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# Exploring the viability of Organic Farming for Sustainable Agriculture in India

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## Abstract
*Organic farming commonly known as ecological or biological farming is a type of farming that emphasises methods like crop rotation and companion planting and employs organic fertilisers including compost manure, crop residues, mineral grade rock additives, green manure, and bone meal. Organic farming is an agricultural system that creates safe, healthy or environmentally friendly products and works in the protection of nature. It excludes the use of synthetic inputs such as fertilizers; hormones feed additives, herbicides, pesticides. In order to preserve ecological balance and safeguard the environment, organic farming was adopted. It supports and improves the health of the agro-ecosystem, including the biodiversity, biological cycles, and soil biological activity. This paper aims to delve into the principles of organic farming and the concept of organic products. It also undertakes an analysis of the opportunities within the domain of organic farming and evaluates potential markets for organic products. Furthermore, the paper scrutinizes the challenges associated with marketing organic products. Organic farming provides nutrients to the plants and improves the physical and biological quality and characteristic of soil.*

***Keywords****: Organic Farming, organic products, Agricultural sustainability, biological farming, companion planting, feed additives, agro-ecosystem health, biological cycles.*

## 1. Introduction
Agriculture plays an important role in a developing nation like India. On the basis of population of the country, fulfilling the increasing food needs is not the only criteria but it should also contribute to enhance country's economic system. In terms of population, India is ranked second among all countries including dependent territories. The population of India makes up 17.7% of the entire global population. Population is growing, which is driving up food consumption in the country people's perception towards food and food products have changed over time, now they focus on safety and healthy food that is nutritious and helps in building strong immune system. Inorganic farming which uses chemical bio pesticides and fertilizers have caused a negative impact on environment and increasing health problem. India from ages has been using organic farming but due to modernization and modern agriculture practices has pushed it backwards. The prospect of expanding farmland area is being reduced as a result of the nation's rising industrialisation and urbanisation. Additionally, the increased fertility mining techniques such as residue removal, imbalanced application of plant nutrients, uncontrolled and excessive grazing, and consequently the haste to meet the demand for agricultural output, are aggravating soil deterioration. With the effect of changes in climate and environment organic farming has got prominence again in the country. Organic farming emerged as a potential substitute for supplying food needs, preserving soil fertility, and boosting soil

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carbon pools [1]. Organic Farming was originated early in the 20th century as a response to rapidly evolving farming methods. The term "organic farming", also referred to as "ecological farming" or "biological farming" refers to an agricultural method that emphasises crop rotation and companion planting by using organic fertilisers including compost manure, green manure, and bone meal. The International Federation of Organic Agriculture Movements (IFOAM), an international organization was established in the year 1972 were organic agricultural methods and standards are internationally regulated and legally enforced. According to IFOAM "Organic Agriculture is a production system that sustains the health of soils, ecosystems, and people. It relies on biological processes, biodiversity, and cycles that are tailored to local conditions instead of using inputs which have adverse impacts. Organic farming blends science, creativity, and tradition to improve the quality of life, protect the environment." According to USDA definition of organic farming is a system which avoids or largely excludes the use of synthetic inputs and to maximum extent feasible rely upon crop rotations, crop residues, animal manures, off farm organic waste, mineral grade rock additives and biological system of nutrient mobilization and plant protection."

## 2. Review of Literature

**i. P. Ramesh, N. R. Panwar, A. B. Singh, S. Ramana, Sushil Kumar Yadav, Rahul Shrivastava and A. Subba Rao (2010)**

In a General Article titled "Status of organic farming in India", a survey has been made by the authors on the certified organic farms in the country to know the actual benefits and feasibility of organic farming in ways of Production potential, economics and soil health in comparision to the conventional farms. It has been found that though there was an reduction in the crop productivity by 9.2%, it contributed higher net profit to the farmers by 22% as compared to the conventional farming and the reason being increase in the availability of the premium price (20-40%) for the certified organic produce and also reduction in the cost of cultivation by 11.7%.

**ii. Anup Kumar Yadava, Jadi Bala Komaraiah (2020)**

The paper titled "Benchmarking the performance of organic farming in India", the authors wanted to measure the organic farming performance in India. Wherein the data has been collected from 21 states in India for the period of 2016-2017, the states are regarded as the units of decision making for performance assessment. The two step model has been followed where in the first input-oriented DEA model has stated that 84.7% is the average technical efficiency of organic farming production. And the second model output-oriented DEA model concluded 20% technical efficiency.

