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Cultivation of White Button Mushroom *(Agaricus bisporus)* for Economic Empowerment of hill people in Uttarakhand

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ABSTRACT

The global market is witnessing an increasing trend for mushroom as a commodity due to a shift in consumers' choices from animal protein to mushroom. Mushroom is a cash crop that is capable of harnessing a good amount of harvest from limited organic and financial resources. Mushroom cultivation offers a way for the socio-economic development of rural people due to its potential to create employment opportunities, poverty alleviation and eradication of malnutrition. Mushroom cultivation can also help to reduce susceptibility to poverty and strengthen livelihoods through the generation of fast yielding and nutritious source of food and reliable source of income. The government has initiated various projects and plans to disseminate awareness of mushroom cultivation in rural areas. The ICAR-Farmer FIRST Project is also one of the important initiative for strengthening rural communities. Training on "Mushroom cultivation and its value added products" was organised by Department of Agricultural Communication in joint collaboration with Mushroom Research and Training Centre, Govind Ballabh Pant University of Agriculture &Technology, Pantnagar in village *Dogra,* district Nanital, Uttarakhand. During the training, total 70 ready mushroom bags (with 10 kg compost each) were distributed to seventy farmers @10 bags/beneficiary. The results revealed that favourable change was noticed in the awareness and perception towards mushroom cultivation among the beneficiaries at the end of the intervention. Change in awareness level includes harvesting and processing methods (82.86%), preservation techniques, methods of compost making (91.43%), sorting/packaging (87.15%), handling techniques of sprayer and other equipment (81.43%), Type of mushroom (88.58%), Marketing Channel (77.15%), Government Schemes for mushroom growers (62.86%), Loans and Subsidies for mushroom growers (64.29%). Change in Perception level includes mushroom cultivation is a profitable venture, mushroom can be sold in local market (91.43%), mushroom has high nutritive value, mushroom's value added products is available in market (81.43%).

Key words: Mushroom cultivation, farmers, intervention, training, Farmer FIRST

Agriculture has been one of the basic practices and necessities of humans since ancient times. To sustain the resources for the future, one has to switch farming practices from conventional to "sustainable intensive agriculture. *Rosmiza et al. (2017)* suggested that to mitigate the environmental shift and increasing population demand, the only way is to integrate sustainable agricultural practices for the eradication of poverty and hunger and to fill the cleft between the different economic classes while also contributing to the sustainability of the ecosystem. Mushroom farming is one of the most potent sources of income

