PRODUCTION AND MARKETING OF WHITE BUTTON MUSHROOM IN LOW HILLS OF HIMACHAL PRADESH: AN ECONOMIC ANALYSIS

Thesis

by

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(NF-2020-01-M)

submitted to

Dr. YASHWANT SINGH PARMAR UNIVERSITY OF HORTICULTURE AND FORESTRY SOLAN (NAUNI) H.P.-173230 INDIA

in

partial fulfilment of the requirements for the degree

of

MASTER OF SCIENCE
(AGRICULTURE)
AGRICULTURAL ECONOMICS

DEPARTMENT OF SOCIAL SCIENCES
COLLEGE OF HORTICULTURE AND FORESTRY
NERI (HAMIRPUR) H.P. -177001 INDIA

2022

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CERTIFICATE-I

This is to certify that the thesis entitled **"Production and marketing of white button mushroom in low hills of Himachal Pradesh: An economic analysis"** submitted in partial fulfillment of the requirements for the award of degree of **MASTER OF SCIENCE (AGRICULTURE)** in the discipline of **AGRICULTURAL ECONOMICS** to Dr. Yashwant Singh Parmar University of Horticulture and Forestry, (Nauni) Solan (H.P)- 173230 India, is a bonafide research work carried out by **Mr. Himanshu Sharma (NF-2020-01-M)** son of Sh. Hitesh Kumar Sharma under my supervision and that no part of this thesis has been submitted for any other degree or diploma.

The assistance and help received during the course of investigations has been fully acknowledged.

Place: Neri, Hamirpur
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CERTIFICATE-II

This is to certify that the thesis entitled "**Production and marketing of white button mushroom in low hills of Himachal Pradesh: An economic analysis**" submitted by **Mr. Himanshu Sharma (NF-2020-01-M)** son of Sh. Hitesh Kumar Sharma to Dr. Yashwant Singh Parmar University of Horticulture and Forestry, (Nauni) Solan (H.P)- 173230 India, in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE (AGRICULTURE)** in the discipline of **AGRICULTURAL ECONOMICS** has been approved by the Advisory Committee after an oral examination of the student in collaboration with an external examiner.

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This is to certify that all the mistakes and errors pointed out by external examiner have been incorporated in the thesis entitled **"Production and marketing of white button mushroom in low hills of Himachal Pradesh: An economic analysis"** submitted by **Mr. HIMANSHU SHARMA (NF-2020-01-M)** son of Shri Hitesh Kumar Sharma to Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Nauni, Solan (HP) – 173230 in partial fulfilment of the requirements for the award of degree of **MASTER OF SCIENCE (AGRICULTURE) AGRICULTURAL ECONOMICS** in the discipline of **SOCIAL SCIENCES.**

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ACKNOWLEDGEMENTS

Acknowledging the kind co-operation, help and suggestions from each and every one during the course of study gives real satisfaction to the explorer. Spirit of team work is inevitable for any task to achieve destinations. Some characters are seemed tangibly but others behind the curtain. Though verbal expression of gratitude lies before written and felt indebtedness but imprinting them through words is also an important part of these forms.

First of all, I would like to thank the 'Almighty' without whose grace; this small work could never have seen the light of the day.

I express my sincere and deep-felt sense of gratitude & obligation to my major advisor ***Dr. Chaman Negi****, Assistant Professor, Department of Social Sciences, for his resolute guidance, constant encouragement, cogent criticism, constructive suggestions and ever inspiring attitude during the course of this investigation and compilation of this thesis.*

I am extremely thankful to members of advisory committee ***Dr. Rajender Singh Jarial****, Senior Scientist, Department of Plant Pathology,* ***Dr. Amit Sharma****, Assistant Professor, Department of Basic Sciences for invaluable guidance, cordial behavior and cooperation throughout the study.*

This acknowledgement would be meaningless if I do not remember my ***parents*** *for love, affection and sacrifices, which they made in enabling me to embark upon a challenging and gratifying education venture.*

Life would have incomplete and wouldn't have been this best and memorable without my friends. I have been grown up in life with you, your unconditional love, support and care. I thank you Aman Vasisht, Kritika Sharma, Vaibhav Negi, Anjali Verma, for being there with me during this journey. I owe my whole heartedly thanks to senior Nitin sir, Nivesh sir, Prakash sir, Shubhangi mam and my lovingly juniors Akanksha and Abhinav who have always supported and guided me in my difficult times.

Last but not the least, I sincerely express my gratitude to Mrs. Kaushalaya Devi, Dr Divya Sharma and Dr Ankita Sharma (HDO) for providing pain staking support and help during my research work.

Though acknowledging is an endless task, in the end, I thank all those whom I am able to recall here and those whom I might have left unknowingly.

