

**RESEARCH ARTICLE**

**Impact of Training in Mushroom Production Technology on Knowledge and Adoption among Women in Hilly Regions: Insights from the Farmer First Project in Uttarakhand**

Arpita Sharma Kandpal, S. K. Kashyap

*Department of Agricultural Communication, College of Ag, GBPUA&T, Pantnagar, Uttarakhand, India*

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**ABSTRACT**

The present study aims to assess the impact of the training program on the change in knowledge and adoption level of mushroom cultivators of mid hills of Uttarakhand. ICAR-funded Farmer FIRST program operated by GBPUA&T, Pantnagar, is supporting mushroom cultivation and processing as an enterprise to double the farmers' income through enhancing their livelihood opportunities. *Dogra* and *Suryatala* villages of Nainital district were selected under the Farmer FIRST program to be promoted as "Mushroom Village." The present study was conducted to see the impact of its training program on mushroom production technology for hill women. It was found that the majority of beneficiaries had a higher level of knowledge compared to non-beneficiaries across various aspects of mushroom cultivation. Regarding the adoption of mushroom production technology, beneficiaries exhibited a higher rate of adoption across various practices compared to non-beneficiaries.

**Key words:** Adoption, knowledge, mushroom cultivation

**INTRODUCTION**

Women play a vital role in combating poverty. Through the adoption of appropriate ventures, hill women experience economic and social benefits. As part of the Farmer FIRST project, mushroom cultivation was introduced as an income-generating activity among women in farming communities. This initiative aims to improve the socioeconomic conditions of families in the project areas. Agriculture stands as a cornerstone of the Indian economy, providing livelihoods for the majority of its population. Significant studies have been made on agricultural productivity, particularly in food grain production, reflecting successes in the sector.<sup>[1]</sup> Training plays a crucial role in bolstering the capabilities of extension workers by facilitating the diffusion of innovations within their operational

contexts.<sup>[2]</sup> However, the effective transfer of technology remains a formidable challenge in realizing India's agricultural potential.<sup>[3]</sup>

Even with advancements in agricultural technologies, their value remains constrained if not embraced by farmers. The adoption of new agricultural practices is influenced by the diverse agro-climatic and socioeconomic conditions prevailing across different regions. Neglecting these factors can hinder the widespread adoption of improved technologies transferred through conventional research and extension efforts.

Mushroom cultivation, as a subsidiary occupation in rural areas, holds importance in providing additional income to growers.<sup>[4]</sup> Recognizing this, mushroom cultivation was introduced as an income-generating activity for farm women in the Farmer FIRST project. Since 2018–2024, hill women have received training, demonstrations, critical inputs, and regular advisory services to support their engagement in mushroom cultivation. Therefore, the present study aims to assess the impact of Training in Mushroom

**Address for correspondence:**

Arpita Sharma Kandpal

E-mail: [sharmaarpita615@gmail.com](mailto:sharmaarpita615@gmail.com)

Production Technology on Knowledge and Adoption among Women in Hilly Regions.

## MATERIALS AND METHODS

The study was carried out in two villages Dogara and Suryatala of farmer FIRST project. A total of 30 beneficiaries and 30 non-beneficiaries were selected randomly from the participating hill women in mushroom cultivation. Thus, a total of 60 respondents were selected from the operational villages of the Farmer First Project. All the variables were measured under the set rules and procedures, with scale and schedules developed for the study. An interview schedule was prepared and data were collected through personal interviews with respondents. Modified Knowledge and Adoption Index by Kumar *et al.* (2020)<sup>[5]</sup> was used to assess the knowledge and adoption level of hill women.

