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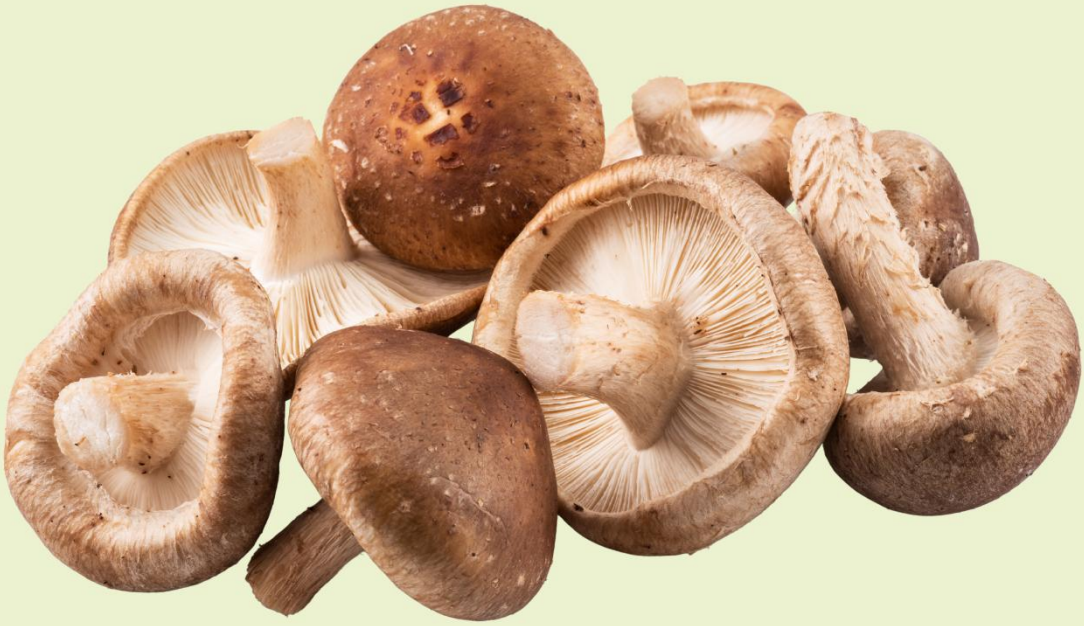

MUSHROOM PRODUCTION

EMPIRICAL OBSERVATIONS FROM ECONOMIC PERSPECTIVE ON KANGRA FARMS

Dr. Girish Mahajan

Bhumi Publishing, India
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Mushroom Production:

Empirical Observations from Economic Perspective on Kangra Farms

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PREFACE

Mushroom cultivation in the mid-hills of the Kangra Valley has emerged as a crucial, non-land-based, and highly profitable enterprise, offering a sustainable alternative to traditional agriculture. With over 80% of Himachal Pradesh's landholdings categorized as small or marginal, the reliance on traditional field crops has seen diminishing economic returns. In this context, mushroom farming offers a significant advantage, producing 100 times more protein per unit area than conventional agriculture, while utilizing agricultural waste, such as wheat straw, efficiently.

Studies in the Kangra valley, focusing on five diverse agro-climatic blocks, indicate that mushroom cultivation—particularly of white button mushrooms—provides substantially higher net returns compared to cereal crops. Evidence suggests that while small-scale farming is common, larger farm units often exhibit better management, higher gross returns, and lower per-unit production costs, indicating economies of scale. While oyster mushrooms have lower setup costs, empirical data from Kangra shows that button mushrooms, due to higher demand and better market linkages, yield significantly higher gross returns (approx. ₹40,587 to ₹47,109 per 100 bags) compared to oyster mushrooms (approx. ₹21,600 to ₹22,320 per 100 bags). Despite high potential, farmers encounter significant challenges, including inadequate supply of quality spawn, high incidence of diseases, lack of specialized cold chain storage, and high costs of labor. The sector serves as an important employment generator for rural families. Socio-economic profiling of cultivators in the region indicates that a significant number of households are diversifying into this, with a notable portion of farmers, often in joint family settings, engaging in this activity for improved income security.

In conclusion, the empirical evidence highlights that with improved, sustainable practices, and addressing institutional gaps in marketing and technology, mushroom production can act as a catalyst for economic empowerment in rural Kangra.

- Girish Mahajan

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ABSTRACT:

With the ever-increasing demand for quality food, mushroom cultivation is emerging as an important activity in different parts of the country. This activity requires very less land and can be a good source of employment for small and landless farmers, educated youth and women. Mushroom cultivation improves the socio-economic condition of the farming community through additional revenue by utilizing farm waste. With this background, the present study was laid –out with the prominent objectives of examining the socio-economic status, economics and marketing of different types of mushrooms and the various challenges faced by the farmers in the study area. In this study, primary data were collected from 60 mushroom growers living in seven randomly selected blocks of purposively selected Kangra district. The respondents were grouped into two categories, small and large on the basis of number of compost bags they kept by using cumulative square-root frequency method. Data were collected on a well structured and pre tested schedule on various aspects of mushroom production and marketing and analyzed using appropriate mathematical and statistical tools. The findings revealed that average family size was 5.22 with small farms having more family size (5.43) than the large farms (4.8). The proportion of joint families was higher (51.67%) compared to that of nuclear families (48.33%) in all farm situation. It was discovered that not even a single mushroom grower was younger than 25 years of age. A comparison between small and large mushroom producers revealed that the percentage of heads in the age group of 40-60 was higher for large farms (85%). The overall sex ratio was around 994 with large farms having comparatively more sex ratio (1087) than small farms (955). The overall literacy rate among mushroom growers in Kangra is high, with a significant proportion of heads of households having mushroom cultivation as a major or subsidiary occupation. Agriculture constitutes the primary source of employment and income for 62 per cent of the total population and this dependency was more on small farms than on large farms. The results also indicated that as the size of mushroom unit increases, the total size of land holding as well as cultivated land decreases. The average cultivated land consists of 0.3033 ha which accounts for 74.34 per cent of the total size of holding. The cost and return analysis of button mushroom suggested that net return over total cost and over variable cost increase with increase in farm size whereas reverse was observed for oyster mushroom. Mushroom production in Himachal Pradesh has shown a compound growth rate, indicating its increasing importance in the state's agricultural landscape. In relation to the economic aspects of button mushroom, it was observed that the fixed cost of production of button mushroom per 100 bags varied from 32.80 per cent on small farms and 22.97 per cent on large farms whereas variable cost varies from 67.20 per cent on small farms and 72.21 per cent on large farms. The gross return per 100 bags

of button mushroom ranges from Rs.40587 and Rs. 47,109 whereas net return over total cost per kg varies from Rs. 34.08 to Rs. 63.73 on small and large farms respectively. The breakeven output in which the mushroom growers were neither in profit nor in loss account depicted that breakeven output of button mushroom in kg was 100 kg on overall farms and it was 150 kg for small farms and 69 kg for large farms. Concerning to the factors affecting mushroom production, it was found that number of compost bags, human labour, expenditure on plant protection materials and management index are the important variables affecting mushroom production on sampled farms. With regard to its marketing, it has been found that three marketing channels were followed in the study area but channel-2 (Mushroom growers---Retailer—consumer) was the most widely used channel in which 48.16 per cent of the produce was marketed by 40.60 per cent of the mushroom growers. The producer's share in the consumer rupee was highest for channel-1 (98.87%) but this channel could absorb only10.55 per cent of the total produce. Channel - 2 was the important channel from the sale point of mushroom as it absorbs 48.16 per cent of the produce and was used by 54 mushroom growers and had 73.65 per cent of the producer's share in the consumer's rupee. As for as oyster mushroom is concerned, the total cost of production on small farms was found out to be Rs, 17055 which was more than large farms of Rs.12,051 because of economies of scale. The total production per 100 bags and gross return also show the same trend, but on the other hand, in case of net return the result was opposite due to the fact that cost of production was more on small farms than large farms. The breakeven analysis suggested that growers were in no profit and no loss situation when they kept 39 compost bags with a breakeven output of 100 kg in overall farm situation. The study also suggested that as the farm size increases, the marketed surplus also increases. From marketing perspective, only two marketing channels were adopted by the oyster mushroom growers for disposal of their produce in the study area. It was found that channel-2 was the widely used channel by which 88.65 per cent of the total produce was marketed by 57.69 per cent of the total growers. When it comes to the comparative analysis of the two types of mushrooms, it was found that button mushroom generates a gross income of Rs. 45,148 per 100 bags whereas for oyster mushroom it was Rs. 21960 per 100 bags. Button mushroom incurs higher input costs due to compost and labour requirements, yield greater returns compared to oyster mushroom. The fixed cost constitutes 27.31 per cent of the total cost which was half of that of oyster mushroom (51.59%). The share of variable cost of producing both types of mushrooms was more in case of button mushroom (72.69%) than in oyster mushroom (48.11%). The net return over total cost and over variable cost was higher for button mushrooms than the oyster mushrooms. The breakeven output of button mushroom in terms of mushroom production in kg was 100 kg

whereas the respective figure for oyster mushroom was 72 kg. Three marketing channels were followed in button mushroom in the study area but in case of oyster mushroom only two marketing channels were adopted by the growers for disposal of their produce. All the findings of the analysis demonstrate the economic superiority of button mushroom over oyster mushroom in terms of profitability, driven primarily by consumer preferences and established market channels in Kangra valley. Opinion of the mushroom growers and their marketing functionaries were also enlisted regarding the challenges which hampered them not to take this enterprise/ venture as their farming business in a large scale. In this context, production, marketing, institutional and social problems are the major constraints which inhibit them not to adopt this venture as their farming business in a big way.

KEYWORDS:

Button Mushroom, Oyster Mushroom, Family Size, Age, Education, Occupation, Cost of Production, Gross Return, Net Return, Breakeven, Production Function, Marketable Surplus, Marketed Surplus, Marketing Channel, Marketing Cost, Margin, Price Spread, Producer's Share in Consumer Rupee, Marketing Efficiency, Constraints.

CHAPTER 1

INTRODUCTION

Mushroom also known as toadstool are the umbrella –shaped fruiting bodies that are a member of fungal kingdom and are often grown above ground on its feeding substrate. There are about 1.5 million species of mushrooms worldwide out of which only 2,327 species are identified as edible and are of medicinal use. Button (*Agaricus bisporus*), Shitake (*Lentinula edodes*), and Oyster (*Pleurotus spp*.) mushrooms are the three primary species of commercialized mushrooms. These species have been utilized for food and medicine since ancient times because of their amazing flavor, taste, nutritional qualities and other numerous therapeutic advantages. The regular consumption of mushroom lowers the chance of developing a number of diseases, including cancer, high cholesterol and other conditions, in addition to balanced diet. Mushrooms are one of the vegan foods that are high in protein with over 3.3 g of protein per 100g of meal.

The demand for mushroom is continuously increasing mainly on account of increasing awareness among people about its nutritive and medicinal values, improvement in socio-economic status, increasing population etc. This offers an opportunity to the farming community for adoption and expanding the scale of mushroom production. In general, the average size of land holding is continuously declining on account of increasing population which results in division of holdings. On this account the scope of increase in farm income from field crops alone got restricted. Thus, there is need to introduce those enterprises in farm production which do not compete potentially with crops for land. Such potential enterprises are mushroom production, hi-tech horticulture, dairy farming, beekeeping etc. Among these, mushroom production has the advantage and is a good subsidiary occupation because the raw material required for the production is readily available on the farm. The leftover mushroom bag can also be utilized to generate revenue by turning it into high quality manure or as crop manure.

India is renowned for having varied agro-climatic conditions that are ideal for the growth of various kinds of mushrooms. The growth of mushrooms has a significant positive impact on rural residents' strengths and quality of life through nutritional, medicinal and economic benefits. Thomas, at the Agricultural College in Coimbatore, cultivated paddy straw mushrooms and made the first mushroom cultivation known in India in 1943 (Prakasam, 2012). The first button mushroom cultivation was started in 1961 at Solan which is also known as city of mushrooms. At present, 0.155 million tones of mushrooms are produced in India annually but its consumption is less than 100g per person annually (Sharma *et al.,* 2017). According to the National Horticulture Board, the top producer of mushroom in India is Bihar where over 28,000 tones of

mushrooms were produced in 2021-22, accounting for 10.82 per cent of the nation's total mushroom production.

Mushroom cultivation is suitable for regions like Himachal Pradesh where the climatic conditions are quite diversified, majority of the farmers are marginal and small (88%) and technical support is readily available to the farmers from the experts of State Agricultural Universities (SAUs), Krishi Vigyan Kendras (KVKs) and ICAR-Directorate of Mushroom Research, Solan. The state department of horticulture is promoting mushroom production since 1980s by way of providing training to the farmers and subsidized compost in the initial periods. It is also one of the activities of major ongoing schemes/ projects like Agricultural Technology Management Agency (ATMA), Rashtriya Krishi Vikas Yojana (RKVY), Japan International Cooperation Agency (JICA), etc. Earlier, the pace of adoption of this enterprise by the farmers was low mainly due to the fact that at that time only the button mushroom was used to be grown and that too only in winter months of the year. At present, there are different strains of the mushroom like oyster mushroom, milky mushroom which can be grown successfully round the year under the natural climatic conditions. As a result, good number of farmers in the state are practicing mushroom production on commercial scale and earning handsome income (Saina *et al*., 2025).

The Kangra region has a temperate climate which is ideal for mushroom cultivation. The moderate temperatures and high humidity levels provide a conducive environment for growing various mushroom species such as button mushroom, oyster mushrooms and milky mushrooms. (Saina *et al*., 2025). The Indian government and the state government of Himachal Pradesh offer various subsidies, training programmes, and financial support schemes for mushroom growers. These initiatives can help new farmers to establish and scale their operations. Proximity to agricultural university and Indo-Dutch department in Kangra district means access to expertise, new technologies, and improved mushroom strains. With this background in view, the study was carried out in Kangra valley of Himachal Pradesh with the objectives of studying the socio-economic impact of different mushroom growers; to examine the economics of different types of mushrooms; to identify the various marketing channels, marketing cost and margins and to identify the major constraints which inhibit the mushroom growers not to take up this venture in a big way.

CHAPTER 2

LITERATURE REVIEW

By reviewing previous research, one can gain a deep understanding of what is already known about your topic, providing a starting point for one's own investigation. Analyzing existing literature helps in pinpoint areas where knowledge is lacking, allowing one to focus in his research on addressing these gaps and contributing new insights. Reviewing previous studies ensures you are not repeating research that has already been done, saving time and resources. By understanding the current state of knowledge, you can develop focus and relevant research questions that build upon existing research. Studying previous research can guide your choice of research methods, data collection techniques, and analysis strategies. A literature review can help you identify relevant theories and concepts that can guide your research and interpretation of results. A well-conducted literature review shows that you are familiar with the existing body of knowledge in your field. By comparing your results to previous research, you can effectively interpret and discuss the implications of your study. In this backdrop, the brief resume of relevant research work by various scholars on various aspects of mushroom cultivation in India and abroad has been evident as in the ever-proliferating literature. In these contexts, a vast range of literature review has been studied by consulting various books, journals and internet sites for the topic of research on production and marketing of mushroom cultivation in Kangra valley of Himachal Pradesh and the same has been categorized into following main headings:

- Literature review on Socio-economic Status of different mushroom growers
- Literature review on economics of different types of mushrooms
- Literature review on various marketing channels, marketing costs and margins

2.1 Socio-Economic Status of Different Mushroom Growers:

Single and Goel (2016) investigated 25 women producers of mushroom to analyze the socio-economic situations and challenges experienced by them in Patiala district of Punjab. According to the research, 72 per cent of mushroom growers have improved their occupation with improvements in social status (24%), knowledge and attitude (52%), saving more money (60%), and standard of living (64%). The women faced the maximum limitation with regard to value-added products, lack of information regarding mushroom growing and higher cost of cultivation.

Shirur *et al.* (2017) studied the impact of the identified variables on the entrepreneurial behaviour of the Karnataka farmers. Four extension variables, six socio-psychological trait features, and five characteristics of farmers and their units were examined to see how they

affected the respondents' entrepreneurial activity. Regression analysis model was used in the study. The results of the regression analysis revealed that the respondents' entrepreneurial activity was substantially influenced by their academic background, cosmopolitanism, self-reliance, engagement in mass media, extension activity, and training.

Bashir *et al.* (2018) analyzed that over 33 types of mushrooms are cultivated commercially around the globe, with three of them being widely grown in India: white button, oyster, and paddy straw mushrooms. White button mushrooms account for 90–92 per cent of India's total mushroom production; the remaining portion is supplied by paddy straw mushrooms and oyster mushrooms. The study was organized in three districts of Kashmir and it was found that 90 per cent of women in the district of Anantnag and 1 per cent of women in Kulgam and Pulwama felt that the increased money from mushroom farming had improved their level of living. The majority of women in the districts of Anantnag, Kulgam, and Pulwama have achieved financial independence as a result of mushroom farming. 99.00 per cent of women in district Pulwama and 100.00 per cent of women in districts Anantnag and Kulgam were able to fully support their family and were able to give their children a healthy diet and a good education because of improved revenue from mushroom cultivation.

Boin and Nunes (2018) conducted a study in Portugal where data was collected on basis of the rate of consumption, consumption by form (fresh, canned, frozen and dried) and consumption by species (five farmed and four wild mushrooms). Regression model was used to determine the results. The results indicated that there was a higher (81.9%) consumption of canned than fresh and dried/frozen mushrooms. The characteristics that had the greatest impact on consumption were gender, degree of education, and size of the household.

Shipra *et al.* (2018) conducted a study on 75 rural women of Samastipur district of Bihar to investigate the effects of mushroom farming on rural women's economic position through skill development. The results of the study indicate that as a result of training, rural farm women's knowledge of all the subcomponents of mushroom production had improved which empowered women to raise the standard of life for themselves and their families. It was concluded from the study that the development of entrepreneurship was the best option for rural farm women to achieve economic independence.

Koirala (2019) studied how beneficiaries' socioeconomic circumstances were affected by the growing of mushrooms and explained the respondents' socio-demographic traits. The study was conducted on 50 households of Padampur. It was found that 38 per cent of the 50 households were found to be in the age group of 40–50. The results of the field survey indicated that 46 per cent of the respondents had only completed elementary school but now data interpretation

reveals that 46 per cent of households send their kids to private schools in order to provide them with a quality education. With reference to social structure of the mushroom growers, 32 per centwere janjati, 4per cent are dalit, and 20 per cent are brahaman and kshetri. The results revealed that 90 per cent grow oyster mushrooms while 4 per cent row both oyster and white button mushroom since they were quick to produce and profitable. Eighty per cent of the fifty households agreed that they were receiving better medical care than they had in the past. The study concluded that those engaged in mushroom cultivation had greater social and financial status than they had previously.

Kala and Hans (2020) conducted a study in Samastipur district of Bihar where 60 respondents in all, or fifteen from each of the listed villages, were chosen for the "Impact assessment on socioeconomic profile of women mushroom growers". The study revealed that 56.67 per cent of the respondents were fewer than 35, 91.67 per cent were married, 65per cent belonged to the lower social classes, and 71.66 per cent had a combined family. Most respondents (60%) reported that their family's annual income ranged from Rs. 50,000 to Rs. 80,000.

Pandey *et al.,* (2020) conducted the study on the substrate of the mushroom. The study examined how commercial mushrooms are supplied with bio-waste, including wood chips, straw, and sawdust. Spent mushroom substrate (SMS) was regarded as a waste product. The study concluded that encouraging research and development was necessary to provide significant advancements that enable the efficient utilisation of mushroom bio-resources.

