

Original Article

Impact of Green Revolution on Agriculture: A Case Study of Rohtas District

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Abstract:

The Green Revolution marked a significant transformation in Indian agriculture, particularly through the introduction of high-yielding variety (HYV) seeds, chemical fertilizers, irrigation, and mechanization. This study examines the impact of the Green Revolution on agriculture in Rohtas district of Bihar from a geographical perspective. The research analyzes changes in cropping patterns, agricultural productivity, socio-economic conditions, and environmental consequences in the region.

The findings reveal that although Rohtas district did not experience the Green Revolution as intensively as northwestern states like Punjab and Haryana, it still witnessed moderate improvements in agricultural productivity, especially in wheat and paddy cultivation. The expansion of irrigation facilities, particularly due to the Sone canal system, contributed significantly to agricultural development.

However, the study also highlights several challenges such as increasing dependence on chemical inputs, declining soil fertility, and unequal distribution of benefits among farmers. Small and marginal farmers have not benefited equally due to limited access to resources and technology.

The study concludes that while the Green Revolution played a crucial role in enhancing agricultural production in Rohtas district, a balanced and sustainable approach integrating modern technology with ecological practices is necessary for long-term agricultural sustainability.¹

Keywords: Green Revolution, Agricultural Productivity, Rohtas District, Irrigation, Sustainability, Bihar Agriculture

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Introduction:

Agriculture has always been the backbone of the Indian economy, particularly in states like Bihar where a large proportion of the population depends on farming for their livelihood. It not only ensures food security but also supports rural employment, socio-economic stability, and regional development. However, in the post-independence period, India faced serious challenges in agricultural production due to traditional farming practices, low productivity, and inadequate irrigation facilities.

During the 1960s, India experienced a severe food crisis, which compelled the government to introduce the Green Revolution as a strategic measure to increase agricultural output and achieve self-sufficiency in food grains. This transformation was marked by the introduction of high-yielding variety (HYV) seeds, chemical fertilizers, pesticides, improved irrigation systems, and modern agricultural technologies. These innovations significantly enhanced crop productivity, particularly in wheat and rice, and played a crucial role in transforming India from a food-deficit to a food-surplus nation.

However, the impact of the Green Revolution was not uniform across all regions of the country. While states like Punjab, Haryana, and western Uttar Pradesh witnessed rapid agricultural growth, eastern states like Bihar experienced relatively moderate progress

due to limitations such as inadequate infrastructure, fragmented landholdings, and socio-economic constraints.

In this context, Rohtas district of Bihar presents an important case for examining the regional impact of the Green Revolution. Located in the southwestern part of the state, Rohtas is endowed with diverse geographical features including fertile alluvial plains, plateau regions, and significant water resources, particularly the Sone River and canal irrigation system. These geographical advantages provide a suitable base for agricultural development.

Despite these favorable conditions, the adoption of Green Revolution technologies in Rohtas district has been uneven. While some areas have benefited from increased agricultural productivity and improved farming practices, others continue to rely on traditional methods due to lack of awareness, capital, and access to modern inputs. Moreover, the region has also experienced certain negative consequences such as environmental degradation, declining soil fertility, and increasing dependence on chemical inputs.²

Therefore, a detailed geographical study of Rohtas district is essential to understand the spatial variations in agricultural development and to assess both the positive and negative impacts of the Green Revolution. Such an analysis not only helps in identifying regional disparities but also provides valuable

insights for formulating sustainable agricultural policies.

Objectives of the Study:

1. To examine the impact of the Green Revolution on agricultural productivity in Rohtas district
2. To analyze changes in cropping patterns and farming practices
3. To evaluate socio-economic impacts on farmers
4. To assess environmental consequences of modern agriculture

Study Area:

Rohtas district is located in the southwestern part of Bihar and forms an important agricultural region of the state. Geographically, the district is characterized by a diverse landscape consisting of fertile alluvial plains in the northern part and plateau as well as hilly regions in the southern part, which are associated with the Kaimur range. This variation in physical features significantly influences agricultural practices and land use patterns in the region.

The district is endowed with rich natural resources, particularly fertile soil

and adequate water availability. The presence of the Sone River, one of the major tributaries of the Ganga, plays a vital role in shaping the agricultural economy of the district. In addition, the well-developed canal irrigation system originating from the Sone River provides a reliable source of water for irrigation, enabling farmers to cultivate crops throughout the year and supporting multiple cropping practices.

Climatically, Rohtas district experiences a subtropical monsoon climate, with hot summers, moderate rainfall during the monsoon season, and cool winters. These climatic conditions are generally favorable for the cultivation of major crops such as wheat, rice, pulses, and oilseeds.

Agriculture is the primary occupation of the majority of the population in the district, and the economy is largely agrarian in nature. The combination of favorable geographical conditions and irrigation facilities makes Rohtas a suitable region for studying the impact of agricultural modernization, particularly the Green Revolution.³

lagged behind due to limited infrastructure, fragmented landholdings, lack of capital, and inadequate access to modern inputs and technology.⁴

Despite these constraints, the Green Revolution played an important role in initiating agricultural transformation in the district. It encouraged farmers to shift from traditional practices to more advanced methods, resulting in moderate growth in crop yields and overall agricultural development. However, the extent of transformation varied across different parts of the district, reflecting the influence of geographical, economic, and social factors.⁵

Impact on Agriculture in Rohtas District:

The Green Revolution brought significant changes in the agricultural landscape of Rohtas district. Although its impact was not as intensive as in some other regions of India, it still contributed to noticeable improvements in agricultural productivity, cropping patterns, irrigation facilities, and the adoption of modern technology. The major impacts are discussed as follows:

1. Increase in Agricultural Productivity:

The introduction of high-yielding variety (HYV) seeds, along with the use of chemical fertilizers and improved irrigation facilities, led to a substantial increase in the production of major crops such as wheat and rice. Farmers began to

adopt improved agricultural practices, which enhanced crop yields and overall farm output.⁶ The practice of multiple cropping also became more common, allowing farmers to cultivate more than one crop in a year, thereby increasing agricultural productivity and income.

