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Identifying constraints and developing strategies for improved rice cultivation practices: A study in Chandauli district of Uttar Pradesh

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ABSTRACT

Rice is one of the most important staple food crops in India and plays a vital role in ensuring food security and rural livelihoods. The present study was conducted to identify the constraints faced by rice growers in adopting improved rice cultivation practices and to suggest suitable strategies for overcoming these constraints in Chandauli district of Uttar Pradesh. A multistage random sampling technique was adopted to select 160 rice growers from four blocks and sixteen villages. Primary data were collected through a pre-tested structured interview schedule and analyzed using Mean Score Value (M_{SV}) and ranking methods.

The study revealed that the major administrative constraint was the hindered distribution of required varieties and seeds ($MSV = 1.70$). Among input constraints, the high cost of HYV seeds, fertilizers, and chemicals ranked first ($MSV = 1.75$). Insufficient knowledge of insect pests, diseases, and their management ($MSV = 1.75$) emerged as the most serious technical constraint, while delayed sowing was identified as the leading miscellaneous constraint ($M_{SV} = 1.78$). To overcome these problems, farmers suggested maintaining effective communication with extension personnel ($MSV = 1.63$), providing financial assistance through subsidies and credit schemes ($MSV = 1.70$), promoting digital advisory services ($MSV = 1.55$), and ensuring timely planning of sowing operations and input availability ($MSV = 1.67$). The study concludes that strengthening extension services, improving access to quality inputs, enhancing farmers' technical knowledge, and providing institutional and financial support are essential for increasing the adoption of improved rice cultivation practices and ensuring sustainable rice production in the study area.

Keywords: Rice cultivation, Rice growers, Improved rice cultivation practices, Constraints, Agricultural extension, Input management, Technical knowledge, Sustainable rice production

1. Introduction

Agriculture, often hailed as the backbone of India's economy, continues to hold a pivotal role and is expected to remain central in the years ahead. The sector has undergone significant transformation, shaped by evolving markets, institutional frameworks, and technological advancements. Despite India occupying only 2.3% of the world's land area and having access to just 4.2% of global water resources, its agricultural system sustains nearly 17% of the planet's population. This highlights both the immense importance and the pressing challenges of agriculture in India, underscoring its enduring necessity for the nation's economic and social stability. (Yumkhaibam *et al.*, 2023) ^[1]. Rice serves as a primary dietary staple for approximately 62.8% of the global population and supplies around 20% of the world's total calorie intake. In Asia, it contributes an even higher share of 29.3% of caloric consumption (Timmer, 2010) ^[2].

Most of the people who live in areas depend on farming for their livelihood. Farming gives jobs to than sixty per cent of the people, in the country. Indian farming has done well over the last few decades. The amount of food grain we produce has gone up a lot. We used to produce

50.82 million tons of food grain in 1950-51. Now we produce 357.73 million tons of food grain during 2024-25. This is the amount of food grain we have produced since India became independent. (Source: Agricultural Statistics at a Glance, 2025) ^[3]. Uttar Pradesh is characterized by two distinct geographical features: the fertile alluvial plains formed by the Ganga and Yamuna rivers, and the rocky plateau region of Bundelkhand. The state experiences a tropical climate, with temperatures fluctuating according to season and location. The monsoon, which typically lasts from June to September, is the most significant weather event, contributing nearly 85–95% of the annual rainfall. As India's most populous state, Uttar Pradesh holds a dominant position in the country's socio-political landscape. Geographically, it lies in the Gangetic plains between latitudes 24° and 30.5° and longitudes 77° and 84.5°. It shares borders with Nepal and Uttarakhand to the north, Madhya Pradesh to the south, Bihar to the east, and Haryana, Rajasthan, and Delhi to the west. Covering a total area of 240,928 square kilometers, the state accounts for 7.32% of India's landmass. During the decade 2001–2011, Uttar Pradesh recorded a population growth rate of 77.73% (Roy *et al.*, 2015) ^[4]. In

Chandauli district majority of the people rely on agriculture. The net sown area of the district is 124060 hectares of which, 123906 hectares is irrigated. The district provides its importance with production of rice and milk. The production of rice in district is 416832 Metric Tonnes. Different crops comprise wheat, barley, pea, gram and lentil that's are main rabi crops. Rice, bajra (pearl millet), jowar, sorghum and pulses are major kharif crops. The district also contributes in production of maize in zaid, fruits like mango, banana, guava and aonla and vegetables like tomato, brinjal, cucumber and capsicum (Zila Spider Reports, 2025) [5].

2. Research methodology

This section of the chapter outlines the procedures used to measure the various independent and dependent variables included in the study. The selection of variables was guided by the objectives of the research. Prior to finalizing the variables, a thorough review of the relevant literature was carried out to ensure informed selection. The chosen variables were then classified into independent and dependent categories. The following section presents a comprehensive list of the selected variables along with the techniques employed to measure them.

