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Organic Farming: A Sustainable Strategy for Farmers and Natural Resource Conservation

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Abstract
The Green Revolution in Haryana, initiated in the 1960s, reached its peak during the 1990s. However, in recent decades, it has begun to reveal the limitations and unsustainable aspects of intensive agricultural practices. The excessive dependence on synthetic inputs such as chemical fertilizers, pesticides and high-yielding variety (HYV) seeds has not only degraded soil health and fertility but has also posed serious risks to human and environmental well-being. Growing awareness of these adverse impacts has prompted policymakers, environmentalists and researchers to search for sustainable alternatives. Among these, organic farming has emerged as a viable and holistic solution that minimizes or eliminates the use of synthetic inputs while relying on natural soil-enriching methods such as crop rotation, composting, animal manure, crop residues and bio-fertilizers to restore ecological balance and soil productivity.From an economic standpoint, organic farming offers significant benefits to farmers**.** The global and domestic demand for organic produce has risen steadily, creating lucrative market opportunities.
Haryana, owing to its proximity to the National Capital Region (NCR)**,** holds great potential to capitalize on this growing demand, thereby enhancing farm incomes. Moreover, the reduced reliance on expensive chemical inputs fertilizers, pesticides and synthetic growth enhancers can substantially lower production costs, easing the financial burden on farmers. Thus, both in terms of economic returns and environmental sustainability**,** organic farming represents a promising alternative for the agricultural community. The present study aims to examine the existing agricultural practices in Haryana, assess the policy framework promoting organic farming and evaluate the current market conditions influencing its adoption in the state. By analyzing these dimensions, the paper seeks to highlight organic farming as a sustainable pathway for agricultural growth, environmental conservation and improved farmer livelihoods in Haryana.
Keywords: Green revolution, organic farming, sustainability, commercial agriculture.

Introduction

During the twentieth century, agriculture along with other vital sectors of human progress achieved tremendous advancements that effectively dispelled long-standing fears of food insecurity. This success was largely driven by the industrial modernization of agriculture**,** which introduced a wide array of modern inputs such as chemical fertilizers, pesticides, improved seeds and mechanical implements. The central objective of this transformation was to maximize production from limited

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land resources, a goal that received enthusiastic support from governments, non-governmental organizations and farmers alike. To encourage large-scale adoption of modern agricultural technologies, the state extended substantial subsidies on fertilizers, machinery and other inputs, ensuring their accessibility to farmers. The Green Revolution in Indian agriculture thus emerged as the culmination of coordinated efforts among government institutions, industrial enterprises and the farming community.

However, over time, the very practices that once ensured agricultural prosperity began to reveal their long-term ecological drawbacks**.** The excessive and indiscriminate use of chemical inputs led to a range of environmental problems, undermining the sustainability of agricultural systems. Although the Green Revolution succeeded in achieving national food security and meeting the demands of a rapidly growing population, it did so at a considerable ecological cost. Continuous dependence on intensive farming methods resulted in the deterioration of soil health, depletion of natural resources and disruption of ecological balance. Consequently, what once symbolized agricultural progress gradually became a source of environmental concern posing challenges not only to environmentalists and policymakers but also threatening the long-term productivity and resilience of India's farmlands**.**

Methodology

The present paper seeks to evaluate the prevailing agricultural practices in Haryana and assess their ecological implications. Such an evaluation is crucial for understanding the unintended consequences of the Green Revolution and the increasing signs of unsustainability in the state's agricultural system. The study further explores the potential of organic farming as an alternative approach to address both environmental degradation and the issue of declining farm incomes**.** Experiences from several developed countries suggest that organic farming not only enhances soil fertility and ecological balance but also improves the profitability of agriculture**,** offering a dual advantage to farmers by promoting environmental health alongside economic sustainability. The research framework relies primarily on secondary data sources, including the *Statistical Abstracts of Haryana*, reports from the *Department of Agriculture* and relevant academic studies, journal articles and books**.** To gain a clearer understanding of the ecological implications of the wheat–rice cropping system**,** the study identifies specific regions in Haryana based on the concentration of wheat and rice cultivation**.** These identified zones serve as the focal points for assessing environmental impacts such as soil depletion, groundwater decline and chemical contamination. Preliminary analysis indicates a direct relationship between increased agricultural production and higher input consumption**.** Areas with intensive input use particularly chemical fertilizers, pesticides and irrigation resources tend to exhibit more severe ecological stress. Consequently, the study underscores the urgent need for sustainable agricultural practices**,** with organic farming

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emerging as a promising alternative to restore ecological stability while supporting farmers' livelihoods in Haryana.

