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Review Article

Embracing Organic Farming in India: A Holistic Approach to Sustainable Agriculture

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Abstract

This article, explores the burgeoning trend of organic farming in India as a sustainable and eco-friendly alternative to conventional agricultural practices. The article delves into the historical roots of organic farming, its contemporary relevance, and the pivotal role played by key figures such as Sir Albert Howard and Rudolf Steiner. It sheds light on the various government initiatives supporting organic farming, emphasizing schemes like Paramparagat Krishi Vikas Yojana (PKVY), Mission Organic Value Chain Development for Northeastern Region (MOVCDNER), and others.

The discussion extends to the critical aspects of soil health and crop management, underscoring the adverse effects of synthetic farm inputs and the benefits of organic alternatives. The utilization of biofertilizers and organic manure, along with their impact on soil structure and microbial diversity, is elucidated. The economic viability of organic farming is explored, emphasizing the higher market value of organic products and the potential for export opportunities in the global market.

Challenges faced by farmers transitioning to organic methods are addressed, accompanied by proposed solutions, ranging from awareness campaigns and financial support for certifications to the establishment of decentralized production systems. The article concludes by advocating for a balanced approach to organic farming, recognizing the need for sustained government support, collaboration, and a gradual transition to ensure the long-term sustainability of Indian agriculture.

Keywords: Organic Farming; Sustainable Agriculture; Government Initiatives; Soil Health; Biofertilizers; Economic Viability; Challenges; Solutions; India; Agriculture

Introduction

Organic farming, a practice deeply rooted in traditional wisdom, is gaining momentum as a sustainable and eco-friendly alternative to conventional methods.

Organic farming is an eco-friendly agricultural system where crop cultivation is done without synthetic farm inputs such as fertilizers, herbicides, and pesticides.

Instead of these synthetic farm inputs ecologically derived fertilizers and pesticides are used along with organic manure and other natural methods like the use of organic manure, crop rotation, green manure, etc. The benefits of organic farming over conventional farming are countless, organic farming uses eco-friendly inputs hence improving the health of soil, reducing health hazards, encouraging biodiversity, and so on. In this article, we will delve into the various facets of organic farming in India, looking at its history, how the government supports it, the focus on good soil, challenges faced by farmers transitioning to organic methods, and why people are starting to prefer organic food. It's like a green and natural story in the big book of India's farms.

History

Organic farming is not a novel approach as it has been practiced since ancient times in our country. In the 1960s and 1970s, India witnessed the Green Revolution, marked by the adopting of high-yielding varieties of seeds and chemical fertilizers to increase agricultural productivity. While this period led to significant gains in food production, it also contributed to concerns about environmental degradation and health issues.

The drawbacks of chemical-intensive agriculture prompted a revaluation of farming practices. In the 1980s, the organic farming

movement started gaining momentum in India. Farmers began experimenting with organic methods, avoiding synthetic pesticides and fertilizers. One of the earliest proponents of organic farming was *Sir Albert Howard, a British agriculturist scientist* who worked in India in the *early 20th century.*

Howard observed that traditional Indian farmers used natural methods to maintain soil fertility and produce healthy crops. He read the situation and started their work on composting and other natural methods. Rudolf Steiner introduced the concept of biodynamic farming in the early 20th century which significantly helped organic farming to gain momentum [1].

Increasing demand for organic products, both domestically and internationally, is contributing to the expansion of organic agriculture in India. The movement is expected to play a vital role in ensuring a sustainable and environmentally friendly future for Indian agriculture.

Policy support and initiatives

The government of India assists farmers by launching several schemes and subsidies to encourage and promote organic farming [2].

Paramparagat krishi vikas yojana (PKVY)

Paramparagat Krishi Vikas Yojana promotes cluster-based organic farming with PGS (Participatory Guarantee System) certification. Cluster formation, training, certification, and marketing are supported under the scheme. Assistance of Rs. 50,000 per ha /3 years is provided out of which 62 percent (Rs. 31,000) is given as incentive to a farmer towards organic inputs.

Mission organic value chain development for northeastern region (MOVCDNER)

The scheme promotes third-party certified organic farming of niche crops of the northeast region through Farmer Producer Organisations (FPOs) with a focus on exports. Farmers are assisted Rs 25,000 per hectare for three years for organic inputs including organic manure and bio-fertilisers among other inputs. Support for the formation of FPOs, capacity building, and post-harvest infrastructure up to Rs 2 crore are also provided in the scheme.

Capital investment subsidy scheme (CISS) under soil health management scheme

Under this scheme, 100 percent assistance is provided to state government, government agencies for setting up of mechanised fruit and vegetable market waste, agro waste compost production unit up to a maximum limit of Rs 190 lakh per unit (3000 Total Per Annum TPA capacity). Similarly, for individuals and private agencies assistance up to 33 percent of cost limit to Rs 63 lakh per unit as capital investment is provided.

National mission on oilseeds and oil palm (NMOOP)

Under the Mission, financial assistance at a 50 percent subsidy to the tune of Rs. 300 per hectare is being provided for different components including bio-fertilizers, supply of Rhizobium culture, Phosphate Solubilising Bacteria (PSB), Zinc Solubilising Bacteria (ZSB), Azotobacter, Mycorrhiza and vermicompost.