The present study was conducted in **Chandauli district of Uttar Pradesh**, which was purposively selected due to its significant contribution to rice cultivation in the state. Chandauli district was also selected purposively because of its predominance in rice production and the widespread adoption of rice-based farming systems. Chandauli district, also known as the “**Rice Bowl of Uttar Pradesh**” (Dhaan Ka

Katora), is renowned for its fertile Gangetic plains and significant potential for rice production.

A multistage sampling technique was employed for the selection of respondents. In the first stage, **four blocks**, namely **Chandauli, Niyamtabad, Dhanapur, and Chakiya**, were selected Purposively from the total blocks of the district. In the second stage, **four villages** were selected randomly from each selected block. Accordingly, **Salempur, Sikari, Bajaha, and Dhaneja** villages were selected from Chandauli block; **Bauri, Dhapari, Mahdeur, and Pachokhar** from Niyamtabad block; **Kharan, Awajapur, Bhadau, and Sakarari** from Dhanapur block; and **Sonhul, Rampur, Bharuhia, and Utraut** from Chakiya block.

In the final stage, **10 rice growers** were selected randomly from each of the selected villages. Thus, a total of **160 respondents** (16 villages × 10 respondents) constituted the sample for the present investigation. The selected respondents were personally interviewed using a well-structured and pre-tested interview schedule to collect the required information related to the objectives of the study.

The sampling procedure adopted in the study ensured adequate representation of rice growers from different parts of Chandauli district, thereby providing reliable and representative data for analyzing the knowledge, adoption, constraints, and suggestions regarding improved rice cultivation practices.

3. Results and discussion

3.1 Distribution of respondents based on constraints -

S.no.	Constraints	MSV	Rank
A.	Administrative Constraints		
1.	Farmers lack adequate technical knowledge.	1.68	II
2.	Extension agents rarely visit during the crop season.	1.57	IV
3.	Extension workers, including fertilizer and seed store staff, are inefficient.	1.66	III
4.	Distribution of required varieties and seeds is hindered.	1.7	I
B.	Input Constraints		
1.	Lack of irrigation facilities in farmer's field	1.63	V
2.	Lack of improved seeds at sowing time	1.7	III
3.	Unavailability of fertilizers at sowing time	1.56	VII
4.	Unavailability of labour at sowing time	1.61	VI
5.	Money problem during sowing time	1.68	IV
6.	High cost of labour	1.71	II
7.	High cost of HYVs seeds, fertilizers and chemicals	1.75	I
8.	Unavailability of recommended chemicals for seed treatment	1.55	VIII
C.	Technical Constraints		

A. Among the administrative constraints, the hindered distribution of required varieties and seeds ranked first (MSV=1.70), followed by lack of technical knowledge (MSV=1.68), inefficiency of extension workers (MSV=1.66), and infrequent visits of extension agents ranked last (MSV=1.57). Overall, input supply and knowledge gaps were identified as the major administrative barriers faced by farmers.

B. Among the input constraints, the high cost of HYV seeds, fertilizers, and chemicals ranked first (MSV=1.75), followed by high cost of labour (MSV=1.71), lack of improved seeds at sowing time (MSV=1.70), and money problems during sowing time (MSV=1.68). Lack of irrigation facilities ranked fifth (MSV=1.63), while unavailability of labour at sowing time ranked sixth (MSV=1.61). Unavailability of fertilizers at sowing time ranked seventh (MSV=1.56), and unavailability of recommended chemicals for seed treatment ranked last (MSV=1.55)

C. Among the technical constraints, insufficient knowledge about insect pests, diseases, and their proper management ranked first (MSV=1.75), followed by lack of knowledge about insecticides, chemical doses, and application measures (MSV=1.66), and limited access to information regarding improved agricultural practices ranked third (MSV=1.63). Low adoption rates of high-yielding variety seeds ranked last (MSV=1.55).

D. Among the miscellaneous constraints, delayed sowing negatively impacting crop yield ranked first (MSV=1.78), followed by farmers' limited capacity to bear financial risks (MSV=1.72), and unpredictable weather conditions and rainfall affecting overall yield ranked last (MSV=1.71).