Agricultural practices in Haryana

It is now well recognized that the Green Revolution in Haryana, which once ushered in an era of economic prosperity for the state's rural population, now requires a thorough re-evaluation of prevailing agricultural practices**.** Agricultural development in Haryana has been characterized by the establishment of a distinct cropping pattern dominated largely by food crops**,** particularly the rice–wheat combination (Amita, 2001). This trend, which began in the 1960s, became firmly entrenched by the 1990s and has since emerged as a major concern due to its negative ecological consequences in the early decades of the twenty-first century. In the discourse on the ecological implications of the Green Revolution, special attention is directed toward the rice–wheat cropping system, as it represents the most input-intensive agricultural practice in the state. The production of these two staple crops relies heavily on chemical fertilizers, pesticides, groundwater irrigation and mechanized operation**s**, making them more resource-demanding than other crop varieties. Driven by the dual forces of food security imperatives and market incentives, both the government and the farming community have continued to favor rice and wheat cultivation. Policies such as Minimum Support Prices (MSP) and assured procurement systems have reinforced farmers' dependence on these crops, creating a cycle of ecological and economic dependency. While this system has contributed significantly to Haryana's role as a leading food grain producer, it has simultaneously led to soil degradation, water table depletion and reduced biodiversity. Hence, the time has come to reconsider this intensive pattern of cultivation and promote sustainable alternatives**,** such as crop diversification and organic farming**,** to ensure the long-term health of the state's agricultural ecosystem.

Table – 1

TRENDS IN RICE CULTIVATION IN HARYANA

Year	Area(in '000 hectares	Production ('000 tons)	Yield/ Hectares (in Kgms.)
1970-71	269.2	460	1697
1975-76	303.5	625	2063
1980-81	483.9	1259	2606
1985-86	584.0	1633	2797
1990-91	661.2	1834	2775
1995-96	830.0	1847	2225

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2000-01	1054.3	2695	2557
2005-06	1046.6	3194	3051
2010-11	1243.3	3465	2788
2017-18	1422.0	4880	3432

Compiled from Statistical Abstract of Haryana

The trends clearly reveal a remarkable expansion in the area under rice cultivation**,** registering an increase of 428 per cent in 2017–18 compared to 1970–71**.** Correspondingly, rice production surged by 960.8 percent during the same period. This substantial growth can primarily be attributed to a significant rise in yield per hectare, driven largely by the widespread adoption of **modern** agricultural inputs such as high-yielding variety (HYV) seeds, chemical fertilizers, improved irrigation facilities and mechanized farming techniques.

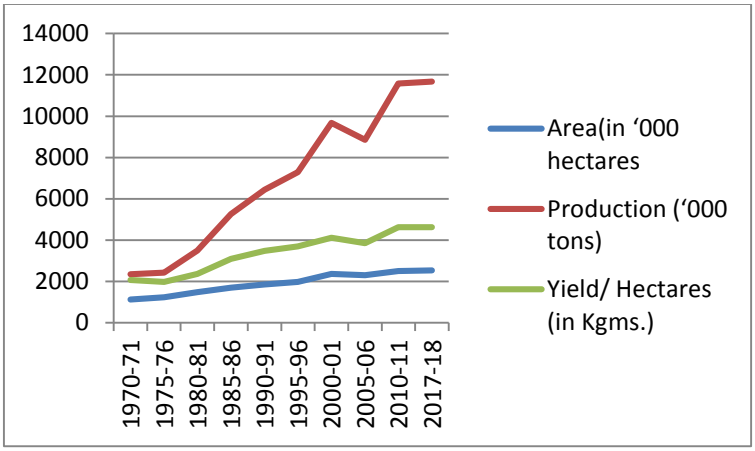

Fig. 1: Trends in Rice Cultivation in Haryana

The cropping pattern in Haryana is characterized by the predominance of rice during the Kharif **s**eason and wheat during the Rabi season**,** with wheat maintaining a dominant position over other crops. These two staple crops continue to receive strong governmental support and policy preference due to their high profitability and assured market returns. The trends in wheat cultivation illustrating changes in area, production and yield over time are presented in Table 2**.**

Year	Area(in '000 hectares	Production ('000 tons)	Yield/ Hectares (in Kgms.)
1970-71	1129.3	2342	2074
1975-76	1226.0	2428	1980
1980-81	1479.0	3490	2360
1985-86	1701.3	5260	3094

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1990-91	1850.1	6436	3479
1995-96	1972.1	7291	3697
2000-01	2354.8	9669	4106
2005-06	2302.7	8853	3844
2010-11	2504.0	11578	4624
2017-18	2526.0	11680	4624

Compiled from Statistical Abstract of Haryana

The data on wheat cultivation reveals a substantial increase of 123.7 per cent in area under cultivation between 1970–71 and 2017–18**.** During the same period, wheat production rose by 398.7 per cent**,** a growth largely attributed to the significant improvement in yield per hectare**.** Similar to the case of rice, this remarkable increase in productivity can be linked to the intensive use of modern agricultural inputs such as high-yielding seed varieties, chemical fertilizers, pesticides and advanced irrigation methods. The overall pattern of growth in wheat cultivation and yield efficiency is more clearly illustrated in Figure 2.

