



## A Comprehensive Review of Organic Farming in India: Current Status, Challenges, Benefits, and Future Prospects

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### Abstract:

Organic farming has surfaced as a sustainable agricultural method that responds to increasing concerns regarding environmental damage, food safety, and health issues linked to traditional farming techniques. This extensive review explores the present condition, challenges faced, advantages gained, and future outlook for organic farming in India. The research compiles insights from peer-reviewed articles, governmental publications, and empirical studies released between 2000 and 2023. Findings reveal that India ranks ninth worldwide in terms of land dedicated to organic agriculture, with around 2.3 million hectares cultivated organically, and holds the top position for the number of organic producers with over 1.3 million farmers engaged in this practice. Organic farming showcases enhanced environmental outcomes by improving soil health, conserving biodiversity, and lowering pollution levels. Economic evaluations suggest that while initial yields may drop by 9.2-25% during transition periods to organic practices, farmers benefit from net profits that are 22% higher due to price premiums ranging from 20-40%, along with an 11.7% reduction in production costs. Nonetheless, notable challenges remain, such as insufficient policy frameworks for domestic markets, limited access to organic inputs, high certification fees, and inadequate marketing infrastructure. This review highlights significant research deficiencies and offers policy recommendations aimed at fortifying India's organic farming sector while stressing the importance of region-specific strategies that marry traditional knowledge with scientific advancements.

**Keywords:** Organic Farming, Sustainable Agriculture, Food Security, Soil Health, India, Agricultural Policy.

### Introduction:

Agriculture is a fundamental component of India's economy—employing roughly 54.6% of the workforce—and plays a crucial role in contributing to the national GDP (Karunakaran, 2021). The Green Revolution of the 1960s transformed India into a food-surplus nation through the use of high-yield crop varieties alongside chemical fertilizers and intensive irrigation practices. Although this technological advancement addressed immediate food supply issues effectively, it also led to environmental

degradation, including soil nutrient depletion and groundwater pollution, along with health risks associated with pesticide residues (Yadav et al., 2013). The excessive application of chemicals has resulted in detrimental effects on soil ecosystems, including nutrient mining and loss of biodiversity across agricultural fields. Studies have shown that over half of India's land area suffers from desertification or degradation, largely attributed to chemically intensive agricultural methods (Sankar, 2011). Furthermore, concerns about pesticide

contamination in food products have heightened consumer anxiety regarding safety and nutritional value.

These pressing challenges have prompted a shift towards alternative agricultural systems emphasizing ecological stability and sustainable resource management practices. Organic farming is characterized by the International Federation of Organic Agriculture Movements (IFOAM) as "a production system that sustains the health of soils, ecosystems and people." It prioritizes ecological processes tailored to local conditions over synthetic substances known for their harmful impacts (Das et al., 2020). Integrating traditional wisdom with modern science, organic practices focus on managing soil health through crop rotations, green manures, biological pest control methods, and nutrient recycling techniques.

India's historical roots in organic agriculture can be traced back thousands of years, documented within ancient texts such as the Vedas, which describe methods for preserving soil fertility via natural means (Sofia et al., 2006). However, contemporary interest surged only after the initiation of the National Programme for Organic Production (NPOP) in the early 2000s, along with supportive policies.

The objectives outlined in this review are threefold:

1. To analyze current trends and growth patterns within Indian organic farming,
2. To assess the environmental, economic, and social benefits attributed to these practices,
3. To pinpoint obstacles hindering broader adoption while advocating evidence-based policy recommendations facilitating sustainable progress.

### **Methodology:**

A systematic literature search was conducted targeting relevant studies focused on organic agriculture within India utilizing various academic databases such as Scopus Web of Science Google Scholar PubMed Research Gate using search terms like "organic farming" "sustainable agriculture" "India" "soil health" "organic certification," among others restricted solely peer-reviewed journal articles government reports institutional publications published between years spanning from 2000 until 2023.

Initial searches generated approximately 16 700 results, subsequently filtered based on inclusion criteria emphasizing studies addressing either operational aspects concerning Indian practices examining environmental/economic ramifications or discussing existing regulatory frameworks/challenges encountered throughout this field's growth narrative, resulting ultimately selecting 19 articles for full-text analysis.

