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Constraints in Adopting Improved Chickpea Cultivation Practices in Ballia, Uttar Pradesh

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HIGHLIGHTS

- Non-availability of agricultural inputs at the proper time (92.78 MPS) was the most critical constraint limiting effective chickpea cultivation.
- Knowledge-related barriers, such as Lack of information about improved chickpea varieties (89.45 MPS) and Lack of training in scientific chickpea production (88.35 MPS), significantly affected technology adoption.
- Economic constraints, especially the High cost of seed, fertilizers, insecticides, and implements (84.67 MPS), restricted investment in improved practices.
- Social and environmental challenges like the Grazing animal problem (86.98 MPS) and Labour shortage during peak season (82.67 MPS) further hindered productivity.

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ABSTRACT

Despite favourable agro-climatic conditions in eastern Uttar Pradesh, chickpea productivity remains below potential due to multiple adoption barriers. This study investigated the constraints faced by chickpea growers in Ballia district, Uttar Pradesh, during the Rabi season of 2024–25. Using multistage random sampling, 160 farmers from four blocks and sixteen villages were surveyed with structured interviews. The most pressing constraint was the non-availability of agricultural inputs at the proper time, followed by knowledge-related gaps such as a lack of information about improved chickpea varieties and a lack of training in scientific chickpea production. Economic factors such as the high cost of seed, fertilisers, insecticides, and implements, and institutional issues like the non-availability of required seeds in cooperative societies also ranked high. Environmental and social issues–particularly the grazing animal problem and labour shortages during peak seasons further complicated technology adoption. Lower-ranked but still relevant constraints included limited exposure to demonstrations, poor market access, and gender barriers in extension outreach. These findings highlight the complex interplay of technical, economic, institutional, and environmental factors in adoption behaviour. The study recommends a multi-dimensional approach involving timely input delivery, capacity building, improved infrastructure, and targeted policy interventions to enhance chickpea productivity and sustainable adoption of improved cultivation practices.

INTRODUCTION

Chickpea (*Cicer arietinum*), often referred to as the "meat of the poor," plays a critical role in India's agriculture and nutrition due to its high protein content (~25%) and soil-enriching properties through biological nitrogen fixation. As a major pulse crop, chickpeas contribute nearly 50 per cent of India's total pulse production, with

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India accounting for over 70 per cent of global chickpea output (Singh et al., 2020). Uttar Pradesh is one of the top chickpea-producing states, with Ballia district being an important region due to its favourable agro-climatic and soil conditions (Rajbhar et al., 2018). Despite these advantages, the region suffers from suboptimal productivity, largely due to low adoption of improved farming practices and limited awareness among farmers. Studies confirm that variables such as education, income, landholding size, and extension contact significantly influence knowledge and adoption of chickpea technologies (Chaudhary et al., 2014; Nain et al., 2014; Nain et al., 2015).

In Ballia and similar districts, major constraints include lack of technical knowledge, poor access to quality seeds, inadequate irrigation, and weak extension services. In central Uttar Pradesh, 72 per cent of farmers were marginal landholders and over 60 per cent had low income, which correlated with low adoption levels (Rajbhar et al., 2020). However, demonstration projects in Uttar Pradesh have shown significant gains in yield (up to 60% more income) and adoption when improved varieties and complete technological packages are introduced (Singh & Singh, 2013). For example, adoption of STCR-based nutrient management increased yields by 37 per cent and improved soil fertility (Singh et al., 2021). Similarly, frontline demonstrations revealed a technology gap of up to 8.1 q/ha, highlighting the need for more effective knowledge transfer (Singh et al., 2020). Studies have also shown that extension training (e.g., by Krishi Vigyan Kendras) significantly improves knowledge and adoption, especially among farmers with better access to training and information sources (Meena et al., 2015).

