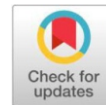


## Original Research Article

## Open Access

# An Opportunity towards Self-employment: Profitability of Mushroom Cultivation in Jammu Region of J&K UT



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## ABSTRACT

In the present study, an attempt had been made to analyse the economics of mushroom farming in Jammu region of Jammu and Kashmir UT for the period 2021-22. A list of progressive farmers was obtained from the KVKs of eight districts falling in Jammu division of J&K UT and out of all the progressive farmers, only mushroom growers were chosen. Thus, Jammu, Samba and Kathua district were selected due to highest number of mushroom growers practicing mushroom farming in these districts, according to the list obtained. A total of 22 mushroom growers were selected by using sampling without replacement method and these growers were interviewed twice and took the data relevant to three selected years viz. 2019-20, 2021-22 and 2023-24, thus constituting a total sample size of 66. The results have revealed that highest investment on Kuchcha mushroom units was found to be made by mushroom growers of Jammu district (₹203894.88) and least by Kathua district (₹158100) with an overall average as ₹176226.63. Whereas highest investment on Pucca mushroom units was made by growers of Kathua district (₹345600) while least by Samba district (₹289912) with an overall average as 341874.63. This indicates clearly that investment made was higher in case of Pucca mushroom units as compared to Kuchcha mushroom units. As far as the share of various equipments in total investment is concerned it was found to be highest for racks while least for thermometers. The total cost incurred per 1000 bags per unit has shown the increasing trend over the years which might be due to the increase in prices of various inputs used in mushroom farming. The average cost of production per 1000 bags per unit was ₹220067.02. Among various components of variable cost, labour contributed the most followed by compost and spawn. Of the hired and family labour used for mushroom farming, family labour played a significant role. Average production from mushroom units increased to 3000 Kgs in 2023-24 from 2500 Kgs in 2019-20 thus indicating an increasing trend over the years. Average market price per kg has also increased from 110 per kg in 2019-20 to 150 per kg in 2023-24. On an overall basis, the gross return obtained from the mushroom production of 1000 bags, was ₹355290.00. Thus, an overall cost-benefit ratio was calculated as 1:1.61. There were also some challenges during the study, thus accurate data collection for mushroom cultivation was hindered by incomplete records, fluctuating prices, species and method variations, regional differences, labour cost variability. This study provides insights on profitability for farmers and investors, aiding investment decisions and resource allocation while assisting policymakers in creating supportive measures for mushroom farming's economic viability.

**Keywords:** Progressive farmers, investment, compost, spawn, labour, cost, production, market price, cost-benefit ratio.

## Introduction

Agriculture is the mainstay of Indian economy as it is the primary source of food, employment and income for most of the population. India ranks second worldwide in farm outputs. Agriculture employed more than 50 per cent of the Indian workforce and contributed 20.2 per cent to country's GDP (Economic Survey, 2020-21). Agriculture and allied sectors account for 18.40 per cent of India's gross value added (GVA) at current prices during 2022- 23, marginally higher than 17.70 per cent in 2015-16. As agriculture is confronted with various problems like lack of access to institutional credit, high input cost, small land holdings, inadequate marketing infrastructure etc. which are pushing the small and marginal farmers to commit suicides.

As suggested by NITI Aayog, opting for allied sectors can address the woes of the farmers as well as contributes to economic growth. Due to fragmentation of land, majority of the farmers i.e. 82-86 per cent in India are small and marginal who can't get much output out of limited land. So, they are moving/shifting towards agri-allied sectors like mushroom cultivation/fungi culture, dairy farming, poultry farming, fish farming, apiculture, floriculture, etc. These ventures are highly profitable due to their low initial cost, can be practiced round the year, require less space, give quick and more returns in shorter period of time and are environment friendly.