### **Current Status of Organic Farming in India:**

#### **1. Global Overview:**

Globally there has been remarkable expansion seen across trade occurring within organically managed lands totaling around 72 .3 million hectares distributed across 187 countries reported by end-year 2019 (Willer & Lernoud , 2020) where Australia leads occupying most space at approximately 35 .7 million hectares followed closely behind Argentina at about three-point seven million hectares Spain thereafter accounting two-point four million hectares respectively leaving an impression upon global landscape positioning itself ninth ranking attaining roughly two-point three million hectares under cultivation reflective making up one-point three percent total net sown area encompassing around one hundred forty point one million

hectares within country's territory according data sourced FiBL IFOAM reporting findings derived through close examination tracing back developments since beginning year two thousand-two wherein only forty-one thousand hectares previously accounted actual management being observed expanding twenty-five-fold five years later reaching figure nearing one point two million during period eight-nine indicating significant success trend continuing today marking highest population engaged certified production estimated around one thousand three hundred sixty-six thousand two hundred twenty-six farmers presently active participating efforts toward sustainability goals outlined earlier Karunakaran, 2021.

## **2. Regional Distribution:**

The distribution pattern showcasing variances among various states illustrates notable concentrations found particularly in regions like Madhya Pradesh, commanding the largest share encompassing thirty-seven point seventy-four percent of the overall national totals, followed by Rajasthan, eleven point ten percent, Maharashtra, eight point fifty-seven percent, and Chhattisgarh, six point sixty percent, respectively(Sankar Reddy,2022). Other states significantly contributing include Himachal Pradesh, Jammu Kashmir, Karnataka, Uttar Pradesh, where Sikkim achieved status, becoming the first fully organic state recognized back dated year sixteen, demonstrating feasibility potential transitions occurring statewide levels effectively transforming landscapes positively moving forward, establishing models replicable elsewhere across the nation, promoting growth opportunities ahead amidst ongoing demands, changing climate realities facing us daily.

## **3. Production Export Performance:**

During fiscal year nineteen-nineteen-twenty Indian economy produced nearly two-

point seventy-five metric tons certified goods ranging categories including oil seeds sugarcane cereals millets cotton pulses medicinal plants tea coffee fruits spices processed foods(APEDA,2020) dominating sectors showing highest outputs witnessed oilseeds leading pack followed sugar crops then cereals trailing behind each segment holding unique contributions respective markets established overseas export values climbed upward reaching heights approximately six hundred thirty-eight thousand nine hundred metric tons generating foreign exchange earnings INR four thousand six hundred eighty-six crore equating roughly USD six hundred eighty-nine million major destinations identified include United States European Union Canada Switzerland Australia Japan Israel New Zealand(APEDA,2020).

## **Benefits of Organic Farming:**

### **1.Environmental Advantages:**

Evidence supports assertion claiming positive influences stemming directly from implementing properly managed systems exhibiting sound methodologies enhancing overall ecosystem functions measured several parameters consistently revealing improvements noted specifically relating aspects concerning increased presence beneficial organisms fostering resilience against threats posed external pressures enabling longevity maintained productivity sustained longer terms uninterrupted cycles employed creating healthier environments conducive thriving habitats allowing diverse life forms flourish (Bengtsson et al.,2005).

Biofertilizers play a pivotal roles maintaining long-lasting fertility structures, crucially integrating recurring elements enabling enhancements wherein nitrogen fixation occurs, mobilizing macro and micronutrients, converting unavailable phosphorus forms accessible to plants

helping enrich soils further enhancing utility derived crops themselves benefitting entire communities reliant producing them without resorting harmful synthetic alternatives protecting surrounding ecosystems preventing contamination burdens falling nature altogether(Gomiero et al.,2008).

## **2. Economic Gains:**

Economic analyses depict favorable scenarios despite lower initial productivity rates experienced transitioning phases frequently impacting smallholder farmer groups less resilient adapting quickly circumstances emerging requiring patience facing uncertainties often discourage engagement required adopting new technologies(Ramesh et al.,2010) illustrating example thorough surveys conducted involving three hundred seventy-six individuals representing diverse backgrounds seven distinct states collectively concluding findings indicate profitability arises primarily driven factors involving substantial premium pricing coupled reduced input costs driving returns improving livelihoods beyond expectations set initially challenging conventional norms prevailing market dynamics altering perceptions gradually shifting towards sustainability ideals embraced widely accepting paradigm changes necessary embracing future considerations holistically (Charyulu Dwivedi,2016).

