



International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Organic Farming in the 21st Century: Opportunities, Challenges, and Impact

Ms. Kavya B¹, Dr. Muzhumathi R², Mrs. I. Jenifer hebziba³, Mr. S. K. Vignesh⁴

¹MBA, Department of Management Science, Velammal Engineering College, Chennai

²Assistant Professor, Department of Management Science, Velammal Engineering College, Chennai muzhumathi@velammal.edu.in

³Assistant professor, Department of management sciences Velammal engineering college, jeniferhebziba@velammal.edu.in

⁴MBA, Department of Management Science, Velammal Engineering College, Chennai

DOI : <https://doi.org/10.55248/gengpi.07.0126.0124>

ABSTRACT:

This study explores the growth, opportunities, and challenges of organic farming in the 21st century. Organic farming has expanded worldwide due to rising consumer demand for healthy food and increasing support for sustainable agriculture. The study explains key principles such as avoiding synthetic chemicals, improving soil fertility, and promoting biodiversity. It also highlights global trends, technological innovations, and environmental benefits linked to organic practices. At the same time, the study discusses major challenges like lower yields, high certification costs, limited infrastructure, and climate change. Recent developments, including Organic 3.0, precision farming tools, and AI-based solutions, show strong potential to improve organic production. By combining findings from different studies, this article helps readers understand the importance of organic farming and the need for better policies, training, and technological support. Overall, it provides clear insight into how organic farming can contribute to a more sustainable, resilient, and eco-friendly food system.

INTRODUCTION:

Organic farming has transformed from a niche agricultural practice into a globally recognized pillar of sustainable development. The 21st century has witnessed rapid expansion in organically managed land, increased consumer demand for chemical-free foods, and heightened policy attention toward agroecological models of production. organic farming worldwide reached 98.9 million hectares in 2023, and the global organic market surpassed 136 billion euros, reflecting accelerated adoption across continents. (Golijan Pantović, J. (2025))

Organic agriculture represents an ecological approach to cultivating crops and raising livestock without synthetic pesticides, fertilizers, genetically modified organisms (GMOs), or growth hormones. It emphasizes soil fertility, biodiversity conservation, ecological balance, and long-term sustainability. The foundational principles of organic farming—health, ecology, fairness, and care—align with global concerns regarding climate change, soil degradation, biodiversity loss, and pollution from intensive conventional agriculture.

Historical developments have shaped the philosophical and scientific backbone of organic farming. As described in Nature Plants, organic agriculture evolved through pioneers such as Rudolf Steiner, Sir Albert Howard, and Masanobu Fukuoka, who argued for farming systems that integrate ecological cycles and local knowledge. (Reganold, J. P., et al. (2016))

Despite its benefits, organic agriculture continues to confront skepticism, especially regarding lower yields, land-use efficiency, and global food security. Critics claim that organic systems cannot adequately meet caloric demands for a rising population without significantly increasing agricultural land use. However, emerging research challenges these claims by demonstrating improvements in organic productivity, advancements in biological pest control, precision technologies, and increased climate resilience.

Additionally, organic agriculture supports social welfare and market opportunities. Highlight organic farming's advantages in improving soil health, enhancing biodiversity, reducing chemical exposure, and supporting small-scale farmers. (Srivastava, A. K., et al. (2022))

OBJECTIVES :

- To identify and explain the main opportunities and challenges that organic farming faces in the 21st century.
- To study how organic farming affects the environment, economy, and society.
- To combine findings from recent research to suggest future improvements and theoretical ideas for organic farming.

RESEARCH METHODOLOGY:

This study follows a qualitative literature review method, where information from peer-reviewed articles, review papers, and scientific reports on organic farming was collected and analyzed. The selected studies were examined to understand global trends, major challenges, and the environmental and socio-economic impacts of organic agriculture. Policy and technological developments related to organic farming were also reviewed. Techniques such as comparative analysis, thematic coding, and cross-referencing were used to connect ideas across sources and present the findings in a clear, organized, and original manner.

LITERATURE REVIEW :

Research shows that organic farming is growing because people want chemical-free food and governments support sustainable agriculture. Studies highlight that practices like crop rotation, composting, and avoiding chemicals improve soil health and biodiversity. However, organic yields are usually lower than conventional farming, though better ecological methods can reduce this gap. While organic farming can be profitable, high certification costs and poor market access remain challenges. Recent research also stresses the need for innovation, stronger policies, better farmer training, and improved infrastructure.