Koodagi *et al.* (2021) studied that ICAR KVK, Mandya conducted mushroom-related skill-development workshop with the aim of fostering employment and microenterprise. The study found that the trainees varied in their socioeconomic status. The study's findings showed that participants' pre- and post-training understanding of mushroom production technology ranged from 2.12 to 34.62 per cent and 42.04 to 85.87 percent, respectively and the percentage change in knowledge ranged from 26.14 to 74.91 per cent. The study concluded that right training and direction will enable interested producers to survive and make a living.

Sharma *et al.* (2021) in his study considered 60 mushroom growers that were chosen through a simple random sampling method.The mushroom producers were categorized into three groups according to the quantity of bags they produced: Small Group (600 or less), Medium Group (601–1200), and Large Group (more than 1200).The literacy rate of all houses showed 2.69, and 88.25 per cent of their members were literate as a whole.The acquired results revealed that mushroom yielded the highest value share of overall farm income (43.44 %) in the medium and large categories (72.18%), respectively. It is evident from the conducted studies that mushroom

was the most contributing crop among the all-other farm crops accounting for 49.42 per cent of the total amount.

Ashiegbu *et al.* (2022) studied the involvement of young people from rural areas at the Agricultural Zone of Umuahia in Nigeria in the activity of cultivating mushrooms. There was provision of 60 young people from the Umuahia Agricultural Zone to undertake a training program on mushroom production technology. The finding of this study shows that 58.3 per cent of the respondents were male, 65.0 per cent had education beyond secondary level while 63.3 per cent had worked in mushroom sector for a period of one year or longer. It is therefore argued that education level, family size, years of experience and income of the respondents had significant influence level of mushroom production technology in the study area this is based on the regression analysis model that was used to analyze the data. Despite all the studied reasons for the lack of young people's involvement in mushroom farming, the government should promote younger generations to engage in mushroom production using technologies information that they could understand and apply effectively.

Kumari and Mazhar (2023) conducted a study in Dhanbad district of Jharkand to assess the adoption level of knowledge towards mushroom cultivation. The study was done on 120 growers and the respondents' knowledge of mushroom growers was divided into three categories: low, medium, and high. The results revealed that 19.17per cent 59.17 per cent and 21.66 per cent were having low, Medium and high level of knowledge respectively whereas the majority (52.20%) belonged to the medium level adoption group, whereas 29.17 per cent had a high level of adoption group for mushroom farming, while the remaining 18.33per cent of the respondents were observed in the low level of adoption group. It was found that the socioeconomic standing of mushroom farmers has significantly improved as a result of the various entrepreneurial skills that have been developed through mushroom cultivation.

To sum up, A socio-economic profile of review of mushroom production reveals that it has significant potential to improve livelihoods, particularly for marginalized communities, by providing a reliable income source, utilizing readily available agricultural waste, and offering a relatively low-cost entry point for small-scale farming, thereby contributing to enhanced nutritional security and promoting sustainable agricultural practices through its ability to generate income while simultaneously recycling waste materials; however, successful implementation requires access to proper training, market linkages, and awareness campaigns to maximize its socio-economic impact (Mahajan and walia, September, 2025).

2.2 Economics of Different Types of Mushrooms:

Chrishti *et al.* (2000) investigated the financial position of mushroom producers in the Rawalpindi and Islamabad region of Pakistan. The findings indicated that there were statistically significant differences in the variable costs between small and medium farms as well as between small and large farms. The larger farm holding which comprised of medium and large, had the powers to lower cost by bargaining on the purchase of bulk and by reinvesting money which could have been otherwise used on handling and shipping. Net profits per unit area of large farm (3000 sq. ft.) were higher than small farms. The study suggested that mushroom farming cannot be carried out successfully as a viable business unless the private sector builds large farms instead of small ones.

Thakare *et al.* (2006) carried out a study on sixty-four growers who were chosen from three districts in the plain of Chhatisgarh: Raipur, Durg, and Bilaspur. The results indicated that the proportion of fixed costs to overall production costs was relatively low (33.58%), with variable costs accounting for 66.42 per cent of the total and the net return per kilogramme was, on average, Rs. 24.04. Large farms were found to have the highest input-output ratio, indicating that they benefit more than other growers. Lack of spawn and other acceptable mushroom species, as well as lower productivity resulting from a lack of technical know-how, were reported to be the main obstacles to mushroom cultivation.

Ram and Ram (2007) carried out the study in the Gurgaon and Sonepat District of Haryana in order to calculate the cost- benefit ratio of mushroom farming. The study found that the fixed capital investment was more than double when comparing large and medium farms to small farms. The study also revealed that the compost usage and the farm size had positive relationship. Large farmers produced mushrooms at the lowest cost when compared to small and medium farmers because they made the best use of their fixed farm resources. The study suggested that mushroom farming requires a lot of capital and grows as farms get bigger in size.

Ahmed and Rahman (2008) carried out their research in Bangladesh and reported that 49.8 per cent of the population lives below poverty line. He found that increased population, reduced income are some of the causes of poverty which can be reclaimed through mushroom cultivation. By taking this enterprise, the average net profit calculated was tk. 29300.00 which was more than the rice and wheat cultivation. He concluded that farmers have cultivated mushrooms on a modest scale and reaped direct benefits in various parts of Bangladesh. They've succeeded in adopting the technology in a more straightforward manner that allows them to make small-scale investments. They were mostly using agricultural waste, primarily straw from paddy fields and wheat fields.

Celik and Peker (2009) examined the advantages, disadvantages, and SWOT of mushroom growing as a means of diversifying rural income in a study carried out in Konya. The average production area was 1135.1m2 and the average yearly income was 45.4kg/m2 and compost output was 256.6kg/ton. The study showed that the average cost of 1 kg mushroom was USD 1.36 and average sales price was 1.54. The study came to the conclusion that boosting mushroom production was crucial to maintaining the health and growth of the rural economy, expanding and diversifying business and employment opportunities in rural areas, and supplying small family farms and underprivileged groups with income opportunities.

Barmon *et al.* (2012) determined mushroom profit, BCR and household income as a benefit while developing some problems associated with mushroom production in Bangladesh. The results would show that as average production cost of a mushroom per farm were Taka 41,948 and the revenue were Taka 64,826. The mean BCR per mushroom unit was approximately 1.55. It was being analyzed that marketing costs and profit margins are fairly higher than the ones that it would be in case of any other agricultural product. Following the study there were coupled by a wide range of production related problems that the producers faced which include high cost of the spawn, infestation of the fly and cockroaches as well as the high-temperature marketing, technical and awareness challenges.

Karma and Bhatt (2013) conducted a study on *Ganodermalucidum* species of mushroom to create an organic farming method using polypropylene bags in a subtropical environment. The study showed that the spawn run took 51 days to complete and after that spawn sacks were exposed to 90–95 per cent relative humidity and 30°C. It took 67 days to complete the vegetative phase and 92 days to finish the fruiting phase. The crop was planted for a total of 224 days, with a 65-day interval between each flush. The results indicated the total yield which was 570gm and no pest attack was seen during cultivation. The study recommended growing *Ganodermalucidum* species under subtropical climate.

Tahir and Hassan (2013) conducted a study on the profitability of button mushroom production on a small scale at the National Agricultural Research Centre in Islamabad, Pakistan in 2010. For this analysis, cost of production methodology was applied. Estimates for the mushroom output and gross returns were 155.6 kg ha^{-1} and Rs 77,800 ha^{-1}, respectively. The findings showed that mushroom production is highly profitable for its growers since it may maximise net return by lowering production costs because the crop's growth depends on inexpensive agricultural raw materials.

Kangotra and Chauhan (2014) revealed in their research that the majority of the sampled mushroom farmers, who were largely middle-aged and typically between the ages of 40 to 60,

had 6-7 years of experience, with the rest 5 years of experience.The results of the financial test ratios indicated that growing mushrooms on big scales was more economically feasible and profitable due to larger investment and improved marketing connections with suppliers, which guaranteed a sufficient and consistent supply of produce. The major limitation reported were scarcity of spawned compost bags, poor quality spawned compost material, absence of remunerative prices, and the prevalence of diseases. The study proposed growing at least two crops annually with timely delivery of high-quality spawned compost bags at reasonable prices to their doorsteps so as to increase the output.

Thakur (2014) studied the characteristics of the mushroom and analysed that enzymes secreted by mushroom mycelia degrade substances including cellulose and lignin, which were subsequently taken up by the hyphae. The study indicated that India and several other developing nations have a lot of potential for mushroom production because the necessary raw materials were readily available at low cost. Mushroom cultivation function as a vehicle for creating jobs, especially for young people and women from remote areas to improve their social standing. Tropical mushrooms, such as oyster (*Pleurotus* spp.), paddy straw (*Volvariella volvacea*), and milky mushroom (*Calocybe indica*), were produced using agricultural wastes as they were readily available in the area, such as paddy straw, wheat, soybean, chickpea, mustard, lathyrus, cotton wastes, and lignocellulosic wastes. An estimated 15–20,000 metric tonnes of oyster mushrooms were produced in India. However, only about 10,000 tonnes of milky mushrooms and paddy straw were produced each year. It was found from the study that on a small to medium scale, oyster mushroom farming was mostly carried out by the women in self-help groups which was a significant source of revenue for them.

Sharma *et al.* (2016) conducted an investigation in Himachal Pradesh district of Mandi where it was found that 80 per cent of the mushroom growers grow button mushroom only. The results showed that for every 100 bags, the fixed cost of production ranged from 44.47 per cent to 22.42 per cent on small farms to large farms respectively whereas on large farms, the variable cost ranged from 77.58 per cent to 55.53 per cent on small farms. The BC ratio calculated was 1.87:1. It was estimated that both small and large farmers had different break-even outputs, ranging from 279 kg to 147 kg. The study concluded that mushroom growers faced many problems but production problems were more severe than other problems.

Singh and Singh (2018) did a study in Amritsar and Gurdaspur district of Punjab to determine the cost and return structure of white button mushroom by taking 80 samples. The study revealed that with increase in the farm size of mushroom the recurring and non-recurring expenditures per square metre of bed area spawned declined due to economics of scale. The mushroom farms

were categorized on the basis of input-output ratio in which large farms (1.81) were more productive followed by medium-sized (1.47) and small-sized (1.35) mushroom farms. The results indicated that due to the greater average price realization, medium-sized mushroom farms had better gross returns, but large mushroom farms had higher net returns because of reduced costs. The study recommended farmer's training for canning and refrigerated facilities, mechanised compost preparation plants, and mushroom growing shed disinfection.

Raut (2019) did a study in Nepal to examine the current situation and various problems faced by mushroom growers. He pointed out that lack of improved technology, poor quality of the raw material, pest and disease attack, insufficient investments, lack of well organised marketing channels and high prices of the raw material are some of the main problems which the mushroom grower faces. The study also showed the increasing trend of output of mushroom cultivation which was only 30 kg in 1974 which has reached 9300 tonnes in 2016.

Acharya and Tiwari (2021) noted the current state of mushroom cultivation and related businesses in the land areas of Kalika Municipality and Bharatpur Metropolitan City. Different analytical tool was used to analyze the data. The study found that Spawn costs the highest percentage of investment, followed by straw cost and depreciation of equipment. The average production of oyster mushrooms in the Chitwan district was determined to be 4,307.71 kg per Kattha. The oyster mushrooms yielded a gross return of Rs. 808,966.61, with a total cost of production of Rs. 318,089.61. In the Chitwan district, mushroom cultivation was regarded as a lucrative agricultural endeavour with a BC ratio of 2.54. It was discovered that the majority of farmers sell their mushrooms to neighbourhood whole vendors and collectors. According to the survey, farmers don't employ any value adding strategies that would increase their profit.

Bringye *et al.* (2021) conducted its research to investigate the various aspects of mushroom-related consumer behaviour in Hungary. Total 1768 samples were collected and groups of connecting variables describing mushroom consumption were found using exploratory factor analysis. Four aspects of Hungarian customer behaviour were discovered by the authors: (1) medicinal and functional qualities; (2) enjoyment-based consumption; (3) additional food source; and (4) unfavourable evaluation of the product line. Three categories of consumers were distinguished through the use of cluster analysis: typical consumers, indifferent consumers, and health-conscious consumers. The result of the study showed that the socio-demographic attributes of consumers, such as age, educational attainment, marital status, and place of residence, have a noteworthy influence on their consumption behaviour of mushrooms.

Radhakrishnan *et al.* (2021) conducted the study in the krishi Vighan Kendra laboratory, Wayanand and gathered the information from the farmers who participated in the mushroom

cultivation training course. The study revealed how mushroom experiment was conducted as front line demonstrations and on farm testing. *Pleurotuscystidiosus* species of mushroom was preferred after conducting experimental trials because of its higher yield and less day's requirement for bud initiation. The result of the study showed that banana pseudostem waste was considered as a suitable substratum for mushroom cultivation in the study area, and unorganized market structure was the biggest challenge that the farmers faced.

Mulazimogullari and Ceylan (2023) conducted a study in Turkey where the production reported was 55455 tonnes in 2020. The average producer profit per unit was estimated to be Rs24.98, whereas the average profit inefficiency was identified as 44 per cent. The stochastic profit frontier method was used to estimate the inefficiency score. The results highlight the factors which reduces the profit inefficiency which include producer's gender, degree of education, and level of contentment whereas factors contributing to inefficiency were identified as the farmer's age, the usage of composted manure in the garden, and the sale of mushrooms through middlemen (Mahajan and walia, September, 2025).

Saikia and Bora (2023) in their study revealed that mushrooms provide significant nutritional and functional worth, medicinal attributes, nutraceutical significance, and organoleptic potential. The study mainly focused on various challenges faced by mushroom growers in Jorhat district of Assam. The snowball sampling approach was used to choose 60 samples. Nineteen problem statements were formulated to investigate the issues encountered by the participants in the cultivation of mushrooms. Respondents were classified as having a low, medium, or high level of problem based on the mean scores from the respondents and the standard deviation. The results showed that around 60.00 per cent of the participants experienced medium level of problem.

In brief, A review of the economic aspects of mushroom production reveals that it presents a promising opportunity for income generation, particularly for small-scale farmers, due to its high yield per unit area, ability to utilize agricultural waste as a substrate, and relatively low production costs; however, challenges like market volatility, technical requirements, and limited access to quality spawn can hinder its full economic potential, requiring targeted support and infrastructure development to maximize its benefits for rural communities and economies.

2.3 Review of Literature on Various Marketing Channels, Marketing Costs and Margins:

Carrera *et al.* (2005) conducted a study to investigate the distribution networks of wild and farmed mushrooms in central Mexico between 1999 and 2004 using an institutional approach. It was found that the majority of cultivated and wild mushrooms were sold in that area. Three representative locations were chosen for the study: a rural village (Cuetzalan), two medium-sized

cities (Puebla, Toluca), and a big city (Mexico). There was several marketing channels discovered and detailed, including public markets, retail food stores, wholesalers, retailers, middlemen, "tianguis," and food services. It was analyzed that the current method for marketing mushrooms developed from a modest, centralised operation to a mix of decentralised and centralised marketing procedures with a restricted number of activities. Large private companies assumed control of a number of marketing responsibilities during this wave of reforms, assisting the decentralisation process while impeding the growth of new businesses specialising in the marketing and processing of mushrooms. It was concluded from the study that Changes resulted in the market concentration of open-market sales in sizable private companies and useful wholesalers at the same time.

Zamil and Cadilhon (2009) carried out a study under the FAO portion of the UNDP-funded Local Partnerships for Urban Poverty Alleviation Project in Bangladesh. The project connects the underprivileged urban residents of Mymensingh city with the oyster mushroom specialty market. This small business endeavour seemed to be sustainable since it increased agricultural production to meet a particular need of an already-existing small marketing business. The merchant had incentive to work with the project beneficiaries who supplied the produce as long as he found market for his mushroom. This model demonstrated how a development project's catalytic effect could benefit both a merchant and incredibly tiny landholders.

Ganie and Yousuf (2010) revealed that India produced 1, 00,000 MT of mushrooms in 2006–07, which rises from 5,000 Mt in 1990. Study was conducted in Jammu and Kashmir where the mushroom cultivation was of recent origin so the majority of producers were concerned about large-scale production in such a young industry, with issues such as inadequate infrastructure, uninformed consumers, lack of technical support and required institutional support. Growers often sell the majority of their produce directly to consumers (40.37%) or to retailers (47.19%). The results analyzed that the entire cost of marketing, including profit margins, ranged from 2.50 to 10.65 rupees per kg in three most popular channels and producer’s share was maximum in channel where mushroom grower sells directly to consumer. It was observed that net margins were also correlated with the expenses incurred during the marketing process.

Adinya *et al.* (2012) in their study in three villages in Central Cross River State, Nigeria analyzed that women and children controlled the edible mushroom market, with monthly profit margins being N60,000.00, N56,000.00, and N52,000.00 for Alesi, Ekukunela, and Ochon marketplaces per year. Regression analysis examined that the transportation had the most effect on sellers' profits. Therefore, the study suggested that growers should establish a cooperative called Mushroom Grower and Marketing in order to apply for bank loans who offers less interest

rate and government should implement Action-research programmes through export processing zones or cooperatives. The study concluded by recommending that significant effort be put into making market to perfect market.

Banga *et al.* (2013) studied that promotional materials were not being used by any of the mushroom farmers in Punjab to market their products. The finding clearly indicated that produce of every mushroom farmer was being sold packaged, but without a brand name. The study also highlights the main issues that mushroom growers deal with which were the product's high perishability and lack of popularity, low demand brought on by high costs, the absence of nearby processing facilities, and insufficient farm-to-market transportation.

Mohd *et al.* (2013) carried out a study in Malaysia to examine the problems and difficulties faced by growers that could slow down its development. Focus group discussions were conducted to learn about participants' perceptions, expectations, and experiences with fresh mushroom cultivation and commercialization in Malaysia. The result of the study showed that government policies, marketing, and production were the three primary areas of concern for this industry. The problems with production included controlling the hot water, getting low-quality seeds, and raising production costs. Demand exceeded supply as oyster mushroom growers could not meet the increased demand which conversely leads to increase in the prices in the Klang valley area. The study recommended some government initiatives in the form of training, subsidies for the production house, and research and development on the production system to address environmental issues.

Singh (2014) carried out a study by selecting equal number of wholesalers and retailers from Amritsar and Gurdaspur district of Punjab to ascertain the marketing structure of mushroom. Cumulative cube root frequency technique was used to divide the mushroom growers into different categories. Marketed surplus was about 99 per cent. The marketing pattern showed that the producer-consumer channel had the greatest net price paid to growers, although the marketing agency that handled the majority of the produced goods was the wholesaler. The study focused on the necessity of refrigeration and canning facilities for mushroom growers in the event of increased production to prevent distressed sales and raising public awareness of the nutritional value of mushrooms to promote their use.

Sabyasachi (2016) highlights the importance of mushroom cultivation as it doesn’t require access to land making it attractive activity for both rural farmers and pre-urban dwellers for sustainable development in North Bengal. The present study focused on analyzing the market potential for mushroom producers by taking into account the factors that affect consumer awareness and competitiveness. SWOT analysis and hypothesis testing was done to generate the

information and for mathematical reasoning respectively. The study recommended that the government must provide much-needed financial and technical support on a high priority basis.

Shirur and Shivalingegowda (2016) conducted research on consumer behavior among people. The study examined the degree of fluctuation in the average selling price across all mushroom kinds, ranging from Rs. 27 to Rs. 40, when sold to consumers, merchants, and wholesalers. No skilled workers, processing facilities, and the high rate of perishability were the main drivers of the surge in prices. The study revealed that the majority of consumers preferred button mushroom even though they have similar nutritional and therapeutic qualities to another mushroom because they were inexpensive to grow.

