Bulletin of Nexus
Multidisciplinary International Research Journal, Double-Blind Peer Reviewed, Open Access Journal
ISSN : 3065-7865 / Volume-2, Issue-3 / March - 2025

Original Article

A Comprehensive Study of Sustainable Agriculture in India: Emphasis on Jammu and Kashmir

Peer Aqib Nazir Baba[1], Dr. Savitri Singh Parihar[2]
[1]Research Scholar Department of History, Rabindranath Tagore University Raisen (M.P)
[2]Head Department of History, Rabindranath Tagore University Raisen (M.P)

Manuscript ID:
BN-2025-020302

ISSN: 3065-7865

Volume 2

Issue 3

March 2025

Pp. 9-12

Submitted: 25 Jan 2025

Revised: 10 Feb 2025

Accepted: 15 Mar 2025

Published: 31 Mar 2025

DOI:
10.5281/zenodo.15654317

DOI link:
https://doi.org/10.5281/zenodo.15654317

Abstract

Changing Indian traditional agriculture into modern, green, and more equal agribusiness is needed to meet rising food needs and help people in poverty. Whatever changes there are, they should involve introducing technology, reforming policies, and helping rural areas, all the time dealing with major problems, such as divided ownership, climate-related risks, weak infrastructure, and faulty market mechanisms. Many Indian farmers have difficulty obtaining credit, using new technologies, and selling their produce at fair prices; therefore, targeted actions are needed to improve what they earn and how much they produce. Climate change adds to these problems by introducing poor weather and loss of natural resources that create lasting trouble for the world's food supply. Nevertheless, new advances in technology, modern farming ideas, and government actions, such as Farmer Producer Organizations (FPOs) and direct benefit transfers, provide farmers with the potential for sustainable growth. While the Green Revolution provided valuable results, its impact on the environment teaches us to use more environmentally sound methods. Crop diversification, efficient use of water in irrigation, and enhanced value chains for important crops such as apples and saffron can help Jammu and Kashmir become more economically and able to withstand problems. Both government coordination and private investment in farm-related infrastructure and ideas are needed to help farmers catch up with new technologies and sell their products. Farmers, agribusinesses, researchers, and policymakers must work together to ensure that the agricultural field is inclusive and sustainable. Indian agriculture can help millions by achieving a more sustainable, growing, and advanced industry while maintaining natural resources for several generations.

Keywords: *Agri-Business, Traditional Farming, Sustainable Agriculture, Farmer Livelihoods, Policy Reforms, Jammu and Kashmir.*

Introduction

Agriculture is a major part of Jammu and Kashmir's economy, with approximately 65% of the population depending directly or indirectly on it. Despite this, J&K's food grain production in 2010–11 was only 137.15 thousand tons —just 0.6% of India's total—placing it 20th among the states. In 2004–05, the cultivated area was 7.52 lakh hectares, with over 70% used for food crops and 13% for fruits. To ensure continued agricultural growth, focus must be on food security, improving productivity, and addressing environmental and ecological challenges. The state's strategy aims for 4% growth through sustainable practices. Key priorities include increasing yield and profitability while ensuring long-term viability. Measures such as the use of HYV seeds, better irrigation, and fertilizers are vital. Sustainable agriculture is essential to meet future food needs without degrading natural resources.

Address for correspondence:
Peer Aqib Nazir Baba, Research Scholar Department of History, Rabindranath Tagore University Raisen (M.P)
Email: *Peeraqibbaba91@gmail.com*

How to cite this article:
Baba, P. A. N., & Parihar, S. S. (2025). A Comprehensive Study of Sustainable Agriculture in India: Emphasis on Jammu and Kashmir. Bulletin of Nexus, 2(3), 9–12. https://doi.org/10.5281/zenodo.15654317

Quick Response Code:

Website: https://bnir.us

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National agricultural policy emphasizes tapping growth potential, improving infrastructure, adding value to production, creating rural jobs, ensuring fair incomes for farmers, and reducing migration. It also seeks to adapt to economic liberalization (Takle, 2016).