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generation for landless farmers and farmers with smaller landholdings (Hatai and Singh, 2019). Mushrooms are commonly known as fruiting bodies of fungus (basidomycities), which may be edible or poisonous. *Chang and Miles (1992)* defined mushrooms as "macro-fungus as distinctive fruiting bodies that can be seen by the naked eye and can be picked with hands." Mushrooms are higher fungi with specific palatable properties and are thus cultured for economic purposes. Due to limited resources, for the upliftment of rural communities, there's a need for low cost input and maximum profit plans. Mushroom cultivation is a venture with minimum input and maximum output. Currently, mushroom cultivation is largely an urban or semi-urban affair. When the technology is promoted and adopted in rural regions, the results will be more profitable as the agri-residues will be utilised as input for the venture. According to Bijla and Sharma (2023), with the support of entrepreneurial activities in mushroom cultivation through various technology transfers and various training activities, as a result of the different approaches to attracting the target population, in the last decade, mushroom production in India has almost tripled from 1.00 lakh MT to 3.15 lakh MT. Mushroom cultivation is the process of cultivating the mushroom artificially for commercial purposes. This is one of the agricultural activities with negligible effects of biotic and abiotic stress. On comparing the benefit-cost ratio, the figure proves that the final harvest has a high monetary value. The economist says that the total cost calculated for mushroom production (Oyster and button mushroom) per unit was Rs 44,823 and the gross income was Rs. 1,35,000, hence there was a profit of Rs 90,000 per respondent and it shows a two-fold increase in the economy of the participants. Uttarakhand has a huge and untapped potential for mushroom production, as its cold and humid climate supports mushroom growth and development. Due to low and fragmented land holdings and distressed economic conditions, farmers are unable to invest and harness the potential fully. According to statistical data provided on state websites of Uttarakhand, around 77.6 percent of farmers in states have landholdings less than 1 hectare. About 1/3rd of the state population is in the age group 15–34, which is forced to migrate**.** *(Statistical Abstract, Uttarakhand 2015-2016)* According to *Kushwah and Chaudhary (2015),* mushroom farming as an income source is helpful to stop migration. *Kumar et al. (1995)* concluded that in the Uttarakhand hills, intensive mushroom cultivation can lead to exponential growth in mushroom growers economic status as this unit requires a very small amount of land for establishment, inputs are locally available at a low cost, and output fetches a great monetary value. The constraints faced by mushroom growers are mainly a lack of technical know-how and a lack of marketing channels. Other constraints can be the lack of availability of spawns, compost, etc. (*Shirur et al. 2016).* They reported a ratio between extension workers and farmers is quite wide (1:1162), due to which an information gap prevails. Mushroom cultivation can reduce vulnerability to poverty and strengthen livelihoods through the generation of a fast-yielding and nutritious source of food and a reliable source of income. The production of spawn and the preparation of value added products are considered enterprises in mushroom production with immense economic potential. Extensive training has generally been considered the outlet for an exchange of concepts within a community (*Mazumdar et al. 2020).*

Mushroom cultivation is a technological intervention under the ICAR-funded farmer FIRST project in the village of *Dogra in the* Nainital district of Uttarakhand. The present research investigation was conducted in a village *Dogra* with the objective of encouraging farmers to take up mushroom cultivation as an entrepreneurial venture.

MATERIAL AND METHOD

The project "Enhancing Livelihood Opportunities of Farming Communities in the Mid Hills of Uttarakhand" is going on in the Department of Agricultural Communication, G.B.P.U.A&T, Pantnagar. Mushroom cultivation was one of the interventions under the project, with the objective of encouraging farmers to take up mushroom cultivation as an entrepreneurial venture. To generate awareness and knowledge about mushroom cultivation among the farmers, a training programme and farmer-scientist interaction were organised for the beneficiaries in village *Dogra*. The training was organised to impart knowledge and skills required for mushroom cultivation to the 70 participants. During this training programme, 70 mushroom bags of white button mushroom (*Agaricus bisporus)* were distributed among the beneficiaries. Data were solicited through the interview schedule. An awareness test was used to collect data before and after the organisation of the training programme. A lecture on mushroom cultivation was delivered by an expert from the Mushroom Research and Training Centre, Pantnagar. To assess the level of awareness of mushroom cultivation, a knowledge test was developed.

RESULTS AND DISCUSSION

This section highlights the findings in terms of the change in level of awareness and perception of the seventy beneficiaries towards mushroom cultivation at the end of the intervention. The change in awareness and perception level was obtained through an interview with the help of frequency and percentage as statistical measures. For measuring the change in level of awareness and perception of the participants regarding mushroom cultivation, pre-exposure and post-exposure scores of beneficiaries were calculated for each subcomponent of mushroom cultivation before and after the intervention. The difference in scores between pre-exposure and post-exposure indicates a change in the level of awareness and perception of beneficiaries regarding mushroom cultivation. To assess the change in awareness level among beneficiaries, 14 statements related to mushroom cultivation were used. In a similar way, to measure the change in level of perception among the beneficiaries, eight statements were identified and responses were recorded from each beneficiary (Table 1).