Singh *et al.* (2016) indicated that in the study area, Jammu province four marketing channels were used by the mushroom growers. The study showed that marketing efficiency was highest in case of fourth channel (mushroom grower- consumer) followed by third channel (mushroom grower- wholesaler – consumer), second channel (mushroom grower – retailer- consumer) and first channel (mushroom grower –wholesaler –retailer-consumer) with the estimated figures of 1.75, 1.25, 1.16 and 1.06 respectively. It was concluded that with enough infrastructure and supportive government policies, marketing could have been done more effectively.

Shirur and Chandregowde (2017) analyzed the constraints in mushroom entrepreneurship in the Karnataka state. 60 mushroom growers were selected and SWOT analysis was done. It was concluded from the case study and SWOT analysis that mushroom entrepreneurs require unique characteristics of entrepreneurial activity and for the success in mushroom entrepreneurship it requires the understanding of the nuances of mushroom biology, calculating profitability based on scale of economy, coming up with creative packaging and marketing ideas, figuring out ways to cut down on energy costs for temperature modulation during cropping, and being personally involved in the business.

Chattopadhyay and John (2019) highlighted the importance of mushrooms that mushrooms were nutrient-dense food that can be used in place of dairy, eggs, meat, etc despite being coming from lingo-cellulosic waste. The study analyzed that 280 of the approximately 2000 edible mushroom species were grown in India and Guchhi, the most significant mushroom, was supplied to western nations. The report showed that mushrooms were not used extensively in India even though they have a high nutritional value because of lack of awareness among people and insufficient marketing.

Sachan *et al.* (2019) analyzed the breakeven point, various costs and their returns, marketing system and Marketing efficiency in Haryana. The study observed that the fixed cost and its investment was twice for large and medium-sized farms when compared to small farms due to

absence of availability of money to mushroom growers. The size of the farm was closely correlated with the cost of spawn and compost. The largest producer share in the consumer price was found in Channel I (consumer – mushroom grower) whereas most produce went through channel IV Mushroom Grower-Wholesaler-Retailer-Consumer). The study suggested upgrading the infrastructure to extend the crop's shelf-life.

Lidyana *et al.* (2021) carried out a study in Probolinggo where the census approach was used to pick oyster mushroom farmers. The study finding's indicated that Probolinggo oyster mushroom growers employed logs as a tool, which generated them high revenue. Oyster mushrooms use two distinct patterns in their marketing channel and second pattern (mushroom farmer- reseller-consumer) was considered more profitable than first pattern (mushroom farmers- resellers-retailers- consumers).

Dey *et al.* (2022) conducted a study in Dehradun district of Uttrakhand which is the second largest producer of mushroom after Punjab. In his study he observed that the channel I (producer- consumer) showed the greatest levels of marketing efficiency (36.70%) and producer share (97.28%) in consumer rupee followed by channel II (producer-retailer-consumer) and channel III (producer-wholesaler-retailer-consumer). Channel III had the highest marketing cost, marketing margin, and price spread, followed by Channel II, I.

Farooz *et al.* (2022) examined the particular issues and constraints that the Hardoi District of Uttar Pradesh experienced when marketing mushrooms. He pointed out that the absence of marketing structure prevents farmers from receiving a fair price and were often obliged to sell their goods at an unprofitable minimum market price after reaching crop thresholds and in need of cash. The study underlined the need for fair and appropriate mushroom marketing mechanism in the district to engage in profitable transactions. Marketing through cooperative and farmer-producer organisations needs to be promoted in order to raise the share of producers in the consumer rupee and simultaneously efforts need to be made to improve the quantity and quality terms in order to increase export of mushrooms.

Sikander *et al.* (2022) curtained that recycling agricultural waste, including agro-industrial waste, is one of the main ways to help achieve the goals of resource conservation and higher productivity. Multi stage random sampling technique was used to select the mushroom growers in Patiala. Button mushroom cultivators were divided into three size groups based on the quantity of bags they produce: small (<4000 bags), medium (4000-6000 bags) and large (>6000 bags). The result of the study showed that out of the three marketing channels, Channel I: Producer-Consumer Channel II: Producer-Retailers-Consumer Channel III: Producer-Wholesaler Retailer-Consumer the total marketing cost was same in channel II and III i.e. Rs.15/kg,

marketing margin and price spread was maximum in channel III i.e. Rs.32/kg and Rs.42/kg respectively whereas the producer share in consumer rupee was maximum in channel I i.e. 88.75 per cent.

Andrew (2023) conducted a study in Kenya whereby the purpose was to measure the effect of farmers' marketing strategies. The results showed that 43.3 per cent of the farmers gave their goods to hotels and restaurants, while 56.7 per cent of them sold mushrooms in rural open markets. In addition, 53.3 per cent of farmers sold directly to customers, while 46.7 per cent relied on suppliers for distribution. 3.3 per cent of the packaging was done in bottles, compared to 96.7 per cent that used polythene bags. The study concluded that existing marketing strategies had a limited impact on the performance of Oyster mushroom cultivation and suggested creating cooperatives for mushrooms, cold storage facilities, creating incentive programmes, and providing extensive training.

Kumar *et al.* (2023) studied the marketing cost, marketing margin, price spread, marketing efficiency and marketing channels of oyster mushroom in the Kaithar district in Bihar. 120 mushroom growers were selected randomly and were grouped into three categories large, medium and small on the basis of their production and the mushroom yield for small, medium, and large farms was 0–50 kg, 50–100 kg, and 100 kg and above respectively. The two marketing channels, channel I. producer-consumer, channel II. producer-retailer-consumer were used in the study area with greater marketing efficiency in channel I (36.7%) compared to channel II (17.23%) and greater marketing cost per kg of mushroom in channel II (Rs 4.54/kg) compared to channel I (Rs 3.25/kg).

In short, the identification of marketing channels, costs, and price spreads in mushroom production literature reveals that direct-to-consumer channels offer the highest marketing efficiency and producer share, while channels with intermediaries like wholesalers and retailers lead to higher costs and lower efficiency. This means that while direct sales provide higher profits for the grower and potentially lower prices for the consumer, they also limit market reach compared to the broader access offered by intermediaries (Mahajan and walia, September, 2025).

CHAPTER 3
METHODOLOGY

The base of any scientific investigation is systematic methodology which enhances the validity, precision and reliability of the finding in relation to the research problem. It is essential for doing quality research work as it has a direct impact on the reliability of the research findings. Future researchers in the same or similar field will find it useful to have elaborative picture of material and methods used in the study when assessing the data requirements. The methodology used and the various tools that were utilized to obtain and analyze the findings of the research are given here under:

3.1 Selection of Study Area:

The study was conducted in Kangra district of Himachal Pradesh. This district was selected purposively because the Indo Dutch Mushroom Project Palampur, which is run by the State Directorate of Horticulture and located in the CSKHPKV Palampur, provides spawned compost to mushroom producers in several districts. Secondly, the centre for mushroom research and training (CMRT) CSKHPKV, Palampur also provides spawned compost bags and spawn of different kind of mushrooms i.e. button and Oyster mushrooms. Thirdly, training on many different aspects of mushroom farming is also provided by the directorate of extension education CSKHPKV Palampur. And lastly, large number of mushroom growers is also present in the district and no study was conducted in the recent years that are why the kangra district was selected purposively (Mahajan *et al.,* 2025)

3.2 Sampling Design:

The primary data for the study was collected from seven randomly selected blocks of the district namely, Nagrota, Sullah, Palampur, Bhawarna, Jaisinghpur, Panchrukhi and Baijnath as these blocks are located around Palampur which is a hub of trainings and technical know-how on mushroom cultivation and supplying of spawned compost bags and spawn of different kinds of mushrooms. Data were collected on various aspects of costs, returns, and production of button and oyster mushrooms. Simple Random Sampling design was employed for the selection of 60 mushroom growers which were selected randomly from the above mentioned seven blocks. The selected mushroom growers were categorized into two categories, small and large; on the basis of number of composts bags, they placed by using cumulative square root frequency method. By following this method, those mushroom growers who kept less than 300 compost bags are called small and their number was 40 whiles, those mushroom growers who placed more than or equal to 300 compost bags are called large and their number was 20 (Mahajan *et al.,* 2025; Mahajan *et al*., 2026). The rationale behind mushroom farmers is categorized as small or large based on the

number of compost bags they used, which is a proxy for the size of their operation and production capacity, impacting resource allocation and support programs. The number of compost bags directly correlates with the volume of mushrooms a farmer can cultivate, and therefore, their potential output and income. Categorizing farmers allows for targeted support and resources. Small farmers may access to inputs (such as compost and spawn), technology and training, while large farmers might benefit from programs focused on market access and expansion. The classification helps policymakers understand the structure of mushroom farming sector and tailor interventions to meet the needs of different farmers groups. For instance, A farmer using a few hundred compost bags might be considered a small-scale producer, while someone using thousands could be classified as a large –scale farmer. The method to grow button mushrooms is same as described by Directorate of Mushroom Research (DMR), Solan, Himachal Pradesh. Simple random sampling design was employed for the selection of mushroom growers. The complete list of mushroom growers of the district was prepared, a sample of 60 mushroom growers were selected randomly. The distribution of sample mushroom growers is given in table 3.1

Table 3.1: Distribution of mushroom growers among different categories using square root frequency method

Sr. No.	Category	Number of compost bags	Number of mushroom growers	Percentage of mushroom growers
1.	**Small**	<300	40	66.67
2.	**Large**	≥300	20	33.33
	Total		60	100.00

3.3 Data Collection:

In order to meet out the requirements of specific requirements of the study, both primary as well secondary data were collected. Primary data were collected from 60 mushroom growers and secondary data were collected from annual reports of the government departments and related websites. Survey schedule was prepared for collection of detailed primary data which was pre-tested in the two villages of the study area to examine the relevance of questions on different production aspects of the mushroom cultivation. The primary data were collected on well designed and pre-tested schedules from the selected mushroom growers through personal interview method. The data for the study were collected pertaining to the agricultural year 2023-24 (Mahajan *et al.,* 2025; Mahajan *et al*., 2026). Primary data collected contains the information pertaining to the demographic features such as age, sex, family size, education level and the

experience of growing mushrooms. The other features of the household consisted of information in relation to land and livestock inventory, investment on mushroom unit, labour used and input used pattern on mushroom production, quantities of input used, prevailing prices of inputs, production and disposal of mushroom, cost and return structure, marketing channels followed by the mushroom growers and associated costs and different problems and constraints faced by the mushroom growers.

The secondary data were also collected from statistical outline of Himachal Pradesh, Indo-Dutch mushroom project, Palampur, Department of Horticulture, Shimla and Department of Horticulture, Kangra. The secondary data comprised of information concerning to the descriptive features of the study area, population and literacy statistics of the study area, zone-wise mushroom production under both public and private units in Himachal Pradesh and trends and growth of mushrooms in Himachal Pradesh (Mahajan *et al*., 2025).

3.4 Analytical Framework

The collected data were complied properly and analyzed by employing appropriate mathematical and statistical tools. In order to meet out the objectives, tabular analysis using averages, percentages, ratios were used to study the demographic features, land use and cropping pattern, input use, occupational pattern, investment pattern of mushroom unit, labour use, costs and returns etc were employed. The functional technique such as Cobb Douglas's production function was also used to study the factors which affect the mushroom production.

3.4.1 Growth in Mushroom Production: In order to find out the increase in mushroom production over the year in both public and private units, compound growth rates were calculated using time-series data over a period of ten years started w.e.f. 2013-14 to 2022-23 by using the following formula (Mahajan *et al*., 2025)

$Y = (ab)^t$

Log Y= log (a) + log (b)*t

b = Antilog (b)

$$\text{CAGR } (\%) = (\text{antilog of b} - 1) \times 100$$

Where,

Y= Mushroom production (tones)

a= Constant

b=Regression coefficient

t= time variable in years (1, 2, 3……n)

3.4.2 Socio-economic Features: Tabular technique was employed and averages and percentages were worked out so as to present the socio-economic features of mushroom growers which

include the parameters such as family size and structure, age, educational status, occupational pattern, cropping pattern, inputs and labour use pattern (Saina *et al.,* 2025).

3.4.3 Cost and Return Analysis: The costs and net returns from mushroom production were calculated in order to determine the economic viability of mushroom. The total cost components were divided into fixed and variable cost components. The fixed cost components include the factors such as depreciation charges of mushroom building and implement, interest on fixed capital whereas the variable cost include the factors such as outlays on compost bags, packing material, crop protection material, electricity, transportation and labour charges and miscellaneous charges. Gross returns from mushroom crop (Rs/ 100 bags) were calculated by multiplying the total production of mushroom in kg by its price (Rs/kg). Net return over variable cost was computed by deducting the variable cost from gross return. Whereas the Net returns over total cost were worked out by deducting the total cost from gross return. In order to work out the Benefit Cost ratio, gross return was divided by the total costs and it implies per rupee invested on input used in the production process (Mahajan *et al.,* 2025; Saina *et al*., 2025 and Mahajan *et al*., 2026).

3.4.4 Break-Even Analysis: It is that output level where the total cost curve intersects the total revenue and the profit is zero at this level. In simple terms, it is a point where the producers are in no profit and no loss situation**.** In economic terms, it is the amount of production needed to pay all the production costs and the output below this level would lead into net loss to the producer. The break-even output was calculated by dividing the total fixed cost with the difference between the price per unit of mushroom and the average variable cost in rupees (Mahajan *et al.,* 2025; Saina *et al*., 2025 and Mahajan *et al*., 2026).

3.4.5 Functional Analysis: Both linear and Cob-Douglas's were tried to examine the factors which were affecting the production of mushroom but it was found that Cob Dougla's production function gives more reliable results on the basis of number of significant variables. The factors which were affecting the mushroom yield and were used in the regression analysis were the number of compost bags, labour used in maydays, expenditure on crop protection material and management index. The parameters which were involved in the management index were maintaining temperature, relative humidity, hygiene and formalin spray (Mahajan *et al*., 2026).

3.4.6 Marketable and Marketed Surplus: The marketable surplus is the residual left with the producer after meeting their requirements for family consumption, kind payment to labour and gifts. While, marketed surplus was the actual quantity of mushroom that the producers sold in the market irrespective of its requirements (Mahajan *et al.,* 2025; Saina *et al*., 2025; Mahajan *et al*., 2026).

3.4.7 Marketing Channels: Marketing channels refers to the various intermediaries which were involved for the transfer of mushroom produce from mushroom growers to consumers. The personal survey of various intermediaries involved in the marketing process was done to assess the different marketing channel that the mushroom growers in the research area used to market their mushrooms (Mahajan and Thakur, 2025; Mahajan *et al.,* 2025; Saina *et al*., 2025).

3.4.8 Marketing Costs, Margins and Price Spread: Marketing costs includes all the marketing charges from local assembling to retailing in the marketing process. Total marketing margin of the middle man was calculated as the difference between the total payments (marketing costs + purchase price) and the receipts (sale price) of the middlemen. Total marketing margin or price spread is the difference between the price paid by the consumer and price received by the producer. Price spread generally measures the economic efficiency of the marketing system. Smaller the price spread; greater is the efficiency of the marketing system. Producer's share in the consumer's rupee is the price received by the mushroom grower expressed as a percentage of the price paid by the consumer (Sale price of retailer) (Mahajan and Thakur, 2025).

3.4.9 Marketing Efficiency: The marketing channels efficiency indicates that the goods are moved from producer to consumer at the lowest feasible cost, consistent with the provision of services desired by the consumer. Shepherd's marketing efficiency was used to measure the marketing efficiency of various marketing channels of mushrooms. In order to work out the marketing efficiency of the marketing system, price received by the retailer is divided by the sum of the total marketing costs and total marketing margins and the figure which comes out of it is subtracted by minus one. This was how the marketing efficiency was worked out (Mahajan and Thakur, 2025).

3.4.10 Problems and Constraints: The survey was conducted to identify the various problems and constraints encountered by the mushroom growers during mushroom production. The constraints that the mushroom growers had to deal with were categorized into four subheads which were production problem, marketing problem, institutional problem and social problem. Garrett's ranking technique was used to analyze the various problems. The major benefit of Garrett's ranking over standard frequency distribution is that the respondents rank the constraints according to their relative importance. The order of the ranks given by the respondents will be converted into per cent position. With reference to the table provided by Garrett and Woods worth (1969), the per cent position of each rank was converted into scores. The sum of individual respondent's score for each factor was divided by the total respondents for whom the score was added and these mean score for each factor were arranged in descending order and were given ranks and the most significant factor was identified (Mahajan and Thakur, 2025).

CHAPTER 4
SOCIO-ECONOMIC IMPACT OF MUSHROOM CULTIVATION

Mushroom cultivation can have a significant positive socio-economic impact, particularly in rural areas, by providing a reliable source of income for farmers, improving household nutrition, generating employment opportunities, and utilizing agricultural waste, thereby enhancing livelihoods and reducing poverty vulnerability. Due to high demand for mushrooms in urban areas, producers can easily access markets and sell their products at competitive prices. Mushroom cultivation can empower rural communities by providing them with a viable economic activity, leading to improved social status and self-reliance (Saina *et al.,* 2025).

Analyzing the socio-economic traits of the sample mushroom growers is crucial since it provides insight into the farmers' circumstances and aids in decision making. It offers a wide range of policies and programmers to assist farmers in resolving various issues. In order to improve the sampled farmers' economic position through appropriate actions, a socio-economic status of sampled households was examined (Saina *et al.,* 2025).

4.1 Family Structure and Size

Both the size and the structure of the family play crucial role in the sustainability and productivity of the farm. A larger family size means more hands to help with labor- intensive tasks and it will contribute to greater productivity and efficiency of the farm. It also offers diverse experiences and knowledge which can be combined to solve the complex problems. The results show (Table 4.1) that the average size of the family was 5.22 with small farms having more family size (5.43) than the large farms (4.8). Males (2.78) dominated in small farms whereas in large farms there were more females (2.5) (Saina *et al.,* 2025).

The results also indicates that the proportion of joint families was higher (51.67%) compared to that of nuclear families (48.33%). Large farms had a higher percentage of nuclear families (50%), whereas small farms had a higher percentage of joint families (52.5%). It can also be visualized that majority of the households had 4 to 5 and 6 to 8 members (33.33%). Only 8.34 per cent of households had more than eight members. Small farms had more proportion of 4-5 members and in case of large farms there were more proportion of 6-8 members (Saina *et al.,* 2025).

4.2 Age Wise Distribution

The distribution of mushroom growers and their family members according to their age is of utmost importance as it helps to know the total active labor which is present in the household. Secondly, it will help determine the proportion of the younger and older generations. Younger generations are generally more aware than older ones in terms of adopting new technologies whereas vice-versa in terms of decision making (Saina *et al.,* 2025).

Table 4.1: Distribution of sampled farms according to size and type of family

Sr.No.	Particulars	Farm Size		
		Small	**Large**	**Overall**
	Number of Mushroom Growers	40	20	60
1.	**Average family size**	5.43	4.8	5.22
i.	**Male**	2.78	2.3	2.62
ii.	**Female**	2.65	2.5	2.6
2.	**Type of family**			
i.	**Nuclear**	19	10	29
		(47.50)	(50)	(48.30)
ii.	**Joint**	21	10	31
		(52.5)	(50)	(51.67)
	Total	40	20	60
		(100)	(100)	(100)
3.	**Family size distribution**			
i.	**Upto 3 members**	10	5	15
		(25)	(25)	(25)
ii.	**4-5 members**	13	7	20
		(32.5)	(35)	(33.33)
iii.	**6-8 members**	12	8	20
		(30)	(40)	(33.33)
iv.	**Above 8 members**	5	0	5
		(12.5)	(0)	(8.34)

Note: Figures in the parentheses indicate percentages to the total in each category.