J&K faces the following specific challenges: low crop yield, small landholdings (94% under two hectares), limited credit access, and poor marketing infrastructure. In 2011–12, most credit came from commercial banks, while rural and cooperative banks contributed less than 10%. As farming becomes less viable, many youth are shifting to urban jobs (Bandral & Sharma, 2013).

India's broader economic reforms in marketing, pricing, research and development, and technology have supported agricultural growth. Government and private support are key to sustainable agriculture, along with improving rural living standards to reduce poverty and malnutrition (Samantaray, 2015). The Green Revolution played a critical role, but climate challenges now require water conservation strategies such as rainwater harvesting and improved land management (Nerker et al., 2013).

Despite urbanization, agriculture in India has seen significant progress (Shukla & Dwivedi, 2015). Current trends offer opportunities for sustainable farming, as stakeholders recognize their long-term benefits. Although agrochemicals still play a role, research, accessible credit, and support for marginalized farmers, especially women, are vital. Success depends on the sector's ability to learn, adapt, and collaborate. Small-farm management practices are key to ensuring productivity, profitability, and long-term sustainability (Narayan, 2012).

Objectives

1. To emphasize the possibilities, constraints, and approaches for achieving sustainable development in the agricultural sector in Jammu and Kashmir.
2. To examine the latest advancements in the Seed Replacement Rate (SRR) and Varietal Replacement Rate (VRR) in Jammu and Kashmir.
3. To assess the financial outcomes of Centrally Sponsored Schemes (CSS) promoting farmer welfare and agricultural sustainability in J&K.

Methodology

This study relies on secondary data. The data were gathered from several sources, with a focus on the J&K Annual Economic Surveys conducted between 2014 and 2017. In addition, data were gathered from other credible sources, such as publications, reports, and journals.

Discussion

The agriculture sector in Jammu and Kashmir faces several challenges, including sluggish development, poor crop yields, limited opportunities for expanding cultivable land, soil degradation, mountainous terrain, and tiny and fragmented land holdings. The following are the potential, constraints, and strategy-related issues.

A. Potentials

Our product range included organic Basmati rice, Rajmash, off-season vegetables, virus-free potato seeds suitable for all seasons, and a variety of aromatic and medicinal herbs. Key objectives are:

1. Promoting commercial floriculture and cultivating high-quality virus-free seeds of flowers, vegetables, and medicinal plants.
2. The year-round production of mushrooms and honey, including honey byproducts, is supported by diverse flora for enhanced beekeeping.
3. Boosting high-quality saffron cultivation.
4. Growing Jatropha for biofuel on unused, non-irrigated land in Jammu under the National Watershed Development Project for Rainfed Areas (NWDPRA).
5. Increasing fodder production.

B. Seed Management and Seed Replacement Rate (SRR)

The Seed Replacement Ratio (SRR) indicates the share of cultivated land sown with certified seeds rather than farmer-saved seeds. It also reflects the supply of quality seeds compared to actual crop needs. In Jammu and Kashmir, efforts are ongoing to meet the national SRR target of 25% or more for high-yielding varieties of key crops, although the limited availability of breeder and foundation seeds remains a challenge. Nationally, the recommended SRR has been updated: 33% for self-pollinated crops (up from 25%), 50% for cross-pollinated crops (up from 35%), and 100% for hybrids.

Table I Seed Replacement Rate Achievements in J&K (In %)

Season	Crop	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17		
							KMR	JMU	Average
Kharief	Paddy	22.4	32.52	25	29.68	32.54	33	42.59	37.795
	Maize	18.15	15.48	16.22	28.05	29.69	30	40.90	35.45
	Pulses	42.89	35	35	20.87	70.38	47	8.33	27.66
	Fodder	15.18	55	55	59.98	61.00	45	69.56	57.28
Rabi	Wheat	26.05	27.34	32.19	40.25	41.84	45	33.80	39.40
	Pulses	9.21	17.53	17.53	3.63	2.56	41	8.33	24.665
	Oilseeds	41.87	40.46	31.7	33.60	39.28	46	64.13	55.065
	Fodder	26.89	24.82	25	32.23	28.75	41	82.73	61.865

Source: J&k Economic Survey

The Department of Agriculture states that there is a 33% SRR in Kashmir and 42.59% SRR in Jammu. In Kashmir, 30% of the seeds are changed each year, but in Jammu Division, the number is 40.90%. The J&K Economic Survey, 2014-17, predicts the SRR for fodder in Kashmir for Kharief 2016-17 to be 45% and in Jammu to be 69.56%. Table I also lists the SSR values of the Rabi season for each category.