A. Change in the level of awareness of beneficiaries for button mushroom cultivation

The level of awareness of the beneficiaries regarding mushroom cultivation was observed under 14 components: government schemes for mushroom growers, loans and subsidies for mushroom growers, marketing channels, harvesting and processing methods, preservation techniques, optimum temperature and humidity for fruiting, raw materials, type of mushroom, methods of compost making, method of spawning, handling techniques of the sprayer and other equipment to be used, shorting and packaging, value-added products, and profitability in mushroom cultivation.

It was found that prior to the implementation of the intervention, only 32.86 percent of the beneficiaries were aware of government schemes for mushroom enterprises, and 28.58 percent were aware of loans and subsidies available for mushroom cultivation. An equal number of respondents (22.86 percent) knew about the marketing channels and value-added products, followed by 21.43 percent who knew about the raw materials used for mushroom cultivation. About 14.29 percent of respondents were aware of the profitability obtained from mushroom cultivation, followed by handling techniques for sprayers and other equipment (12.86 percent) and shorting and packaging (11.43 percent). A smaller number of participants (7.15 percent) were aware of the method of spawning. After the implementation of the

Table 1: Change in level of awareness and perception

Sl. No	Components	Knowledge level of beneficiaries before intervention	Knowledge level of beneficiaries after intervention	Change in level of awareness
	A. Change in Awareness Level			
1.	Government Schemes for mushroom growers	23 (32.86)	67 (95.72)	44 (62.86)
2.	Loans and Subsidies for mushroom growers	20 (28.58)	65 (92.86)	45 (64.29)
3.	Marketing Channel	16 (22.86)	70 (100)	54 (77.15)
4.	Harvesting and Processing Methods	8 (11.43)	66 (94.29)	58 (82.86)
5.	Preservation techniques	5 (7.15)	69 (98.58)	64(91.43)
6.	Optimum Temperature and humidity for fruiting	10 (14.29)	60 (85.72)	50 (71.43)
7.	Raw materials	15 (21.43)	61(87.15)	46 (65.72)
8.	Type of mushroom	5 (7.15)	67(95.72)	62 (88.58)
9.	Methods of Compost making	6 (8.58)	69(98.58)	63(91.43)
10.	Method of spawning	5 (7.15)	65(92.86)	60 (85.72)
11.	Handling techniques of sprayer and other equipment to be used	9 (12.86)	66(94.29)	57 (81.43)
12.	Sorting/Packaging	8 (11.43)	69(98.58)	61 (87.15)
13.	Value added products	16 (22.86)	69(98.58)	53 (75.72)
14.	Profitability in mushroom cultivation	10 (14.29)	64 (91.43)	54 (77.15)
	B. Change in Perception Level			
1.	Mushroom cultivation requires less time.	3 (4.29)	66(94.29)	63(90)
2.	Mushroom may be infested with pest and diseases.	8 (11.43)	65(92.86)	57(81.43)
3.	Mushroom can be sold in local market.	6 (8.58)	69(98.58)	63(91.43)
4.	Mushroom's value added products is available in market.	10 (14.29)	67(95.72)	57(81.43)
5.	Mushroom cultivation is an easy method of cultivation.	19 (27.15)	63 (90)	44(62.86)
6.	Mushroom cultivation is a profitable venture.	9 (12.86)	66(94.29)	57(81.43)
7.	Mushroom has high nutritive value.	8(11.43)	65(92.86)	57(81.43)
8.	Mushroom is a vegetarian food.	18 (25.72)	70 (100)	52 (74.29)

Values in parenthesis indicate the multiple responses among the 70 beneficiaries in per cent

intervention, the majority of the beneficiaries reported that they were well aware of all the subcomponents of mushroom cultivation. However, among all the subcomponents, the highest percentage of beneficiaries (83.33%) showed a change in level of awareness regarding preservation techniques and methods of compost making (91.43 percent), type of mushroom (88.58 percent) and shorting/packaging (87.15 percent), method of spawning (85.72 percent), harvesting and processing methods (82.86 percent), marketing channel, and profitability in mushroom cultivation (77.15 percent), respectively. Other components related to the change in level of awareness were optimal temperature and humidity for fruiting (71.43 percent), loans and subsidies for mushroom growers (64.29 percent), and government schemes for mushroom growers (62.86 percent).