4.2.1 Age Wise Distribution of the Head of the Family

The findings revealed (Table 4.2) that out of the total members maximum number of mushroom growers belongs to the age group of 40-60 (63.33 %) followed by age group of 25-40 (33.33 %) and greater than 60 (3.33%). It was discovered that not even a single farmer was younger than 25 years old. A comparison between small and large mushroom producers revealed that the percentage of heads in the 40–60 age groups was higher for large mushroom growers (85%), while the percentage of heads in the 25–40 age groups was higher for small mushroom growers (42.5%) when compared to large mushroom grower (15%). The working population was found to be 100 per cent in large farms whereas it was 95 per cent in small farms (Saina *et al.,* 2025).

Table 4.2: Age wise distribution of head of the family

Sr. No.	Age Group	Farm size								
		Small			Large			Overall		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
1.	25-40	8	9.00	17	3.00	-	3	11	9	20
		30.77	64.29	42.50	17.65	-	15.00	25.58	52.94	33.33
2.	40-60	16	5.00	21	14.00	3	17	30	8	38
		61.54	35.71	52.50	82.35	100.00	85.00	69.77	47.06	63.33
3.	>60	2	-	2	-	-	-	2	-	2
		7.69	-	5.00	-	-	-	4.65	-	3.33
	Total	26	14	40	17	3	20	43	17	60
		100	100	100	100	100	100	100	100	100

Note: Figure in parentheses indicate the percentage to the total in each category

4.2.2 Age Wise Distribution of the Family Members

It was visualized from the results (Table 4.3) that more number of males belongs to the age group of 15-25 (40. 13%) followed by <15, 40-60 age group with 17.76%, 16.45% respectively. However, when it comes to female, the majority of them are in the 25-40 age range (36.94%) followed by age range of 15-25 (27.39%).71.25 per cent of the total population fell within the working population age range. When comparing large and small farms, it was discovered that small farms (71.43%) have high percentage of people in the 15-60 age group than the large farms (70.83%). When comparison was made across male and female of small and large farms, it was found that more number of males were in the age group of 15-25, whereas more number of females were in the 25-40 age group. The overall sex ratio was around 994 with large farms (1087) having comparatively more sex ratio than small farms (955) (Saina *et al*., 2025)

Table: 4.3: Age wise distribution of family members on sample farms

Sr. No.	Age group	Farm size								
Sr. No.	Age Group Years	Small			Large			Overall		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
1.	**<15**	19	14	33	8	9	17	27	23	50
		17.12	13.21	15.21	17.39	18.00	17.71	17.76	14.65	15.97
2.	**15-25**	41	30	71	20	13	33	61	43	104
		36.94	28.30	32.72	43.48	26.00	34.37	40.13	27.39	33.23
3.	**25-40**	21	38	59	3	19	22	19	58	81
		18.92	35.85	27.18	6.52	38.00	22.92	12.50	36.94	25.88
4.	**40-60**	17	8	25	8	5	13	25	13	38
		15.31	7.55	11.53	17.39	10.00	13.54	16.45	8.28	12.14
5.	**>60**	13	16	29	7	4	11	20	20	40
		11.71	15.09	13.36	15.22	8.00	11.40	13.16	12.74	12.78
	Total	111	106	217	46	50	96	157	156	313
		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
6.	**Sex-ratio no. of female per 1000 of males**	955			1087			994		

Note: Figure in parentheses indicates percentage of the total in each category

4.3 Educational Status

Education plays a crucial role to provide the individual with the knowledge and skill needed to improve the economic outcomes by adoption of advance technology, different marketing strategies etc. A person with good education will be more aware of and utilize government initiatives. It also increases awareness and empowers people to make informed decisions. Educational status can significantly influence an individual quality of life and opportunities ((Saina *et al.,* 2025).

4.3.1 Educational status of head of the family

The educational qualification of the head provides the best possible final decision regarding access to different resources. It is evident that (Table 4.4) maximum number of head have done matriculation (38.33%) followed by senior secondary (31.67%). Only about 8.33 per cent of the population was illiterate. There was more percentage of females who have done matriculation in the large farms (50%) than the small farms (40%). The overall literacy rate of the head was 91.67 per ent with male having more literacy rate (95.12%) than females (84.21%). When comparison was made across small and large farms, the literacy rate was more among small farms (92.5 %) than large farms (90%) (Saina *et al.,* 2025).

4.3.2 Educational status of the family members

The education of the family members has a profound and multifaceted impact on the well-being and progress of an individual. Educated family members provide support and resources to help each other and can drive innovation and improve efficiency. The results (Table 4.5) depict the gender wise educational status of the family members. The overall literacy rate of the population was 96.49 per cent out of which male (99.36%) has more percentage of literacy rate than female (93.49 %). The population of the female doing middle was more than males by 13.5 per cent. Only 2.56 per cent and 1.92 per cent of females have done diploma and graduation which was very less when compared to male. The percentage of population doing senior secondary was highest (27.16%) followed by metric (25.24%) and middle (12.46%). Only 3.51 per cent of the total population was illiterate out of which female proportion (6.41%) was more than males (0.64%). When compared across small and large, the literacy percentage was more in small farms by 2.25 per cent. The percentage of population doing metric was more in large farms (29.29 %) than small farms (23.36 %). The illiterate population was approximately similar in both the farms (Saina *et al.,* 2025).

Table 4.4: Educational Status of head of the family

Sr. No.	Particulars	Small			Large			Overall		
		Male	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
1.	**Illiterate**	1	2	3	1	1	2	2	3	5
		4.00	13.33	7.50	6.25	25.00	10.00	4.88	15.79	8.33
2.	**Primary**	2	3	5	1	-	1	3	3	6
		8.00	20.00	12.50	6.25	-	5.00	7.32	15.79	10.00
3.	**Middle**	1	2	3	-	-	-	1	2	3
		4.00	13.33	7.50	-	-	-	2.44	10.53	5.00
4.	**Metric**	9	6	15	6	2	8	15	8	23
		36.00	40.00	37.50	37.50	50.00	40.00	36.59	42.11	38.33
5.	**10+2**	10	2	12	6	1	7	16	3	19
		40.00	13.33	30.00	37.50	25.00	35.00	39.02	15.79	31.67
6.	**Diploma**	-	-	-	1	-	1	1	-	1
		-	-	-	6.25	-	5.00	2.44	-	1.67
7.	**Graduation**	2	-	2	1	-	1	3	-	3
		8.00	-	5.00	6.25	-	5.00	7.32	-	5.00
	Total	25	15	40	16	4	20	41	19	60
		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Literate person	24	13	37	15	3	18	39	16	55
	Literacy Rate %	96.00	86.66	92.5	93.75	75.00	90.00	95.12	84.21	91.67

Note: Figure in Parentheses indicate percentage to the total in each category

Table 4.5: Gender wise educational status of family members

Sr. No.	Particulars	Farm Size								
		Small			Large			Overall		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
1.	SG	11.00	5.00	16.00	1	2	3	12	7	19
		10.00	4.81	7.48	2.13	3.85	3.03	7.64	4.49	6.07
2.	Illiterate	-	6.00	6.00	1	4	5	1	10	11
		-	5.77	2.80	2.13	7.69	5.05	0.64	6.41	3.51
3.	Primary	5.00	12.00	17.00	1	6	7	6	18	24
		4.55	11.54	7.94	2.13	11.54	7.07	3.82	11.54	7.67
4.	Middle	6.00	21.00	27.00	3	9	12	9	30	39
		5.45	20.19	12.62	6.38	17.31	12.12	5.73	19.23	12.46
5.	Metric	27.00	23.00	50.00	14	15	29	41	38.00	79.00
		24.55	22.12	23.36	29.79	28.85	29.29	26.11	24.36	25.24
6.	senior secondary	29.00	32.00	61.00	10	14	24	39	46	85
		26.36	30.77	28.5	21.28	26.92	24.24	24.84	29.49	27.16
7.	Diploma	5.00	2.00	7.00	5	2	7	10	4	14
		4.55	1.92	3.27	10.64	3.85	7.07	6.37	2.56	4.47
8.	Graduation	25.00	3.00	28.00	11	-	11	36	3	39
		22.73	2.88	13.08	23.40	-	11.11	22.93	1.92	12.46
9.	PG	2.00	-	2.00	1	-	1	3	-	3
		1.82	-	0.93	2.13	-	1.01	1.91	-	0.96
10	Total	110.00	104.00	214.00	47.00	52.00	99.00	157.00	156.00	313.00
11.	Literate people	110	98	208	46	48	94	156	146	302
12.	Literacy Rate	100	94.23	97.20	97.90	92.31	94.95	99.36	93.59	96.49

4.4 Land Utilization Pattern

Land is the primary resource of agriculture and is the backbone of food production around which farmer's economy revolves. Land utilization pattern provides insight into the efficiency, productivity and sustainability of various farming operations. The size of land holding varies from farmer to farmer and it highlights the fundamental strength of the farming family and how it is used in efficient manner by farmers and their family members. The result (Table 4.6) depicts that overall average size of the land holding was 0.408 ha. Leased in of land was a practice that accounted for 14.88 per cent of the total, with small farms accounting for more of it (17.61%) than large farms (6.58%). It could be analyzed from the table that as the size of mushroom unit increases, the total size of the land holding as well as the cultivated land decreases. The average cultivated land consists of 0.3033 ha which accounts for 74.34 per cent of the total size of the land holding. The comparison between small and large farms revealed that small farms had more percentage of cultivated area than the large farms having percentage gap of 17.52 per cent. The proportion of miscellaneous and permanent pastures was more in large farms than the small farms (Saina *et al.,* 2025).

Table 4.6: Land Inventory of sampled households (Hectares/ farm)

Sr. No.	Particulars	Farm Size		
		Small	**Large**	**Overall**
1	**Owned**	0.379	0.284	0.3473
		82.39	93.42	85.12
2	**Leased in**	0.081	0.02	0.0607
		17.61	6.58	14.88
3	**Total**	0.46	0.034	0.408
		100.00	100.00	100.00
i.	**Cultivated**	0.362	0.186	0.3033
		78.70	61.18	74.34
ii.	**fallow land**	0.041	0.03	0.0373
		8.91	9.87	9.14
iii.	**permanent pastures**	0.019	0.03	0.0227
		4.13	9.87	5.56
iv.	**Misc. (Forest, Grasses, Trees)**	0.027	0.038	0.0307
		5.87	12.50	7.52
v	**Others**	0.011	0.02	0.014
		2.39	6.58	3.43

Note: i) Figures in parentheses indicate percentage to the total in each category

ii) Classification of land inventory on the basis of number of compost bags placed

4.5 Occupational Pattern of the Sampled Farms

The occupational pattern provides insight into the economic activities that were employed as a means of livelihood by farmer and its family members. The occupation was mainly divided into two groups main and subsidiary. The main occupation is the one in which farmer was engaged for most of the time and whereas subsidiary is the one where they were engaged partially (Saina *et al.,* 2025).

4.5.1 Heads of the Family

The results (Table 4.7) show that more than half of the percentage of population were engaged in mushroom cultivation (51.69%). The proportion of head of the family having mushroom cultivation as a major source was more in case of large farms (60 %) than the small farms (49.38%) which depicts that there is a high dependency on mushroom cultivation as a source of income for large farmers. The second important source of income was agriculture which constitutes for 28.81 per cent. Out of the total population of head of the family, only 1.69 per cent and 5.93 per cent of the heads were employed in government jobs and private jobs respectively. In small farms, about 11.11 per cent of the population was engaged in their own businesses. In contrast on large farms only 8.57 per cent heads were engaged in their own businesses. In subsidiary occupation, 68.97 per cent of the heads were engaged in mushroom cultivation. Mushroom farming is a subsidiary occupation for 80.49 per cent of heads in small farms whereas for large farms it is subsidiary occupation for 38.89 per cent of heads only (Saina *et al.,* 2025).

4.5.2 Family Members of the Respondent

It was discovered that agriculture constitutes the primary source of employment and income for 62 per cent of the total population (Table 4.8). The dependency on agriculture was more by small farms (64%) compared to large farms (59%). Private jobs which constitute for about 21 per cent, was the second significant source of income followed by government jobs and businesses which provide employment to 9 per cent and 8 per cent of the population respectively. There was more percentage of population from large farms (25%) who were employed through private jobs compared to small farms (19%) whereas in case of business more percentage of people were from small farms (8%) when comparison was made with large farms (6%) (Saina *et al.,* 2025).

Table 4.7: Occupational Pattern of head of the family

Sr. No.	Particulars	Farm Size								
		Small			Large			Overall		
		Main	Subsidiary	Total	Main	Subsidiary	Total	Main	Subsidiary	Total
1.	Agriculture	22	5	27	1	6	7	23	11	34
		(55.00)	(12.20)	(33.33)	(5.88)	(33.29)	(20.59)	(38.33)	(19.30)	(29.06)
2.	Mushroom cultivation	7	33	40	14	6	20	21	39	60
		(17.50)	(80.49)	(49.38)	(82.40)	(38.29)	(58.82)	(35.00)	(68.42)	(51.28)
3.	Business	6	3	9	-	3	3	9	5	14
		(15.00)	(7.32)	(11.11)	-	(17.65)	(8.82)	(15.00)	(8.77)	(11.97)
4.	Government	2	-	2	-	-	-	2	0	2
		(5.00)	-	(2.47)	-	-	-	(3.33)	-	(1.71)
5.	Private	3	-	3	2	2	4	5	2	7
		(7.50)	-	(3.70)	(11.80)	(11.76)	(11.76)	(8.33)	(3.51)	(5.98)
	Total	40	41	81	17	17	34	60	57	117
		(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

Note: Figures in parentheses indicate percentage to the total in each category.

Table 4.8: Occupational Status of family members

Sr. No.	Particulars	Small			Large			Overall		
		Male	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
1.	**Agriculture**	24	69	93	6	42	48	30	111	141
		(33.00)	(95.00)	(64.00)	(17.00)	(91.00)	(59.00)	(28.00)	(93.00)	(62.00)
2.	**Business**	12	-	12	5	-	5	17	-	17
		(17.00)	-	(8.00)	(14.00)	-	(6.00)	(16.00)	-	(8.00)
3.	**Government**	12	1	13	7	1	8	19	2	21
		(17.00)	(1.00)	9.00	(20.00)	(2.00)	(10.00)	(18.00)	(2.00)	(9.00)
4.	**Private**	24	3	27	17	3	20	41	6	47
		(33.00)	(4.00)	(19.00)	(49.00)	(7.00)	(25.00)	(38.00)	(5.00)	(21.00)
	Total	72	73	145	35	46	81	107	119	226
		(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

Note: Figures in parentheses indicate percentage to the total in each category

4.6 Costs and Returns Analysis of Button Mushroom: The results (Table 4.9) highlight that total production of mushroom per 100 compost bags weighing 20kg each was more on large farms (362.38kg) than the small farms (312.21kg). The gross returns showed positive relation with the size of farm. The gross returns of large farms were found to be Rs. 47,109 whereas for small farms it was Rs. 40,587. Similarly, net returns also increases with increase in farm size. The net returns over total cost and over variable cost per 100 bags of small farms account s for Rs. 10,640 and Rs. 20,464 respectively whereas for large farms it was Rs. 23,096 and Rs. 28,568 respectively. The net returns per kg over total cost and variable cost were Rs. 52.27 and Rs. 73.50 respectively (Saina *et al.,* 2025).

Table 4.9: Return and benefit cost analysis of button mushroom on sampled farms

Sr. No.	Particulars	Units	Farm size		
			Small	**Large**	**Overall**
1.	**Total cost**	Rupees/100 bags	29,947	24,013	26,996
i)	**Fixed cost**	Rupees/100 bags	9,824	5,472	7,372
ii)	**Variable cost**	Rupees/100bags	20,123	18,541	19,624
2.	**Total Production**	Kilograms/100bags	312.21	362.38	347.3
3	**Selling Price of Mushroom**	Rs./Kg	130	130	130
4.	**Gross Returns**	Rupees/100bags	40,587	47,109	45,149
5.	**Net Returns over Total cost**	Rupees/100bags	10,640	23,096	18,153
6.	**Net Return over Total cost**	Rs/kg	34.08	63.73	52.27
7.	**Net Returns over Variable cost**	Rupees/100bags	20,464	28,020	25,525
8.	**Net Return over Variable cost**	Rs/kg	65.55	78.83	73.50

4.7 Cost and Return Analysis of Oyster Mushroom: It is visualized from the results (Table 4.10) that the total production per hundred bags of small farms (186kg) was more than that of large farms (180 kg). The gross return also showed the similar trends i.e. gross returns of small farms was more than that of large farms but in case of net returns, the results were opposite i.e. the net returns of large farms was more than that of small farms. It was due to the fact that the total cost of small farms was more than the large farms. The gross returns of small farms were found to be Rs. 22,320 whereas it was Rs. 21,600 for large farms. It was discovered that in small farms, net return over total cost per 100 bags was Rs. 5,265 and Rs. 15,089 respectively whereas it was Rs. 9,549 and Rs. 15,021 for large farms. The net returns per kg over total and variable costs on overall farms were Rs. 41.91 and Rs. 82.20 respectively. It is seen that net return over variable cost from oyster mushroom per hundred bags were also more which indicate that oyster mushroom is a profitable venture (Saina *et al.,* 2025).

Table 4.10: Return and benefit cost analysis of oyster mushroom on sampled farms

Sr. No.	Particulars	Units	Farm Size		
			Small	Large	Overall
1.	**Total cost**	Rs/100 bags	17,055	12,051	14.290
i)	**Fixed cost**	Rs/100 bags	9,824	5,472	7,372
ii)	**Variable cost**	Rs/100 bags	7,231	6,579	6,918
2.	**Total Production**	Kg/100 bags	186	180	183
3	**Selling Price of oyster mushroom**	Rs./Kg	140	140	140
4.	**Gross Returns**	Rs/100bags	22,320	21,600	21,960
5.	**Net Returns over Total cost**	Rs/100 bags	5,265	9,549	7,670
6.	**Net Return over Total cost**	Rs/kg	28.31	53.05	41.91
7.	**Returns over Variable cost**	Rs/100 bags	15,089	15,021	15,042
8.	**Net returns over variable cost**	Rs/kg	81.12	83.45	82.20

CHAPTER 5
PRODUCTION ECONOMICS AND MARKETING ASPECTS OF BUTTON MUSHROOM

5.1 Trends and Growth rates of mushroom production in H.P

Mushroom production in Himachal Pradesh is an activity of both the public and private units and the state has witnessed an increase in its production from 6312.71 in 2013-14 to 16256.02 tons in 2022-23 (Table 5.1 &table 5.2). Private units produce more mushrooms compared to government units and it has increased from 98.92 per cent in 2013-2014 to nearly 99.55 per cent in 2022-23. There was decrease in production of mushrooms in case of government units i.e. from 1.08 per cent in 2013-14 to 0.45 per cent in 2022-23. The maximum production of mushroom was in the year of 2021-22 after which it decreases. The total compound annual growth rate of 11.15 per cent was recorded over the last decade. The public units indicate the growth rate of just 1.57 per cent whereas the private farms recorded highest percentage of growth rate 11.22 per cent. This indicates that there is a significant growth in the government as well as private units over the ten year statistics (Mahajan *et al*., September, 2025).

