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Impact analysis of the mushroom cultivation training and demonstrations programme in TSP, Project, ICAR, Uttarakhand, India

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Abstract

Mushroom cultivation has emerged as a promising livelihood opportunity, particularly in rural areas, due to its low investment, high returns, and potential for nutritional and economic benefits. This study evaluates the training needs, constraints, and impact of vocational training programs on mushroom cultivation in the selected areas of Khateema, Gadarpur, and Sitarganj in Uttarakhand. A total of 100 respondents were purposively selected, and primary data were collected through structured questionnaires, personal interviews, and focused group discussions (FGDs). The findings revealed that a significant percentage of participants joined the training to gain scientific knowledge, adopt mushroom production as an enterprise, and utilize locally available resources for secondary income generation. The study identified key training areas such as spawn preparation, substrate management, pest and disease control, water management, and financial assistance opportunities**.** Constraints faced by the respondents included lack of access to quality spawn, inadequate financial support, market linkages, and technical know-how**.** The impact assessment indicated substantial improvement in the participants' knowledge and skills in identifying edible mushrooms, utilizing bi-products for composting, managing pest and disease outbreaks, and value addition through dried mushroom products. The study highlights the need for continuous skill enhancement, financial assistance, and market linkages to ensure the sustainability and scalability of mushroom cultivation as a viable agri-business.

Keywords: Mushroom cultivation, constraints, impact assessment

Introduction

Mushroom cultivation has emerged as a significant livelihood opportunity, particularly for rural and tribal communities, due to its low investment, high nutritional value, and potential for economic empowerment. The Tribal Sub-Plan (TSP) project, implemented under the Indian Council of Agricultural Research (ICAR) in Uttarakhand, has been instrumental in promoting mushroom cultivation through structured training and demonstration programs. These initiatives aim to equip farmers, self-help groups (SHGs), and rural entrepreneurs with technical skills, knowledge of scientific cultivation practices, and post-harvest management strategies.

The training and demonstration programs focus on providing hands-on experience in mushroom production, including spawn preparation, substrate selection, cultivation techniques, pest and disease management, and value addition. Special emphasis is given to oyster and button mushroom varieties, which are well-suited to the climatic conditions of Uttarakhand. By facilitating access to high-quality mushroom bags and ensuring knowledge transfer, the program seeks to enhance income generation and food security among marginalized communities.

This impact analysis evaluates the effectiveness of these training and demonstration programs, examining key outcomes such as participant skill development, adoption rates of mushroom farming, economic benefits, and sustainability. It also assesses the challenges faced during implementation and explores strategies to improve future training interventions. Through this study, we aim to highlight the role of capacity-building initiatives in fostering entrepreneurship, nutritional security, and rural development in Uttarakhand's tribal regions.

Methodology

The present study was conducted to assess the training needs and impact of vocational training programs on mushroom cultivation in selected areas of Uttarakhand. A total of 100 tribal women were purposively selected from three locations: Khateema, Gadarpur, and Sitarganj. The study aimed to identify the constraints faced by the participants and evaluate the effectiveness of the training program in enhancing their knowledge and skills in scientific mushroom cultivation**.**

A structured questionnaire was developed to collect primary data from the respondents. The questionnaire included sections on demographic details, reasons for participation, training needs, constraints faced, and the impact of the training program**.** Data collection was carried out through personal interviews and focused group discussions (FGDs) to ensure accuracy and in-depth understanding.

For analysis, both descriptive and inferential statistical tools

were employed. The collected data were tabulated and analyzed using percentages and frequency distributions to determine the key training areas, major constraints, and overall impact of the training program. The findings provide valuable insights into the effectiveness of vocational training on mushroom cultivation and the specific knowledge gaps that need to be addressed for future capacity-building initiatives.