National food security mission (NFSM)

Under NFSM, financial assistance is provided for the promotion of bio-fertiliser (Rhizobium/PSB) at 50 percent of the cost limited to Rs 300 per hectare.

Soil health and crop management

Too much use of synthetic farm inputs not only harms the health of consumers but also hampers the health of soil. Extreme use of fertilizers severely affects the soil properties i.e. physical, chemical, and biological. excessive use of fertilizers may be responsible for the salinization, alkalinization, and acidification of soil.

Accumulation of soluble salt disturbs the soil exchange complex, which leads to the Dispersion of soil colloids and specific ion effect.

Synthetic pesticides are indiscriminate on soil fauna which kills the beneficial insects and microorganisms also, this affects the biological health of soil. But organic farming strictly avoids any of these chemicals, and instead uses fertilizers and pesticides that are derived ecologically. This not only improves the soil health but also maintains the balance in an ecosystem.

Use of biofertilizers in organic farming

Biofertilizers are substances containing living microorganisms, which, when applied to seeds, plant surfaces, or soil, colonize the rhizosphere or interior of the plant and promote growth by increasing the supply or availability of primary nutrients to the host plant. Unlike chemical fertilizers that directly provide nutrients to plants, biofertilizers enhance nutrient availability through biological processes.

Among biofertilizers most used biofertilizers are Rhizobium, blue-green algae (BGA), Azolla, Frankia, and Mycorrhiza

- **Rhizobium:** Rhizobium in association with legumes, fixes atmospheric N.

- **Azospirillum:** these bacteria are known to have a close associative symbiosis with the higher plant system (sorghum, maize, pearl millet, finger millet, etc)
- **Blue Green Algae (BGA**): Several species of blue-green algae can fix atmospheric nitrogen. The amount of nitrogen fixed by blue-green algae ranges from 15 to 45 kg N/ha. They are more abundant in rice fields.
- **Azolla**: Azolla is a free-floating freshwater fern. A thick mat of Azolla supplies 30 to 40 kg N/ha.

Use of organic manure in organic farming

In organic farming, the use of concentrated or synthetic fertilizers is generally discouraged or prohibited. The emphasis in organic farming is on natural and sustainable methods of soil fertility management. Instead of concentrated manure or synthetic fertilizers, organic farmers rely on organic inputs such as compost, green manure, and animal manure.

Manures

Manures are prepared from plant and animal waste, which are used as a source of plant nutrition. They release nutrients after their decomposition Manures can be grouped into bulky organic manures and concentrated organic manures based on the concentration of the nutrients.

The most used organic manures are:

Farmyard manure

Farmyard manure is the decomposed mixture of dung and urine of farm animals along with litter and leftover material from farms. The average NPK content of well-decomposed farmyard manure is 0.5:0.2:0.5.

Green manure

Green un-decomposed plant material used as a source of plant nutrients is called green manure. It can be done in two ways i.e. by growing the green manure crops in the same field or by collecting twigs, leaves, or green parts of plants.

Green manuring is the growing of crops in the same field and incorporating them in the soil after sufficient growth of plants.

Ex sunn hemp, dhaincha, pillipesara, cluster beans and Sesbania rostrata

Green leaf manuring is the application of leaves, twigs, shrubs, and herbs collected from different locations.

Ex neem, mahua, wild indigo, gliricidia, Karanji

Vermicompost

Earthworm gut is the site of production of genuine humic acids which are distinct from the polysaccharide-gum humic acids. some species of earthworms are used to decompose the organic residue to make compost, this process is known as vermicomposting, and compost is known as vermicompost.

Species used for vermicomposting are Eisenia foetida, Lumbrius rubellus, Eudrillus euginiae, Perionyx exacavatus.

On average vermicompost provides about 60-90 kg N to the soil.

Cumulative effects of organic farming on soil health.

Soil structure – because of the addition of organic matter the physical health of soil improves, it enhances soil structure and aggregation. This promotes better water infiltration, reduces soil erosion, and creates a favorable environment for roots.

Organic farmers often use organic inputs such as compost, green manure, and animal manure. These additions increase the organic matter content in the soil, providing a source of nutrients and improving soil structure. Higher organic matter content also enhances the soil's water-holding capacity.

Organic farming supports a diverse microbial community in the soil. Healthy soil microbial activity is crucial for nutrient cycling, nutrient availability, decomposition of organic matter, and disease suppression.

By avoiding the use of synthetic inputs that may degrade soil health over time, organic farming promotes long-term sustainability. The cumulative effect of organic practices contributes to maintaining productive and resilient soils for future generations.

Latest trends and technologies in organic farming across India

In the world of organic farming, trends and technologies play a big role in making things work better. They help farmers be more efficient, sustainable, and productive. Here are some tech and trends that organic farmers are using or might use to make their crops better and more eco-friendly.