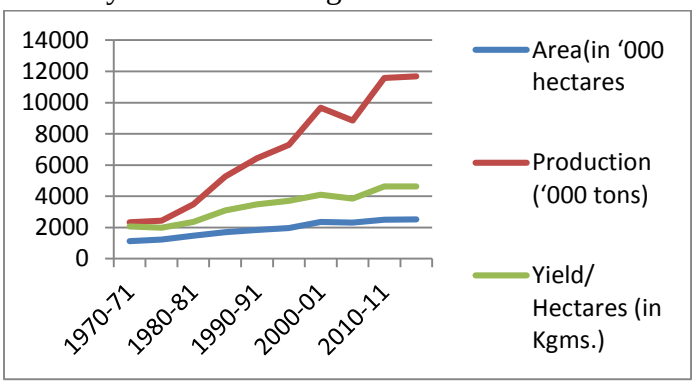

Fig. 2 Trends in the Wheat cultivation

The data on cropping patterns clearly highlights the dominance and continuous expansion of rice and wheat cultivation in Haryana's agriculture. The combined share of the rice–wheat cropping system in the total cropped area increased dramatically from 28.21 per cent in 1970–71 to 63.26 per cent in 2017–18**,** reflecting a clear structural shift toward these two major food crops. This persistent rise indicates a long-term trend in which non-rice and non-wheat crops have failed to register comparable growth, leading to a gradual decline in crop diversification across the state. The regions that have emerged as the core zones of intensive rice–wheat cultivation include the districts of Ambala, Yamunanagar, Kurukshetra, Kaithal, Karnal, Sonipat, Jind, Hisar and Fatehabad**.** Collectively, these districts account for nearly 75 per cent of the total area under rice and more than 60 per cent of the total area under wheat cultivation in Haryana. These areas are characterized by extensive use of modern agricultural inputs**,** such as high-yielding seed varieties, chemical fertilizers, pesticides, groundwater irrigation and mechanized farming practices**.**

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However, it is precisely within these highly intensive agricultural zones that the negative environmental impacts of the Green Revolution are most evident. Problems such as soil nutrient depletion, groundwater decline, chemical contamination and reduced ecological resilience have become increasingly pronounced. The concentration of input-intensive farming in these districts underscores the urgent need for sustainable agricultural strategies**,** including crop diversification and organic farming, to restore ecological balance while maintaining productivity.

Ecological Implications

i) **Increasing demand of Water**: The widespread adoption of High-Yielding Variety (HYV) seeds has significantly increased the demand for irrigation water, placing immense pressure on Haryana's existing water resources, particularly canals and tube wells. In the wheat-dominated regions such as Hisar, Sirsa, Fatehabad and Jind**,** irrigation needs are primarily met through the canal network of the Ghaggar basin. Conversely, the rice-intensive districts depend heavily on groundwater extraction through tube wells to sustain their cultivation cycles. This excessive reliance on groundwater for irrigation has led to a notable decline in the water table**,** especially in the areas where rice–wheat cropping is most prevalent, highlighting a growing concern over the sustainability of the state's water resources**.**

ii) **Depleting Soil Nutrition**: Soil nutrition refers to the availability of essential nutrients in the soil, including nitrogen, phosphorus, potash, manganese, copper, zinc, iron and sulphur**,** which are vital for healthy crop growth. However, due to continuous and intensive cultivation, the soil in many parts of Haryana has become **severely** nutrient-deficient, making it increasingly dependent on chemical fertilizers to replenish its fertility. The excessive and prolonged use of these synthetic fertilizers has disrupted the natural balance of the soil, leading to a rise in soil acidity. This growing acidity not only reduces the soil's capacity to retain nutrients but also diminishes its overall fertility and productivity**,** posing a serious threat to the long-term sustainability of agriculture in the region

iii) **Soil Bacteria falling Prey to pesticides**: The bacteria present in the soil play a vital role as natural agents of fertility**,** contributing to essential biological processes such as nutrient cycling and organic matter decomposition. However, the excessive use of chemical pesticides aimed at controlling weeds and crop pests has had a detrimental impact on soil health. These toxic substances not only eliminate harmful organisms but also destroy the beneficial bacteria and microorganisms that thrive in the upper layers of the soil. As a result, the natural microbial balance is disrupted, leading to a decline in soil fertility and a gradual deterioration of its biological productivity.

