

Breaking the mold: analyzing key constraints faced by mushroom growers in Northern India

Shweta Bijla*

ICAR-Directorate of Mushroom Research, Solan, Himachal Pradesh 173213, India
* Corresponding author; E-mail: shwetabijla00@gmail.com

ABSTRACT

Mushroom farming is an emerging and profitable agribusiness in India due to its high nutritional value, low land requirement, and increasing consumer demand. It promotes efficient agricultural waste utilization and provides employment opportunities, especially in rural areas. However, despite its potential, mushroom growers face several constraints that hinder productivity and profitability. A study was conducted to identify and prioritize these challenges using Garrett's ranking method. Data were collected through a structured questionnaire covering production, financial, marketing, labour, institutional, and infrastructure constraints from 50 mushroom growers in major button mushroom producing states Bihar and Haryana. Mushroom farming faces major constraints, with capital-intensive investment, low market prices, and high raw material costs being the most significant. Financial instability arises due to high investment costs, inadequate working capital, difficult loan procedures, and frequent price fluctuations. Labour shortages, high wage rates, and lack of skilled manpower, along with inadequate infrastructure like compost units and post-harvest facilities hinder efficiency of mushroom farms. Production challenges such as disease and pest management, non-availability of quality inputs, and improper spent mushroom substrate (SMS) disposal affect sustainability. Overall major constraints are capital intensive nature of the enterprise, low market price, high cost of raw materials, inadequate market information, and lack of input facilities.

Keywords: Mushroom farming, agribusiness, constraint analysis, Garrett ranking

Mushroom production holds significant importance in India due to its economic, nutritional, medicinal, and environmental benefits, and is increasingly recognized as an important component of the circular economy. Mushrooms are high-value crops that require minimal land, water, and investment, making them suitable for small and marginal farmers. India's diverse agro-climatic conditions support the cultivation of various mushrooms such as button, oyster, milky, paddy straw, Shiitake, and Hericium, making mushroom farming a sustainable and profitable enterprise. Mushrooms are rich in vitamin D, antioxidants, and bioactive

compounds, and their low-calorie and cholesterol-free nature has increased their popularity as health foods (Shirur *et al.*, 2014; Shirur *et al.*, 2016). They also contribute to nutritional security by helping address protein and micronutrient deficiencies.

Mushroom cultivation generates employment and entrepreneurship opportunities for women, landless laborers, and unemployed youth because of its low investment requirement and short production cycle (Sharma *et al.*, 2017). It also supports environmental sustainability by utilizing agricultural wastes such as

paddy straw, sugarcane bagasse, and sawdust as substrates, thereby promoting waste recycling and sustainable agriculture (Grimm and Wotsen, 2018). Specialty mushrooms such as Shiitake and Cordyceps are emerging as promising enterprises for modern entrepreneurs (Bijla and Sharma, 2023; Bijla *et al.*, 2024). Additionally, mushroom farming contributes to the socio-economic upliftment of vulnerable communities by improving income and living standards (Singh *et al.*, 2015).

Despite its immense potential, commercial mushroom cultivation in India is still at a nascent stage and faces several constraints. Pest infestations and fungal diseases significantly affect yield and quality, emphasizing the need for integrated pest and disease management practices (Pipaliya and Ansari, 2023). Inadequate marketing infrastructure, fluctuating prices, lack of cold storage facilities, and poor market access also limit profitability for growers (Kumari and Kumari, 2021). The limited availability of quality spawn further hampers production, while poor spawn quality and delays in supply negatively impact cultivation cycles (Sharma and Bijla, 2024). Financial limitations and lack of technical knowledge and training among growers also restrict the adoption of improved cultivation technologies.

The present paper aims to analyze the major constraints faced by mushroom growers in India in order to identify suitable solutions. By addressing gaps related to infrastructure, input supply, technical knowledge, and marketing, policymakers, researchers, and entrepreneurs can work collectively to strengthen the mushroom sector. Such efforts will help unlock the full potential of mushroom cultivation as a sustainable, profitable, and environmentally friendly agribusiness enterprise in India.

