Volume 4, Issue 1
January I 2026

Agri Roots
e- Magazine

ISSN: 2583-9071
www.agrirootsmagazine.in

Organic Farming for Sustainable Agriculture

ARTICLE ID: 0325

Amisha Patel[1], Naveen Kumar[2], Professor (Dr.) Srinivasa Rao Meesala[3]

[1]M.Sc. Agriculture (Agronomy), School of Agriculture, K.K. University, Biharsharif, Nalanda, Bihar – 803115, India

[2]Research Scholar (Ph.D. Agronomy), School of Agricultural Sciences, K.K. University, Biharsharif, Nalanda, Bihar – 803115, India

[3]Dean, School of Agricultural Sciences, K.K. University, Biharsharif, Nalanda, Bihar – 803115, India

After independence, India faced a major challenge in producing sufficient food to meet the needs of its rapidly growing population. To overcome this problem, agriculture adopted high-yielding crop varieties along with modern inputs such as irrigation, chemical fertilizers, and pesticides. Although these technologies significantly increased agricultural productivity, they also resulted in adverse effects such as deterioration of soil health, environmental pollution, pesticide toxicity, and sustainability concerns. Consequently, scientists and policymakers are reconsidering farming practices that rely more on organic inputs rather than synthetic chemicals.

Organic farming offers the potential to produce healthy and high-quality food without harming soil health or the environment. However, concerns remain regarding the ability of organic farming to meet the food demands of a large population like India. India produces a wide range of certified organic products, including basmati rice, pulses, honey, tea, spices, coffee, oilseeds, fruits, grains, herbal medicines, and value-added products. Non-edible organic products include cotton, textiles, cosmetics, health foods, and personal care items. The present review discusses the role of organic farming in sustainable agriculture with special reference to northern India.

At present, rising levels of pollution in all sectors of life pose a serious challenge to sustainable environmental development. Increasing population pressure, growing demands, and changing lifestyles have accelerated environmental degradation. Agriculture, a critical sector for human survival, has also contributed to pollution through the excessive use

of chemical fertilizers and pesticides to enhance crop yields. These practices disrupt soil nutrient balance, reduce soil fertility, and negatively affect ecosystems.

Organic farming is an effective and promising approach to environmental sustainability, as it ensures crop stability, improves soil health, minimizes environmental hazards, and promotes the production of organic food. While several agricultural practices aim to reduce environmental damage, organic farming remains one of the most scientifically proven methods for maintaining ecological balance in agriculture.

Organic farming relies on various components such as organic fertilizers, crop rotation, vermicomposting, nitrogen-fixing microorganisms, crop residues, biofertilizers, biopesticides, kitchen waste, sludge, and biogas. These inputs enhance soil structure, fertility, and biological activity while remaining environmentally friendly. The use of synthetic chemicals is avoided, and eco-friendly inputs are preferred. Organic cultivation of vegetables and other crops ensures the availability of safe and nutritious food in the market.

Therefore, it is essential to formulate and implement organic farming policies with active participation of stakeholders. Proper monitoring, ground-level implementation, impact assessment, and public awareness are crucial for policy success. Effective policies promote sustainable development and contribute to environmental conservation.

What Is Organic Farming?

The term *organic* was coined by Northbourne in 1940 in his book *"Look to the Land."* Organic farming is an agricultural system that relies on biological fertilizers and environmentally based pest control methods derived from plant and animal residues and nitrogen-fixing cover crops. Modern organic farming developed as a response to environmental damage caused by chemical-based conventional agriculture.

Compared with conventional farming, organic agriculture uses fewer pesticides, reduces soil erosion, minimizes nitrate leaching into groundwater, and recycles animal waste within the farm. However, organic farming often results in lower yields—approximately 25% less than conventional systems—though this varies depending on crop type and management practices. The future challenge of organic agriculture lies in maintaining natural resources, increasing productivity, reducing costs, and addressing climate change and population growth.