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iv) **Contamination of ground water**: The excessive use of chemical fertilizers and pesticides not only affects the surface soil but also seeps deep into the ground**,** leading to the contamination of groundwater resources**.** This polluted water, when used for drinking or irrigation, poses serious health risks to humans and animals alike. Prolonged exposure to such contaminated water has been linked to severe ailments**,** including cancer and other chronic diseases**,** underscoring the urgent need for environmentally responsible agricultural practices and safe water management in the state.

Organic Farming as Ecologically Sustainable Option

Organic farming in India is deeply rooted in traditional agricultural practices and continues to be adopted in several villages across the country. It promotes the health of the agro-ecosystem**,** enhancing biodiversity, natural nutrient cycles and soil biological activity. Unlike conventional agriculture, organic farming emphasizes management-based practices rather than the dependence on external synthetic inputs, recognizing that local environmental conditions require region-specific and adaptive farming systems. India is naturally endowed with abundant organic nutrient sources such as compost, crop residues, green manure and animal waste distributed across diverse agro-climatic regions, which can significantly support the expansion of organic cultivation (Deshmukh & Babar, 2015).

Historically, organic farming has been integral to Indian agriculture for thousands of years**,** forming the backbone of the rural economy. Traditional Indian society practiced agriculture through natural and eco-friendly methods, utilizing fertilizers and pest control substances derived from plant and animal sources. These practices not only maintained soil fertility but also sustained rural livelihoods. The formal introduction of organic agriculture in India is credited to Albert Howard, a British agronomist who began experimenting with organic methods in North India around 1900. During that period, farming was predominantly small-scale and subsistence-based, aimed at meeting the needs of families and local communities. However, the onset of the Green Revolution drastically altered this structure, introducing input-intensive methods that emphasized productivity over ecological balance. In the present context, organic farming is once again being recognized as a viable strategy for sustainable crop production, ensuring both environmental and economic stability.

Globally, the demand for organic food products has been increasing, especially in developed nations**,** due to high purchasing power and growing health consciousness among consumers. In contrast, organic food consumption in India remains relatively low compared to Western markets. The Indian organic food sector is still largely unorganized and fragmented, yet it holds tremendous growth potential for both domestic and international investors. India primarily exports organic

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products, including processed foods, basmati rice, beverages, cereals and millets, to markets such as the United States, Canada, Europe and Southeast Asia (Deshmukh & Babar, 2015).

In recent years, organic farming has gained considerable momentum in Haryana as policymakers, producers and consumers collectively seek sustainable alternatives to conventional agriculture. The Government of Haryana has taken proactive steps to promote and institutionalize organic farming, recognizing its dual benefits for environmental conservation and farmer welfare. A substantial portion of the agricultural budget dedicated to organic farming is being utilized for research, education and awareness initiatives. Moreover, the government has partnered with OneCert**,** an internationally accredited organic certification agency approved by the Agricultural and Processed Food Products Export Development Authority (APEDA)**,** to facilitate certification processes. To encourage participation, the certification fees for organic farms are covered by the state (Ohlan, 2016). According to data from the Haryana State Co-operative Supply and Marketing Federation Limited (HAFED), approximately 1,000 acres have been allocated for organic basmati rice cultivation in the districts of Kaithal, Kurukshetra and Karnal**.** Additionally, desi wheat is being cultivated organically on about 805 acres across Mewat and Jhajjar**,** while Sirsa district has been designated for the organic cultivation of gram (Ohlan, 2016). These efforts signify Haryana's commitment to transforming its agricultural landscape through eco-friendly, economically viable and sustainable organic farming practices that can serve as a model for other states in India.

Conclusion

Organic farming has become the need of the hour, demanding strong policy support for the benefit of soil health, farmers' welfare and consumer well-being. Haryana, as one of India's leading agricultural states, can no longer afford to overlook the multiple adverse ecological consequences of the Green Revolution**.** The time has come for the state to acknowledge this pressing reality and reorient its agricultural strategy toward more sustainable and eco-friendly practices. The **prevailing agricultural system** in Haryana is increasingly proving to be both ecologically damaging and economically unviable**.** Continuous dependence on chemical-intensive farming has severely degraded soil fertility, while the rising cost of cultivation driven by expensive fertilizers, pesticides and irrigation inputs has eroded farm profitability. As a result, agriculture is no longer yielding adequate returns, pushing many farmers into economic distress. In this context, organic farming emerges as a sustainable alternative**,** offering a path toward restoring soil health, reducing input costs and improving farmers' income**s**. By minimizing reliance on synthetic inputs and harnessing natural resources for soil enrichment, organic farming can not only revive the ecological balance but also strengthen the economic foundation of agriculture in Haryana. Hence, adopting organic farming is not merely an environmental necessity but a strategic imperative for achieving long-term agricultural sustainability and rural prosperity**.**

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