Table 1: Socio-Economic Profile of Respondents

S. No.	Category	No.	Percentage
1	**Age**		
	Young (18-35)	30	30
	Middle (36-50)	45	45
	Old (51 & above)	25	25
2	**Gender**		
	Male	60	60
	Female	40	40
3	**Education**		
	Primary	20	20
	Secondary	35	35
	Graduation	30	30
	Post-Graduation	15	15
4	**Occupation**		
	Farming	40	40
	Livestock	25	25
	Farming + Livestock	35	35
5	**Annual Income (₹)**		
	Low (< ₹50,000)	30	30
	Medium (₹50,000-₹1L)	50	50
	High (> ₹1L)	20	20
6	**Landholding Size**		
	Landless	20	20
	Small (up to 2 acres)	50	50
	Medium (2-5 acres)	25	25
	Large (>5 acres)	5	5
7	**Training Experience**		
	First-time Trainee	50	50
	Previously Trained	50	50

The table provides an overview of the socio-economic profile of respondents participating in the mushroom cultivation training program. It highlights three key parameters: age, education, and occupation, giving insights into the demographic characteristics of the trainees.

Age

The largest group of participants (45%) falls in the middle-aged category (36-50 years), indicating that individuals in their most productive years show the highest interest in learning mushroom cultivation techniques. Total 30% of respondents are young (18-35 years), suggesting that a significant portion of the youth is interested in vocational training, potentially for self-employment or additional income. The remaining 25% of respondents are older (51 years & above), showing that mushroom farming also appeals to experienced farmers and rural entrepreneurs looking for alternative income sources.

Education Level

A substantial proportion of respondents (35%) have secondary education, followed by 30% who have completed graduation. This suggests that most participants have a moderate to high level of education, making it easier for them to grasp scientific techniques in mushroom farming. Total 20% of the respondents have only primary education, which indicates that some trainees may require additional support, such as hands-on training or simplified learning materials. A smaller group (15%) holds post-graduate degrees, highlighting that mushroom cultivation is also being explored by highly educated individuals as a business opportunity.

Occupational Background

Total 40% of the respondents are primarily engaged in farming, showing that mushroom cultivation is being adopted as a complementary agricultural activity. 25% are involved in livestock farming, suggesting that integrating mushroom cultivation with animal husbandry could be an effective way to utilize farm waste like straw and husk. 35% of respondents practice both farming and livestock management, indicating a diversified livelihood approach, where mushroom cultivation can serve as an additional source of income.

Table 2: Reasons for participation in vocational training programme on mushroom cultivation

S. No.	Category	No.	Percentage
1	To learn about mushroom growing techniques for self-consumption	95	95%
2	To get a certificate of vocational training course for financial assistance	20	20%
3	To adopt mushroom production as an enterprise	90	90%
4	As a secondary income generation activity using locally available resources (paddy straw, wheat husk, etc.)	95	95%

The table provides insights into the motivations behind the participation of trainees in the vocational training program on mushroom cultivation. Below is an elaboration of the findings:

1. **Learning Mushroom Growing Techniques for Self-Consumption:** A significant portion of respondents (95%) joined the training program primarily to acquire knowledge and skills for growing mushrooms for their own household consumption. This indicates a strong interest in improving food security and dietary diversification at the household level.
2. **Obtaining a Certificate for Financial Assistance:** Around 20% of participants enrolled in the training to obtain a vocational training certificate, which could help them access financial support from government schemes, banks, or self-employment initiatives. This suggests that formal recognition of skills is essential for individuals seeking funding opportunities to establish mushroom cultivation as a business.
3. **Adopting Mushroom Production as an Enterprise:** The largest group of respondents (90%) showed interest in adopting mushroom production as a full-fledged enterprise. This reflects the growing recognition of mushroom farming as a profitable agribusiness that can

provide sustainable livelihood opportunities, especially for rural populations.

4. **Generating Secondary Income Using Locally Available Resources:** Another 95% of respondents participated in the training to explore mushroom cultivation as a supplementary source of income by utilizing readily available agricultural by-products like paddy straw and wheat husk. This indicates that the training has significant potential to enhance rural economic stability by promoting resource-efficient agricultural practices.