## Global Scenario of Mushroom Production

Mushroom production in the world has increased more than five times since 2000 and presently, it stands at as 44 million tonnes (FAOSTAT, 2023) with Asian continent as the major producer with 95% share in production after Europe (3%), and American continent (1%). The leading countries in terms of fresh mushroom production are China (93%), Japan (0.01%), and Poland (0.01%). India stands at sixth position with around 0.24 million tonnes production. Although as per its domestic data updates, it has reached 0.31 million tonnes.

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Interestingly, the CAGR of fresh mushroom production of China (9.23%) and India (8.58%) is comparable for the last 20 years despite of the substantive advancements in China, presenting encouraging growth of Indian mushroom industry *vis-a-vis* global leader (FAO, 2023, Bijla and Sharma, 2023).

### Indian scenario

The commercialization of mushrooms in India began in the year 1960s when a German agriculturalist associated with an Indian agriculturist in Solan. Upon collaborating, he suggested running a scheme like "Development of Mushroom Cultivation in Himachal Pradesh" can open new doors. He felt that cultivating wide types of mushrooms in India can bring a lot of employment opportunities, increment in earning opportunities and diversity in crop production. The sector has since expanded, driven by growing demand for specialty mushrooms. The ease of cultivation in varied environments, including small plots and urban settings, contributes to its appeal. India's mushroom industry is expanding significantly and the data obtained from market depicts a compound annual growth rate (CAGR) of 13.20 per cent between 2019 and 2024. (Shukla, 2024). The top mushroom producing states in India are Bihar, Maharashtra, Odisha, Haryana, Punjab, Himachal Pradesh, Uttar Pradesh, West Bengal and Kerala. Modern cultivation technology has made it possible to grow mushrooms anywhere in India. The best thing about the cultivation of mushroom farming is, they require less space and become ready to harvest within 3 weeks of the casing (covering of compost with a thin layer of sterile soil or materials like chalk powder). The most common types of mushrooms grown in India are button mushrooms and oyster mushrooms.

During last couple of decades, mushroom farming has contributed immensely in the nutritional security and employment generation in the urban and rural areas of the country. Mushroom farming is a remunerative option for the farmers keeping in view the reduction in land holdings and depleting natural resources like water. As compared to other field and Horticultural crops, mushroom cultivation utilizes vertical space with minimum quantity of water. The available agricultural residue in the country may be utilized for generating wealth from the waste. As there is constant farm income and employment opportunity, the livelihood of the farmers can be strengthened through this enterprise.

Although the mushroom production and consumption is on the rise, India has a tepid response to it. Indian mushroom industry is majorly focused on few labour- and capital-intensive mushrooms. With abundant agro-residue resources, cheap labour and wide range of suitable climatic conditions, we have enormous scope of producing mushrooms at cheap rates. As vertical and indoor space is utilized for mushroom production, comparatively less land and capital is required. Markedly, the average operating holding size in India has declined to 1.08 hectares (GoI, 2020). A minimum viable controlled unit of white button mushroom needs an area that is even less than 0.1 hectares. Thus, with such minimum requirements, mushroom farming can be considered as a diversification tool for land and capital-constrained farmers. China leads the world in mushroom output, which now exceeds 40 million tonnes (MT) globally. There is considerable growth in Indian mushroom production in recent years. Twenty years from now, we produced mere 44000 metric tonnes of mushrooms, but at present, India is producing 0.31 million tonnes of mushrooms with position in the top 5 countries in the world.

In the last five years, the mushroom production in India has almost doubled from 1.00 lakh MT to 2.01 lakh MT (Directorate of Mushroom Research Report, 2019-20, Bijla and Sharma, 2023). The total mushroom production in India was approximately 0.336 million tonnes during 2023-24, which is about two times higher than 0.155 million tonnes in 2019-20 (Indiastat, 2024). According to National Horticulture Board, Bihar has become the largest mushroom producing state in the country by producing more than 28,000 tonnes of mushrooms in the year 2021-22.