To error is human, I solely claim the responsibility for the shortcomings and limitations in this work.

Place: Neri, Hamirpur *Himanshu Sharma*
Date:

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LIST OF ABBREVIATIONS AND SYMBOLS

Abbreviation	**Meaning**
Sr.	Serial
No.	Number
%	per cent
/	Per
w.r.t	With respect to
@	at the rate
et al.	et alii (and others)
Fig.	Figure
i.e.	id est (that is to say)
kg	Kilogram
Q	Quintal
IR	Irrigated
UIR	Unirrirated
^{o}C	degree Celsius
viz.	videlicet (namely)
ACU	Adult Cattle Unit
MT	Metric Ton
TFC	Total Fixed Cost
TVC	Total Variable Cost
TC	Total Cost
BEP	Break- Even Point
BCR	Benefit-Cost Ratio
ME	Marketing Efficiency
GR	Gross Returns
Rs.	Rupees
₹	Rupees
Spp.	Species
m^2	Meter square
p.a.	Per annum

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Chapter-1

INTRODUCTION

Mushroom is a fungal growth of group of mycelium buried in the substratum. Under optimum conditions of temperature, relative humidity and proper nutrition, the mycelium produces fruiting bodies which are commonly called mushrooms. The term "mushroom" dates back centuries and has never been fully defined, nor has there ever been agreement on how to use it. Mushroom and its variation may have been derived from French word “mousserom” in reference to moss (mausse). The word “mushroom” can also be used for wide variety of gilled fungi, with or without stems (Verma *et al*., 2013). The fruiting body typically takes the shape of a domed cap with gills present on the underside of a cap on a stalk. As the land resources for growing food crops are depleting with increasing population to feed, the need to diversify our agriculture with quality food crops to provide nutritional security to people is an important issue. Because mushroom farming is an indoor crop that does not require soil or sunshine, any sort of site can be used for the construction of a mushroom house for crop growth thus suited for small and landless labourers. It can be a source of national income and poverty alleviation and can be a promising activity for rapid socioeconomic development.

The economic significance of mushrooms stems mostly from their usage as human food. The mushroom's exotic flavour, taste, and fleshiness have made it a popular delicacy in human cuisine. Mushrooms are a comprehensive, healthful food that is excellent for people of all ages. The white button mushroom is available fresh or canned, and is used in soups, sauces, and other dishes. Mushroom protein is 60-70 per cent digestible and contains all of the key amino acids. It also has medicinal qualities (Gautam, 2020). The button mushroom contains a high level of retene, which is thought to have an antitumor impact in some cases. Aside from its nutritional and medicinal benefits, mushroom farming is regarded as environmental friendly since it can utilise waste materials as a growing medium, particularly agricultural wastes. Moreover, as mushroom farming requires a lot of

labour, it can provide unemployed youths in rural and semi-urban regions with a means of earning a living. Additionally, the activity needs a relatively less area of land.

Origin

The earliest record of mushroom can be traced from the Vedic period in the Hindu religion and recent description can also be found in Bible as "bread from heaven". The first known cultivation of agaric type of mushroom began in France in 1550-1650. Frenchman de Tournefort wrote the earliest known description of how to grow mushroom in 1707 (Suman and Sharma, 2011). The technique first passed to England and then to USA in the late 19th century. In India initial reference to the possibilities of mushroom cultivation came in 1886 when some specimens of mushroom were first identified and exhibited by N W Newton at the annual show in Agri. Hort. Society of India at Calcutta. However, the first systematic attempt to cultivate button mushroom was made in 1961 at Solan district of Himachal Pradesh under a scheme entitled "Development of Mushroom cultivation in Himachal Pradesh" which was collaboration by HP state government with ICAR. National Centre for Mushroom Research and Training (NCMRT) came into existence in 1983 at Solan district of Himachal Pradesh which was later upgraded to Directorate of Mushroom Research (DMR) on December 2008. Solan has been declared as "Mushroom city of India" on 10th September 1997.

International scenario

Mushroom production and consumption are rapidly increasing around the world, owing to increased awareness of their nutritive and medicinal properties, as well as their distinct flavour and texture; consumption of such coveted items is also a natural corollary of a country's overall economic development. Out of 14000 species known to exist about 3000 species are regarded as prime edible mushroom. Out of which, nearly 20 species are commercially cultivated around the world. However, white button mushrooms (*Agaricus bisporus*), oyster mushrooms *(Pleurotus spp*.), shiitake mushrooms (*Lentinula edodes*), black ear mushrooms (*Auricularia*

polytricha), and paddy straw mushrooms (*Volvariella volvacea*) account for nearly 90 per cent of global mushroom production (Gautam, 2020). The button mushroom is dominating the market with largest market share. It is grown by all major mushroom growing countries. China is the largest producer of mushroom with approximately 40 million tons of production followed by Japan, USA and Netherlands while Poland is the largest exporter of fresh and chilled mushrooms in 2020 with export value of 402.35 million USD and UK is the largest importer of mushrooms with 19.19 per cent of world's import followed by Germany and USA (FAOSTAT, 2020).