## **3. Social Health Impacts:**

Beyond economic implications, social dimensions emerge prominently, influencing rural development initiatives and fostering employment generation. Notably, labor-intensive methodologies adopted inherently tend to create job opportunities, supporting livelihood diversification, essential to combating poverty alleviation goals (Bakewell-Stone et al.,2008).

Organic cooperatives enhance community networks, providing training resources, extension

services, ensuring accessibility to vital healthcare programs, credit avenues, ultimately enriching the lives of participants involved in cultivating relationships, strengthening bonds, shared trust, working collaboratively, and achieving common objectives grounded in principles of equity, justice, and fairness upheld throughout processes undertaken.

Healthwise perspectives reveal considerable reductions detected regarding pesticide residues prevalent conventionally produced items consequently diminishing human exposure dangerous chemicals potentially harming well-being(Forman Silverstein ,2012) whilst discussions surrounding nutritional differentials persist some studies indicate superiority antioxidants vitamins minerals evidenced organically grown produce available marketplaces meeting rising demands informed consumers increasingly aware choices matter greatly determining futures built upon healthy foundations below surface levels visible outward appearances alone signify deeper truths lie beneath surface layers needing exploration understanding fully grasp complexities surrounding interconnectedness affecting everyone involved journey onward discovery paths lead both personal collective growth aspired towards inevitably leading brighter tomorrow awaits just ahead horizon beckoning forth possibilities abound waiting eagerly receive embrace wholeheartedly together united vision progress shared aspirations realized become tangible realities lived daily basis continuously striving achieve greatness sought after together hand-in-hand navigating waters unknown safely guided compass hearts minds aligned purpose-driven journeys embarked upon collectively unified front bolstering strength hope dreams fulfilled ultimately shaping destinies carved out existence evermore intertwined fates written stars

above shining brightly illuminating pathways treaded forth thereafter onward ever upward!

### **Methods Practices in Organic Farming:**

#### **1. Soil Fertility Management:**

Principles guiding effective management revolve around the idea "feeding soil feeds plants". Key components involve utilizing farmyard manure vermicompost alongside biofertilizers employing ratios calculated meticulously, ensuring maximum efficiency is achieved, delivering essential nutrients required to sustain optimal growth levels maintained throughout lifecycle stages encountered varied climatic conditions experienced diverse contexts encountered locally adapted solutions rendered possible through collaborative efforts pooling expertise resources harnessed to maximize potential realized to the fullest extent possible! (Yadav et al.,2013)

Vermicomposting stands out distinctly, benefiting from earthworm-mediated decomposition processes, resulting in superior content compared to traditional compost types, providing necessary macro and micronutrients, growth hormones, enzymes, beneficial microorganisms, enhancing biological activity, enriching targeted outcomes aimed at elevating standards expected performance attained consistently irrespective of variability present varying circumstances confronted regularly encountered across board ( Kumar Prakash Brar Kumar,2018 )

Green manuring practices employing leguminous crops contribute significantly to fixing atmospheric nitrogen, forming symbiotic relationships, enhancing overall productivity, improving water retention capacities, simultaneously suppressing weed competition, reducing the need for herbicides, pesticides, and unnecessarily harming delicate balances existing

naturally must be preserved to protect the integrity of systems functioning smoothly and efficiently (Sankar Reddy, 2022)

#### **2. Pest Disease Control Strategies:**

Preventive strategies underpinning successful pest management rely heavily on incorporating crop rotation, intercropping, conservation of natural enemies, botanical pesticides, leveraging natural processes, reducing reliance on external inputs, minimizing adverse impacts incurred surroundings ensure healthy balance is maintained ecosystem functions optimally performed realizing desired objectives collectively attained through innovative approaches adopted proactively rather reactively addressing emerging threats timely manner accordingly anticipated beforehand (Gaur Sharma,2010)

#### **3. Weed Management:**

In organic systems, we know weed-handling strategies are preventive, cultural, and mechanical. Weed cycle disruptions are caused by crop rotation, and weed expansion is inhibited by competitive crop canopies. The technique of stale seedbed provides for preparing seedbeds and weed germination before ending tillage, and thus helps decrease weed pressure. Mechanical weeding via hoeing and inter-cultivation, hand-weeding, and hand weeding continue to be fundamental but labor-intensive. Tying crop residues and plastic film around crops with mulch prevents weed emergence and conserves moisture in the soil.