### Status of mushroom production in Jammu and Kashmir UT

Gilhotra *et al.* (2023) stated that the Himalayan states, including Himachal Pradesh, Uttarakhand, and Jammu & Kashmir, are particularly suitable for mushroom cultivation due to their favorable climatic conditions and the presence of medicinal and wild edible mushrooms. In Jammu & Kashmir, mushroom farming is increasingly seen as a promising agricultural practice, supported by government initiatives like the Rashtriya Krishi Vikas Yojna. As under this program, two training programmes have been set up by the State agricultural university SKUAST-Jammu namely PRAGATI and UDGAM for providing financial assistance to the youth for running the agro-enterprise. According to Kathua Chief Agriculture Officer (CAO), mushroom production has increased from 900-1000 quintals per year to 9,000 quintals per year, generating a revenue of ten crore rupees for farmers (ANI Report, 2024). Button mushroom is cultivated in temperate regions of Himachal Pradesh, Jammu and Kashmir (J&K), however, the oyster, milky, paddy straw mushrooms are cultivated in the tropical and subtropical regions (Raman *et al.*, 2018). The number of mushroom growers in Jammu division is 2265 and 4682 in J&K UT (Digest of Statistics, UT of J&K, 2022-23). The production of mushrooms in Jammu division is 24826.12 quintals while for the UT it was 28865.32 quintals. This paper attempts to find out the economics of mushroom cultivation in the Jammu region of J&K UT.

### Data and Methodology

#### Study area

We purposively selected Jammu Region of Jammu and Kashmir UT for the study. A list of progressive farmers was procured from Krishi Vighyan Kendras (KVKs) falling under the purview of SKUAST-J. Further out of all progressive farmers, only mushroom growers were chosen and thus collected the data from the farmers belonged to Jammu, Samba and Kathua. The study pertains to the year 2022-23 during which the data for the years i.e. 2019-20 and 2021-22 and 2023-24 were collected. Thus, the primary data were collected from the selected progressive mushroom growers twice through a well-structured and pre-tested interview schedule by personally visiting their places. The collected data i.e. from mushroom growers for different years, were compared to know about any change in their economic conditions.

Agro-enterprises	Sample size after applying the sampling method without replacement
Mushroom	66

Fig 1: Number of mushroom growers selected after using sampling without replacement

#### Analytical framework

For the selection of mushroom growers sampling without replacement was employed where the progressive mushroom farmers were interviewed twice and data of three different

financial years viz; 2019-20, 2021-22 and 2023-24 were taken thus constituting to a total sample size of 66 mushroom growers means data were drawn from same population thrice.

**Computation of costs and returns**

For the computation of costs and returns, various cost concepts framed by Commission on Agricultural Costs and Prices (CACCP) such as Cost A<sub>1</sub>, Cost A<sub>2</sub>, Cost B<sub>1</sub>, Cost B<sub>2</sub>, Cost C<sub>1</sub> and Cost C<sub>2</sub> as indicated below were used.

Also for assessing the economics of selected agro-enterprise, variable costs, fixed costs, gross returns, net returns and cost-benefit ratio were worked out using the formulae given below.

Cost groups	Items of cost involved
Cost A <sub>1</sub>	Total variable cost + land revenue + depreciation
Cost A <sub>2</sub>	Cost A <sub>1</sub> + Rent paid for leased in land
Cost B <sub>1</sub>	Cost A <sub>1</sub> + Interest on fixed capital
Cost B <sub>2</sub>	Cost B <sub>1</sub> + Rent paid for leased in land + Rental value of owned land
Cost C <sub>1</sub>	Cost B <sub>1</sub> + value of family labour
Cost C <sub>2</sub>	Cost B <sub>2</sub> + value of family labour
Cost C <sub>3</sub>	Cost C <sub>2</sub> + Cost of management i.e., 10% of cost C <sub>2</sub>

✓ Gross Income (GI) = Q<sub>m</sub> × P<sub>m</sub> + Q<sub>b</sub> × P<sub>b</sub>