### Knowledge about Mushroom Production Technology

Knowledge is a vital aspect of human behavior and wealth, essential for utilization once acquired. Webster's dictionary defines "knowledge" as familiarity with facts, breadth of information, and awareness accumulated by humanity to the extent of one's understanding. In psychology, it encompasses the entirety of cognitive behavior concerning both tangible and hypothetical objects. Essentially, knowledge embodies the comprehended information within an individual's possession. In the realm of decision-making processes regarding innovation, as outlined by Rogers and Shoemaker (1971),<sup>[6]</sup> knowledge is pivotal. It evolves alongside the stages of decision-making as individuals become aware of innovations and grasp their functionality. This understanding can be categorized into "how-to knowledge" and "principle knowledge." According to Bloom *et al.* (1956),<sup>[7]</sup> knowledge encompasses behaviors and test situations emphasizing the retention of ideas, materials, or phenomena, whether through recall or recognition. The table presented in this context delineates the disparity in knowledge levels between beneficiaries and non-beneficiaries concerning mushroom production [Table 1].

Data presented in Table 1 depict the knowledge level of beneficiaries and non-beneficiaries in different aspects of mushroom cultivation.

#### *Mushroom cultivation and compost preparation*

A total of 13.3% of non-beneficiaries had the knowledge and 86.6% of non-beneficiaries had no knowledge about mushroom cultivation and compost preparation. On the other hand, majority of respondents (96.6%) had knowledge and 3.34% had no knowledge about mushroom cultivation and compost preparation.

#### *Mushroom growing is an economically profitable business*

An equal number of non-beneficiaries were aware or not aware that mushroom growing is an economically profitable business while all the beneficiaries were aware that mushroom growing is an economically profitable business.

#### *Mushroom cultivation is an agro-based industry*

Only 33.33% non-beneficiaries were aware that mushroom cultivation is an agro-based industry while 66.6% were not aware of that whereas all the beneficiaries were aware that mushroom cultivation is an agro-based industry.

#### *Mushroom cultivation is a sideline business*

Total of 30% non-beneficiaries were aware of that mushroom cultivation is a sideline business while 70% not aware of that. Majority of beneficiaries (93.3%) were aware that mushroom cultivation is a sideline business while 6.6% respondents were not aware of that.

### Start Small Enterprise

#### *Mushroom cultivation can start with small training*

Total of 10 non-beneficiaries were aware of that mushroom cultivation can start with small training while 90% non-beneficiaries were aware of that. On the other hand, all the beneficiaries were aware that mushroom cultivation can start with small training.

**Table 1:** Distribution of respondents according to their knowledge about mushroom production technology  $n=60$ 

S. No.	Item	Non-beneficiaries $n=30$				Beneficiaries $n=30$			
		Yes		No		Yes		No	
		Frequency	%	Frequency	%	Frequency	%	Frequency	%
Mushroom cultivation									
1.	Mushroom cultivation and compost preparation.	4	13.3	26	86.6	29	96.6	1	3.34
2.	Mushroom growing is an economically profitable business.	15	50	15	50	30	100	0	0
3.	Mushroom cultivation is an agro-based industry.	10	33.33	20	66.6	30	100	0	0
4.	Mushroom cultivation is a sideline business.	9	30	21	70	28	93.3	2	6.6
Start small enterprise									
1.	Mushroom cultivation can start with small training.	3	10	27	90	30	100	0	0
2.	Mushroom cultivation requires less land.	2	6.6	28	93.3	30	100	0	0
3.	Mushroom cultivation requires less amount of money to start the enterprise.	0	0	30	100	30	100	0	0
4.	Mushroom cultivation waste increases crop yield.	3	10	27	90	30	100	0	0
5.	Mushroom cultivation gives a quick return in time.	0	0	30	100	25	83.3	5	16.6
6.	Mushrooms can be cultivated in less costly buildings.	3	10	27	90	30	100	0	0
Spawn production									
1.	Spawn-producing laboratory or agency in the locality.	0	0	30	100	23	76.6	7	23.3
2.	Species of mushrooms are cultivated in Uttarakhand.	2	6.6	28	93.3	30	100	0	0
Quality of mushroom									
1.	Time of oyster is grown in your locality.	2	6.6	28	93.3	30	100	0	0
2.	Time of button is grown in your locality.	2	6.6	28	93.3	30	100	0	0
3.	Management of mushroom								
4.	Management of mushrooms varies with climate.	5	16.6	25	83.3	27	90	3	10
5.	Fresh air is needed for mushrooms varies with climate.	0	0	30	100	28	93.34	2	6.67
6.	Mushrooms grow fast in the poly bag even in the winter season.	0	0	30	100	26	86.6	4	13.3
7.	Fertilizers are also added to improve mushroom production.	6	20	24	80	23	76.67	7	23.34
Nutritive value of mushroom									
1.	Mushroom is highly nutritious food for vegetarians.	3	10	27	90	28	93.3	2	6.6
2.	Mushrooms contain equal protein that other non-vegetarians.	0	0	30	100	27	90	3	10
3.	Mushroom is useful for diabetic patients.	6	20	24	80	22	73.3	8	26.6
4.	We dry the mushrooms their nutritional value declines.	0	0	30	100	26	86.6	4	13.3
5.	Mushroom is a boon for heart patients.	0	0	30	100	28	93.3	2	6.67
6.	Mushroom has anti-tumor properties.	0	0	30	100	26	86.67	4	13.34
7.	Mushroom possesses anti- arthritis properties.	6	20	24	80	22	73.3	8	26.6