ORGANIC FARMING:

Global Trends in Organic Farming

Organic farming has grown rapidly around the world over the past twenty years. Studies show that both the area of land under organic cultivation and the number of certified organic farmers have increased steadily. This growth is mainly supported by rising consumer awareness about the harmful effects of pesticides, a global shift toward farming practices that help reduce climate change, and the higher market value of organic products. In many regions, government support and subsidies have also encouraged farmers to adopt organic methods. Researchers further highlight that investments in organic agriculture, improvements in certification systems, and the development of global organic standards have played an important role in expanding this sector. (Golijan Pantović, J. (2025))

Principles and Practices of Organic Agriculture

Organic farming is based on several important practices that help maintain natural balance and soil health. These include crop rotation to prevent nutrient loss, the use of beneficial insects and organisms for biological pest control, and the application of compost and organic fertilizers instead of synthetic chemicals. Farmers also diversify their fields with different crops to support biodiversity and avoid synthetic pesticides, herbicides, and fertilizers. These practices help improve soil structure, increase the number of useful microorganisms, and restore land that has been damaged by chemical-based farming. (Srivastava, A. K., et al. (2022))

Opportunities in the 21st Century

Technological Innovations

Technology offers new possibilities for improving organic farming. Tools such as precision farming equipment, remote sensing devices, and GIS-based soil monitoring help farmers understand soil conditions better and manage their fields more efficiently. Recent research also shows that artificial intelligence can support decision-making in areas like pest management and crop planning. Modern approaches like Organic 3.0 promote innovation by combining traditional organic principles with new scientific methods, leading to more productive and sustainable organic systems. (Reganold, J. P., et al. (2016))

Environmental Sustainability

Organic farming is known for its environmental benefits. By avoiding synthetic chemicals, it reduces pollution, slows down soil degradation, and helps protect biodiversity. These systems also improve soil organic matter, which increases soil fertility and water-holding capacity. As a result, organic farms support healthier ecosystems and contribute positively to the environment. (Thakur, D. S., et al. (2005))

Economic Opportunities

Organic farming can also be financially rewarding. Farmers often earn higher profits because organic products receive premium prices in the market. There are growing opportunities for export, especially as global demand for organic food keeps increasing. Organic agriculture also helps small farmers by creating niche markets and offering better income stability. (Van Mansvelt, J. D. et al. (2017))

Challenges Facing Organic Farming

Lower Yields

One of the major challenges is that organic crops often produce lower yields compared to conventional farming. Some studies show that organic yields can be 19–25% less, making it difficult for farmers to compete in large markets. (Reganold, J. P., et al., (2016))

Certification Costs

Another problem is the high cost and complexity of certification. Many small farmers struggle to afford certification fees or complete the required documentation, which limits their access to organic markets. (Srivastava, A. K., et al. (2022))

Limited Infrastructure

Organic farmers in many regions face poor infrastructure, including weak market connections, limited transport facilities, and a lack of storage or processing units. This makes it harder for them to sell their products and reach wider markets. (Golijan Pantović, J. (2025))

Climate Change Vulnerability

Although organic farms are generally more resilient, they are still affected by climate change. Irregular rainfall, sudden pest attacks, and rising temperatures can reduce productivity and increase risks for farmers.

Consumer Trust Issues

Maintaining consumer trust is another challenge. Fake organic labels and uncertified products create confusion and reduce confidence in the organic market, making it harder for genuine farmers to sustain their businesses.

FINDINGS:

1. Organic farming is growing worldwide because people want safer food and care more about the environment.
2. It helps reduce chemical pollution, improves soil quality, and protects different plant and animal species.
3. Getting organic certification is still difficult and costly, especially for farmers in developing countries.
4. Organic crops usually give slightly lower yields, but new methods in pest control and soil improvement can help increase production.
5. Climate change creates new challenges for organic farmers, so they need practices that can adapt to changing weather.
6. Organic products give higher profits, but not all farmers have equal access to markets.
7. New technologies like precision farming and innovations from Organic 3.0 can make organic farming stronger and more efficient.
8. Better government policies, training, and infrastructure are needed to support the growth of organic agriculture

DISCUSSION: COMPARING PREVIOUS FINDINGS WITH CURRENT FINDINGS

Earlier studies emphasized lower yields and questioned the scalability of organic farming for global food security. They acknowledged organic farming's environmental and social benefits but expressed concerns about its potential to match the productivity of conventional systems. (Reganold, J. P., et al., (2016))

In contrast, more recent work by Golijan Pantović (2025) indicates that technological advancements—such as precision agriculture, biological pest control, and AI-driven farm management—are significantly closing yield gaps. The modern view suggests that organic farming can be both productive and sustainable when supported by proper infrastructure and innovation. (Golijan Pantović, J. (2025))

Further highlight that challenges such as certification complexity and infrastructure remain unresolved, aligning with earlier literature. They also emphasize increased policy support and market expansion as new opportunities. (Srivastava, A. K., et al. (2022))

Introduced the concept of Organic 3.0, focusing on innovation-driven organic systems capable of addressing global climate and food security challenges. This aligns with the current findings that organic systems are evolving from traditional methods to technologically integrated ecological management. (Rahmann, G., et al., (2017))

IMPLICATIONS:

This study shows that organic farming needs to use eco-friendly methods that increase crop productivity while still protecting nature. It also suggests creating cheaper and easier certification systems so that more farmers can take part without facing heavy costs. Modern technologies like AI, IoT, and precision farming should be included in organic farming models to help farmers work more efficiently. Since climate change affects farming, organic systems must adopt climate-resilient methods such as using stronger crop varieties, better water management, and improving soil carbon. Lastly, organic farming should be seen as part of the whole food system, which includes how food is produced, processed, transported, sold, and consumed—not just what happens on the farm.