Where,

GI = Gross Income

Q<sub>m</sub> = Quantity of main product

P<sub>m</sub> = Price of main product

Q<sub>b</sub> = Quantity of by-product

P<sub>b</sub> = Price of by-product

✓ Net Income (NI) = Gross Income – Total cost (C<sub>2</sub>)

✓ Cost-benefit ratio =  $\frac{\text{Gross Income (GI)}}{\text{Total Cost (cost C}_2\text{)}}$

**Results and Discussion**

**Investment structure of mushroom units**

The data regarding investment made for constructing and operating the mushroom units, costs incurred in mushroom farming, returns accrued per 1000 bags and various inputs used for production of 1000 bags of mushroom were collected from sample respondents. The results (Table 1) indicate that the initial investment for establishing a mushroom unit (*Kuchcha* shed) with a capacity of 1000 bags per unit was highest for Jammu district (₹103603.00) followed by Samba (₹94166.00) and Kathua districts (₹62500.00) with an overall value for the Jammu region as ₹76540.00. For *Pucca* shed, the investment figures turned out to be ₹238235.00 for Jammu district followed by Samba (₹191744.00) and Kathua (₹250000.00) districts with an overall average figure for the Jammu region as ₹242188.00. This clearly indicates that the investment pattern was found to be similar in the three districts for both *Kuchcha* and *Pucca*-sheds. In terms of total investment for *Kuchcha* mushroom units, Jammu district recorded the highest investment at ₹203,894.88, while Kathua district had the lowest at ₹158,100, with an overall average investment of ₹176,226.63. For *Pucca* mushroom units, the highest investment came from Kathua district at ₹345,600, while Samba district had the lowest investment at ₹289,912, with an overall average of ₹341,874.63.

The investment structure for various equipments in growing mushroom was also worked out which revealed that per unit investment on equipments was ₹100291.88, ₹100291.88 and ₹95600.00 for Jammu, Samba and Kathua districts, respectively with overall average as ₹99686.63. As far as the share of various equipments in investment on equipments is concerned it was found to be highest for racks in all the three districts with an average value of ₹69210.35 while least was found to be for thermometers in Jammu (₹500.00) and spade in Samba (₹600.00), Kathua (₹400.00) and at overall level (₹577.78). This can be concluded from the table that higher investment was found to be for *Pucca* shed than the *Kuchcha* shed.

Table 1: Average investment structure of mushroom units (n=22)

Particulars	₹/000 bags/unit			
	Jammu (n=11)	Samba (n=6)	Kathua (n=5)	Overall Average (n=22)
<b>I) Investment on building</b>				
a) <i>Kachcha</i> (35×24×12 ft <sup>3</sup> )	103603.00	94166.00	62500.00	76540.00
b) <i>Pucca</i> (35×25×15 ft <sup>3</sup> )	238235.00	191744.00	250000.00	242188.00
<b>II) Investment on equipment</b>				
a. Racks	71693.55	68437.50	67500.00	69210.35
b. Polythene Sheets	1750.00	1250.00	1500.00	1500.00
c. Tubs	2940.00	2363.00	2800.00	2701.00
d. Baskets	4375.00	4000.00	4500.00	4291.67
e. Spray Pumps	3500.00	3500.00	3500.00	3500.00
f. Exhaust Fans	-	2500.00	-	2500.00
g. Thermometers	500.00	717.50	600.00	605.83
h. Weighing Machine	800.00	800.00	800.00	800.00
i. Electric Motor	12000.00	12000.00	12000.00	12000.00
j. Spade	733.33	600.00	400.00	577.78
k. Packing Machine	2000.00	2000.00	2000.00	2000.00
Sub-Total (a-k)	<b>100291.88</b>	<b>98168.00</b>	<b>95600.00</b>	<b>99686.63</b>
<b>Total investment having <i>kachcha</i> shed (a)+(II)</b>	<b>203894.88</b>	<b>192334.00</b>	<b>158100.00</b>	<b>176226.63</b>
<b>Total investment having <i>pucca</i> shed (b)+(II)</b>	<b>338526.88</b>	<b>289912.00</b>	<b>345600.00</b>	<b>341874.63</b>