***Mushroom cultivation requires less land***

A total of 6.6% non-beneficiaries were aware of that mushroom cultivation requires less land while 93.3% were not aware of that. On the other hand, all the beneficiaries were aware of that mushroom cultivation requires less land.

***Mushroom cultivation requires less amount of money to start the enterprise***

All the non-beneficiaries were not aware of that mushroom cultivation requires less amount of money to start the enterprise while all the beneficiaries were aware of that.

***Mushroom cultivation waste increases crop yield***

Majority of non-beneficiaries (90%) were not aware that mushroom cultivation waste increases crop yield while 10 were aware of this. On the other hand, all the beneficiaries were aware of these aspects.

***Mushroom cultivation gives a quick return on time***

All the non-beneficiaries were not aware of this aspect. On the other hand, 83.3% of beneficiaries were aware of these aspects while 16.6% were not aware of them.

***Mushrooms can be cultivated in less costly building***

Majority of non-beneficiaries (90%) were unaware of this while all the beneficiaries were aware of this.

***Spawn-producing laboratory or agency in the locality***

All the non-beneficiaries were unaware of this while 76.6% beneficiaries were about this and 23.3% respondents were not aware of this.

***Species of mushroom are cultivated in Uttarakhand***

Majority of non-beneficiaries (93.3%) were not aware of this while all the beneficiaries were aware of this.

**Quality production of Mushroom**

***Time of oyster is grown in your locality***

Majority of non-beneficiaries (93.3%) were not aware while all the beneficiaries were aware of that.

***Time of button is grown in your locality***

Majority of non-beneficiaries (93.3%) were not aware while all the beneficiaries were aware of that.

**Management of Mushroom**

***Management of mushrooms varies with climate***

A total of 83.3% of non-beneficiaries were not aware of this while 90% of beneficiaries were aware of this.

***Fresh air is needed for mushroom varies with climate***

All the non-beneficiaries were not aware of this while 93.34% of beneficiaries were about this.

***Mushrooms grow fast in poly bags even in winter season***

All the non-beneficiaries were not aware of this while 86.67% of beneficiaries were about this.

***Fertilizers are also added to improve mushroom production***

Maximum number (80%) of non-beneficiaries were not aware of this while 76.67% of beneficiaries were about this.

**Nutritive Value of Mushroom**

***Mushroom is a highly nutritious food for vegetarian***

Majority of non-beneficiaries (90%) were not aware about this aspect while 93.3% of respondents were aware of this.

***Mushrooms contain equal protein that other non-vegetarian***

All the non-beneficiaries were not aware of this while 90% of respondents were aware about this.

***Mushroom is useful for diabetic patients***

A total of 80% of non-beneficiaries were not aware of this while 73.3% of beneficiaries were about this.

***We dry the mushrooms their nutritional value declines***

All the non-beneficiaries were not aware of this while 86.6% of respondents were aware of this.



***Mushroom is a boon for heart patient***

All the non-beneficiaries were not aware of this while 93.3% of respondents were aware of this aspect.

***Mushroom is having anti-tumor property***

All the non-beneficiaries were not aware of this while 86.67% of respondents were aware of this aspect.