MATERIALS AND METHODS

In the study, data were collected from the states of Bihar and Haryana, which rank among the top six

mushroom-producing states in India. Due to the sparse distribution of mushroom growers across the country, 50 mushroom growers were purposively selected to rank various constraints.

Scoring and ranking of constraints

The Garrett Ranking method was used to rank the identified constraints. A questionnaire listing the constraints was prepared, and all the selected mushroom growers from 50 units were asked to assign ranks to all constraints. These rankings were then converted into score values using the following formula:

$$\text{Percent position} = 100 \times (R_{ij} - 0.5) / N_j$$

where,

R_{ij} = Rank given for the i^{th} variable rank given by j^{th} respondent, N_j = Number of variables ranked by j^{th} respondent

The estimated percent positions were transformed into scores using Garrett's Table (Garrett and Woodworth, 1969). For each constraint, individual scores were summed and averaged across all respondents. The constraints were then ranked in descending order based on their mean scores, with the highest-scoring constraint deemed the most important in each category.

RESULTS AND DISCUSSION

Due to shifting consumerism and high yielding strains, new growers are entering and mushroom growers are scaling up their production, fetching high prices and generating profits from their farms. Despite of this, certain constraints are faced by mushroom farmers in terms of production which hinders the growth of mushroom production in these states. Besides, marketing has always been a blind spot to new emerging entrepreneurs in this enterprise.

Effective and strategic marketing is essential for any enterprise, as an inefficient supply chain can undermine the value of production (Kumar *et al.*, 2024). The potential constraints as expressed by the sampled farmers in both the states were clubbed together and the results so obtained were categorized into, infrastructure, production, labour, waste, financial, marketing, and institutional disposal constraints.

Infrastructure constraints

The Garrett Ranking method provides an objective way to analyze infrastructure constraints in mushroom farming by assigning scores based on their severity (Table 1). In this analysis, high investment on infrastructure emerges as the most significant constraint with a score of 61.56, as mushroom cultivation requires substantial initial investment in climate-controlled units, ventilation systems, and automation, making it difficult for small and medium-scale farmers to enter in to the industry. High power charges rank second (score 51.68) as the continuous electricity is required for maintaining optimal environmental conditions, which significantly increase production cost. Difficulty in managing environmental parameters is the third major challenge (45.84), as precise control of temperature, humidity, and CO₂ levels is crucial for yield and quality. Lastly, limited knowledge of input supplies ranks fourth (40.92), as access to high-quality spawn, casing materials, etc. are critical points in mushroom cultivation with reliable and quality supplies. These rankings highlight the need for financial assistance, energy-efficient technologies,

Table 1. Infrastructure constraints faced by mushroom farmers

Constraints	Average score	Rank
High infrastructure investment	61.56	1
High power charges	51.68	2
Difficulty in managing environmental parameters	45.84	3
Less knowledge on input suppliers	40.92	4

and better knowledge dissemination to improve the sustainability of mushroom farming.

Production constraints

Mushroom farmers face several production challenges that hinder efficiency and profitability (Table 2). The most critical challenge is the high price of raw materials with a score of 65.10, which increases production costs and reduces farmers' profit margins. This is in concurrence with Shirur *et al.* (2016) in Karnataka state and Kumar *et al.* (2018) in Bihar. Difficulty in managing diseases and insect pests (53.70) ranks second, as mushroom cultivation is highly susceptible to fungal infections and insect infestations, leading to yield losses, and lower returns. The non-availability of essential inputs (41.50), such as quality spawn and casing materials, ranks third, disrupting the production cycle and affecting output consistency. Lastly, low yield (39.70) is a concern, often resulting from poor-quality inputs, inadequate disease management, and suboptimal growing conditions. Addressing these challenges through affordable input supply, improved pest and disease control measures, and research on high-yielding varieties can enhance productivity and profitability in mushroom farming.