### Cost structure of button mushroom

The total cost for mushroom farming includes two components i.e. fixed and variable cost. Year-wise and item wise cost incurred for mushroom cultivation (Table 2) indicates that highest fixed cost (₹6338.68) was incurred in the year 2021-22 while least cost (₹3671.17) was incurred in the year 2019-20 with an overall average as ₹5269.75. Total variable cost was found to highest (₹301737.31) in the year 2023-24 while least (₹151119.57) in the year 2019-20 with an overall average as ₹214797.27. As far as total cost is concerned it was found to be highest (₹307535.64) in the year 2023-24 while least (₹154790.74) in the year 2019-20 with an overall average as ₹220067.02. Highest share among various components of variable cost was found to be of labour (i.e. family labour) followed by compost preparation and spawn in the respective years. The highest figures under these categories were obtained in the year 2023-24 which might be due to the fact that wages and prices has gone up as compared to the past years. The values for total cost in the year 2019-20, 2021-22 and 2023-24 turned out to be ₹154790.74, ₹197870.55 and ₹307535.64, respectively with overall average as ₹220067.02 for 1000 bags of mushroom unit.

Table 2: Item wise cost of cultivation of mushroom units

(₹/000 bags/unit)				
Particulars	2019-20	2021-22	2023-24	Overall Average
<b>Fixed cost</b>				
I) Depreciation on Equipments	3431.00	5924.00	5419.00	4925.00
II) Interest on Fixed Capital @ 7 % per annum	240.17	414.68	379.33	344.75
<b>Total Fixed Cost (I+II+III)</b>	<b>3671.17</b>	<b>6338.68</b>	<b>5798.33</b>	<b>5269.75</b>
<b>Variable Cost</b>				
a) Hired labour				
i. Labour cost on shed and shelf making	37474.00	46843.00	79633.00	54650.00
ii. Labour cost on compost preparation	7200.00	9000.00	15300.00	10500.00
<b>Sub-Total</b>	<b>44674.00</b>	<b>55843.00</b>	<b>94933.00</b>	<b>65150.00</b>
b) Family Labour				
i. Watering	6652.00	8315.00	14135.50	9700.00
ii. Picking	11841.60	14802.00	25163.40	17270.00
iii. Cutting	8998.40	11248.00	19121.60	13123.00
iv. Washing	3256.80	4071.00	6920.70	4750.00
v. Packing	21316.00	26645.00	45296.50	31086.00
iii. Casing	1858.40	2323.00	3949.10	2710.00
<b>Sub-Total</b>	<b>53923.20</b>	<b>67404.00</b>	<b>114586.80</b>	<b>78639.00</b>
<b>Total labour (a+b)</b>	<b>98597.20</b>	<b>123247.00</b>	<b>209519.80</b>	<b>143789.00</b>
A) Compost				
i. Wheat Straw	18000.00	24000.00	36000.00	26000.00
ii. Urea	804.00	804.00	804.00	804.00
iii. DAP	720.00	780.00	840.00	780.00
iv. MOP	1275.00	1425.00	2250.00	1650.00
v. Poultry Manure	2490.00	4800.00	7500.00	4930.00
vi. Gypsum	3000.00	3600.00	4200.00	3600.00
vii. Wheat bran	9000.00	10200.00	10800.00	10000.00
<b>Sub-Total (i-vii)</b>	<b>35289.00</b>	<b>45609.00</b>	<b>62394.00</b>	<b>47764.00</b>
B) Polythene bags for packing	2600.00	3000.00	4000.00	3200.00
C) Casing Material	1500.00	1600.00	1920.00	1673.33
D) Spawn	7500.00	11250.00	15000.00	11250.00
E) Chemical for Whitening	2650.00	2968.00	2968.00	2862.00
F) Electricity charges	200.00	350.00	500.00	350.00
G) Insecticides and Disinfectants	306.00	368.00	489.00	387.67
H) Interest on working capital for 5 months @ 4% per annum	2477.37	3139.87	4946.53	3521.27
<b>Total Variable cost (A-H)</b>	<b>151119.57</b>	<b>191531.87</b>	<b>301737.31</b>	<b>214797.27</b>
<b>Total Cost (Fixed cost +Variable cost)</b>	<b>154790.74</b>	<b>197870.55</b>	<b>307535.64</b>	<b>220067.02</b>