Centrally Sponsored Schemes

A variety of centrally sponsored schemes are being implemented to improve farmers' welfare and agricultural development in J&K.

1. Rashtriya Krishi Vikas Yojana (RKVY)

Targeted interventions aim to reduce yield gaps, increase profitability, and improve productivity. In 2016–17, Rs. 9323 lakhs were allocated, including Rs. 3973 lakhs under RKVY Normal. Additional allocations included Rs. 5000 lakhs for the National Mission on Saffron and Rs. 350 lakhs for the Foot and Mouth Disease Program.

2. National Mission for Sustainable Agriculture (NMSA)

Focuses on climate-resilient, profitable, and sustainable farming. Key components:

- **Rainfed Area Development (RAD)**: Rs. 153.65 lakh allocated; Rs. 96.30 lakh utilized.
- **Soil Health Management (SHM)**: Rs. 103.94 lakh allocated; Rs. 45.91 lakh spent.
- **Soil Health Card Scheme**: Rs. 79.85 lakh allocated; Rs. 50.02 lakh spent. The achievements included 139,295 samples and 249,920 cards.
- **Paramparagat Krishi Vikas Yojana (PKVY)**: Rs. 134.87 lakh available; Rs. 62.73 lakh spent.
- Climate change initiatives were piloted in Budgam and Jammu districts.

3. National Mission on Agricultural Extension and Technology (NMAET)

Promote Agri-education, technology transfer, and improved access to inputs. Sub-missions include:

- Agricultural Mechanization
- Agricultural Extension
- Seed and Planting Material
- Plant Protection
- The total allocation for 2016–17 was Rs. 3365.46 lakh. Out of the available Rs. 2221.13 lakh, Rs. 1925.50 lakh was utilized.

4. National Food Security Mission (NFSM)

Supports the production of rice, wheat, pulses, and coarse cereals. For 2016–17, Rs. 1584.12 lakh was allocated; Rs. 871.26 lakh received, and Rs. 773.94 lakh spent.

5. National Mission on Oilseed and Oil Palm (NMOOP)

Promotes oilseed cultivation. Rs. 111.87 lakh was planned, with Rs. 27.09 lakh spent from existing balances. Rape and mustard seed demo plots were established using the Mini Mission-I.

6. Pradhan Mantri Fasal Bima Yojana (PMFBY)

The premium costs for crop insurance were 2% for Kharif, 1.5% for Rabi, and 5% for annual commercial and horticultural crops, all of which were subsidized.

7. Pradhan Mantri Krishi Sinchai Yojana (PMKSY)

Aims to improve irrigation and water use efficiency. Approximately 75% of Jammu's and 60% of Kashmir's agricultural land lack irrigation. Rs. 14,688.46 crore is needed for 22 District Irrigation Plans under phased implementation.

Conclusion

The agricultural sector in J&K faces challenges owing to limited irrigation, market access, and transportation, stemming from its geography. However, this region has significant potential for cultivating rice, vegetables, medicinal and aromatic plants, biofuels, and saffron. To realize this potential, improved seed management and higher Seed Replacement Rates (approximately 40% for Kharif crops and 45% for Rabi crops) are being implemented. Additionally, the financial performance of various government schemes that support sustainable agriculture has shown positive growth in recent years.

Acknowledgement

I would like to express my deepest gratitude to all those who contributed to the successful completion of this study. This work would not have been possible without guidance, support, and encouragement.

First and foremost, I extend my sincere thanks to my research supervisor or advisor, Dr. Savitri Singh Parihar. Head Department of History for invaluable guidance, insightful feedback, and constant motivation throughout the course of this study. Their expertise and constructive criticism have greatly enriched the quality of this research.

I am also grateful to Rabindranath Tagore University Raisen (M.P) for providing me with the necessary resources and academic support to undertake this research. The library facilities, access to scholarly articles, and research discussions were instrumental in shaping this study.

Financial support and sponsorship

Nil.

Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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