### **Challenges and Constraints:**

#### **1. During Transition the yield reduction is high:**

Most of the farmers switching from conventional to organic cultivation also experience a reduction of 9.2-25% in the first 2-3 years (Elayaraja & Vijai, 2020). This yield

surplus is due to the need for the time of the fertility cycle (i.e., restoration to nutrient cycling capacity of the soil biological processes) or establishment of pest-predator balances. Costs incurred during such a phase may prevent the adoption by resource-poor smallholders.

## **2. Input Quality and Availability:**

Demand for organic nutrients from available organic resources is highly unsustainable in India. National nutrient requirements for an organics could only reach around 25-30% from organic sources (Chhonkar, 2002) according to existing figures. Competing animal feed or fuel uses often predominate; therefore, residues are of little availability for incorporating into soil. Further, poor quality natural, organic inputs, non-standardized inputs, and poor supply chain performance constrain organic production.

## **3. Certification and Distribution to the Market:**

There is still a cost on organic certification – for small and marginal farmers, this can be a barrier of INR 15,000 - 50,000 annually, depending on both certification agencies and the size of the organic group itself (Jouzi et al., 2017). Bureaucratic documentation and inspection are other obstacles. Historically, the organic policy focused on exporting production in India without active market development. Therefore, it is insufficient standards of labeling, low awareness of consumers, and weak market infrastructure discourage premium price realization in the domestic marketplace.

## **4. Policy and Institutional Gaps:**

Policy is still highly fragmented and not followed consistently, despite several government schemes of organic farming. Lack of comprehensive organic farming policies across state boundaries, insufficient support for research,

and inadequate extension services pose challenges for technology transfer and farmer adoption (Pathania, 2020). Productivity is also restricted by the lack of organic seed production systems and variety creation programs in accordance with organic conditions.

## **Future Outlook and Suggestions:**

### **1. Local Strategies of Organic Promotion:**

India has heterogeneous agro-ecological zones; thus, region-specific organic farming strategies are requisite. An “on the organic side” which combines integrated crop management with lower chemical input might present a viable path for intensively cultivated food and grain producing regions. For rain-fed, hilly, and tribal villages marked by historically low chemical needs, “certified organic” options that tap traditional knowledge and practices could potentially help India compete at the top end of export markets of high value.

### **2. Strengthening Research and Extension:**

Research on organic farm technologies must be conducted systematically and strengthened by network projects in agro-ecological zones. Among the areas of focus are the evolution of organic-specific varieties, organized organic input production plans, integrated pest control modules, and post-harvest management technologies. Farmer research and demonstration programs can quickly accelerate tech adoption and technology improvement.

### **3. Market Development and Infrastructure:**

Building strong local organic markets that are strong at home demands a broad strategy from consumer campaigns and organic retail infrastructure, as well as links to markets. Farmer-Producer Organizations can be promoted as venues for certification, as collective certification of farmers, input procurement, and product sales platforms. The Participatory

Guarantee System is an inexpensive but potentially effective certification alternative for the domestic market.

#### 4. Support and Institutional Framework:

Whole-system support at the national and state level for organic farming development in the transition phase, such as subsidies for inputs, technical assistance, and risk management, should be provided. Minimum support prices for organic produce, broken down by certification status, can help stabilize incomes for farmers. Including organic production in global food security initiatives will create automatic demand and increase population density.

#### Conclusion:

An organic farmer works under a whole new paradigm of sustainable agriculture, which links productivity with ecological preservation and human health. The organic sector in India has expanded in leaps and bounds, making it a world leader in organic producers. The environmental advantage of organic agriculture—improved health and sustainability for soil, conservation of biodiversity, and reduction of pollution—matches well with the national sustainable development strategies. The economic evidence shows that organic farming can increase farmer profitability even if farmer yields decrease in the future, if we are to maintain the policies and market infrastructure we need. Nevertheless, to achieve the full efficacy of organic farming, challenges in the form of input access, certification price, market development, and policy coherence will have to be overcome. A more diverse regional approach, which acknowledges the agricultural diversity of India, presents pragmatic routes for organic development while maintaining national food security. The extent to which India adopts an organic agriculture as an agro-industrial system is likely to depend on improving

research–extension linkages, devising organic technologies, and appropriate policy environments.

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