***Mushroom possesses anti-arthritis property***

Maximum respondents (80%) of non-beneficiaries were not aware of this while 73.3% of beneficiaries were aware of this aspect.

Majority of beneficiaries were aware of all aspects while non-beneficiaries were found to have no knowledge about the growing season, spices, and spawn details. Thus, it can be concluded that beneficiaries had more knowledge about mushroom cultivation and its production technology. The findings therefore conclude that the Farmer First project had made a significant impact on the knowledge level of beneficiaries with respect to mushroom production.

**Extent of Adoption of Mushroom Production Technology**

Level of adoption of an improved agricultural production system would depend on the production and productivity. The selected respondents were asked a set of open-ended questions to assess the adoption. Their responses were analyzed, summarized, and tabulated. Further responses were classified into none, partial, and full categories of adoption. The frequencies, percentages, and ranks were computed for the adoption. The results of the adoption of mushroom production technology are reported in Table 2.

***Use of properly certified spawn, use of the recommended rate of spawn, and Spawn preparation while all the beneficiaries had adopted these technologies***

All the non-beneficiaries had not adopted the technologies such as the use of properly certified spawn, use of recommended rate of spawn, and spawn preparation while all the beneficiaries had adopted these technologies.

***Proper preparation of compost***

Maximum number of non-beneficiaries (86.6%) had not adopted proper preparation of compost while 80% of beneficiaries had adopted this.

***Making disinfectant for compost***

Total of 86.6 non-beneficiaries had not adopted this; on the other hand, 90% of beneficiaries had adopted this technique.

***Compost used after flushing***

Majority of non-beneficiaries (96.6%) have not adopted compost used after flushing techniques while 83.34% of beneficiaries had adopted this.

***Proper harvesting***

Maximum number of respondents (86.6%) have not adopted proper harvesting techniques while all the respondents have adopted this.

***Treatment of produce after harvest***

All the non-beneficiaries have not adopted this while all the beneficiaries have adopted this.

***Storage practices to the produce***

Maximum number of non-beneficiaries (96.67%) have not adopted this while all the beneficiaries have adopted this.

***Grading and processing of produce***

A total of 93.3 non-beneficiaries have not adopted this while 70% of beneficiaries have adopted this.

***Quality monitoring of produce***

A total of 96.6% of respondents have not adopted this while 70% of beneficiaries have adopted this.

***Proper infrastructure of equipment***

Maximum number of non-beneficiaries 96.6% has not adopted this while 80% of beneficiaries have adopted this.

***Seasonal management in mushroom cultivation***

A total of 96.6% of non-beneficiaries have not adopted this while 93.34% of beneficiaries have adopted this.

**Table 2:** Distribution of respondents according to adoption of mushroom production technology  $n=60$ 

Items	Non-beneficiaries						Beneficiaries					
	None		Partial		Full		None		Partial		Full	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
1. Use of properly certified spawn	30	100	0	0	0	0	0	0	0	0	30	100
2. Use of recommended rate of spawn	30	100	0	0	0	0	0	0	0	0	30	100
3. Spawn preparation	30	100	0	0	0	0	0	0	0	0	30	100
4. Proper preparation of compost	26	86.6	3	10	1	3.3	1	3.3	5	16.6	24	80
5. Making disinfectant for compost	26	86.6	3	10	1	3.3	1	3.3	2	6.67	27	90
6. Compost used after flushing	29	96.6	1	3.3	0	0	0	0	5	16.6	25	83.34
7. Proper harvesting	26	86.6	4	13.3	0	0	0	0	0	0	30	100
8. Treatment of produce after harvest	30	100	0	0	0	0	0	0	0	0	30	100
9. Storage practices to the produce	29	96.67	1	3.3	0	0	0	0	0	0	30	100
10. Grading and processing of produce	28	93.3	1	3.3	1	3.3	0	0	9	30	21	70
11. Quality monitoring of produce	29	96.6	0	0	1	3.3	0	0	9	30	21	70
12. Proper infrastructure of equipment	29	96.6	0	0	1	3.3	0	0	6	20	24	80
13. Seasonal management in mushroom cultivation	29	96.6	0	0	1	3.3	0	0	2	6.6	28	93.34
14. Types of cultivation adopted	26	86.6	0	0	4	13.3	0	0	3	10	27	90
15. Casing practice adopted	28	93.3	0	0	2	6.6	0	0	5	16.67	25	83.34
16. Preventive measures against disease control	28	93.3	0	0	2	6.6	3	10	2	6.6	25	83.3
17. Preventive measure against weed control	30	100	0	0	0	0	2	6.6	2	6.6	26	86.6
18. Recommended dose of fertilizer	30	100	0	0	0	0	0	0	4	13.34	24	86.67
19. Taking booster training program	30	100	0	0	0	0	0	0	8	26.6	22	73.3
20. From marketing chain to sale produce	28	93.3	2	6.6	0	0	0	0	4	13.34	24	86.67