## 3. Organic Farming in India

India ranks first in number of organic farmers and ninth in terms of area under organic farming. Sikkim is the first state in the entire world to become fully organic state by converting around 75,000 hectares of agricultural land into sustainable cultivation. Apart from Sikkim other states which are practicing organic farming includes Tripura, Uttarakhand, Madhya Pradesh, Rajasthan, and Maharashtra. North east India was traditionally been organic and the consumption of chemicals is far less than the rest of the country. The tribal and island territories are being nurtured to continue organic farming.

According to Research Institute of organic Agriculture FiBL (German: Forschungsinstitut fur biologischen Landbau) report 2021 India was in a unique position among the 187 nations that practise organic agriculture with 2.30 million acres. India is home to 30% of all organic producers worldwide. Total organic farming area, contributes to 27, 59,660 and total farmers 11, 60,650 PGS. Recent years have seen a significant proportional growth in the amount of land used for organic farming across the nation. The entire nation is not part of organic agriculture a few states in the country have taken initiative in improving organic farming. In order to preserve food security, farmers were given access to high yielding seeds and fertilisers as a result of the Green Revolution, which began in 1960. Profitability was increased by increasing productivity, but ultimately the land was becoming infertile owing to overuse of fertilisers, making the

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soil unproductive and pesticides making the produce unsafe to consume [2] [3]. The reasons for the need of organic farming in India:

- The demand for organic food is increasing and it is expanding quickly ensuring high profitability.
- Organic food industry is growing and the food security is to be maintained with the increase in the population growth and decreasing supply of resources there is need to boost production but in a feasible and sustainable manner.
- As consumption of inorganic foods can cause many diseases, including cancer and infertility, which occurs which occurs when harmful residue stays in the body there's a needs to be an improvement in health.
- Maintaining ecological balance between the environment and livelihood is important due to the risk caused by conventional agriculture methods.

According to the Ministry of Agriculture, with the increased awareness of organic foods people are inclining more towards the food products as shown in Table 1. Organic products also have demand in foreign countries. According to 2018-2019, there was an increase by 50% in organic exports touching Rs. 5151 crore and Rs. 5249.32 crore by 2021-2022 [4].

**Table 1 Organic Products Exported by India**

| S. No | Type of Commodity | Products |
|---|---|---|
| 1 | Spices | Black pepper, Ginger, Turmeric, Chilli, Cardamom, Clove |
| 2 | Plantation | Tea, Coffee, Cocoa |
| 3 | Pulses | Red gram, Black gram |
| 4 | Fruits | Mango, Banana, Orange, Pineapple, Tomato |
| 5 | Nuts | Walnut, Cashew |
| 6 | Vegetables | Okra, Brinjal, Onion, Potato |
| 7 | Oil seeds | Sesame, castor oil, sunflower oil |
| 8 | Others | Cotton, herbal extracts |

### 3.1 Components of Organic Farming

Major components of organic farming are crop rotation, biological nitrogen which maintains and improves soil fertility, organic manure, utilisation of soil microbes, crop residues, bio-pesticide, biogas slurry; garbage etc. vermicomposting is a major element of biological farming, which has been effective in enhancing soil fertility and yielding a lot of horticultural crops in a sustainable manner.

The various components of organic farming are:

1. **Crop rotation:**

Crop rotation is a process of growing different crops in succession on the piece of land in a specific period of time, with an object to get maximum profit from least investment without deterioration of soil fertility. The growing of different crops on a same land in a pre-planned succession. For example use of legumes in rotation improves soil fertility.

2. **Organic Manure:**

Manures are the organic material derived from animal human and plant residues which content plant nutrients in complex organic forms. Manures increase the soil fertility which is important element of organic farming. It enables in yielding crop growth through enhancing the uptake of humus materials and not directly promoting soil productiveness through growing availability of essential and minor plant vitamins through soil microorganisms.

- **Bulky Organic Manures:** FYM, compost, night soil (human excrete), sewage and sludge, green manure, poultry manures.
- **Concentrated Organic Manures:** Oil cakes, blood meal, meat meal, fish meal, bone meal.

3. **Bio Fertilizers:**

Fertilizers which occur in nature and increase productivity of soil are called as bio fertilizers. Bio fertilizers are microorganisms that can improve soil fertility in number of ways, such as by fixing atmospheric nitrogen, using mycorrhizal fungi and solubilizing phosphate. It is environment friendly and long lasting. The biological nitrogen organisms found bio fertilizers help them in growth of crops, plants, trees and also increases biomass production at the same time increases yield. It has about 14% of NPK ratio where as compared to chemical fertilizers which consists of

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20 to 60% NPK ratio. Example: Cyanobacteria, fish emulsion, and manure and sewage sludge.