Need for Organic Farming

- Excessive use of chemical fertilizers reduces soil fertility
- Chemical inputs cause soil, water, and air pollution
- Conservation and maintenance of ecosystems
- Promotion of sustainable agricultural development
- Low-input and cost-effective farming practices
- Increasing consumer demand for safe and quality food

Effect of Organic Nutrition on Crop Productivity

The addition of organic matter to soil is a well-established practice for improving crop productivity. Sharma and Mitra reported increased grain and straw yield of rice with organic matter application. Ranganathan and Selvaseelan observed that spent mushroom compost and rice straw compost increased rice grain yield by 20% compared to NPK fertilizers.

Singh *et al.* reported that application of 7.5 t FYM ha^{-1} significantly improved grain and fodder yield in degraded soils.

Green manuring with *Sesbania aculeata* significantly enhanced grain yield in rice and chickpea. Stockdale *et al.* highlighted multiple benefits of organic farming, including environmental protection, biodiversity conservation, and reduced energy consumption in developed countries, while supporting sustainable resource use and improved yields in developing nations.

Effect of Organic Nutrition on Soil Fertility

Application of NPK fertilizers tends to lower soil pH, making soils acidic, whereas organic manures increase soil pH. Organic fertilizers increased soil nitrogen content by approximately 17%, while NPK treatments showed little improvement. Available phosphorus increased by more than 50% under organic treatments, and exchangeable potassium levels doubled with organic manure application.

Organic manures also enhanced calcium and magnesium levels, unlike NPK fertilizers, which reduced calcium content. Electrical conductivity increased under both organic and inorganic treatments, with the highest values observed under combined application.

Effect of Organic Nutrition on Crop Quality Parameters

Studies on *Amaranthus* revealed that crops grown with organic manures exhibited superior nutritional quality compared to chemically fertilized crops. Poultry manure enhanced iron and calcium content, while vermicompost improved iron availability, carotenoids, crude fibre, vitamin C, and zinc content. Overall, organic fertilizers proved more effective in improving crop nutritional quality than chemical fertilizers.

Effect of Organic Nutrition on Soil Biological Properties

The application of FYM, vermicompost, and coir pith compost along with biofertilizers significantly improved soil physical, chemical, and biological properties. The combined use of vermicompost and *Azospirillum* enhanced soil organic carbon, nitrogen availability, and microbial populations. Among organic nitrogen sources, 75% vermicompost combined with *Azospirillum* was most effective in improving soil health.

Conclusion

Organic farming provides high-quality food while preserving soil health and environmental integrity. It is more eco-friendly than conventional farming and supports long-term sustainability. Identifying region-specific organic crops and products can help meet global market demands while ensuring food security. Organic farming can generate employment, promote rural prosperity, and contribute to environmental conservation. Integrated research and policy support are essential to enhance productivity and sustainability in organic agricultural systems.

References

1. Ambika Devi, Y., Raj, S., & Kaundal, M. (2025). Climate-smart organic agriculture and future directions. *Archives of Current Research International*, 25(5), 609–624.

2. Bhaumik, S., Kumar, R., Kumar, S., & Kumari, A. (2024). Organic farming as a pathway to sustainable agriculture. *International Journal of Environment and Climate Change*, 14(11), 419–435.
3. Kaswan, S., Kaswan, V., & Kumar, R. (2025). Organic farming as a basis for sustainable agriculture: A review. *Agricultural Reviews*, 33(1), 27–36.
4. Naveen, M., Bhavani, P., Praveen, M., & Piraisoodan, K. (2025). Embedded in nature: A comprehensive review of organic agriculture. *Asian Research Journal of Agriculture*, 18(1), 332–341.
5. Varma, N., Wadatkar, H., Salve, R., & Kumar, T. V. (2024). Advancing sustainable agriculture: A comprehensive review of organic farming practices and environmental impact. *Journal of Experimental Agriculture International*, 46(7), 695–703.