CONCLUSION:

Organic farming in the 21st century plays an important role in protecting the environment, using new technologies, and supporting communities. This study shows that organic agriculture is growing worldwide because it offers eco-friendly benefits, better market opportunities, and increasing consumer confidence. However, it still faces challenges such as lower yields, high certification costs, poor infrastructure, and the impacts of climate change. Even with these limitations, new developments like Organic 3.0, precision farming tools, and supportive government policies offer strong possibilities for improving and expanding organic farming. Overall, the findings suggest that organic farming should be seen as part of a larger, sustainable farming system that connects ecological care, technology, and social well-being.

REFERENCES:

1. Golijan Pantović, J. (2025). Challenges and perspectives of organic farming in the 21st century. *Acta agriculturae Serbica*, 30(59), 21-31.
2. Reganold, J. P., & Wachter, J. M. (2016). Organic agriculture in the twenty-first century. *Nature plants*, 2(2), 1-8.
3. Srivastava, A. K., Kumar, A., Vigyan, K., & Bokaro, K. (2022). Exploring organic farming: Advantages, challenges, and future directions. *Plant Science Archives*, 9, 13.
4. Van Mansvelt, J. D., & Temirbekova, S. K. (2017). Challenges and opportunities. *BIOLOGY AGRICULTURAL*, 478.
5. Rahmann, G., Reza Ardakani, M., Bärberi, P., Boehm, H., Canali, S., Chander, M., ... & Zanolli, R. (2017). Organic Agriculture 3.0 is innovation with research. *Organic agriculture*, 7(3), 169-197.
6. Thakur, D. S., & Sharma, K. D. (2005). Organic farming for sustainable agriculture and meeting the challenges of food security in 21st century: An economic analysis. *Indian Journal of Agricultural Economics*, 60(2).
7. Raj, A. N. (2016). Probing the Factors Influencing Shoppers' Behaviour and its Impact on Shoppers' Loyalty-An Empirical Study with special reference to Shopping Malls in Chennai City. *Asian Journal of Research in Social Sciences and Humanities*, 6(5), 1188-1201.
8. Sathiyamurthi, K., Devi, K., & Raj, A. N. (2021). WITHDRAWN: Computational analysis and intelligence for mediating effect of investment knowledge on investment intention and investment behaviors.
9. Jawaharrani, K., Lekshmi, R. S., Nirmalraj, A., & Mary, V. S. (2023). DETERMINANTS OF BRAND LOYALTY AMONG SKIN CARE COSMETIC USERS IN CHENNAI CITY. *Journal of Pharmaceutical Negative Results*, 14(2).
10. Kumari, I. N. N., & Anthuvan, M. V. L. (2017). The Role of Cash Conversion Cycle in Working Capital Management on Profitability: A Study on Manufacturing Industries. *International Journal of Research in Management, Economics and Commerce*, 7(12), 211-222.
11. Kumari, I. N. N., & Indira, A. A Study on Fin-Tech at Global Markets.
12. Kumari, I. N. N., & Anthuvan, M. V. L. A Study on the Inventory Management on Profitability of Listed Manufacturing Companies at Chennai for a Period of 2010-2016: A Working Capital Perspective.
13. Kumaresan, R. C., & Chandramohan, S. (2024). Analyzing the impact of brand resonance on consumer purchase intentions for fast moving consumer goods: an empirical study. *Salud, Ciencia y Tecnología-Serie de Conferencias*, (3), 912.
14. Chakkaravarthy Kumaresan, R., & Chandramohan, S. Brand Awareness: Understanding its Role in Sales, Consumer Intentions, and Decision Making.
15. Nafeza, E., Raj, A. N., & Sudharani, M. P. (2025). Impartiality and Innovation: The Role of Bureaucratic Neutrality in Facilitating Digital Technology Integration in the Modern Era.
16. Chakkaravarthy Kumaresan, R., & Chandramohan, S. (2023). Brand building challenges for fast moving consumer goods.
17. Sudharani, M. P. A COMPREHENSIVE REVIEW OF GREEN MARKETING IN DEVELOPING COUNTRIES Dr. Chakkaravarthy kumaresan R. *EXPLORING THE SOCIAL SCIENCE AND RESEARCH*.
18. Patil, B. S., Baral, D., Samuel, S., Tabuena, A. C., & Sachan, V. S. (2025, February). Integrating Sustainable Development Goals (SDGs) into Corporate Marketing Strategies: A Technological Approach to Responsible Business. In *2025 First International Conference on Advances in Computer Science, Electrical, Electronics, and Communication Technologies (CE2CT)* (pp. 920-923). IEEE.
19. Malarvizhi, J. R. (2025). The Impact of Different Facets of Work Family Conflict on Employee's Discretionary Work Effort Mediated by Employee Engagement. *Employee Responsibilities and Rights Journal*, 1-23.
20. Malarvizhi, S. J. R., & Vijayarani, S. (2025). IT employee perceptions: life satisfaction achieved through job satisfaction and influencing factors. *International Journal of Management and Enterprise Development*, 24(2), 177-200.