Table 5.1: Zone wise Production of mushroom under different units in Himachal Pradesh (Tones)

Sr. No.	Year	Particulars	Zone				Total
			Palampur	Solan	Bajaura	Rampur	
1.	2013-14	Government units	68.013	0	0	0	68.01
		Private units	1354.967	4639.73	250	0	6244.69
		Total	1422.98	4639.73	250	0	6312.71
2.	2014-15	Government units	65.968	0	0	0	65.97
		Private units	1542	6168.25	259	0	7969.25
		Total	1607.968	6168.25	259	0	8035.22
3.	2015-16	Government units	65.82	0	0	0	65.82
		Private units	1635	7003	268	0	8906
		Total	1700.82	7003	268	0	8971.82
4.	2016-17	Government units	65.50	0	0	0	65.50
		Private units	1634	13889	354	0	15877.10
		Total	1688.5	13889	354	0	15942.6
5.	2017-18	Government units	64.90	0	0	0	64.90
		Private units	1659	11986	254	0	13899
		Total	1659	11986	254	0	13963.9

6.	2018-19	Government units	17.12	0	0	0	17.12
		Private units	1717	12239	242.5	8.2	14206.7
		Total	1787.12	12239	242.5	8.2	14276.82
7.	2019-20	Government units	71.69	0	0	0	71.69
		Private units	1739	12660	326	7.8	14732.8
		Total	1810.69	12660	326	7.8	14804.49
8.	2020-21	Government units	75.65	0	0	0	75.65
		Private units	1686	16181	433	8.03	18308.03
		Total	1761.65	16181	433	8.03	18383.8
9.	2021-22	Government units	74.21	0	0	0	74.21
		Private units	1758	15538	378	12.6	17686.6
		Total	1832.21	15538	378	12.6	17760.81
10.	2022-23	Government units	73.62	0	0	0	73.62
		Private units	3863	12038	260	21.4	16182.4
		Total	3936.62	12038	260	21.4	16256.02

Source: Directorate of Horticulture, Shimla

Studies indicate that button mushroom cultivation is a profitable venture in Himachal Pradesh, with farmers achieving a good net return on investment. Mushroom farming is a secondary source of income for many rural families, particularly for landless farmers or those with small landholdings, as it requires only a small area. Mushroom production creates employment opportunities in rural areas, contributing to the livelihoods of the local population. Button mushrooms are a good source of protein and other essential nutrients, making them a valuable food source, especially for vegetarians. The state's agro-climatic conditions are suitable for mushroom cultivation, including button mushrooms, which has the potential for export and earning foreign exchange. The cost of cultivation is relatively low, and the yield is high, making mushroom farming a cost-effective venture. The spent mushroom compost can be used as good manure for other field crops, further enhancing its economic value. Mushrooms are highly palatable and are very good for health as well. It has rich amounts of various proteins, vitamins, minerals etc. Mushroom production is gaining popularity among farmers, women and youths in Himachal Pradesh. Thus, Button mushroom cultivation in Himachal Pradesh is economically important, providing a profitable venture for farmers, contributing to rural income generation, and offering a valuable source of protein and other nutrients. (Mahajan, *et al*., 2026).

Table 5.2: Trends and Growth of Mushroom production in Himachal Pradesh

Year	Production (Tones)		
	Government Units	**Private units**	**Total**
2013-14	68.01	6244.69	6312.71
	(1.08)	(98.92)	(100.00)
2014-15	65.97	7969.25	8035.22
	(0.82)	(99.18)	(100.00)
2015-16	65.82	8906	8971.82
	(0.73)	(99.27)	(100.00)
2016-17	65.50	15877.1	15942.6
	(0.41)	(99.59)	(100.00)
2017-18	64.90	13899	13963.9
	(0.46)	(99.54)	(100.00)
2018-19	70.12	14206.7	14276.82
	(0.50)	(99.50)	(100.00)
2019-20	71.69	14732.8	14804.49
	(0.48)	(99.52)	(100.00)
2020-21	75.65	18308.03	18383.68
	(0.41)	(99.59)	(100.00)
2021-22	74.21	17686	17760.81
	(0.42)	(99.58)	(100.00)
2022-23	73.62	16182.4	16256.02
	(0.45)	(99.55)	(100.00)
	1.57*	11.22*	11.15*

Source: Directorate of Horticulture, Shimla

Note: Figure in the parentheses indicates percentages of the totals.

*Significant at5% level of significance.

5.2 Input use Pattern of Button Mushroom: It is viewed from Table 5.3 that on overall farm, 100 compost bags of each category weighing 20 kg were used. The overall packing material used for 100 bags on overall farm was 2.43 kg with large farms using more packing material than small farms because of the larger production of mushroom. Plant protection is one of the crucial steps in mushroom production as they were used to control the different diseases and thereby enhance the yield of the mushroom. Formalin was mainly used for sterilizing the room before

putting the bags in the room. The overall quantity of formalin used was 173.45 millilitre per 100 bags with small and large farms using 160.30 millilitre and 186.6 millilitre of formalin respectively. The transportation cost was also incurred which was Rs488 on overall farms with small farms having more transportation cost than large farms. Human labor plays indispensable role in mushroom production. The total labor used for 100 bags on overall farms was 19 man days with small having 18 man days and large having 20 man days. The miscellaneous charges which include crop washing material and other plant protection material accounted for Rs 380 on overall farm with small farms incurred more expenditure on miscellaneous head (Rs 411) than large farms which accounted for Rs366 (Mahajan, *et al*., 2026).

Table 5.3: Input use pattern of button mushroom on sampled farms (Per 100 bags)

Sr. No.	Particulars	Units	Farm Size		
			Small	Large	Overall
1.	**Compost Bags (20 kg)**	Number	100	100	100
2.	**Packing Material**	Kg	2.06	2.59	2.43
3.	**Plant Protection**				
i)	**Formalin**	Millilitre	160.3	186.6	173.45
ii)	**Bavistin**	Grams	102.2	100.38	101.29
4.	**Electricity charges**	Rs.	406	272	312
5.	**Transportation charges**	Rs.	592	444	488
6.	**Human Labour (man days)**	Man days	18	21	20
7.	**Miscellaneous**	Rs.	411	366	380

5.3 Labor Utilization:

Mushroom cultivation is a labor-intensive work as it requires labour from cultivation to harvesting for various purposes like putting bags into the racks, watering, maintenance, harvesting, washing and packing, etc. Efficient management by the labor will directly impact the production and profitability of mushrooms. The labour duration engaged in different operation in mushroom production has been converted into man days in order to calculate the labour employment (Mahajan *et al*., 2026).

It is seen from table 5.4 that the total labor required for performing various operations in button mushroom production varied from 18 man days on small farms to 19 man days on large farms per 100 bags. It is also viewed that labor used in the overall farm per 100 bags was highest for harvesting operations followed by washing and packaging which accounted for 34.97 per cent

and 28.47 per cent respectively. The next highest labor usage was found in watering and medicine spray accounting for 24.83 per cent and 8.98 per cent. When comparison was made between small and large farms, it was found that more percentage of labor in large farms was used only in case of watering (26.66%) and washing and packaging (29.62%) than the small farms. The overall family labor used was approximately 16 man days with small farms having more man days (17 man days) than large farms (15 man days). Very less hired labor was used on overall farm for mushroom production with large farms using more hired labor than the small farms (Mahajan *et al*., 2026).

Table 5.4: Labour utilization Pattern of button mushroom on sampled farms (Man days/100bags)

Sr. No.	Particulars	Farm Size		
		Small	**Large**	**Overall**
1.	**Putting bags in rack**	0.64	0.47	0.52
		(3.53)	(2.44)	(2.75)
2.	**Watering**	3.67	5.14	4.70
		(20.23)	(26.66)	(24.83)
3.	**Medicine spray**	1.78	1.67	1.70
		(9.81)	(8.66)	(8.98)
4.	**Harvesting**	7.40	6.29	6.62
		(40.79)	(32.62)	(34.97)
5.	**Washing and packing**	4.65	5.71	5.39
		(25.63)	(29.62)	(28.47)
	Total Labour	18.14	19.28	18.93
		(100)	(100)	(100)
i)	**Hired Labour**	0.95	4.5	3.43
ii)	**Family Labour**	17.19	14.78	15.50

Note: Figures in parentheses indicate the percentage to the total in each category

5.4 Cost Component: The total cost components were divided into fixed and variable cost components. The fixed cost components include the factors such as depreciation charges on mushroom building and implement and interest on fixed capital whereas the variable cost include the factors such as outlays on compost bags, packing material, crop protection material, electricity, transportation, labor charges and miscellaneous charges.

Table 5.5: Cost of production of button mushroom on sampled farms (Rupees/100 bags)

Sr. No.	Particulars	Farm Size		
		Small	Large	Overall
A.	Non-Recurring Expenditure (Fixed Cost)			
i)	Interest on fixed capital @12%	4,015	2,342	2,845
		(13.41)	(9.75)	(10.54)
ii)	Depreciation Charges			
a)	Buildings (@2% p.a.)	2,463	1,178	1,564
		(8.22)	(4.91)	(5.79)
b)	Depreciation on implements (@10%)	3,346	1,952	2,963
		(11.17)	(8.13)	(10.98)
	Total Fixed cost	9824	5472	7372
		(32.80)	(22.79)	(27.31)
B.	Recurring Expenditure (Variable Cost)			
i)	Compost Bags	10,650	9,000	10,100
		(35.56)	(37.48)	(37.41)
ii)	Packing material	308	259	274
		(1.03)	(1.08)	(1.01)
iii)	Plant protection	203	214	208
		(0.68)	(0.89)	(0.77)
iv)	Electricity charges	406	272	312
		(1.36)	(1.13)	(1.16)
v)	Transportation charges	592	444	488
		(1.98)	(1.85)	(1.81)
vi)	Labour charges	7256	7712	7572
		(24.23)	(32.12)	(28.05)
vii)	Miscellaneous	411	366	380
		(1.37)	(1.52)	(1.41)
viii)	Total (i to vii)	19,826	18,267	19,334
		(66.20)	(76.07)	(71.62)
ix)	Interest on Recurring Expenditure (variable cost) (@12 % for 1.5 months)	297	274	290
		(0.99)	(1.14)	(1.07)
	Total Recurring Expenditure (Total Variable Cost)	20,123	18,541	19,624
		(67.20)	(77.21)	(72.69)
C.	Total cost (A+B)	29,947	24,013	26,996
		(100.00)	(100.00)	(100.00)

Note: Figure in parentheses indicate the percentage to the total in each category

It is seen (Table 5.5) that fixed cost on overall farm constitutes 27.31 per cent of the total cost with small and large farms constituting 32.80 and 22.79 per cent of the total cost respectively. The results also reflects that the variable cost constitutes 72.69 per cent of the total cost with large farms (77.21%) investing more in variable cost than the small farms (67.20%). Similar results were represented by Sharma *et al.,* from Mandi district of Himachal Pradesh (2016). The investment on the compost bags was the major component of the variable cost constituting to Rs 10,100 per 100 bags i.e. 37.41 per cent of the total cost. The next highest investment on overall farm was made on human labour followed by transportation charges with a percentage of 28.05 per cent and 1.81 per cent of the total cost respectively. When comparison was made between small and large farms, it can be visualized that the percentage of investment on compost bags and labor was more by large farms than small farms. The investment made on crop protection material was to the extent of 0.77 per cent of the total investment (Mahajan *et al*., 2026).

5.5 Costs and Returns Analysis:

Table 5.6: Return and benefit cost analysis of button mushroom on sampled farms

Sr. No.	Particulars	Units	Farm size		
			Small	Large	Overall
1.	**Total cost**	Rupees/100 bags	29,947	24,013	26,996
i)	**Fixed cost**	Rupees/100 bags	9,824	5,472	7,372
ii)	**Variable cost**	Rupees/100bags	20,123	18,541	19,624
2.	**Total Production**	Kilograms/100bags	312.21	362.38	347.3
3.	**Gross Returns**	Rupees/100bags	40,587	47,109	45,149
4.	**Net Returns over Total cost**	Rupees/100bags	10,640	23,096	18,153
5.	**Net Return over Total cost**	Rs/kg	34.08	63.73	52.27
6.	**Net Returns over Variable cost**	Rupees/100bags	20,464	28,020	25,525
7.	**Net Return over Variable cost**	Rs/kg	65.55	78.83	73.50
8.	**Net returns per rupee of investment**	Rupees	0.36	0.96	0.67
9.	**Benefit-Cost Ratio**	Ratio	1.36	1.96	1.67

The results (Table 5.6) depict that total production of mushroom per 100 compost bags was more on large farms (362.38kg) than the small farms (312.21kg). The gross returns showed positive relation with the size of farm. The gross returns of large farms were found to be Rs. 47,109 whereas for small farms it was Rs. 40,587. Similarly, net returns also increase with increase in farm size. The net returns over total cost and over variable cost per 100 bags of small farms account s for Rs. 10,640 and Rs. 20,464 respectively whereas for large farms it was Rs. 23,096 and Rs. 28,568 respectively. The net returns per kg over total cost and variable cost were Rs. 52.27 and Rs. 73.50 respectively. The benefit cost ratio of button mushroom on overall farm was 1.67 with small farms and large farms having 1.36 and 1.96 respectively (Mahajan *et al*., 2026).

5.6 Break-even Analysis: Break-even output is the level of output at which the mushroom grower will neither face profit nor loss. Break-even output for small and large units in the result (Table 5.7) reveals that if small units receive 150 kg of mushroom valued at Rs. 19,500 then these units will be at no profit no loss situation under the given input and output. Similarly, the large farms will be at no profit and no loss situation when they produce 69 kg of mushroom valued at Rs. 10,350. The large farms had less break-even output because of low average variable cost of production of Rs. 51.16 per kg. At overall level, the break-even output was achieved at 100 kg of mushroom production. The break-even output in terms of number of compost bags placed reveals that the small and large farms will be at no loss and no profit situation if they placed at least 50 and 23 compost bags respectively (Mahajan *et al*., 2026).

Table -5.7: Break-even analysis of button mushroom on sampled farms (Rupees per 100 bags)

Sr. No.	Particulars	Farm size		
		Small	**Large**	**Overall**
1.	**Cost of Production**			
i)	**Fixed Cost**	9,824	5,472	7,372
ii)	**Variable Cost**	20,123	18,541	19,624
iii)	**Total Cost**	29,947	24,013	26,996
2.	**Average Variable cost**	64.45	51.16	56.50
3.	**Total Production (kg)**	312.21	362.38	347.3
4.	**Selling Price of Mushroom (Rs/Kg)**	130	130	130
5.	**Break-even output (mushrooms in kg)**	150	69	100
6.	**Break -even point (No. of compost bags)**	50	23	33

5.7 Production Function Analysis: In order to determine the input-output relationship in mushroom cultivation under different categories of farm sizes, regression analysis was carried out. Cobb-Douglas production function was shown to be better fit based on its adjusted coefficient of multiple determination value and the number of significant variables. The factors which were affecting the mushroom yield and were used in the regression analysis were the number of compost bags (X1), labour used in man days (X2), expenditure on crop production material (X3), and management index (X4) which includes maintaining temperature, relative humidity, hygiene, and formalin spray. The results (Table 5.8) reveal that the most important variables which influenced the mushroom production were the number of compost bags (X1), labor (X2), and management index (X4). With 1 per cent increase in the number of compost bags (X1), the mushroom of yield would increase by 1.0528 per cent. Similarly, with 1 per cent increase in labor (X2) and management index (X4), the yield of mushroom would increase by 0.1091 and 0.5169 per cent respectively. The result further revealed that the expenditure on crop protection material had negative significant impact on the mushroom production. This shows that there is a scope for further increasing the profit from mushroom by reducing the level of this input. The adjusted coefficient of multiple determinations on all farm level came out to be 0.9786 which implies that nearly 97 per cent of the variation in mushroom production was explained by these three independent variables and remaining 3 per cent of the variation was explained by the variables which were not included in the function (Mahajan, *et al*., 2026).

Table 5.8: Factors affecting Mushroom Production: Results of Cobb Douglas Production function

Sr. No.	Particulars	Regression coefficient	Standard error	t-value
1.	**Compost bags (X1)**	1.0528*	0.0620	16.98
2.	**Labor (X2)**	0.1091*	0.0406	2.69
3.	**Expenditure on crop Plant protection material (X3)**	-0.0753	0.0547	-1.37
4.	**Management index (x4)**	0.5169*	0.2584	2.02
5.	**Constant term**	-0.9196		
6.	**Adjusted Coefficient of multiple determination**	0.9786		
7.	**T table**	2.004		
8.	**Degree of freedom**	55		

Note: *Significant at 5 per cent level of significance

5.8 Marketing of Button Mushroom: The ultimate goal of any commercial activity is to guarantee an efficient market for its product. The marketing of mushrooms include all the processes, agencies and the channel which are involved to transfer the produce from mushroom growers to consumers. Marketing plays a vital role in production of mushroom since it has the power to influence remunerative prices, which in turn influences production incentives. If the marketing system is not efficient, the production cannot fetch reasonable prices (Mahajan and Thakur, 2025).

5.9 Production and Disposal Pattern: The result (Table 5.9) revealed that the overall production of button mushroom was 8.36 quintal per farm with small and large farms producing 3.39 and 18.3 quintal per farm respectively.

Table 5.9: Production and disposal pattern of button mushroom on sampled farms (Quintal/farm)

Sr. No.	Particulars	Farm Size		
		Small	**Large**	**Overall**
1.	**Production**	3.39	18.3	8.36
		100	100	100
2.	**Self- Consumption**	0.14	0.22	0.16
		(4.13)	(1.2)	(1.91)
3.	**Payment in kinds**	0.003	0.07	0.02
		(0.09)	(0.38)	(0.24)
4.	**Gifts**	0.04	0.08	0.05
		(1.18)	(0.44)	(0.6)
5.	**Marketable Surplus**	3.21	17.93	8.13
		(94.69)	(97.98)	(97.25)
6.	**Losses**	0.11	0.51	0.25
		(3.24)	(2.79)	(2.99)
7.	**Marketed Surplus**	3.1	17.42	7.88
		(91.45)	(95.19)	(94.26)

Note: Figures in parentheses indicate the percentage to the total in each category

Out of the total production, the overall self consumption was 1.91 per cent of the total production with small farms having more self- consumption than the large farms. Approximately, one per cent of the total production was given to relatives, neighbors and friends as gifts. When the comparison was made between small and large farms in case of payment given to labor, it was

more in case of large farms (0.38%) than the small farms (0.09%). There was a positive relationship of the marketed surplus with the size of farm as is evident from the results. The marketed surplus of large farms (95.19%) was more than that of the small farms (91.45%). The overall marketed surplus was found to be 94.26 per cent. It was concluded that out of the total production, about 94 per cent was available for sale and the remaining 3 per cent was used for other purposes like home consumption, gifts to relatives, friends and neighbor and kind payment and there was a loss of around three per cent on overall farms (Mahajan and Thakur, 2025; Mahajan *et al*., 2026).

5.10 Marketing Channels of Button Mushroom in the Study Area: Marketing channels are the route or the path through which the commodity changes hand from producer to ultimate consumer. Market functionaries such as wholesaler and retailer etc serve as a link between producer and consumer throughout the entire marketing process. Marketing channels significantly impact the disposal and the sale of the produce. In the study area, there were two different intermediaries that were involved between producer and consumer i.e. retailers and wholesalers. Effective utilization of the marketing channels can help mushroom growers to increase the profitability from the produce. The main marketing channels that were involved in the marketing of button mushrooms in the study area were as follows:

Channel 1: Mushroom grower ⇨ Consumer
Channel 2: Mushroom grower ⇨ Retailer ⇨ Consumer
Channel 3: Mushroom grower ⇨ Wholesaler ⇨ Retailer ⇨ Consumer

It is evident (Table 5.10) that 40.60 per cent of the mushroom growers followed the channel-2 (Mushroom grower—Retailer------Consumer). The total quantity of mushroom that was marketed through this channel was 48.16 per cent of the total production. The second important route was channel-3 (mushroom grower—Wholesaler---Retailer----Consumer) through which 41.30 per cent of the produce was marketed by 24.06 per cent of the mushroom growers. Only 10.55 per cent of the total produce was disposed through channel-1 (Mushroom grower-----Consumer) and this channel was used by 35.34 per cent of the total mushroom growers. When comparison was made between small and large farms, it was found that more percentage of produce was marketed using channel-2 in case of small farms (69.58%) whereas in case of large farms, channel-3 was the mostly used channel by the mushroom growers for marketing (48.91%) (Mahajan and Thakur, 2025).