4. **Crop Residue:**

Crop residue means the crop biomass left after removal of the main produce from the field, including straw, stalk, stubble, trash, and husk. India has a huge potential for recycling nutrients in organic farming by employing crop wastes; cereal hulls. The physic-chemical characteristics of soil and crop yields are improved when crop residues are inoculated with fungi species.

5. **Biomass:** It is taken weight of living matter derived from animals and plants are biomass. Often referring to plant biomass that includes all the components of plants.
6. **Bio char:** It is basically charcoal, a stable solid which is rich in carbon, obtained by the pyrolysis of biomass and primarily used as an organic amendment in soil.
7. **Vermicomposting:** Vermicomposting is an organic manure or compost that is made using earthworms, which typically reside in soil, consume organic waste, and then expel it after being dissolved. These are abundant in vitamins, growth hormones, macro and micronutrients as well as immobilised micro flora that is crucial for plant growth.

## 3.2 Schemes for Organic Farming in India

**Table 2 Organic Farming Schemes in India with its purpose**

| Name of the Scheme | Year of Introduction | Purpose |
|---|---|---|
| **Paramparagat Krishi Vikas Yojna (PKVY)** | 2015 | Adopt organic farming to increase remunerations and to encourage farming which is chemical free |
| **Mission Organic Value Chain Development for North Eastern Region** | 2015 | Development of certified organic production in value chain |
| **National Mission on Oilseeds and Oil palm** | 2014 | Aims to boost production of edible oils and expand oil palm areas |
| **Capital Investment Subsidy Scheme (CISS) under Soil Health Management Scheme** | 2009 (Revised 2018) | To minimize use of chemicals and synthetic fertilizers and to promote use of organic inputs |
| **National Food Security Mission** | 2007 | Improve the production and productivity of wheat, rice and pulses |

As per the details from Table 2,

- **Paramparagat Krishi Vikas Yojna (PKVY):** PKVY was launched in 2015; it aims at increasing soil fertility by supporting and promoting organic farming. The programme supports the participatory Guarantee System (PGS) for India method of organic certification. The objective of PKVY scheme is to produce agriculture products which are chemical free and to inculcate and promote organic farming among rural youth, farmers, and consumers. Additionally, PKVY seeks to empower farmers by fostering institutional growth through clusters for

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management of farming techniques, input production, quality control and use creative strategies for selling. The scheme is funded by both State and Central Governments in the 40:60 ratios respectively. In case of Northern Eastern and Himalayan regions the sharing ratio of 10:90 and whereas for Union Territories the assistance is 100%. Assistance provided under this scheme is around Rs. 50,000 per ha for 3 years and 62% (31,000/-) of which is provided to farmers as incentive towards organic inputs.

- **Mission Organic Value Chain Development for North Eastern Region (MOVCDNER):** The scheme through Farmer Producer Organizations (FPDs), encourages third-party certified organic growing of speciality crops in the north-eastern region with a focus on exports. For three years, farmers are offered financial help of Rs 25,000 per ha for organic input such as biofertilizers, organic manure and other inputs. The scheme also offers support for the establishment of FPOs, capacity building and post-harvest infrastructure up to 2 crore.
- **Capital Investment Subsidy Scheme (CISS) under Soil Health Management Scheme:** The scheme is implemented by the Department of Agriculture, Cooperation and Farmers' Welfare through the National Centre of Organic Farming in collaboration with NCDC to minimize the use of external inputs and avoid synthetic fertilisers and pesticides. The scheme aims to promote organic farming by giving organic in puts for production and to increase agricultural productivity by preventing environmental degradation. Under this scheme, 100% assistance is provided to state government, government agencies. In case of individuals and private agencies assistance up to 33% of cost limit to Rs. 63 lakh p.u capital investment is provided.
- **National Mission on Oilseeds and Oil palm (NMOOP):** The scheme aims to boost the production of edible oils and expand the oil palm areas. It facilitates way to help states meet the production of edible oil. The assistance provided at 50% subsidy of Rs. 300 per ha under this scheme for different components including bio-fertilisers, phosphate Solubilising Bacteria (PSB), Azatobacter, Mycorrhiza and Vermi compost.
- **National Food Security Mission (NFSM):** The objective of the scheme is to improve the production and productivity of wheat, rice and pulses and to raise the income of farmers through providing sophisticated technologies and farm management practices. Under NFSM, assistance provided for promotion of bio-fertilisers at 50% of the cost limited to Rs 300 per ha. The target of this scheme is to achieve are 13 million tonnes of additional food grains production comprising of Rice-5 million tonnes, wheat-3million tonnes, pulses-3 million tonnes and coarse cereals-2 million tonnes [5].