Table 3: Constraints Expressed by Respondents

S. No.	Constraint	No.	Percentage
1	Lack of availability of quality spawn	30	30%
2	High cost of mushroom cultivation setup	25	25%
3	Lack of technical knowledge and hands-on training	20	20%
4	Difficulty in marketing and selling mushroom produce	15	15%
5	Seasonal limitations and unfavorable climatic conditions	10	10%

The table provides an overview of the key constraints faced by participants in the vocational training program on mushroom cultivation. Below is a detailed explanation of each constraint:

1. **Lack of Availability of Quality Spawn:** The most frequently cited constraint, affecting 30% of respondents, is the difficulty in accessing high-quality mushroom spawn. Since spawn quality directly affects mushroom yield and profitability, this limitation hinders the successful adoption of mushroom cultivation.
2. **High Cost of Mushroom Cultivation Setup:** A significant 25% of respondents indicated that the initial investment required for setting up a mushroom cultivation unit is a major challenge. This includes the cost of infrastructure, spawn, substrate, and environmental control systems, which may be unaffordable for small and marginal farmers.
3. **Lack of Technical Knowledge and Hands-on Training:** About 20% of respondents highlighted a lack of technical know-how as a barrier. Despite receiving training, many still feel the need for more practical exposure and ongoing support to successfully cultivate mushrooms on a commercial scale.
4. **Difficulty in Marketing and Selling Mushroom Produce:** Marketing challenges were reported by 15% of participants. Due to limited access to markets, lack of consumer awareness, and competition from other agricultural products, many growers struggle to sell their mushrooms at profitable rates.
5. **Seasonal Limitations and Unfavorable Climatic Conditions:** Seasonal constraints and unsuitable weather conditions were noted by 10% of respondents as a limiting factor. Since mushroom cultivation requires specific temperature and humidity conditions, growers face difficulties in maintaining optimal growing conditions, particularly in extreme climates.

Table 5: Impact of Training Programme on Mushroom Cultivation

S. No.	Category	No.	Percentage
1	Identification of edible and wild mushrooms	60	60%
2	Use of locally available resources for production of different mushroom species	55	55%
3	Bi-products of mushroom cultivation used for compost making	50	50%
4	Good scientific knowledge in pest and disease management in mushrooms	45	45%
5	Value addition in mushrooms (e.g., drying and selling)	40	40%

The training programme on mushroom cultivation had a significant impact on participants, enhancing their knowledge and skills in various aspects of mushroom production and management. The table highlights the key areas of improvement among the respondents.

1. **Identification of Edible and Wild Mushrooms:** A majority (60%) of the respondents reported an improvement in their ability to distinguish between edible and wild mushroom varieties. This knowledge is crucial for ensuring food safety and avoiding toxic mushrooms.
2. **Use of Locally Available Resources for Mushroom Cultivation:** Around 55% of participants gained knowledge about utilizing locally available materials such as paddy straw, wheat husk, and other organic substrates for mushroom production. This reduces input costs and promotes sustainable farming.
3. **Utilization of Bi-products for Compost Making:** Half (50%) of the respondents learned how to repurpose mushroom cultivation bi-products into compost, which can enhance soil fertility and support organic farming practices.
4. **Scientific Knowledge in Pest and Disease Management:** About 45% of the trainees developed a better understanding of managing pests and diseases affecting mushrooms using scientific methods. This helps in reducing crop losses and ensuring high-quality yield.
5. **Value Addition in Mushrooms:** A smaller but significant portion (40%) of the respondents gained knowledge on value addition techniques such as drying and selling mushrooms, which can increase profitability and open new market opportunities.

Table 4: Important Training Needs Areas Identified in Scientific Mushroom Cultivation