B. Change in perception of beneficiaries regarding mushroom production

The change in perception of beneficiaries regarding mushroom cultivation was measured in eight subcategories. Prior to the implementation of the intervention, even though some of the beneficiaries (25.72%) perceived mushrooms as an edible vegetarian food, about 11.43 percent of the beneficiaries still alleged that mushroom has high nutritive value. Slightly more than twenty percent of the beneficiaries perceived mushroom cultivation as an easy method. A total of 14.29 percent of respondents agreed that mushrooms' value-added products are available in the market, followed by 11.43 percent who agreed that Mushroom may be infested with pests and diseases. After the implementation of the intervention, the majority of the beneficiaries showed favourable perceptions towards all the subcategories of mushroom cultivation. Even prior to the implementation of the intervention, the majority of the beneficiaries (76.67 percent) perceived mushroom as an edible vegetarian food, but 23.33 percent disagreed about the edibility of mushroom. Slightly more than fifty percent of the beneficiaries (53.34 percent) perceived the nutritive and medicinal properties of mushroom as valuable, while less than fifty percent of the beneficiaries (45 percent) agreed that mushroom is available in a variety of recipes and pickles. Mushroom entrepreneurship was identified as a profitable venture by 35 percent of the beneficiaries, whereas one third of the beneficiaries (33.33 percent) agreed that mushroom can be sold in local markets. Mushroom cultivation was perceived as an easy method of cultivation by about 18.34 percent of the beneficiaries. Only 13.33 percent and 10.00 percent of the beneficiaries agreed that mushroom may be infested with pests and diseases like any other crop without consuming time and hard work.

After the implementation of the intervention, the majority of the beneficiaries showed favourable perceptions towards all the subcategories of mushroom cultivation. The mind-set of the majority of the respondents (91.43 percent) changed and found themselves familiar with the mushroom can be sold in local markets.

Mushroom's value-added products are available in the market, and mushroom has high nutritive value. 90 percent of respondents perceived that mushroom cultivation required less time. An equal number of respondents' (81.43 percent) perception was changed in the component of mushroom cultivation, and they considered it a profitable venture. Mushrooms' value-added products are available in the market, Mushroom mushrooms have high nutritive value. These results may be attributed to individual as well as collective efforts made in terms of training and supervision provided by scientists, experts, and extension functionaries. Overall, the beneficiaries develop a favourable perception and an increased level of awareness towards mushroom cultivation at the end of the intervention. It was observed that the scores obtained prior to the implementation of the intervention were not very satisfactory for many aspects of mushroom cultivation. However, the scores gained by beneficiaries after the intervention were much more satisfactory in all aspects. This implies that the impact of mushroom cultivation as an adopted intervention was quite satisfactory in terms of change in level of awareness and perception of beneficiaries due to constant supervision, proper training, and regular assistance.

CONCLUSION

Though mushroom cultivation has been documented as a cost-effective venture in many places, it still requires efforts to be made in some regions. This is an income generating activity. The first step in a mushroom production enterprise requires awareness and understanding of mushroom as a crop and its cultivation methods among the people. The efforts undertaken during the implementation of the intervention addressed the issue and were able to move the beneficiaries towards adopting mushroom cultivation as an enterprise. The villagers were greatly stimulated by the easy method of cultivation. It was highly nutritious and included in their daily diet. Results revealed an overall increase in awareness and a favourable change in the perception of beneficiaries towards mushroom cultivation. Post-implementation of the intervention, the majority of farmers in the village were interested in taking up mushroom cultivation as a major income generating activity. Our studies further suggests that an appropriate training programme can be provided and for that the farmers need motivation to adopt mushroom entrepreneurial ventures.

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