- **Biopesticides and Organic Inputs:** Increased adoption of biopesticides and organic inputs to replace synthetic chemicals. Farmers are turning to natural alternatives like neem-based products, biofungicides, and biopesticides to control pests and diseases.
- **Aquaponics and Hydroponics:** Experimentation with aqua-

ponics and hydroponics, especially in urban and peri-urban areas where traditional farming space is limited. These soilless cultivation methods allow for controlled environments and efficient resource utilization.

- **Use of polyhouse and green house:** It is a significant technology that has been embraced by many organic farmers, not only in India but globally. These protected cultivation methods offer several advantages, particularly in enhancing crop yield and quality while minimizing environmental impact.
- **Precision Farming:** Precision farming techniques, including the use of technology for monitoring, and managing crops more efficiently. This involves the use of sensors, drones, and other technologies to optimize resource usage, such as water and fertilizers.
- **Crop Diversification:** Emphasis on crop diversification to improve resilience against climate change and market fluctuations. Farmers are encouraged to grow a variety of crops rather than depending on monoculture.
- **Soil Health Management:** Focus on soil health management through practices like cover cropping, crop rotation, and the use of organic amendments to enhance soil fertility and structure.
- **Organic Certification and Traceability:** Growing awareness and importance of organic certification. Farmers are increasingly seeking organic certification for their produce to meet the demand of health-conscious consumers. Traceability systems are also being implemented to ensure transparency in the organic supply chain.

Economic viability

The price of organic products is often higher in the market because the process strictly avoids the use of synthetic farm inputs. Due to this consumer are willing to pay a premium price for it. Yields in organic farming may initially be lower during the transition period, but over time, they can reach comparable levels with conventional farming. The emphasis on soil health and biodiversity can contribute to sustainable yields in the long run.

With the growing global demand for organic products, there are export opportunities for Indian organic farmers. Meeting international organic standards can open up markets abroad.

Many studies have shown that yield per acre in organic farming is low as compared to non-organic farming, but organic products can easily compensate for the low yield with their higher rates in markets [3].

Challenges and solutions

Lack of awareness and education

- **Challenge**: Many farmers lack awareness and knowledge about organic farming practices and their benefits.
- **Solution**: Conduct extensive awareness campaigns, training programs, and workshops to educate farmers about the principles and practices of organic farming. Collaboration with agricultural extension services, NGOs, and educational institutions can play a crucial role in this regard.

High certification costs

- **Challenge**: Obtaining organic certification can be expensive for small and marginal farmers.
- **Solution**: Provide financial support and subsidies to farmers for organic certification. Government and non-governmental organizations can work together to ease the financial burden and encourage more farmers to adopt organic practices.

Limited access to organic inputs

- **Challenge**: The availability and affordability of organic inputs, such as biofertilizers and organic pesticides, can be a challenge.
- **Solution**: Establish decentralized production and distribution systems for organic inputs. Encourage local production of organic inputs and provide subsidies or incentives to make them more affordable. Government agencies and private enterprises can collaborate to address this issue.

Market access and infrastructure

- **Challenge**: Inadequate market infrastructure and limited access to markets for organic produce.
- **Solution**: Develop and strengthen market linkages for organic farmers. Establish organic markets, improve transportation and storage facilities, and create certification standards that align with international organic standards to facilitate exports. Government support in creating marketing infrastructure is crucial.

Transition period yields

- **Challenge**: During the transition from conventional to organic farming, there is often a dip in yields.
- **Solution:** Offer financial incentives and support mechanisms for farmers during the transition period. Implement agroecological practices that facilitate a smoother transition without compromising yields.

Pests and disease management

- **Challenge**: Organic farming relies on natural pest control methods, and managing pests without synthetic pesticides can be challenging.
- **Solution:** Promote integrated pest management (IPM) strategies, encourage the use of biopesticides, and provide farmers with training on natural pest control methods. Research institutions can play a role in developing and disseminating effective pest management practices.

Government support

- **Challenge**: Inconsistent or insufficient government support for organic farming.
- **Solution**: Advocate for comprehensive policies and financial support for organic farming. Encourage the inclusion of organic farming in national agricultural development plans. Strengthen collaboration between government agencies, research institutions, and non-governmental organizations to provide sustained support.

Scaling up and standardization

- **Challenge**: Scaling up organic farming while maintaining quality standards can be challenging.
- **Solution**: Develop scalable models for organic farming that can be replicated across regions. Establish standardized organic farming practices while allowing for regional adaptations. Encourage the participation of private sector entities to promote scalable and sustainable organic farming practices.

Conclusion

In closing, fostering a flourishing future for organic farming in India is a shared journey. By spreading awareness and providing accessible training, we can cultivate a landscape of informed farmers. Overcoming challenges like high certification costs, limited access to inputs, and the initial lower yields during the transition period requires sustained government support and creative solutions. It's crucial to recognize that while organic farming offers immense benefits, suddenly replacing traditional farming might not be feasible. Sri Lanka's recent struggles with organic farming underscore the importance of finding a balanced approach that embraces sustainable practices without disregarding the strengths of traditional agriculture. Together, let's sow the seeds of collaboration among farmers, policymakers, and stakeholders, ensuring a resilient and diverse agricultural landscape that can weather any storm and yield a harvest of sustainability for generations to come.

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