### 3.3 Organic Farming - Sustainability

The Indian climatic conditions such as hot temperatures, improper rainfalls, unfavourable soil level requires a need of best agriculture practice to be followed. Organic farming technique is being incorporated in the country due to climatic changes, the aim of organic farming are promotion of soil fertility, conservation of biodiversity, avoiding chemicals and pesticides inputs. Usage of such cultivation methods help in increasing crop productivity and ensures food security, quality and additive free products, increases farmers' income and stabilizes the ecology [6].

## 4. Practices to be followed for Sustainability Development in Agriculture

1. **Composting for Soil Management:** The soil fertility, nutrients and quality is lost after the cultivation of crops. Organic farming places a strong emphasis on the usage of atmospheric microorganisms, plant and animal waste and organic fertiliser.
2. **Crop Diversity:** Polyculture is one technique which farmers are practicing for sustainable agriculture development. It is a method through

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which multiple crops are grown simultaneously to meet food demands and at the same time ensures soil fertility.

3. **Weed Management:** Weed is an unwanted plant which is grown along the crops in farming. Weed management is a technique which is used in organic farming which doesn't eradicate the weed completely but tries to minimize their frequency through crop rotation.
4. **Controlling other organisms:** Detrimental organisms affect the crops as it lives in the soil. Under organic farming these organisms are not harmed but yet avoided from the crops by using herbicides which are natural and chemical free.
5. **Live Stock:** For agricultural sustainability organic farming propagates organic live-stock management. Live-stock raised organically promotes pasture and limits the use of antibiotics and growth hormones. Organic farming not only improves the quality of life for cattle, but also maintains sustainability of the farm.

These are some of the practices followed to maintain agriculture sustainability, apart from these techniques; proper irrigation system, crop rotation, usage of off-farm inputs, water harvesting and collection should also be followed.

## 5. Data Analysis and Interpretation:

The data has been collected from the government website (apeda) [7]:

### 5.1 State wise Organic Area under Wild Collection

**Table 3 State vs Organic Area under Wild Collection**

| S. No | State | Organic area 2021-2022 | Organic area 2020-2021 |
|---|---|---|---|
| 1 | Chhattisgarh | 2,989,749.87 | 263475.00 |
| 2 | Madhya Pradesh | 865,643.27 | 617712.48 |
| 3 | Rajasthan | 197,515.84 | 183176.09 |
| 4 | Himachal Pradesh | 19,882.47 | 191882.47 |
| 5 | Uttar Pradesh | 44,643.82 | 91865.12 |
| 6 | Jammu & Kashmir | 29,150.00 | 162150.00 |
| 7 | Uttarakhand | 24,076.66 | 7383.80 |
| 8 | Punjab | 16,616.00 | 16616.00 |
| 9 | Karnataka | 14,514.56 | 79373.48 |
| | Total | 4201791.83 | 163634.44 |

**Interpretation** - According to the Table 3, Chhattisgarh stands first in India in terms of organic area, and there is an increase of 2726274.87 in comparison to 2020-21 to 20021-22. And the next highest state is Madhya Pradesh with 247930.79, where Rajasthan stands third position with an increase of 14339.75. Himachal Pradesh, Uttar Pradesh, Jammu & Kashmir, Uttarakhand, Punjab, Karnataka and others states following the order. In this table the comparison has been made by comparing 2021-2022 with 2020-2021.

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### 5.2 State wise Organic Farm Production

**Interpretation -** In the Table 4, it depicts the state wise organic farm production of top 5 states. From the statistics of the Country, Madhya Pradesh is ranked first in terms of farm production along with increased conversion production when compared with previous year. According to the above table Odisha has least production when compared to other states in the country. The comparison has been made with 2021-2022 and 2020-2021.

**Table 4 State vs Organic Farm Production in Year wise Comparison**

| | 2021-2022 | | | 2020-2021 | | |
|---|---|---|---|---|---|---|
| **State Name** | **Organic Production (in MT)** | **Conversion Production (in MT)** | **Total Production (in MT)** | **Organic Production (in MT)** | **Conversion Production (in MT)** | **Total Production (in MT)** |
| Madhya Pradesh | 1262966.52 | 147927.97 | 1410894.49 | 1214919.50 | 177176.43 | 1392095.93 |
| Maharashtra | 581164.05 | 110255.6 | 691419.72 | 752176.23 | 23598.76 | 775774.99 |
| Rajasthan | 331900.65 | 15060.67 | 346961.32 | 355718.73 | 0.00 | 355718.73 |
| Karnataka | 150640.95 | 12.10 | 150653.05 | 2374436.69 | 18949.46 | 2393386.15 |
| Odisha | 135999.21 | 47604.82 | 183604.02 | 183089.90 | 319.14 | 183409.04 |