National scenario

In India, there are two types of mushroom producing systems: seasonal farming and year round farming. Mushrooms are grown both seasonally and in state-of-the-art facilities. In the commercial units, climate-controlled cropping rooms are available all year round. With a favourable agro-climate, an abundance of agricultural wastes, relatively low-cost labour and a diverse fungal community, India's biodiversity provides a fantastic opportunity to cultivate a variety of mushrooms with different environmental requirements. In India, out of the total mushroom produced, white button mushroom share is 73 per cent followed by oyster mushroom (16%), paddy straw mushroom (7%) and milky mushroom (3%) (Sharma *et al*., 2017). White button mushroom requires 20-28^0 C for vegetative growth and 12-18^0 C for reproductive growth. Besides it requires 80-90 per cent relative humidity and enough ventilation during cropping. Seasonally, it is grown during the winter months in north-west plains of India and 8-10 months in a year on the hills. However, with the advent of modern cultivation technology, it is now possible to cultivate this mushroom anywhere in India.

At present, the total mushroom production in India is approximately 243 thousand MT. Orissa (22500 MT), Maharashtra (22000 MT) and Bihar (21330 MT) are the leading states of India in mushroom production (Anonymous, 2020).

State scenario and about the study area

Himachal Pradesh is 7th leading mushroom producing state of India contributing about 6.09 per cent with total production of 14800 tons during the year

2020-21 (Anonymous, 2020). Himachal Pradesh is a state of small and scattered land holdings. About 87 per cent of the total land holdings belong to marginal and small farmers with average holding of 0.41 and 1.39 ha, respectively. Agriculture provides direct employment to 69 per cent of the total workers of the state; however, more than 80 per cent of the people in the state directly or indirectly depend on agriculture for their livelihood. Most of the farmers are not getting good returns from crops and want to adopt other agriculture related activities to enhance their income. Mushroom farming is gaining popularity among farmers, women and youths in Himachal Pradesh as it is considered a profitable venture. Mushroom growing can prove to be a profitable activity which requires relatively less land. With suitable climatic conditions of low hills of Himachal Pradesh during growing season and easily available raw material, mushroom growing is gaining popularity among farmers.

Hamirpur, Bilaspur and Una have low hills agro-climatic zone where mushrooms can be potentially grown one crop per year under natural seasonal conditions. Increasing popularity and awareness about mushroom cultivation are helping in boosting the mushroom production in this region of Himachal Pradesh. Therefore, keeping above facts into consideration, the present study was planned to conduct a study in Hamirpur, Bilaspur and Una districts of Himachal Pradesh with the following objectives:

Objectives of the study

1. To analyse socio-economic condition of mushroom growers.
2. To analyse the cost, return and financial viability of mushroom production.
3. To study the existing marketing system and marketing efficiency.
4. To identify problems and constraints faced by the mushroom growers.

Chapter-2

REVIEW OF LITERATURE

The review of available literature contributes to our analysis of the subject. It generates new ideas for the methods and materials that will be employed to accomplish the defined objectives and reach conclusions. Some key research on mushroom production were undertaken by prior scholars are reviewed in this chapter. This was done to strengthen the study effort by providing conceptual clarity, developing strong methods, and detecting chronological changes and crucial gaps. Under these criteria, the literature has been reviewed;

2.1 Economics of mushroom production.

2.2 Marketing of mushroom.

2.3 problems faced by mushroom growers.

2.1 Economics of mushroom production

Thakare *et al*. (2006) conducted a study in Raipur, Durg and Bilaspur districts of Chhatisgarh plain. Sixty four growers were selected for the study and results were recorded. Amongst the cost components of mushroom production, the fixed cost constituted as small fraction (33.58 %) while variable cost was 66.42 per cent of the total cost of production. On an average the net return per kilogram was ₹ 24.04. The input-output ratio was found to be highest in large farms which show that large growers are more benefitted as compared to other growers. Participation of men was observed more as compared to women in training and production of mushroom. Less production due to lack of technical knowledge, unavailability of spawn and different suitable varieties of mushroom is observed as major constraints in mushroom production

Godara *et al.* (2008) conducted a study on the economics of mushroom production in the Sonepat district of Haryana in 2008–2009 with the goals of

analysing the benefit–cost ratio, breakeven point, and policy implications for improving mushroom production, as well as the costs and returns of mushroom production on various types of farms. According to the study, the fixed capital investment was more than twice as high on large and medium farms as it was on small farms, and compost use was positively correlated with farm size. The size of the farm and mushroom yield were positively correlated. Because they used fixed farm resources more effectively than small and medium farmers, large farmers had lower production costs for mushrooms. Net returns rupees per kilogram also increased with the farm size. Benefit-cost ratio was highest over total cost as well as over variable cost of the large farmers.