2. Changes in Cropping Pattern:

One of the significant outcomes of the Green Revolution in Rohtas district was the shift in cropping patterns. Traditional crops such as millets and pulses gradually declined, while wheat and paddy emerged as dominant crops due to their higher productivity and market demand. This transformation reflects a broader national trend, where farmers shifted towards high-yielding and commercially viable crops. However, this shift also led to a reduction in crop diversity.

3. Expansion of Irrigation:

The development and expansion of irrigation facilities, particularly through the Sone canal system, played a crucial role in agricultural development in the district. Reliable water supply enabled farmers to reduce their dependence on monsoon rainfall and ensured better crop management. Irrigation facilities also supported multiple cropping and improved agricultural stability, especially during periods of irregular rainfall.

4. Mechanization of Agriculture:

The Green Revolution encouraged the adoption of modern agricultural machinery such as tractors, threshers, and pump sets. Mechanization increased the

efficiency of farming operations, reduced the time required for cultivation, and minimized dependence on manual labor. It also contributed to higher productivity and better management of agricultural activities, although small and marginal farmers often faced challenges in accessing such technologies due to financial constraints.

Socio-Economic Impact:

Positive Effects:

- Increase in farmers' income
- Generation of rural employment
- Development of agro-based industries

Negative Effects:

- Unequal distribution of benefits
- Small farmers lagging behind
- Increased cost of cultivation

The Green Revolution benefited large farmers more due to their better access to capital and technology.⁷

Environmental Impact:

The Green Revolution, while contributing significantly to agricultural growth, has also led to several environmental challenges in Rohtas district. The intensive use of modern agricultural inputs and practices has adversely affected the natural ecosystem. The major environmental impacts are discussed as follows:

1. Soil Degradation:

The excessive and imbalanced use of chemical fertilizers and pesticides has led to a gradual decline in soil fertility.

Continuous cultivation of high-yielding variety (HYV) crops without adequate soil management practices has reduced the natural nutrient content of the soil. Over time, this has resulted in soil degradation, decreased productivity, and increased dependence on chemical inputs.

2. Water Depletion:

The expansion of irrigation facilities, particularly through tube wells and canal systems, has increased pressure on water resources. Over-extraction of groundwater for irrigation purposes has led to a decline in the water table in several parts of the district. This unsustainable use of water resources poses a serious threat to long-term agricultural sustainability.⁸

3. Loss of Biodiversity:

The dominance of HYV seeds has led to the decline of traditional crop varieties, which were better adapted to local environmental conditions. This shift has reduced agricultural biodiversity and increased vulnerability to pests, diseases, and climate variability. The loss of indigenous varieties also affects ecological balance and long-term resilience of the farming system.

4. Environmental Pollution:

The increased use of chemical fertilizers, pesticides, and insecticides has resulted in soil and water pollution. These chemicals often seep into groundwater or are carried into nearby water bodies through runoff, affecting both human health and aquatic ecosystems. Additionally, improper disposal of

agricultural waste further contributes to environmental degradation.

Critical Analysis:

The Green Revolution in Rohtas district has had a mixed impact. While it improved food production and agricultural efficiency, it also created environmental and socio-economic challenges.

- Productivity increased but sustainability declined
- Awareness improved but dependency on inputs increased
- Development occurred but inequalities widened

This dual impact highlights the need for balanced agricultural policies.

Suggestions:

- Promote sustainable farming practices
- Encourage organic agriculture
- Improve access to technology for small farmers
- Strengthen irrigation management
- Increase awareness about environmental conservation

Conclusion:

The Green Revolution has brought about a significant transformation in the agricultural landscape of Rohtas district, contributing to increased agricultural productivity, improved food security, and the gradual adoption of modern farming practices. The introduction of high-yielding variety seeds, expansion of

irrigation facilities, and use of modern inputs have collectively enhanced the efficiency and output of the agricultural sector in the region.

However, the impact of the Green Revolution has been uneven and complex in nature. While large and resource-rich farmers have benefited considerably from increased production and income, small and marginal farmers have not been able to fully access or utilize modern agricultural technologies due to financial and infrastructural constraints. This has resulted in widening socio-economic disparities within the farming community.

Moreover, the environmental consequences of intensive agricultural practices have emerged as a matter of serious concern. Issues such as soil degradation, depletion of groundwater resources, loss of biodiversity, and increasing levels of pollution highlight the unsustainable nature of excessive dependence on chemical inputs and monocropping practices. These challenges pose a threat not only to agricultural productivity but also to the long-term ecological balance of the region.

In this context, it becomes essential to adopt a more balanced and sustainable approach to agricultural development. Integrating modern scientific techniques with traditional knowledge systems can help in achieving both productivity and sustainability. Practices such as organic farming, crop diversification, efficient water management, and conservation of natural

resources should be encouraged to reduce environmental stress.

Furthermore, policy interventions should focus on inclusive agricultural development by ensuring better access to technology, credit facilities, and awareness programs for small and marginal farmers. Strengthening agricultural extension services and promoting community participation can play a crucial role in bridging the gap between knowledge and practice.

In conclusion, while the Green Revolution has laid the foundation for agricultural advancement in Rohtas district, its long-term success depends on adopting a holistic and sustainable development model. A balanced integration of productivity, equity, and environmental conservation is essential

to ensure that agriculture remains both economically viable and ecologically sustainable for future generations.

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