S. No.	Category	No.	Percentage
A	**Advantages of Mushroom Cultivation**		
1	Advantage of growing oyster mushroom	40	40%
2	Choice of species	35	35%
3	Simple cultivation technologies	45	45%
4	Longer shelf life	30	30%
5	Highest productivity	38	38%
B	**Preparation or Procurement of Spawn**		
6	Wheat grain	50	50%
7	Rice grain	40	40%
8	Jowar grain	35	35%
9	Bajra grain	30	30%
C	**Substrate Preparation**		
10	Stem pasteurization	45	45%
11	Hot water treatment	40	40%
12	Sterile technique	35	35%
13	Chemical sterilization	30	30%
D	**Substrate Supplementation**		
14	Wheat bran	40	40%
15	Rice bran	35	35%
16	Mustard seed cake	30	30%
E	**Spawning of Substrate**		
17	Freshly prepared (20–30 days old)	50	50%
18	Old spawn	25	25%
19	Spawn mixed (300g in 10–12 kg substrate)	40	40%
20	Spawn put in side layer (400g in 10–12 kg substrate)	35	35%
F	**Crop Management**		
21	Incubation	50	50%
22	Fruit body induction	40	40%
23	Temperature	45	45%
24	Oxygen and Carbon dioxide requirement	35	35%
G	**Water Management**		
25	Spray of water time to time	50	50%
26	Spray of water after opening the bags	45	45%
27	Excess of water	30	30%
H	**Crop Protection Measures**		
28	Identification of diseases and their control measures	50	50%
29	Identification of pests and their control measures	40	40%
30	Proper handling techniques of sprayer/other crop protection equipment	35	35%
I	**Finance**		
31	Financing agencies and types of loans available for the farming community	45	45%
32	Exposure to procedures for availing loans with terms	40	40%
J	**Harvesting**		
33	Optimum time of harvesting	50	50%
34	Economic and efficient method of harvesting	45	45%

This table presents the key training areas necessary for improving scientific mushroom cultivation practices**.** It highlights the most sought-after topics, reflecting the training needs of participants**.**

Advantages of Mushroom Cultivation: 40% of respondents wanted to learn about oyster mushroom cultivation**,** as it is easy to grow and has high market demand. Total 45% of participants emphasized the need for simple cultivation technologies to improve their production efficiency. Total 30% of trainees showed interest in the longer shelf life aspect of mushrooms to reduce post-harvest losses.

Preparation or Procurement of Spawn: The highest demand **(**50%**)** was for training on wheat grain spawn preparation, as it is commonly used in mushroom cultivation. Other spawn types like rice grain (40%)**,** jowar grain (35%)**,** and bajra grain (30%) were also considered important by the trainees.

Substrate Preparation and Supplementation: Techniques such as stem pasteurization (45%) and hot water treatment (40%) were identified as crucial for preventing contamination. Among substrate supplements, wheat bran (40%) was preferred over rice bran (35%) and mustard seed cake (30%) for enhancing productivity.

Spawning of Substrate: 50% of respondents found training on freshly prepared spawn necessary for better yield. 40% preferred learning about the spawn mixing process, which improves mushroom growth conditions.

Crop Management and Water Management: Temperature control (45%) and fruit body induction (40%) were considered crucial aspects of managing mushroom crops. 50% of respondents emphasized the need for training in regular water spraying to maintain proper moisture levels.

Crop Protection Measures and Finance: 50% of respondents wanted training on disease identification and control, highlighting the importance of protecting crops from fungal infections. 45% needed financial guidance, particularly on loan procedures and the availability of funding agencies to support mushroom cultivation enterprises.

Harvesting: 50% of participants sought knowledge on the optimum time of harvesting to ensure better market value. 45% were interested in learning about economic and efficient harvesting methods to maximize profits.

Conclusion

The findings from this study indicate that training in scientific mushroom cultivation is crucial for improving the knowledge and skills of farmers and entrepreneurs. The highest training needs were observed in areas such as spawn preparation, substrate management, crop protection, water management, and financial assistance. A significant percentage of participants (50% or more in key areas) expressed a strong demand for practical training, particularly in disease and pest control, economic harvesting techniques, and securing financial support for mushroom farming**.** By addressing these training gaps, agricultural extension services and training institutions can enhance the efficiency, productivity, and profitability of mushroom cultivation**.** Focused skill development in scientific techniques, value addition, and market linkages will empower farmers, promote sustainable agricultural practices, and contribute to rural entrepreneurship. Therefore, well-structured, hands-on training programs tailored to the specific needs of participants can play a

pivotal role in boosting mushroom production and income generation in the farming community.

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