3.2 Distribution of respondents based on suggestion

3.2 Distribution of respondents based on suggestion

1.	Farmers have limited access to information regarding improved agricultural practices.	1.63	III
2.	There is insufficient knowledge among farmers about insect pests, diseases, and their proper management.	1.75	I
3.	Lack of knowledge about insecticides and chemical doses and application measures.	1.66	II
4.	Farmers show low adoption rates of high-yielding variety seeds.	1.55	IV
D.	Miscellaneous Constraints		
1.	Farmers have a limited capacity to bear financial risks.	1.72	II
2.	Delayed sowing negatively impacts crop yield.	1.78	I
3.	Unpredictable weather conditions and rainfall significantly affect overall yield.	1.71	III

S.no.	Suggestion	MSV	Rank
A.	Administrative suggestion		
1.	Offer ongoing training sessions and skill development programs to help farmers learn up-to-date agricultural methods, tools, and effective practices	1.60	II
2.	Maintain proper and effective communication with extension agents.	1.63	I
3.	Leverage digital tools such as mobile apps and SMS platforms to deliver timely and relevant farming and production information to farmers	1.55	IV
4.	Strengthen market connections to ensure better availability and affordable pricing of required crop varieties and seeds.	1.57	III
B.	Input Suggestion		
1.	Construct rainwater harvesting systems to capture and retain rainfall for use in crop irrigation.	1.60	II
2.	Motivate farmers to plan ahead and place early orders for fertilizers to guarantee timely availability.	1.49	IV
3.	Adopt agricultural equipment such as seed drills and planters to minimize reliance on manual labor.	1.50	III
4.	Governments can offer financial assistance, subsidies, or credit schemes to help farmers	1.70	I

acquire high-yielding variety seeds, fertilizers, and agrochemicals.

C.	Technical Suggestion		
1.	Leverage mobile applications and online portals to give farmers easy access to information on better agricultural practices.	1.55	I
2.	Educate and train farmers on the advantages and correct application of high-yielding variety seeds.	1.50	II
D.	Miscellaneous Suggestion		
1.	Motivate farmers to adopt crop insurance as a safeguard against risks such as harvest loss, disease outbreaks, and pest infestations.	1.59	II
2.	Develop planting schedules ahead of time and arrange seeds, fertilizers, and equipment in advance to ensure sowing is carried out promptly.	1.67	I
3.	Farmers are advised to adopt crop varieties that are resistant to weather-related stress and well-suited to local climatic conditions.	1.49	III

A. Among the input suggestions, government financial assistance, subsidies, or credit schemes to help farmers acquire high-yielding variety seeds, fertilizers, and agrochemicals ranked first ($MSV = 1.70$), followed by constructing rainwater harvesting systems to capture and retain rainfall for use in crop irrigation ($MSV = 1.60$). Adopting agricultural equipment such as seed drills and planters to minimize reliance on manual labor ranked third ($MSV = 1.50$), while motivating farmers to plan ahead and place early orders for fertilizers to guarantee timely availability ranked last ($MSV = 1.49$). Overall, financial support and water management were highlighted as the most critical input-related suggestions.

B. Among the technical suggestions, leveraging mobile applications and online portals to give farmers easy access to information on better agricultural practices ranked first ($MSV = 1.55$), while educating and training farmers on the advantages and correct application of high-yielding variety seeds ranked last ($MSV = 1.50$). Overall, digital access to information and farmer education were identified as key technical suggestions to improve rice production.

- C. Among the miscellaneous suggestions, developing planting schedules ahead of time and arranging seeds, fertilizers, and equipment in advance to ensure sowing is carried out promptly ranked first ($MSV = 1.67$), followed by motivating farmers to adopt crop insurance as a safeguard against risks such as harvest loss, disease outbreaks, and pest infestations ($MSV = 1.59$). Farmers being advised to adopt crop varieties that are resistant to weather-related stress and well-suited to local climatic conditions ranked last ($MSV = 1.49$). Overall, timely planning and risk management emerged as the most emphasized miscellaneous suggestions among the respondents.
- D. Among the administrative suggestions, maintaining proper and effective communication with extension agents ranked first ($MSV = 1.63$), followed by offering ongoing training sessions and skill development programs to help farmers learn up-to-date agricultural methods, tools, and effective practices ($MSV = 1.60$). Strengthening market connections to ensure better availability and affordable pricing of required crop varieties and seeds ranked third ($MSV = 1.57$), while leveraging digital tools such as mobile apps and SMS platforms to deliver timely and relevant farming and production information to farmers ranked last ($MSV = 1.55$). Overall, improving communication and knowledge dissemination were identified as the major administrative suggestions put forward by farmers.

4. Conclusion

The present study on "Knowledge and Adoption of Improved Rice Cultivation Practices by the Farmers in Chandauli District of Uttar Pradesh" was conducted with 160 respondents selected through random sampling. With regard to constraints, high cost of inputs, hin-

dered distribution of seeds and varieties, insufficient knowledge about pest and disease management, and delayed sowing were reported as the most critical barriers to adoption. To overcome these constraints, respondents suggested effective communication with extension agents, government financial assistance and subsidies, digital access to agricultural information, and timely planning as key strategies. Overall, the study concludes that strengthening extension services, improving input accessibility, and enhancing technical knowledge are essential for promoting wider adoption of improved rice cultivation practices among farmers in Chandauli district.

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