Table 5.10: Pattern and utilization of button mushroom on sampled farms

Sr. No.	Particulars	Farm Size					
		Small		Large		Overall	
		No.	Qty.(q/farm)	No.	Qty.(q/farm)	No.	Qty.(q/farm)
1.	**Mushroom Grower →Consumer**	30	0.33	17	1.85	47	0.83
		(39.47)	(10.68)	(29.82)	(10.62)	(35.34)	(10.55)
2.	**Mushroom Grower →Retailer---Consumer**	34	2.15	20	7.05	54	3.79
		(44.74)	(69.58)	(35.09)	(40.47)	(40.60)	(48.16)
3.	**Mushroom Grower →Wholesale---Retailer---Consumer**	12	0.61	20	8.52	32	3.25
		(15.79)	(19.74)	(35.09)	(48.91)	(24.06)	(41.30)
	Total	76	3.09	57	17.42	133	7.87
		(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

Note: Figures in parentheses indicate the percentages to the total in each category

5.11 Marketing Cost, Margins and Price Spread Through Different Channels:

The price spread is the discrepancy between the amount a customer pays and the amount a farmer receives per unit of produce. Price spread analysis is typically used to evaluate the economic efficiency of the mushroom marketing systems. It also shows the producer's percentage of the consumer rupee along with marketing expenses and profit margins of several market intermediaries for the services they provide in helping to transfer mushrooms from producers to ultimate consumers. Marketing cost includes all the marketing charges from local assembling to retailing in the marketing process. The producer has to pay these costs to bring mushrooms to the market which includes washing, packing and transportation charges etc. Marketing margin is the difference between the price that a certain agency earned and the amount that it paid. The marketing costs and margins should not be excessive otherwise it will lead to inefficient marketing system which further diminishes the producer's share in the consumer's rupee (Mahajan and Thakur, 2025).

Table 5.11: Marketing cost, margins and price spread through different channels (Rupees/Kg)

Sr. No.	Particulars	Channel 1	% of consumer price	Channel 2	% of consumer price	Channel 3	% of consumer price
1	**Price received by grower**	150	100	150	75	135	66.18
2	**Marketing Cost Incurred by grower/producer**	1.7	1.13	2.7	1.35	2.7	1.32
i)	**Washing and packing charges**	0.9	0.6	0.9	0.45	0.9	0.44
ii	**Transportation Charges**	0	0	1	0.5	1	0.49
iii	**Packing Material**	0.8	0.53	0.8	0.4	0.8	0.39
3	**Net price receive by growers**	148.3	98.87	147.3	73.65	132.3	64.85
4	**Marketing Cost incurred by wholesaler**	-	-	-	-	22.4	10.98
i)	**Handling**	-	-	-	-	2	0.98
ii	**Wastage**	-	-	-	-	15	7.35
iii	**Commission**	-	-	-	-	3.4	1.67
iv	**Market fee**	-	-	-	-	2	0.98
5	**Sale price of wholesaler**	-	-	-	-	165	80.88
6	**Gross margin of wholesaler**	-	-	-	-	30	14.71
7	**Net margin of wholesaler**	-	-	-	-	7.60	3.73
8	**Cost incurred by retailer**	-	-	29	14.5	24.8	12.16
i)	**Wastage**	-	-	21	10.5	18	8.82
ii	**Transportation**	-	-	2	1	2	200

iii	**Loading and Unloading**	-	-	2.8	1.4	2.8	1.37
iv	**Commission**	-	-	3.2	1.6	2	0.98
9	**Gross margin of retailer**	-	-	50	25	39	19.12
10	**Net margin of retailer**	-	-	21	10.5	14.2	6.96
11	**Sale price of retailer**	150	100	200	100	204	100
12	**Consumer purchase price**	150	100	200	100	204	100
13	**Price spread**			50		69	

The results (Table 5.11) revealed that the net price received by the growers in channel-1 is the highest at Rs.148.30 per kg of mushrooms followed by channel -2 (Rs. 147.3 per kg) and channel-3 at Rs. 132.3 per kg. Similar results were shown by Singh (2014) from Punjab state. The net margin by the retailer was the highest in channel-2 at Rs. 21 whereas it was Rs. 14.2 in channel-3. The price spread worked out for channel-2 and channel-3 was Rs. 50 and Rs. 69 per kg respectively. It shows that as the number of intermediaries' increases, price spread also increases (Mahajan and Thakur, 2025).

5.12 Marketing Efficiency: Marketing efficiency demonstrates the extent to which the various marketing firms were able to transfer mushrooms from growers to buyer's at the most affordable price while maintaining the highest level of customer's satisfaction along the supply chain. The marketing efficiency of the mushroom has been calculated using shepherd's formula. It is viewed from the results (Table 5.12) that channel-1 has the highest marketing efficiency of 87.24 followed by channel-2 (2.8). The producer's share in the consumer's rupee was also highest for channel-1 (98.87%) but this channel was not much efficient from the sale point of mushrooms because it could only absorb 10.55 per cent of the produce. Similar results were shown by Koundal and Kumar (2024) from Solan district of Himachal Pradesh. Channel-2 was the important channel from the sale point of mushroom as it absorbs 48.16 per cent of the total produce and was used by 54 mushroom growers and has 73.65 per cent of the producer's share in the consumer's rupee. The difference in the marketing efficiency of channel-2 and channel-3 was due to the fact that more number of intermediaries was involved in channel -3 than the channel-2 that is why channel-3 has less marketing efficiency (1.85) than the channel-2 (2.8) (Mahajan and Thakur, 2025).

Table 5.12: Channel wise marketing efficiency of mushroom production in the study area

Sr. No.	Particulars	Marketing Channels		
		Channel 1	**Channel 2**	**Channel 3**
1.	Price paid by consumer	150	200	204
2.	Total marketing cost	1.7	31.7	49.9
3.	Total marketing margin	-	21	21.8
4.	**Marketing efficiency index**	**87.24**	**2.8**	**1.85**
5.	Net producer price	148.3	147.3	132.3
6.	**Producer's share in consumer's rupee%**	**98.87**	**73.65**	**64.85**

CHAPTER 6
PRODUCTION ECONOMICS AND MARKETING ASPECTS OF OYSTER MUSHROOM

Mushroom cultivation is suitable for the regions like Himachal Pradesh where the climatic conditions are quite diversified, majority of farmers are marginal and small and technical support is readily available to the farmers from the experts of State Agricultural University, Krishi Vigyan Kendras and ICAR-Directorate of Mushroom Research, Solan.The state department of horticulture is promoting mushroom production since 1980s by way of providing training to farmers and providing subsidized compost in the initial periods. It is also one of the activities of major ongoing schemes like Agricultural Technology Management Agency (ATMA), Rashtriya Krishi Vikas Yojana (RKVY), and Japan International Cooperation Agency (JICA), etc. Earlier, the pace of adoption of this enterprise by the farmers was low mainly due to the fact that at that time only the button mushroom was used to be grown and that too only winter months of the year. At present, there are different strains of the mushroom like oyster mushroom, milky mushroom which can be grown successfully round the year under natural climatic conditions. As a result, good number of farmers in the state is practicing mushroom production on commercial line and The Kangra region has a temperate climate which is ideal for mushroom cultivation. The moderate temperatures and high humidity levels provide a conducive environment for growing mushroom species such as button mushroom, oyster mushroom and milky mushroom. Therefore, an attempt has been made to examine the cost and return structure, break-even level of production and to find out the pattern and disposal of oyster mushroom through different marketing channels in Kangra district (Saina *et al.,* 2025).

Oyster mushroom production can be cost effective because the raw materials are easily available and the cultivation techniques are simple. It is a good source of protein, fibre, vitamin and minerals. It can be grown in a variety of climates without requiring complex environmental conditions. It can be a sustainable way to use waste materials to produce nutritious food and can be environmentally friendly way to produce food. Oyster mushroom production can help to address food insecurity in developing countries and can improve the economic well-being of the rural communities. This mushroom is popular for its rapid growth, nutritional value and adaptability. Studies on the economic aspects of oyster mushroom production help to understand the potential of this crop as a source of income for the rural communities. These studies also help to identify ways to improve the economic viability of oyster mushroom production through different marketing channels (Saina *et al.,* 2025).

6.1 Input use Pattern:

It is viewed from table 6.1 that for 100 bags, 10kg of spawn was used by both small and large farms. Plant protection is one of the crucial steps in oyster mushroom production as they were used to control the different diseases and thereby to enhance the yield of the crop. In this context, the overall bavistin and formalin used was 18and 161mililitre respectively. The small farms were using more the quantity of bavistin and formalin with quantity of 19 and 174 mililitre respectively than the large farms with a quantity of 16 and 148 mililitre respectively. The overall packing material per 100 bags of oyster mushroom was1.39 kg with small farms were used slightly higher quantity of packing material than large farms as the total production of oyster mushroom per 100 bags on small farms were slightly higher than the large farms. Human labour plays an indispensable role in oyster mushroom production and the total family labor used for 100 bags was 4.74 man days with small having 4.58 man days and large having 4.91 man days. The miscellaneous charged accounted for Rs 231 on overall farm (Saina *et al.,* 2025).

Table 6.1: Input use pattern of Oyster mushroom on sampled farms (Per 100 bags)

Sr. No.	Particulars	Units	Farm Size		
			Small	Large	Overall
	Number of mushroom growers	Number	**40**	**20**	**60**
1.	**Spawn**	Kg	10	10	10
2.	**Spawned compost bags**	10 kg	100	100	100
	Crop protection material				
i)	**Formalin**	Millilitres	174	148	161
ii)	**Bavistin**	Grams	19	16	18
3.	**Electricity Charges**	Rs.	291	213	253
4.	**Family Labour**	Man days	4.58	4.91	4.74
5.	**Packing Material**	Kilograms	1.4	1.38	1.39
6.	**Miscellaneous**	Rs.	252	208	231

6.2 Cost of Production: The cost required to produce 100 compost bags of oyster mushroom has been calculated (Table 6.2) and seen that on overall farms the total cost of production of oyster mushroom was Rs. 14,290 per 100 bags. It is also viewed that the major components of variable costs were labour, spawned compost bags, spawn and the chemicals accounting for 15.03, 10.37, 9.80 and 7.17 per cent of the total cost respectively.

Table 6.2: Cost of production of oyster mushroom on sampled farms (Rupees per 100 bags)

Sr. No.	Particulars	Farm Size		
		Small	Large	Overall
A.	Fixed Cost			
i)	Interest on fixed capital @12%	4,015	2,342	2,845
		(12.27)	(9.66)	(9.84)
ii)	Depreciation Charges			
a)	Buildings (@2% p.a.)	2,463	1,178	1,564
		(14.44)	(9.78)	(10.94)
b)	Depreciation on implements (@10%)	3,346	1,952	2,963
		(19.62)	(16.20)	(20.73)
	Total Fixed cost	9,824	5,472	7,372
		(57.60)	(45.41)	(51.59)
B.	Variable Cost			
i)	Spawn	1,400	1,400	1,400
		(8.21)	(11.62)	(9.80)
ii)	Spawned compost bags	1,500	1,463	1,482
		(8.80)	(12.14)	(10.37)
iii)	Crop Protection Material	1,102	935	1,025
		(6.46)	(7.76)	(7.17)
iv)	Electricity Charges	291	213	253
		(1.71)	(1.77)	(1.77)
v)	Labour charges	2,300	1,988	2,148
		(13.49)	(16.50)	(15.03)
vi)	Packing Material	279	275	277
		(1.64)	(2.28)	(1.94)
vii)	Miscellaneous	252	208	231
		(1.48)	(1.73)	(1.62)
viii)	Total (i to vii)	7,124	6,482	6,816
		(41.77)	(53.79)	(47.70)
ix)	Interest on variable cost	107	97	102
		(0.63)	(0.80)	(0.71)
	Total variable cost	7,231	6,579	6,918
		(42.40)	(54.59)	(48.41)
C.	Total Cost (A+B)	17,055	12,051	14,290
		(100.00)	(100.00)	(100.00)

Note: Figure in parentheses indicate the percentage to the total in each category

When comparison was made between small and large farms, it was found that the total cost of production on small farms (Rs. 17,055) was more than the large farms (Rs. 12,051) per 100 compost bags due to economies of scale. Similar results were obtained by Kumar et.al (2023) from Bhagalpur district of Bihar. It is important to mention here that there were only fifteen oyster mushroom growers in the study area because of less demand and less awareness of the oyster mushroom (Saina *et al.,* 2025).

6.3 Cost and Return analysis of oyster mushroom: The finding also depicts the cost and returns of oyster mushroom on sampled farms. It is visualized fro table 6.3 that the total production per hundred bags of small farms (186kg) was more than that of large farms (180 kg). The gross return also showed the similar trends i.e. gross returns of small farms was more than that of large farms but in case of net returns, the results were opposite i.e. the net returns of large farms was more than that of small farms.

Table 6.3: Return and benefit cost analysis of oyster mushroom on sampled farms (Per 100 bags)

Sr. No.	Particulars	Units	Farm Size		
			Small	Large	Overall
1.	**Total cost**	Rs/100 bags	17,055	12,051	14.290
i)	**Fixed cost**	Rs/100 bags	9,824	5,472	7,372
ii)	**Variable cost**	Rs/100 bags	7,231	6,579	6,918
2.	**Total Production**	Kg/100 bags	186	180	183
3.	**Gross Returns**	Rs/100bags	22,320	21,600	21,960
4.	**Net Returns over Total cost**	Rs/100 bags	5,265	9,549	7,670
5.	**Net Return over Total cost**	Rs/kg	28.31	53.05	41.91
6.	**Returns over Variable cost**	Rs/100 bags	15,089	15,021	15,042
7.	**Net returns over variable cost**	Rs/kg	81.12	83.45	82.20
8.	**Benefit-Cost Ratio**	Ratio	1.31	1.79	1.54

It was due to the fact that the total cost of small farms was more than the large farms. The gross returns of small farms were found to be Rs. 22,320 whereas it was Rs. 21,600 for large farms. It was discovered that in small farms, net return over total cost and over variable cost per 100 bags was Rs. 5,265 and Rs. 15,089 respectively whereas it was Rs. 9,549 and Rs. 15,021 for large farms. The net returns per kg over total and variable costs on overall farms were Rs. 41.91 and Rs. 82.20 respectively. With regard to benefit cost ratio of oyster mushroom, it was found to be 1.31, 1.79 and 1.54 on small, large and overall farms respectively. It is also seen that net return

over variable cost from oyster mushroom per hundred bags were also more which indicate that oyster mushroom is a profitable venture (Saina *et al.,* 2025).

6.4 Break Even Analysis of Oyster Mushroom: Break even output is the level of output at which the mushroom growers will neither face profit nor loss. The result shows (Table 6.4) the break even analysis of oyster mushroom. Break even analysis for small and large reveals that if the large units obtained 53 kg of mushroom valued at Rs. 7,420 and small units obtained 97 kg mushroom valued at Rs. 13,580 then these units will be at no profit and no loss situation. On the overall farms, there will be no profit and no loss situation when there will be a total production of 72 kg valued at Rs. 10,080. The break even output in physical terms reveals that small and large farms would be at no profit and no loss situation if they place at least 52 and 27 compost bags respectively. However, in case of overall farms, the number of compost bags to be placed to have no profit and no loss situation was 39 (Saina *et al.,* 2025).

Table 6.4: Break- even Analysis for oyster mushroom in sampled farms (Rupees per 100 bags)

Sr. No.	Particulars	Farm Size		
		Small	Large	Overall
1.	**Cost of Production**			
i)	**Fixed Cost**	9,824	5,472	7,372
ii)	**Variable Cost**	7,231	6,579	6,918
iii)	**Total Cost**	17,055	12,051	14,290
2.	**Average variable cost**	38.88	36.55	37.8
3.	**Total Production (kg)**	186	180	183
4.	**Selling Price of oyster Mushroom (Rs/Kg)**	140	140	140
5.	**Break-even output (mushrooms in kg)**	97	53	72
6.	**Break-even point (no. of compost bags)**	52	27	39

6.5 Production and Disposal Pattern of Oyster Mushroom: The result (Table 6.5) also highlights the production and disposal pattern of oyster mushroom on sample farms. The overall production of oyster mushroom in the sample farms was found to be 101.33 kg. Out of the total production, 8.16 per cent of the production was consumed at home; the respective figures for small and large growers were 9.49 and 6.67 per cent respectively. The proportion of production given in the form of gifts was 2.87 per cent with small and large farms having percentage of 4.38 and 1.11 per cent respectively. The overall marketed surplus of oyster mushroom was 82.83 per

cent and in this case also the marketed surplus had a positive relation with the size of farm. As the size of the farm increases, the marketed surplus also increases (Saina *et al.,* 2025).

Table 6.5: Production and disposal pattern of oyster mushroom on sampled farms (Kg/farm)

Sr. No.	Particulars	Farm Size		
		Small	**Large**	**Overall**
1.	**Production**	88.89	120.00	101.33
		(100.00)	(100.00)	(100.00)
2.	**Self-Consumption**	8.44	8.00	8.27
		(9.49)	(6.67)	(8.16)
3.	**Payment in kinds**	1.22	2.50	1.73
		(1.37)	(2.08)	(1.71)
4.	**Gifts**	3.89	1.33	2.87
		(4.38)	(1.11)	(2.83)
5.	**Marketable surplus**	75.34	108.17	88.46
		(84.76)	(90.14)	(87.30)
6.	**Losses**	2.89	7.00	4.53
		(3.25)	(5.83)	(4.47)
7.	**Marketed surplus**	72.45	101.17	83.93
		(81.51)	(84.31)	(82.83)

Note: Figure in parentheses indicate the percentage to the total in each category

6.6 Marketing Channels for Oyster Mushroom in the Study Area: Marketing channel are the route through which the produce they changes hands from producer to consumer. Marketing functionaries serve as a link between the producer and consumers throughout the entire marketing process. Marketing channels significantly impact the disposal and the sale of the produce. There was only one intermediary that was involved between producer and consumer i.e retailers in case of oyster mushroom in the study area. Effective utilization of the marketing channels can help mushroom growers to increase the profitability from the produce. The two main marketing channels that were involved in the marketing of oyster mushroom in the study area were as follow:

Channel 1: Mushroom grower ⇨ Consumer

Channel 2: Mushroom grower ⇨ Retailer ⇨ Consumer

6.7 Marketing of Oyster Mushroom on Sample Farms: It is evident (Table 6.6) that only two channels were used in the disposal of oyster mushroom i.e. Channel-1 and Channel-2. Channel-2 (Mushroom grower--- Retailer--------Consumer) was the widely used channel by which 88.65 per cent of the total produce was marketed by 57.69 per cent of the total growers. Only 11.35 per cent of the total produce was disposed of by channel-1. Channel -3 in which wholesaler and retailer are involved between producer and consumer was not used because there were very less number of oyster mushroom grower. Also, very less number of oyster bags were kept by the mushroom growers as the demand for the oyster mushroom is not much because the people are not much aware of this species of mushroom (Saina *et al.,* 2025).