The present study investigates the constraints faced by chickpea growers in Ballia district of Uttar Pradesh, a region known for its favourable agro-climatic conditions for rabi pulse cultivation. Using a structured interview schedule and multistage random sampling, the study systematically examines the knowledge, adoption level, and challenges associated with improved chickpea production technologies. The insights derived from the study aim to support policymakers, researchers, and extension personnel in formulating targeted strategies to overcome these barriers. By addressing the identified constraints, the study aspires to enhance chickpea productivity, promote scientific farming practices, and strengthen the overall pulse production system in the region.

METHODOLOGY

The study was carried out during the Rabi season of 2024–25 in the Ballia district of Uttar Pradesh, India. The region features a subtropical climate conducive to chickpea cultivation and is representative of eastern Uttar Pradesh's agro-ecological conditions. A multistage random sampling technique was employed to select the study respondents. In the first stage, four blocks were randomly selected from the district. In the second stage, sixteen villages were selected from these blocks using simple random sampling, with proportional allocation based on the size of each village. In the final stage, a sample of 160 chickpea farmers was selected using proportional allocation, with eligibility criteria including the cultivation of at least half a bigha (approximately 0.125 acres) of chickpea. Primary data were collected through personal interviews using a pre-tested and structured interview schedule. The data were subsequently coded, tabulated, and analysed using the Statistical Package for the Social Sciences (SPSS). To identify and prioritise the constraints faced by farmers in adopting recommended chickpea production practices, a four-point Likert-type rating scale was employed. The constraints were then ranked according to their mean percent scores (MPS).

RESULTS

The data in Table 1 revealed that the constraint "Non-availability of agricultural inputs at proper time" (92.78 MPS) was the most significant constraint perceived by chickpea growers in the study area. This issue was ranked first and highlights the urgent need for a timely supply of critical inputs to support effective cultivation. The second most important constraint, "Lack of information about improved chickpea varieties" (89.45 MPS), indicates a major knowledge gap among farmers regarding the use of high-yielding or resistant varieties. It was followed closely by "Lack of training in scientific chickpea production" (88.35 MPS), which ranked third, reflecting a lack of capacity-building and skill enhancement among the farming community.

The constraint "High cost of seed, fertilizers, insecticides, and implements" (84.67 MPS) stood at fourth position, indicating that economic limitations continue to restrict the adoption of improved practices. The fifth-ranked constraint was "Non-availability of required seeds and agro-chemicals in cooperative societies" (82.89 MPS), emphasizing issues in local institutional support systems. Interestingly, the "Grazing animal problem" (86.98 MPS) emerged as the sixth major constraint, showing the impact of stray animals on crop productivity. "Labour shortage during peak agricultural season" (82.67 MPS) was ranked seventh, highlighting seasonal workforce challenges. Similar findings have been reported by Tiwari et al., (2020) & Sengar et al., (2020).

Other notable constraints included "Lack of knowledge about plant protection measures" (74.53 MPS, Rank VIII), "Limited access to extension services and technical advice" (70.25 MPS, Rank IX), and "Market is far from the village" (64.67 MPS, Rank X). Constraints like "Lack of irrigation resources" (61.67 MPS), "Inadequate exposure to demonstrations" (67.50 MPS), and "Lack of awareness about cooperative societies" (63.10 MPS) were ranked lower but still represented meaningful barriers to full adoption. The least significant constraints identified were "Social resistance to new practices" (68.90 MPS, Rank XVII), "Gender barriers in accessing training and inputs" (66.20 MPS, Rank XVIII), and "Risk of crop damage due to erratic climate or pests" (72.50 MPS, Rank XIX), which although ranked lower, suggest emerging challenges that may intensify under changing socio-economic and environmental conditions. Sharma et al., (2024) report similar findings.

DISCUSSION

The analysis of constraints faced by chickpea growers in Ballia district revealed a wide range of interrelated issues that collectively hinder the effective adoption of improved production technologies. The most critical constraint identified was the non-availability of agricultural inputs at the proper time (92.78 MPS), underscoring the inefficiencies in supply chain and distribution systems. Knowledge-related constraints, such as a lack of information about improved chickpea varieties (89.45 MPS) and insufficient training

Table 1. Constraints in the adoption of recommended cultivation practices of chickpea.