Table 2. Production constraints faced by mushroom farmers

Constraints	Average score	Rank
High price of raw materials	65.10	1
Difficulty in disease and insect pest management	53.70	2
Non-availability of inputs	41.50	3
Low yield	39.70	4

Labour constraints

Labour constraints significantly impact the efficiency and profitability of mushroom farming (Table 3). The most critical challenge is high wage

rates (57.34), as mushroom cultivation is labour-intensive process, requiring workers for spawning, harvesting, and post-harvest handling, thereby increasing production costs. The second major issue is the limited availability of skilled manpower and technical experts (54.16), as maintaining optimal environmental conditions and managing diseases require specialized knowledge that many farmers struggle to access, and there is a shortage of highly skilled mushroom manpower in India. Lastly, the low availability of labour (39.50) poses a challenge, especially during peak seasons, as workforce shortages delay essential tasks like compost preparation, bag filling, etc. Addressing these constraints through mechanization, skill development programs, and policy support can enhance productivity and make mushroom farming more sustainable.

Table 3. Labour constraints faced by mushroom farmers

Constraints	Average score	Rank
High wage rates	57.34	1
Less availability of skilled manpower/ technical expertise	54.16	2
Low availability of labour	39.50	3

Waste Disposal constraint

The management of spent mushroom substrate (SMS) presents severe challenges for mushroom farmers, impacting both sustainability and farm efficiency (Table 4). The most significant constraint is the lack of space and infrastructure for proper disposal (56.84), making it difficult to manage large quantities of SMS, leading to accumulation and potential environmental hazards. Limited knowledge about the functional uses of SMS (54.56) ranks second, preventing farmers from utilizing it effectively for composting, animal feed, or biofertilizers, which could otherwise add value. The risk of contamination due to improper disposal (38.60) stands third, as leftover substrate can become a breeding ground for

pathogens, increasing the risk of disease outbreaks in subsequent cultivation cycles. Addressing these constraints through improved disposal facilities, awareness programs on SMS utilization, and proper waste management practices can enhance the sustainability of mushroom farming.

Table 4. Waste Disposal constraint faced by mushroom farmers

Constraints	Average score	Rank
No space or infrastructure for disposal	56.84	1
Low knowledge on functional use of SMS	54.56	2
Contamination risk due to improper disposal	38.60	3

Financial constraint

Financial constraints significantly hinder the growth and sustainability of mushroom farming (Table 5). The most pressing issue is that it is a capital-intensive enterprise (65.80), requiring substantial investment in infrastructure, environmental control systems, and production facilities. Inadequate working capital (59.50) ranks second, as farmers struggle to maintain a steady cash flow for essential inputs, labour, and operational expenses. Challenging loan procedure (55.14) ranks third, with complex documentation and stringent requirements making credit access challenging. Inadequate government support (44.10) further limits financial assistance,

Table 5. Financial constraint faced by mushroom farmers

Financial constraints	Average score	Rank
Capital intensive enterprise	65.80	1
Inadequate working capital	59.50	2
Difficult loan procedures	55.14	3
Inadequate government support	44.10	4
Inadequate insurance coverage	41.68	5
Inability to repay on time	33.78	6

restricting farmers from expanding or upgrading their operations. Additionally, inadequate insurance coverage (41.68) leaves farmers vulnerable to losses caused by disease outbreaks and environmental uncertainties. Lastly, the inability to repay loans on time (33.78) ranks as the least significant but still critical constraint, often stemming from low selling prices, market fluctuations and unstable income. Addressing these financial barriers through streamlined credit access, increased government funding, and comprehensive insurance schemes can enhance the economic viability of mushroom farming.