### Returns from Button Mushroom

As the mushroom enterprise is very profitable and give quick returns to the growers so returns from mushroom unit of 1000 bags have been worked out (Table 3) which reveals that production of mushroom has increased from 2500 Kgs in 2019-20 to 3000 Kgs in the year 2023-24 with an overall average figure for the same as 2733 Kgs. Highest gross returns (₹450000.00) were found to be in the year 2023-24 while least (₹275000.00) were reported to be in the year 2019-20 with overall average as ₹355290.00. Highest cost-benefit ratio was found in the year 2019-2020 (1:1.78) and least in the year 2023-24 (1:1.46) with an overall average cost-benefit ratio as 1:1.61.

Table 3: Cost and return structure of mushroom units

(₹/000 bags/unit)				
Particulars	2019-20	2021-22	2023-24	Overall Average
Total Fixed cost (₹)	3671.17	6338.68	5798.33	5269.75
Total Variable cost (₹)	151119.57	191531.87	301737.31	214797.27
<b>Total Cost (₹)</b>	<b>154790.74</b>	<b>197870.55</b>	<b>307535.64</b>	<b>220067.02</b>
Production in Kgs	2500.00	2700.00	3000.00	2733.00
Average market price (₹)	110.00	130.00	150.00	130.00
<b>Gross returns (₹)</b>	<b>275000.00</b>	<b>351000.00</b>	<b>450000.00</b>	<b>355290.00</b>
Net Returns (₹)	120209.26	153129.45	142464.36	135222.98
Cost-Benefit Ratio	1:1.78	1:1.77	1:1.46	1:1.61

## Conclusion

Mushroom is an economically profitable and promising agricultural enterprise in J&K. Usually, small, marginal and landless farmers are engaged in mushroom cultivation mainly because of small piece of land, less investment and little amount of money is required as capital. Highest investment was found to be made on *Pucca* mushroom units than the *Kuchcha* mushroom units. Investment on equipments revealed that major item of investment was racks. Average cost of production per 1000 bags per units was ₹220067.02. Growers were able to harvest 2733 Kgs of average production fetching ₹355290.00 of average gross returns to them. The cost-benefit ratio (C-B Ratio) was about 1.61. A large number of small, marginal and landless poor farmers as well as women can earn a significant amount of money from mushroom cultivation. Thus, with such minimum requirements, mushroom farming can be considered as a diversification tool for land and capital-constrained farmers. It can bring a lot of employment opportunities, increment in earning opportunities and diversity in crop production in J&K UT. As there is constant farm income and employment opportunity, the livelihood of the farmers can be strengthened through this enterprise.

**Future scope of the study:** This study can support long-term research to monitor profitability, compare different mushroom types and growing methods, and analyse various regions. It can also investigate the effects of new technologies, sustainable practices, and market demand on the industry, providing valuable insights for farmers, investors, and policymakers.

**Recommendations and suggestions:** Since labour costs constitute a significant portion of expenses, management strategies should be implemented to minimize labour requirements in the compost preparation process. The second highest cost was associated with compost preparation, primarily due to the lack of wheat straw in the region. It's essential to take actionable steps to address this issue.

The third significant cost arose from purchasing spawn from Solan, Himachal Pradesh. This matter also needs to be considered, and appropriate management decisions should be made to optimize costs.

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