some of the cultivation techniques that can help lower the risk of pest, disease, and weed infestations. It's crucial to pay close attention to how the farming system affects the environment overall. Protecting natural areas and animals is also critical. The greater diversity of microbes, plants, and animals seen in organic agricultural systems, together with their enhanced capacity to sequester carbon dioxide and reduced reliance on external energy sources, are indicative of these systems' ecological sustainability preserved. (Baskaur et al., 2021)

More significantly, organic farming allows us to improve the condition of the soil going

forward by preserving the amount of biological material in the soil, promoting microbial growth in the soil, and using cautiously applied mechanical intervention. Fertilizers enhance the organic process that year-round occurs in the roots of leguminous crops and aid in the recycling of organic materials such as livestock manures and agricultural wastes. Crop rotation, using naturally occurring predators, hardy cultivars, and little—ideally, nonexistent—intervention from chemical, biological, and thermal agents are some of the cultivation techniques that can help lower the risk of pest, disease, and weed infestations. It's crucial to pay close attention to how the farming system affects the environment overall. Protecting natural areas and animals is also critical. The greater diversity of microbes, plants, and animals seen in organic agricultural systems, together with their enhanced capacity to sequester carbon dioxide and reduced reliance on external energy sources, are indicative of these systems' ecological sustainability.

9. Conclusion

A significant portion of India is comprised of dry and semi-arid soils. The amount of

organic matter in these soils is poor. It is possible for the production of organic farming to contribute to the improvement of the physical features of these soils. Organic farming has the potential to improve the soil's health and the quality of the food that is provided to the people of the country. Identifying the crops and the land that are appropriate for this purpose is a necessary step that must be taken. The organic farming method provides a solution to a significant number of the problems that are caused by the current agricultural management system. Farmers in contemporary agriculture make use of synthetic pesticides and fertilizers, both of which are detrimental to the overall health of the ecosystem. The use of artificial pesticides and fertilizers is strictly prohibited in organic farming, which is a particular agricultural approach. In other words, organic farming could be the answer to the question of how to sustainably preserve the natural world.

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