Marketing constraint

Marketing constraints pose significant challenges to the profitability and stability of mushroom farming (Table 6). The most critical issue is the low market price (65.16), which reduces farmers’ earnings and makes it difficult to sustain production. Inadequate market information (64.20) ranks second, limiting farmers’ ability to make informed selling decisions and access better market opportunities. Similar findings were reported by Mehta *et al.*(2008) and Shishir *et al.*(2021). Price fluctuation (54.18) further adds to financial instability, making income unpredictable. The non-availability of storage facilities (52.32) and lack of demand (52.28) rank fourth and fifth, respectively, restricting farmers from storing surplus produce and securing consistent buyers. Additionally, poor transport

infrastructure (36.28) hampers timely delivery, leading to post-harvest losses. The lack of cooperatives (25.58) ranks lowest but remains a concern, as collective marketing efforts could help farmers lower the production cost, negotiate better prices and reach larger markets. Addressing these constraints through better market linkages, improved storage and transportation infrastructure, and the formation of farmer cooperatives can enhance the profitability and sustainability of mushroom farming.

Institutional constraints

Institutional bottlenecks play a significant role in limiting the growth and efficiency of mushroom farming (Table 7). The most critical issue is the lack of central compost units and other essential facilities such as post-harvest processing and cold storage (62.04), which affects production efficiency, storage, and marketability. The second major constraint is the lack of awareness of new technologies and improved mushroom varieties (53.18), preventing farmers from adopting better cultivation practices that could enhance yield and quality. Limited knowledge of government schemes (47.64) ranks third, as many farmers miss out on financial and technical support due to inadequate information dissemination. Lastly, the lack of training facilities and technology support centers (37.14) ranks fourth, highlighting the need for structured capacity-building programs to equip farmers with modern cultivation techniques. Addressing these

Table 6. Market related constraints faced by mushroom farmers

Constraints	Average score	Rank
Low market price	65.16	1
Inadequate market information	64.20	2
Price fluctuation	54.18	3
Non-availability of storage facility	52.32	4
Lack of demand	52.28	5
Lack of transport facilities	36.28	6
Lack of mushroom cooperatives	25.58	7

Table 7. Institutional constraints faced by mushroom farmers

Constraints	Average score	Rank
Lack of central compost units and other facilities	62.04	1
Lack of awareness on new technologies/ varieties	53.18	2
Less knowledge on government schemes	47.64	3
Lack of training and facilities and technology support centers	37.14	4

constraints through infrastructure development, awareness campaigns, and better extension services can significantly enhance the sustainability and profitability of mushroom farming.

Overall constraints

The overall constraints in mushroom farming, ranked based on higher average scores across all constraint categories, highlight key challenges that limit its growth and profitability are provided in Table 8. The most significant issue is its capital-intensive nature, requiring substantial investment in infrastructure, environmental control systems, and production facilities. Low market price ranks second, reducing profitability and making it difficult for farmers to sustain operations. The high price of raw materials further increases production costs, limiting accessibility for small-scale growers. Inadequate market information ranks fourth, preventing farmers from making informed selling decisions and accessing better market opportunities. Additionally, the lack of central compost and spawn units, along with other essential facilities, hampers production efficiency and quality. Addressing these constraints through financial support, infrastructure development, better market linkages, and improved input availability can enhance the sustainability and profitability of mushroom farming.

Table 8. Major (overall) constraints faced by the growers

Overall constraints	Average score	Rank
Capital intensive enterprise	65.80	1
Low market price	65.16	2
High price of raw materials	65.10	3
Inadequate market information	64.20	4
Lack of central compost and spawn units and other facilities	62.04	5

Conclusion and Way Foreword

Mushroom farming is a profitable agribusiness in India, but growers face constraints like high investment

costs, low market prices, and inadequate infrastructure. Addressing these constraints requires a comprehensive approach, including financial assistance through subsidies, easier loan access, and government incentives to reduce capital burdens. Strengthening market linkages, promoting farmer cooperatives, and providing real-time market information can help mitigate pricing and demand issues. Infrastructure investments, such as centralized composting units, cold storage, and improved transport facilities, are crucial for enhancing production efficiency. Additionally, capacity-building initiatives through training programs, skill development workshops, and better extension services can equip farmers with the knowledge needed for effective disease management, pest control, and sustainable waste disposal. By implementing these measures, mushroom farming can be further strengthened as a sustainable and profitable enterprise, contributing to food security, rural employment, and economic growth in India.

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