Table 6.6: Pattern and disposal of Oyster mushroom on sampled farms

Sr. No.	Particulars	Farm Size					
		Small		Large		Overall	
		No.	Qty. (kg)	No.	Qty.(kg)	No.	Qty.(kg)
1.	Mushroom Grower →Consumer	7	7.67	4	12.33	11	9.53
		(43.75)	(10.59)	(40.00)	(12.19)	(42.31)	(11.35)
2.	Mushroom Grower →Retailer	9	64.78	6	88.83	15	74.40
		(56.25)	(89.41)	(60.00)	(87.81)	(57.69)	(88.65)
3.	Mushroom Grower →Wholesaler	-	-	-	-	-	-
		-	-	-	-	-	-
	Total	16	72.45	10	101.16	26	83.93
		(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

CHAPTER 7

COMPARATIVE ASPECTS OF BUTTON MUSHROOM VS. OYSTER MUSHROOM

When comparing button mushrooms and oyster mushrooms in terms of cost, returns and marketing, oyster mushroom generally has a lower production cost due to simpler cultivation requirements, while button mushrooms often command a higher market price due to greater consumer familiarity resulting in potentially higher returns per kilogram. However, factors like local market demand and production practices can significantly influence these dynamics. Higher production costs of button mushrooms are attributed to the need for specialized training in compost preparation, stricter environmental controls, and a longer cultivation cycle when compared with oyster mushrooms which has a lower costs because of the fact that its ability to grow on readily available substrate like straw or sawdust; it requires less stringent environmental control and has faster growth cycle. Secondly, the returns from button mushrooms are potentially higher per kg which is due to higher market price because of wider consumer acceptance and market demand has already established. On the other hand, lower returns per kg of oyster mushrooms may be due to lower market price compared to button mushrooms and potentially has oversupply in certain market. As for its marketing aspects are concerned, button mushrooms are widely recognized by the consumers and are commonly used in traditional dishes and it require less marketing efforts to reach to consumers, while oyster mushrooms require more marketing to educate consumers on its taste and versatility and can be marketed as a sustainable option due to its ability to grow on waste materials (Mahajan *et al.,* 2025).

The relative profitability of each of these two mushrooms type can vary greatly depending on local market demand and consumer preference. The large scale production can often reduce costs per unit for both types of mushroom. Advancements in cultivation techniques can significantly impact production costs and market competitiveness for both button and oyster mushrooms. The mid-hills of Himachal Pradesh, with their unique climatic conditions, present a compelling case for comparing button and oyster mushroom cultivation to inform regional agricultural policy. Despite the growing interest in oyster mushroom cultivation as a cost-effective alternative, limited research has explored its comparative profitability and market dynamics against the well-established button mushroom industry. Keeping all these facts in mind, the investigation was undertaken with the goal of comparing costs, returns, and marketing channels for the two mushroom types in Kangra valley (Mahajan *et al.,* 2025).

7.1 Capital Investment: The investment on farm implements and machinery is very crucial as proper investment in implements and machinery reduces labor cost and enhances the productivity of the crop. The investment on farm implements is a significant source of capital formation. In this context, the investment on farm implements and machinery was studied.

Table 7.1: Capital Investment on Farm implements, tools and asset on sampled farms (Per farm)

Sr. No.	Particulars	Small		Large		Overall	
		Number	Value (Rs)	Number	Value (Rs)	Number	Value (Rs)
1	Mushroom House	0.78 (5.16)	1,33625 (78.63)	1 (2.54)	2,97,500 (75.12)	0.86 (3.71)	1,88,250 (76.74)
2	Iron Racks	3.03 (20.03)	21,100 (12.42)	7.45 (18.93)	44,700 (11.29)	4.5 (19.50)	28,967 (11.81)
3	wooden Racks	3.95 (26.11)	9,875 (5.81)	17.10 (43.46)	24,750 (10.79)	8.33 (35.94)	20,833 (8.49)
4	Thermometer	0.40 (2.64)	120 (0.07)	0.60 (1.52)	180 (0.05)	0.47 (2.03)	140 (0.06)
5	Tank for boiling Dhingri straw	0.23 (1.52)	113 (0.07)	0.60 (1.52)	300 (0.08)	0.35 (1.51)	175 (0.07)
6	Bucket	2.03 (13.42)	203 (0.12)	3.50 (8.89)	350 (0.09)	2.52 (10.87)	252 (0.10)
7	Hygrometer	0.38 (2.51)	188 (0.11)	0.75 (1.91)	375 (0.09)	0.50 (2.16)	250 (0.10)
8	Room Heater	0.15 (0.99)	150 (0.09)	0.55 (1.40)	550 (0.14)	0.28 (1.21)	283 (0.12)
9	Exhaust Fan	1.08 (7.14)	1,075 (0.63)	2.25 (5.72)	2,250 (0.57)	1.47 (6.34)	1,467 (0.60)
10	Cooler	0.08 (0.53)	338 (0.20)	0.25 (0.64)	1,125 (0.28)	0.13 (0.56)	600 (0.24)
11	Blower	0.53 (3.50)	788 (0.46)	1.05 (2.67)	1,575 (0.40)	0.7 (3.02)	1,050 (0.43)
12	Foot Spray Pump	0.33 (2.18)	488 (0.29)	1 (2.54)	1,500 (0.38)	0.55 (2.37)	825 (0.34)
13	Hand spray Pump	0.7 (4.63)	490 (0.29)	0.9 (2.29)	630 (0.16)	0.77 (3.32)	537 (0.22)
14	weighing Machine	0.73 (4.82)	508 (0.30)	1.1 (2.80)	770 (0.19)	0.85 (3.67)	595 (0.24)

15	**Packing Machine**	0.73 (4.82)	870 (0.51)	1.25 (3.18)	1,500 (0.38)	0.9 (3.88)	1,080 (0.44)
	Total cost of equipments	14.35 (94.84)	36,306 (21.37)	38.35 (97.46)	98,555 (24.88)	22.32 (96.29)	57,054 (23.26)
	Total capital investment	15.13 (100.00)	1,69,931 (100.00)	39.35 (100.00)	3,96,055 (100.00)	23.18 (100.00)	2,45,304 (100.00)

Note: Figures in the parentheses indicate percentages to the total in each category.

It is analyzed (Table 7.1) that the highest percentage of investment was made on mushroom house which accounts for 76.74 per cent of the total investment which ranges from 78.63 per cent on small farms and 75.12 per cent on large farms. The second highest investment was made on iron racks (11.81%) followed by wooden racks (8.49%). Exhaust fans, thermometer, hygrometer, room heater, spray pump, and bucket etc. were the other implements on which the investment was made. The overall investment on equipment's accounts for 23.26 per cent of the total capital investment and it varies from 21.37 per cent on small farms to 24.88 per cent on large farms. The total capital investment was more in large farms (Rs. 3, 96,055) than the small farms (Rs. 1, 69,931). The overall investment on overall farms accounts for Rs. 2, 45,304 (Mahajan *et al.,* 2025).

7.2 Classification of Mushroom Growers According to Crops Taken in a Year:

The mushroom growers were divided on the basis of number of mushroom crops taken in a year. The result (Table 7.2) revealed that the total sample of 60 mushroom growers were taken out of which fifty per cent of the growers had taken one crop of button mushroom in a year followed by two crops of button mushroom (25%). Only 8.33 per cent of the total population were growing one crop of button mushroom and one crop of oyster mushroom. When comparison was made between small and large farms, it was found that 75 per cent of the total population from small farms had grown one crop of button mushroom but in case of growing two crops of button mushroom, the percentage of large farms (70%) were more than the small farms (2.5 %) (Mahajan *et al.,* 2025).

Table 7.2: Classification of number of mushroom growers according to crops taken in a year in the study area

(Number/annum)

Sr. No.	Particulars	Farm Size		
		Small	**Large**	**Overall**
1.	**One crop of button mushroom**	30	-	30
		(75.00)	-	(50.00)
2.	**Two crops of button mushroom**	1	14	15
		(2.50)	(70.00)	(25.00)
3.	**One crop of button and one crop of oyster mushroom**	5	-	5
		(12.50)	-	(8.33)
4.	**Two crop of button and one crop of oyster mushroom**	4	6	10
		(10.00)	(30.00)	(16.67)
	Total	40	20	60
		(100.00)	(100.00)	(100.00)

Note: Figure in parentheses indicate the percentage to the total in each category

7.3 Input use Pattern: The various inputs which were used in the mushroom production have been presented. Spawn is an additional input which is used in oyster mushroom only and was used to the extent of 10 kg per hundred bags in the study area. It is viewed (Table 7.3) that 100 compost bags of each weighing 20 kg were used for both type of mushroom in the study area. The packing material used for 100 bags of button mushroom was 2.43 kg while, it was only 1.30 kg in case of oyster mushroom because the production of oyster mushroom was less than the button mushroom so packing material required was less for oyster mushroom. Plant protection is one of the vital steps in both types of mushroom as they were used to control the different diseases and to enhance the yield of mushrooms. Formalin was mainly used for sterilizing the room before putting the bags in the room. The quantity of bavisin and formalin used was more in case of button mushroom than in oyster mushroom because both the chemicals were added during the process of compost preparation i.e. during boiling of straw. The transportation cost was also incurred during the process of marketing which was Rs. 488 for button mushroom as against nil in oyster mushroom on sampled farms. The human labour plays an essential role in mushroom production and for button mushroom, labour used for 100 bags was 19 man days

which was much more than the oyster mushroom which stood at 4.74 man days only (Mahajan *et al.,* 2025).

Table 7.3: Input use pattern of Button and Oyster mushroom on sampled farms (Per 100 bags)

Sr. No.	Particulars	Units	Type of Mushroom	
			Button Mushroom	Oyster Mushroom
1.	**Spawn**	Kg	-	10
2.	**Compost Bags (20 kg)**	Number	100	100
3.	**Packing Material**	Kg	2.43	1.39
4.	**Plant Protection**			
i)	**Formalin**	Millilitre	173.45	161
ii)	**Bavistin**	Grams	101.29	18
5.	**Electricity charges**	Rs.	312	253
6.	**Transportation charges**	Rs.	488	-
7.	**Human Labour (man days)**	Man days	19	4.74
8.	**Miscellaneous**	Rs.	380	231

7.4 Labor Utilization:

Mushroom cultivation is a labor intensive work as it requires labour from cultivation to harvesting for various purposes like putting bags into the racks, watering, maintenance, harvesting, washing and packing, etc. Efficient management by the labor will directly impact the production and profitability of mushrooms. The labor duration engaged in different operation in mushroom production has been converted into man days in order to calculate the labour employment. In this context, the information on the labour utilization pattern of button mushroom is also seen (Mahajan *et al.,* 2025).

It is seen from table 7.4 that the total labor required for performing various operations in button mushroom production varied from 18 man days on small farms to 19 man days on large farms per 100 bags. It can also be viewed that labor used in the overall farm per 100 bags was highest for harvesting operations followed by washing and packaging which accounted for 34.97 per cent and 28.47 per cent respectively. The next highest labor usage was found in watering and medicine spray accounting for 24.83 per cent and 8.98 per cent. When comparison was made between small and large farms, it was found that more percentage of labor in large farms was used only in case of watering (26.66%) and washing and packaging (29.62%) than the small

farms. The overall family labor used was approximately 16 man days with small farms having more man days (17 man days) than large farms (15 man days). Very less hired labor was used on overall farm for mushroom production with large farms using more hired labor than the small farms (Mahajan *et al.,* 2025).

Table 7.4: Combined Labour utilization pattern of Button and Oyster mushrooms on sampled farms (Man days/100bags)

Sr. No.	Particulars	Farm Size		
		Small	**Large**	**Overall**
1.	**Putting bags in rack**	0.64	0.47	0.52
		(3.53)	(2.44)	(2.75)
2.	**Watering**	3.67	5.14	4.70
		(20.23)	(26.66)	(24.83)
3.	**Medicine spray**	1.78	1.67	1.70
		(9.81)	(8.66)	(8.98)
4.	**Harvesting**	7.40	6.29	6.62
		(40.79)	(32.62)	(34.97)
5.	**Washing and packing**	4.65	5.71	5.39
		(25.63)	(29.62)	(28.47)
	Total Labour	18.14	19.28	18.93
		(100)	(100)	(100)
i)	**Hired Labour**	0.95	4.5	3.43
ii)	**Family Labour**	17.19	14.78	15.50

Note: Figures in parentheses indicate the percentage to the total in each category

7.5 Cost of Production: The cost required for 100 compost bags of both button and oyster mushrooms have also been presented in table 7.5. The total cost components were divided into fixed and variable cost components. The fixed cost components include the factors such as depreciation charges on mushroom building and implement, interest on fixed capital whereas the variable cost include the factors like outlays on compost bags, packing material, cost protection material, electricity, transportation and labor charges and miscellaneous charges. It is seen that total cost of production on oyster mushroom was to the tune of Rs. 14,290 per 100 bags which was less than that of button mushroom (Rs. 26,966 per 100 bags). This was due to the fact that oyster mushroom usually grown in March-April so it doesn't require much temperature maintenance so there is less use of electricity than that of button mushroom. Second the cost of

production of oyster mushroom compost bags was also less than the button mushroom. The result also does reflect that fixed cost of button mushroom constitutes 27.31 per cent of the total cost which was half of that of oyster mushroom (51.59 %). The share of variable cost in the total cost of producing both types of mushrooms was more in case of button mushroom which was to the extent of 72.69 per cent than in oyster mushroom which stood at 48.41 per cent. The investment on the compost bags was the major component of variable cost amounting to Rs. 10,100 per 100 bags i.e. 37.41 per cent of the total cost in case of button mushroom while, for oyster mushroom it was just Rs. 1,482 per hundred bags which was 10.37 per cent of the total cost. The next highest investment in button mushroom was made on human labor followed by transportation charges with a percentage of 28.05 per cent and 1.81 per cent of the total cost respectively. On the contrary in case of oyster mushroom, the investment on labor followed by spawn was to the extent of 15.03 per cent and 9.80 per cent of the total cost respectively. On one hand the investment made on crop protection material in button mushroom was just 0.77 per cent of the total cost but on the other hand in case of oyster mushroom, it was 7.17 per cent of the total investment. This indicates that the quantity of chemical used in oyster mushroom was much more than that of button mushrooms because the chemical were added during the boiling of straw. It is also important to mention here that there were only fifteen oyster mushroom growers in the research area because of less demand and less awareness of oyster mushroom (Mahajan *et al.,* 2025).

Table 7.5: Cost of production of button mushroom and oyster mushrooms on sampled farms (Rupees/100 bags)

Sr. No.	Particulars	Type of Mushroom	
		Button Mushroom	**Oyster Mushroom**
A.	**Non-Recurring Expenditure (Fixed Cost)**		
i)	**Interest on fixed capital @12%**	2,845	2,845
		(10.54)	(19.91)
ii)	**Depreciation Charges**		
a)	**Buildings (@2% p.a.)**	1,564	1,564
		(5.79)	(10.94)
b)	**Depreciation on implements (@10%)**	2,963	2,963
		(10.98)	(20.73)
	Total Fixed cost	7,372	7,372
		(27.31)	(51.59)

B.	**Recurring Expenditure (Variable Cost)**		
i)	**Spawn**	-	1,400
			(9.80)
ii)	**Compost Bags**	10,100	1,482
		(37.41)	(10.37)
iii)	**Packing material**	274	277
		(1.01)	(1.94)
iv)	**Plant protection**	208	1,025
		(0.77)	(7.17)
v)	**Electricity charges**	312	253
		(1.16)	(1.77)
vi)	**Transportation charges**	488	-
		(1.81)	-
vii)	**Labour charges**	7,572	2,148
		(28.05)	(15.03)
viii)	**Miscellaneous**	380	231
		(1.41)	(1.62)
ix)	**Total (i to vii)**	19,334	6,816
		(71.62)	(47.70)
x)	**Interest on Recurring Expenditure (variable cost) (@12 % for 1.5 months)**	290	102
		(1.07)	(0.71)
	Total Recurring Expenditure (Total Variable Cost)	19,624	6,918
		(72.69)	(48.41)
C.	**Total cost (A+B)**	26,996	14,290
		(100.00)	(100.00)

Note: Figure in parentheses indicate the percentage to the total in each category

7.6 Costs and Returns Analysis: The findings depict the comparative costs and return of both button and oyster mushrooms on sampled farms. It is seen from table 7.6 that the total production of mushrooms per 100 compost bags was more on button mushroom (347.30 kg) than the oyster mushroom (180 kg). The gross returns of button mushroom were found to be Rs. 45,149 where as for oyster mushroom it was Rs. 21,960. The net return over total cost and over variable cost per hundred bags of button mushroom accounts for Rs. 18,153 and Rs. 25,525 respectively

whereas for oyster mushroom the respective amount was Rs. 7,670 and Rs. 15,042 respectively. The net return per kg over total cost and over variable cost were Rs.52.27/kg and Rs. 73.50/kg respectively for button mushroom while the respective statistics in case of oyster mushroom were Rs. 41.91/kg and Rs. 82.20/kg respectively. This suggests that net return per kg over variable cost was higher in oyster mushroom than in button mushroom. This is because of low variable cost required for the cultivation of oyster mushroom on the sampled farms of the study area. The benefit cost ratio of button mushroom was 1.67 as against 1.54 in case of oyster mushroom. All the above facts indicate that cultivation of button mushroom is a profitable venture than oyster mushroom in the research area (Mahajan *et al.,* 2025).

Table 7.6: Return and benefit cost analysis of button mushroom and oyster mushroom on sampled farms

Sr. No.	Particulars	Units	Type of Mushroom	
			Button Mushroom	Oyster Mushroom
1.	**Total cost**	Rupees/100 bags	26,996	14.290
i)	**Fixed cost**	Rupees/100 bags	7,372	7,372
ii)	**Variable cost**	Rupees/100bags	19,624	6,918
2.	**Total Production**	Kilograms/100bags	347.3	183
3.	**Gross Returns**	Rupees/100bags	45,149	21,960
4.	**Net Returns over Total cost**	Rupees/100bags	18,153	7,670
5.	**Net Return over Total cost**	Rs/kg	52.27	41.91
6.	**Net Returns over Variable cost**	Rupees/100bags	25,525	15,042
7.	**Net Return over Variable cost**	Rs/kg	73.50	82.20
8.	**Net returns per rupee of investment**	Rupees	0.67	0.54
9.	**Benefit-Cost Ratio**	Ratio	1.67	1.54

7.7 Breakeven Analysis: Breakeven output is the level of output at which mushroom grower will neither face profit nor loss. In other words, in economic terms, it is that output level where the total revenue and the total cost curve intersects and the profit is zero at this level. The comparative breakeven analysis of button and oyster mushroom has also been analysed (Table 7.7). Breakeven output for button mushroom from the analysis reveals that if the mushroom grower receives 100 kg of production valued at Rs.13000 then the button mushroom grower will be at no profit and no loss situation under the given input and output regime. Likewise, oyster mushroom growers will be at no loss and no profit situation when they produce 72 kg of oyster

mushroom valued at Rs. 10,080. The oyster mushroom growers had less breakeven output because of low average variable cost of production of Rs. 37.8 per kg. The breakeven output in physical terms or in terms of number of compost bags placed reveals that growers of button mushroom and oyster mushroom will be at no loss and no profit situation if they placed at least 33 and 39 compost bags respectively (Mahajan *et al.,* 2025).