S.No.	Constraints	MPS	Rank
A.	Input & Resource Related Constraints		
1	Non-availability of agricultural inputs at the proper time	92.78	I
2	High cost of seed, fertilizers, insecticides, and implements	84.67	IV
3	Non-availability of required seeds and agrochemicals in cooperative societies	82.89	V
4	Non-availability of soil testing facilities and training for seed & soil treatment	78.89	VII
5	Lack of irrigation resources (electricity and water)	61.67	XI
B.	Knowledge & Training Related Constraints		
6	Lack of information about improved chickpea varieties	89.45	II
7	Lack of training in scientific chickpea production	88.35	III
8	Lack of knowledge about plant protection measures	74.53	VIII
9	Limited access to extension services and technical advice	70.25	IX
10	Inadequate exposure to demonstrations and field visits	67.50	XII
6	Lack of information about improved chickpea varieties	89.45	II
7	Lack of training in scientific chickpea production	88.35	III
C.	Infrastructural & Institutional Constraints		
11	Market is far from the village	64.67	X
12	Lack of proper transport facilities	69.83	XIII
13	Inadequate storage and warehousing facilities	66.75	XIV
14	Delayed or inefficient input supply chains	65.35	XV
15	Lack of cooperative society awareness and support	63.10	XVI
D.	Social & Environmental Constraints		
16	Grazing animal problem	86.98	VI
17	Labour shortage during peak agricultural season	82.67	VII
18	Social resistance or unwillingness to adopt new practices	68.90	XVII
19	Gender barriers in accessing training and inputs	66.20	XVIII
20	Risk of crop damage due to erratic climate or pests	72.50	XIX

in scientific chickpea production (88.35 MPS), also ranked among the top, pointing to serious gaps in farmer education and extension outreach. Economic barriers, particularly the high cost of quality seeds, fertilizers, and pesticides (84.67 MPS), continue to discourage investment in advanced practices, while infrastructural deficiencies such as distant markets, poor transport, and inadequate storage limit the profitability and scalability of chickpea cultivation. Social and environmental challenges, especially the grazing animal problem (86.98 MPS) and labour shortages during peak seasons (82.67 MPS), further compound the difficulties.

These findings are consistent with studies from similar regions in Uttar Pradesh, such as Auraiya and Bundelkhand, where technical constraints (e.g., lack of good-quality seeds and information), financial challenges (e.g., cost of inputs), and socio-environmental issues (e.g., labour shortages and pest problems) were also found to significantly hinder chickpea production (Singh et al., 2016; Gireesh et al., 2019; Sengar et al., 2020). These findings indicate the need for a holistic and multi-pronged approach involving timely input delivery, improved extension services, targeted subsidies, better market access, and localized infrastructure development. Strengthening institutional support and addressing socio-environmental barriers will be key to enhancing chickpea productivity and promoting sustainable pulse cultivation in the region.

CONCLUSION

Farmers in Ballia district face major challenges such as delayed input supply, lack of technical knowledge, high input costs, and limited access to institutional support, all of which hinder the adoption of improved chickpea production practices. These findings highlight the urgent need for targeted interventions, including timely delivery of agricultural inputs, enhanced extension services, capacity-building programs, and affordable credit mechanisms. Addressing these interlinked constraints can significantly improve chickpea productivity, farm profitability, and rural livelihoods. The study reinforces the critical role of institutional support and farmer-focused strategies in bridging adoption gaps and promoting sustainable pulse cultivation in eastern Uttar Pradesh.

DECLARATIONS

Ethics approval and informed consent: Informed consent was sought from the farmer respondents during the course of the research.

Conflict of interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The authors declare that during the preparation of this work, thoroughly reviewed, revised, and edited the content as needed. The authors take full responsibility for the final content of this publication.

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