### ***Types of cultivation adopted***

Maximum respondent (86.6%) non-beneficiaries have not adopted this while 90% of beneficiaries have adopted this.

### ***Casing practice adopted***

Majority of (93.3%) non-beneficiaries have not adopted this while 83.34% of beneficiaries have adopted this.

### ***Preventive measures against disease control***

Majority of the respondent (93.3%) non-beneficiaries have not adopted this while 83.34% of beneficiaries have adopted this.

### ***Preventive measure against weed control***

All the non-beneficiaries have not adopted this while 86.6% of beneficiaries have adopted this.

### ***Recommended dose of fertilizer***

All the non-beneficiaries have not adopted this while 86.6% of beneficiaries have adopted this.

### ***Taking booster training program***

All the non-beneficiaries have not adopted this while 73.3% of beneficiaries have adopted this.

### ***From marketing chain to sale produce***

A total of 93.3% of non-beneficiaries have not adopted this while 86.67% of beneficiaries have adopted this.

## **CONCLUSION**

The study investigated the knowledge level and adoption of mushroom production technology among beneficiaries and non-beneficiaries. The data revealed significant differences in knowledge and adoption between the two groups. The findings indicate that beneficiaries had a higher level of knowledge compared to non-beneficiaries

across various aspects of mushroom cultivation. For instance, the majority of beneficiaries were aware of mushroom cultivation techniques such as compost preparation, economic profitability, and agro-based industry nature. In contrast, non-beneficiaries lacked awareness in these areas, with substantial proportions being unaware of basic cultivation practices. Regarding the adoption of mushroom production technology, beneficiaries exhibited a higher rate of adoption across various practices compared to non-beneficiaries. Notably, beneficiaries showed full adoption in several aspects such as proper spawn usage, compost preparation, and post-harvest treatment, while non-beneficiaries lagged in most of these practices.

By addressing knowledge gaps and facilitating technology transfer, initiatives like the Farmer First project can contribute to sustainable agricultural development and livelihood improvement. Further research and extension efforts are warranted to ensure widespread adoption and maximize the benefits of mushroom cultivation technology.

## **REFERENCES**

1. Singh KM, Kumari P, Ahmad N, Shekhar D. Role of women in agriculture: Technology-led, gender sensitive policy. SSRN Electron J 2020;2:10-20.
2. Meena MS, Singh KM. Impact of training for efficient water management in agriculture. SSRN Electron J 2012;3:19-24.
3. Singh KM, Singh R, Kumar A. Adoption of modern agricultural technologies in Bihar: A farm level study (April 19, 2014). Environ Ecol 2014;32:1342-6.
4. Yadav VP, Sharma BK. Constraints in adoption of mushroom cultivation practices. Indian Res J Ext Educ 2005;5:90-1.
5. Kumar B, Shekhar D, Singh KM, Kumar N. Impact of training on mushroom production technology on knowledge and adoption by rural youth: A study in Samastipur District of Bihar. Int J Curr Microbiol Appl Sci 2020;10:430-7.
6. Rogers EM, Shoemaker FF. Communication of Innovations: A Cross-Cultural Approach. New York: Free Press; 1971. p. 476.
7. Bloom BS, Engelhardt M, Furnst E, Hill W, Krathwal DR. Taxonomy of Education Objectives-the Cognitive Domain. New York: Longmans Green; 1956.