Table 7.7: Break-even analysis of button and oyster mushroom (Rupees per 100 bags)

Sr. No.	Particulars	Type of Mushroom	
		Button Mushroom	Oyster Mushroom
1.	**Cost of Production**		
i)	**Fixed Cost**	7,372	7,372
ii)	**Variable Cost**	19,624	6,918
iii)	**Total Cost**	26,996	14,290
2.	**Average Variable cost**	56.50	37.80
3.	**Total Production (kg)**	347.3	183
4.	**Selling Price of Mushroom (Rs/Kg)**	130	140
5.	**Break-even output (mushrooms in kg)**	100	72
6.	**Break -even point (No. of compost bags)**	33	39

7.8 Production and Disposal Pattern: The result also highlights the production and disposal pattern of button and oyster mushroom simultaneously on sampled farms (Table 7.8). The production of button mushroom in the sample farms was found to be 8.36 quintal per farm. On the contrary, the respective figure for oyster mushroom was found to be 101.3 kg per farm. Out of the total production of button mushroom, 1.91 per cent of the production was consumed at home; the respective figure for oyster mushroom was 8.16 per cent. The proportion of production given in the form of gift was 0.60 per cent in case of button mushroom and 2.87 per cent in case of oyster mushroom. As for as marketed surplus is concerned, it was 94.26 per cent for button mushroom while it was 82.83 per cent in case of oyster mushroom. Thus, it can be concluded from the analysis that out of the total production of button mushroom, about 94 per cent was available for sale and remaining 3 per cent was used for other purposes like home consumption, gifts to relatives, friends and neighbour and kind payments and a loss of nearly 3 per cent; the respective figures for oyster mushroom were 83 per cent and 13 per cent and there was a loss of approximately 4 per cent respectively (Mahajan *et al.,* 2025).

Table 7.8: Production and disposal pattern of button mushroom and oyster mushroom on sampled farms

Sr. No.	Particulars	Type of Mushroom	
		Button Mushroom (Quintal/farm)	**Oyster Mushroom (Kg/farm)**
1.	**Production**	8.36	101.33
		100	(100.00)
2.	**Self- Consumption**	0.16	8.27
		(1.91)	(8.16)
3.	**Payment in kinds**	0.02	1.73
		(0.24)	(1.71)
4.	**Gifts**	0.05	2.87
		(0.6)	(2.83)
5.	**Marketable Surplus**	8.13	88.46
		(97.25)	(87.30)
6.	**Losses**	0.25	4.53
		(2.99)	(4.47)
7.	**Marketed Surplus**	7.88	83.93
		(94.26)	(82.83)

Note: Figures in parentheses indicate the percentage to the total in each category

7.9 Marketing of Mushroom: The final objective of every commercial activity is to guarantee an efficient market for its product. The marketing of mushrooms include all the processes, agencies and channels which are involved to transfer the produce from mushroom growers to consumers. Marketing plays an indispensable role in production of both types of mushrooms since it has the power to influence remunerative prices, which in turn influences production incentives. If the marketing system is not effective and efficient, the production cannot fetch remunerative prices. In view of this head, an attempt has been made to describe the existing marketing system for the button and oyster mushroom cultivation in the study area (Mahajan *et al.,* 2025).

7.10 Marketing Channels: The route or the path through which the commodity passes from producer to ultimate consumer is known as marketing channel. Market functionaries serve as a link between producer and consumer throughout the entire marketing process. Marketing

channels significantly impact the disposal and sale of the produce. There were two different intermediaries that were involved between producer and consumer i.e. retailers and wholesalers. Effective utilization of marketing channels can help mushroom growers to increase profitability from the produce the marketing channels that were involved in the marketing of button and oyster mushrooms were as follow (Mahajan *et al.,* 2025):

Channel	**Button Mushroom**	**Oyster Mushroom**
Channel 1	Mushroom Grower — Consumer	Mushroom Grower — Consumer
Channel 2	M.G. — Retailer — Consumer	M.G. — Retailer — Consumer
Channel 3	Mushroom Grower —Wholesaler — Retailer — Consumer	Missing

It is evident from table 7.9 that in case of button mushroom, 40.60 per cent of the mushroom growers followed channel-2. The total quantity of mushroom that was marketed through this channel was 48.16 per cent of the total production. The second important channel for button mushroom was channel -3 through which 41.30 per cent of the produce was marketed by 24.06 per cent of the mushroom growers. Only 10.55 per cent of the total produce was disposed through channel-1 and this channel was used by 35.34 per cent of the total mushroom growers (Mahajan *et al.,* 2025).

Table 7.9: Pattern and utilization of button mushroom and oyster mushroom on sampled farms

Sr. No.	**Particulars**	**Type of Mushroom**			
		Button Mushroom		**Oyster Mushroom**	
	Channel	**No.**	**Qty.(q/farm)**	**No.**	**Qty.(kg/farm)**
1.	**Mushroom Grower →Consumer**	47	0.83	11	9.53
		(35.34)	(10.55)	(42.31)	(11.35)
2.	**Mushroom Grower →Retailer---Consumer**	54	3.79	15	74.4
		(40.60)	(48.16)	(57.69)	(88.65)
3.	**Mushroom Grower →Wholesale---Retailer---Consumer**	32	3.25	-	-
		(24.06)	(41.30)	-	-
	Total	133	7.87	26	83.93
		(100.00)	(100.00)	(100.00)	(100.00)

Note: Figures in parentheses indicate the percentages to the total in each category

In comparison in case of oyster mushroom only two channels were used in the disposal of the produce i.e. Channel-1 and channel-2. Channel-2 was the widely used channel by 88.65 per cent of the total produce was marketed by 57.69 per cent of the total growers. Only 11.35 per cent of the total produce was disposed of by channel-1. Channel -3 was missing because there were very less numbers of oyster mushroom growers. Very less number of oyster mushroom bags were kept by the mushroom growers as the demand of oyster mushroom is not much because the people are not much aware of this species of mushroom (Mahajan *et al.,* 2025).

CHAPTER 8

PROBLEMS AND CONSTRAINTS IN MUSHROOM CULTIVATION

8.1 Problems and Constraints in Mushroom Cultivation: In addition to the marketing aspects of mushrooms by examining the marketing channels, marketing costs, margin, price spread, marketing efficiency and producer's share in the consumer's rupee of button mushrooms, a considerable scope exist for identifying the major constraints faced by the growers in cultivating mushrooms. Such an analysis has profound impact while making the policy implication of any study. In this context, the survey was also conducted to identify the various problems and constraints encountered by mushroom growers during mushroom production. The constraints that the mushroom grower had to deal with were categorized into four sub-heads which were production problem, marketing problem, institutional problem and social problem. Garrett's ranking technique was used to analyse the various problems (Mahajan and Thakur, 2025).

It is viewed (Table 8.1) from the analysis that in case of production problems, the problem of insect-pests and diseases was found to be the most significant and was ranked first with average Garrett score of 65.00. The second important production problem that the mushroom grower faced was the non-availability of spawned compost bags at appropriate time followed by non-availability and costly labour with average Garrett score of 59.07, 49.68 and 38.03 respectively. Non availability of insecticide and fungicide was ranked last with a Garrett score of 37.30 (Mahajan and Thakur, 2025).

In case of marketing problems, the first major problem was the lack of storage facilities followed by difficulty in disposal of produce due to lack of specialized agencies with Garrett score of 73.75 and 57.33 respectively. The third major marketing problem was high transportation charges with average Garrett score of 55.00. Moreover, the problems such as lack of knowledge about processing, low price of produce, lack of marketing information and low level of marketable surplus were the medium level constraints and were ranked as fourth, fifth, sixth and seventh with an average Garrett score of 49.58, 42.33, 38.75 and 36.25 respectively (Mahajan and Thakur, 2025).

The result also depicts the institutional constraints encountered by the mushroom grower where the major constraint was the lack of supply of package of practice in Hindi followed by insufficient extension staff with an average mean value of 58.23 and 55.70 respectively. Inadequate training facility was the least problem with Garrett score of 36.04. Two types of social problems were faced by the mushroom growers in the study area in which lack of interest of the family members in the mushroom cultivation ranked first with Garrett score of 54.33 and non-availability of space ranked second with Garrett score of 45.67 (Mahajan and Thakur, 2025).

Table 8.1: Problems and constraints in mushroom cultivation:

Sr. No.	Particulars	Sum of Score	Mean	Rank
A	**Production Problems**			
1.	Nom-availability of spawn compost bags at appropriate time	3544	59.07	II
2.	Problem of insects, pests and diseases	3900	65.00	I
3.	Non-availability of labour	2981	49.68	III
4.	Non availability of insecticide and fungicides	2238	37.30	V
5.	Costly labour	2282	38.03	IV
B	**Marketing Problems**			
1.	Disposal of produce is difficult due to lack of specialized agencies	3440	57.33	II
2.	Low level of marketable surplus	2175	36.25	VII
3.	High transportation charges	3300	55.00	III
4.	Lack of market information	2325	38.75	VI
5.	Lack of storage facilities	4425	73.75	I
6.	Low prices of produce	2540	42.33	V
7.	Lack of knowledge about processing	2975	49.58	IV
C	**Institutional Problems**			
1.	Inadequate training facilities	2164	36.04	III
2.	Insufficient extension staff	3342	55.70	II
3.	Lack of supply of package of practices in Hindi	3494	58.23	I
D	**Social Problems**			
1.	Lack of interest of family members in mushroom cultivation	3260	54.33	I
2.	Inadequate space	2740	45.67	II

CHAPTER 9

CONCLUSION AND POLICY IMPLICATIONS

With the ever-increasing demand for quality foods, mushroom cultivation is emerging as an important activity in different part of the country as was evident from the ever-proliferating research studies (Mahajan and Saina, September, 2025). This activity requires very little land and can be a source of employment for small and landless farmers, educated youth and women. With this background in view the study was undertaken with the objectives of examining the socio-economic impact of mushroom cultivation of sampled households; economic analysis of production and marketing of both button and oyster mushrooms; their comparative study on costs, returns and marketing perspective and the problems and constraints faced by the mushroom growers in mushroom cultivation in mid hills of Kangra valley of H.P. Kangra district of Himachal Pradesh was selected purposively. In this study, first the farmers were categorized into two categories, small (<300 bags) and large (> 300 bags); based on the number of compost bags they kept by using cumulative square-root frequency method. 60 respondents were selected purposefully from 7 randomly selected blocks of the district for primary data collection on various aspects of button mushroom production.

The results of the socio-economic structure of sampled farms revealed that the average size of family consisted of 4-5 and 6-8 members (33.33%). The small farms had more proportion of 4-5 members and in case of large farms there were more proportion of 6-8 members. The study revealed that the majority of the families were joint (51.67%). Another sticking point that emerged from the study was that 63.33 per cent of the total mushroom growers fell in the age groups of 40-60 years. In case of small farms, the maximum number of mushroom growers was in the age group of 25-40 (42.50%) whereas in case of large farms maximum growers were in the age group of 40-60 years (85%). It was discovered that not even a single mushroom grower was younger than 25 years old. 71.25 per cent of the total population fell within the working population age range. The overall literacy rate of the heads was 91.67 per cent. The majority of the population were matriculate (38.33 %) followed by senior secondary (31.67%). The overall literacy rate of the population was 96.49 per cent out of which male (99.36 %) has more percentage of literacy rate than female (93.49%). The findings also indicated that as the size of the mushroom unit increases, the total size of land holding as well as the cultivated land decreases. The average cultivated land consists of 0.3033 ha which accounts for 74.34 per cent of the total size of the land holding. The proportion of the head of family having mushroom cultivation as a major source of income was more in case of large farms (60.00%) than the small farms (49.38 %). This depicts that there is a high dependency on mushroom cultivation as a

source of income for large farms. The cost and return analysis of button mushroom suggested that net return over total cost and net return over variable cost increases with increase in size of the mushroom unit which was due to total cost of production of mushroom on small farms was more than large farm. In contrast, reverse was observed for oyster mushroom (Saina *et al*., 2025). The fixed cost of production per 100 bags was more in small farms than on the large farms and it varied from 32.80 per cent in small farms and 22.79 per cent in large farms. Large farms had less total cost of production ie. Rs. 24,013 than the small farms i.e. Rs.29, 947 because there was efficient utilization of resources by the large producers. The gross return of button mushroom per 100 bags ranged between Rs. 40,587 and Rs. 47,109 on small and large farms respectively. The overall net return over total cost and variable cost per kg of mushroom showed positive relation with the size of mushroom unit. The benefit-cost ratio on overall farm was 1.67 with small and large farms had 1.376 and 1.96 respectively. At overall level, the break-even output for button mushroom was achieved at 100 kg of production by placing 33 compost bags. The marketable surplus of button mushroom was 3.21q/farm and 17.93 q/farm on small and large farms respectively, whereas the marketed surplus was 3.10q/farm and 17.42 q/farm respectively. In relation to factors affecting mushroom production, Cobb Dougla's Production Function was run which indicated that number of compost bags, labour used, expenditure on crop protection materials and management index are the significant determinants of mushroom production and productivity suggesting that these factors would lead to mushroom production and productivity of button mushrooms if any one or all these variables are increased simultaneously (Mahajan *et al*., 2026).

The study on the marketing channels of mushrooms in mid hills of Himachal Pradesh reveals significant insights into the efficiency and profitability of different marketing strategies. Channel-1, where producer sell directly to consumers, demonstrate higher efficiency with a producer share of 98.87 % and lower marketing costs. Conversely, channel-2 involving retailers, results in higher marketing costs and lower producer shares at 73.65% in the consumer's rupee. Despite providing retailers with significant margins, channel-2 reduces overall marketing efficiency (2.8). It can also be concluded that although the producer's share in the consumer's rupee was highest in channel-1 (98.87%) but this channel was not much efficient from the sale point of mushrooms as it could only absorb 10.55 per cent of the total produce. Channel-2 was the important channel from the sale point of mushroom as it absorbs 48.16 per cent of the total produce and was used by 54 mushroom growers. Channel-3(Mushroom grower—Wholesaler---Retailer----Consumer) has very less marketing efficiency because of the fact that more number of intermediaries were involved in this channel. It was also concluded that as the number of

intermediaries' increases, price spread also increases. These findings underscore the advantage of direct marketing channels in maximizing producer shares and efficiency. Thus to enhance economic benefits to mushroom growers, agricultural stakeholders and policymakers should consider promoting direct sale to retailer to consumers and should remove too much intermediaries in the marketing process (Mahajan and Thakur, 2025).

The study on the economics and marketing aspects of oyster mushroom brought out that in relation to input use, small farms were used higher quantity of packing material than large farms as the total production of oyster mushroom per 100 bags on small farms were higher than large farms. The total cost of production on small farms was more than large farms which was because of economies of scale. It is important here to mention here that there were only 15 oyster mushroom growers in the study area because of less demand and less awareness of this mushroom. Total production per hundred mushroom bags on small farms were more than that of large farms. The gross return also shows the similar results but, in case of net return the results were opposite. It was due to the fact that total cost of production was more on small farms than on large farms, but the return per rupee invested on large farms were more than small farms. It is also interesting to note in this study that net return over variable cost from oyster mushroom production per hundred bags was also more which suggested that oyster mushroom is a profitable venture in the study area. The break-even analysis suggested that the growers were in no profit and no loss situation when there will be a total production of 72 kg valued at Rs. 10,080 in the overall farm situation. Lastly, in relation to marketing aspect of oyster mushroom, the overall marketed surplus was found out to be 82.83 per cent and in this case marketed surplus had a positive relation with the size of farms. Marketing channels significantly impact the disposal and sale of the produce. The effective utilization of the marketing channels can help growers to increase the profitability from the produce. In this context, only two marketing channels were operated in the study area and these were:

Channel 1 Oyster mushroom growers-----Consumer; and Channel 2 Oyster mushroom Grower---------- Retailer-----Consumer.

Channel 2 was the widely used channel by which 88.65 per cent of the total produce was marketed by 57.69 per cent of the total growers. It was also important to mention here that there were very less number of oyster bags kept by the mushroom growers as the demand for the oyster mushroom is not much as the people are not much aware of this species of mushroom (Saina *et al.,* 2025).

From the comparative analysis of button and oyster mushroom, following point are emerged out from this research study: First, the capital investment on farm building, implements and

machinery revealed that the highest percentage of investment was made on mushroom house which accounts for 76.74 per cent of the total capital investment which ranges from 78.63 per cent on small farms and 75.12 per cent on large farms. Second, out of the 60 mushroom growers, 50 per cent of the mushroom growers were taking one crop of mushroom in a year followed by two crops of button mushroom i.e.25 per cent. Third, the total combined labor required for button and oyster mushrooms for performing various operations varied from 18 man days on small farms to 19 man days on large farms per 100 bags. Fourth, the total cost of production per 100 bags varied from Rs. 26,996 for button mushroom to Rs. 14,290 for oyster mushroom. The fixed cost constitutes 27.31 per cent of the total cost which was half of that of oyster mushroom (51.59%). The share of variable cost in the total cost of producing both types of mushrooms was more in case of button mushroom (72.69%) than in oyster mushroom (48.41%). Fifth, the net return over total cost and over variable cost was higher for button mushroom than the oyster mushroom. The breakeven output of button mushroom in terms of mushroom production in kg was 100 kg whereas the respective figure for oyster mushroom was 72 kg. Sixth, the marketed surplus of button mushroom was 94.26 per cent of the total production which was higher than that of oyster mushroom which stood at 82.83 per cent. Seventh, three marketing channels were followed in button mushroom in the research area but channel-2 was the most widely used channel through which 48.16 per cent of the total quantity was marketed by 40.60 per cent of the mushroom growers. In case of oyster mushroom, only two marketing channels were followed i. e. channel-1 and channel-2. Channel-3 was not used in case of oyster mushroom because there were very less number of oyster mushroom grower who cultivates this crop in the study area. Thus, the higher profitability of button mushrooms underscores the importance of established market channels and consumer preferences. However, the cost-effectiveness of oyster mushroom cultivation suggests significant potential for growth with targeted marketing and education initiatives. While button mushrooms currently dominate the market in the Kangra Valley, the cost-effectiveness of oyster mushrooms presents a significant opportunity for diversification. Future efforts should focus on increasing consumer awareness and improving market access for oyster mushrooms to unlock their potential as a sustainable and profitable crop (Mahajan *et al.,* 2025)

With regard to constraints in mushroom farming and its marketing, problem like insect, pests and diseases, non-availability of spawn compost bags at appropriate time, non-availability of labour coupled with costly labour were the important constraints from production point of view. Lack of storage facilities, difficulty in the disposal of the produce, high transportation charges, lack of knowledge about processing and low price of produce are the important problems from

marketing perspectives in the study area. Another important problem in cultivating mushroom for the mushroom growers was the institutional constraints such as lack of supply of package of practice in Hindi and insufficient extension staff. Among the social problem, lack of interest of the family members in mushroom cultivation is the major constraint. Thus to reap the highest lucrative return from this venture, there is a need to address all these production, marketing, institutional and social problems at government level (Mahajan and Thakur, 2025). Besides these findings, there are few challenges which inhibit the farmers/ mushroom growers not to take up this venture on a commercial and large scale. These are: first mushrooms have a short shelf life, requiring proper storage and marketing strategies to prevent losses. Second, maintaining optimal temperature and humidity levels for mushroom cultivation can be challenging and lastly proper pest and disease control practices are essential to ensure consistent production. Therefore, immediate attention should be given to solve these problems so that lucrative return could be obtained from mushroom farming, whereby mushroom growers could improve the overall standard of living of his/her family.

LIMITATION OF THE STUDY:

As every research study has its own limitations, so was for this study. The findings of this study are specific to the Kangra valley and may not be generalizable to other regions. However, scientific approach was used to conduct this investigation. But, like with every socio-economic survey, there are bound to be some limitations that can't be ignored. The study was based on only 60 mushroom growers selected randomly from the list of mushroom growers, due to limited time and other constraints. Since, sample mushroom growers didn't maintain any records, the information was only collected through personal interview method and they provided the information based on memory and prior experiences The possibility of few slips from the memory of the respondents can't, however, be ruled-out.

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