### 5.3 Report on State Wise Organic Production from Wild Area

**Table 5 Year and State Wise Organic Production from Wild Area**

| S. No | State Name | Organic Production (In MT) 2021-2022 | Organic Production (In MT) 2020-2021 |
|---|---|---|---|
| 1 | Andaman & Nicobar Islands | 3624.00 | |
| 2 | Goa | 3594.27 | 5345.39 |
| 3 | Chhattisgarh | 3152.75 | 2513.38 |
| 4 | Jammu & Kashmir | 3064.02 | 2437.40 |
| 5 | Rajasthan | 1784.35 | 4392.46 |
| 6 | Madhya Pradesh | 1476.92 | 9594.24 |
| | Total | 16696.31 | 24282.87 |

**Interpretation** - From the Table 5, we could interpret that Andaman & Nicobar Islands has the highest Organic Production with 3624 MT, we could not get the data of the Organic Production for the year 2020-2021. Goa stood second highest in 2021-2022 but when comparing with previous year the production has reduced by 1751.12. Chhattisgarh with 3152.75 in the third place and also there was an increase in comparison with

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previous year. Jammu & Kashmir, Rajasthan, Madhya Pradesh and other states following the list.

### 5.4 State wise Export

**Table 6 State wise Export Quantity and Revenue**

| S. No | State Name | Exported Qty (In MT) 2021-2022 | Total Value (In Crore) 2021-2022 | Exported Qty (In MT) 2020-2021 | Total Value (In MT) 2020-2021 |
|---|---|---|---|---|---|
| 1 | Madhya Pradesh | 176385.91 | 1292.55 | 500636.68 | 2683.58 |
| 2 | Gujarat | 60023.78 | 727.09 | 65476.39 | 723.20 |
| 3 | Maharashtra | 85526.16 | 696.71 | 126272.80 | 913.74 |
| 4 | Karnataka | 22075.80 | 419.6 | 17436.02 | 321.36 |
| 5 | Uttar Pradesh | 6968.17 | 333.4 | 12141.77 | 278.56 |
| | Total | 350979.82 | 3469.35 | 721963.66 | 4920.44 |

**Interpretation -** Worldwide there is lot of demand for organic products grown in India. According to the statistics of the country from the Table 6, Madhya Pradesh has lot of exports with a total value of 1292.55 crore in 2021-22. The overall value of exports has increased over 2020-2021 to 2021-2022. The country is improving the production levels and trying to increase its exports and creating a world market for organic products grown in India.

### 5.5 Category wise Production of Organic Commodities

**Table 7 Category wise Organic Commodities Production**

| S. No | Category | Organic Production (In MT) 2021-2022 | Organic Production (In MT) 2020-2021 |
|---|---|---|---|
| 1 | Fibre | 1440603.391 | 811007.77 |
| 2 | Oil Seeds | 464818.474 | 853754.86 |
| 3 | Sugar | 336883.172 | 797627.60 |
| 4 | Cereal & Millets | 242416.929 | 321006.27 |
| 5 | Medicinal Plant Products | 101179.901 | 80533.52 |

**Interpretation -** From the Table 7, it can be observed that from the organic commodities, fibre has the first place in 2021-2022 and also in comparison with previous year, there has been increase with 629595.621 [8]. Oil seeds stood in the second place with an increase of 388936.386 in comparison with previous year, but in the 2021-2022 it had the second highest organic production. Sugar, cereal & Millets, Medicinal Plant Products and other following the list [9].

## 6. Findings & Suggestions

- Organic farming is a traditionally used technique, which increases soil fertility and maintains ecological balance.
- Due to adverse health effects lot of consumers show their support by using organic products in the country.
- 
- Organic farming increases productivity for the incomes are by farmers are not maximum, initiatives have to be taken to increase the remuneration.
- Government has launched various schemes to promote organic farming, under these schemes financial assistance is provided to farmers as per hectare.
- The country is improving the production levels and trying to increase its exports and

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creating a world market for organic products grown in India.

## Conclusion

Global conventional mechanised farming increased food production but over time brought with it a number of issues, including negative health effects, increased pollution, deterioration of soil and water, soil degradation and adverse effects on the environment. Organic agriculture may be able to provide the dual significance of a nation's food security and the protection of the environment. Regardless of schemes and financial assistance provided towards organic farming yet it requires lot of attention towards its development, awareness and in the country.

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