Celik and Peker (2009) a case study in Konya, Turkey to analyse benefit/cost and SWOT analyses of mushroom growing in developing nations as a diversification of rural income. 33 questioners were used in a survey procedure to gather the data. SWOT analysis and benefit/cost analysis were employed as techniques. The average production area in the research area was found to be 1135.1 m^2. The majority of businesses in the province (76.9%) have four production cycles a year. The business produced an average of 45.4 kg/m^2 every year, 11.6 kg/m^2 on a periodic basis, and 256.6 kg/ton of compost per tonne. 1 kg of mushrooms cost, on average, USD 1.36 to produce, and were sold for, on average, USD 1.54.

Gateri *et al.* (2009) mentioned that edible mushroom cultivation has found a niche among small scale farmers in Kenya. Previously they were picked from the wild, but now, many farmers are growing mushrooms for their nutritive value as well as for industrial and medicinal purposes. Two main types of mushrooms are being commercialized, the button *(Agaricus bisporus)* and oyster (*Pleurotus spp.*). Button mushrooms account for 95 per cent (476 tons) of the 500 tons produced annually. Oyster mushroom, introduced in 2003, is the most popular among small-scale farmers, mainly because it can fruit over a wide range of temperatures. It offers lucrative business, requires no arable land for production and provides diversification with benefits, such as increased income, employment and food and nutrition security. Furthermore, the abundant agricultural waste found countrywide offers opportunity

for production, which in turn provides a more economical and environmentally friendly disposal system. The potential for mushroom production in Kenya is high. Demand outstrips supply as Kenya imports 150 tons annually not to mention the feasible export market.

Singh *et al.* (2010) conducted study in the districts of Sonepat and Gurgaon in Haryana during the year 2003-04, has analysed the cost, returns and break-even point of mushroom production on different categories of farms, and has investigated the existing marketing system along with marketing cost, margins and marketing efficiency. The study has suggested that mushroom being a highly perishable crop and prone to high temperature, marketing infrastructures such as cold storage facilities are of immense importance. Similarly, suitable arrangements are needed by the canning/processing units for the management of surplus mushroom.

Mehta *et al.* (2011) concluded that with the advent of modern cultivation technology it is now possible to cultivate this mushroom seasonally under uncontrolled conditions and throughout the year by employing environmentally controlled conditions. Due to the presence of 90 per cent moisture content mushroom is highly perishable so mushrooms have to be processed to extend their shelf life for off season use by adopting appropriate post-harvest technology to process surplus mushrooms into novel value-added products.

Barmon *et al.* (2012) conducted a study to estimate profit, benefit cost ratio (BCR) and household income of mushroom production and also to explore the problems of producing mushroom and its marketing channels in Bangladesh. Thirty samples were randomly selected and information on mushroom production was collected from Savar Upazila in Dhaka district. Mushroom was found to be a profitable agricultural enterprise (22,888 taka per farm). The benefit cost ratio (BCR) was 1.55. The average family household income was about Tk. 43,731. Three intermediaries (mushroom office, wholesalers and retailers) were involved in the marketing channels of mushroom. The marketing margin of mushroom for farm-gate to wholesalers and wholesalers to retailers were taka 50 and 70 per kg, respectively.

Tanni *et al*. (2012) conducted a study in four villages (Vatpara, Jamsing, Purbo Jamsing and Joypara) of Savar Upazilla in Dhaka district to determine the impact of mushroom cultivation on socio-economic condition of beneficiaries and aimed at explaining the socio demographic characteristics of the respondents with exploring the relationship between all these characteristics and their income from mushroom cultivation of the respondents. The findings indicated that most of the respondents of the study area were middle aged (67%) and had secondary to above secondary level of education (76%) with small to medium (78.6%) family. The respondents had an average two years mushroom farming experience which developed favorable attitude (73%) towards mushroom cultivation. Co-efficient of correlation analysis indicated that respondent's annual income, mushroom farming experience and mass media utilization had positive significant relationship with income from mushroom cultivation although age had negative significant relationship. Mushroom cultivation brought positive impact on different aspects of livelihood of the beneficiaries. Annual income, standard of living and household condition of the beneficiaries were increased as compared to the previous year.

Sharma *et al*. (2016) conducted a study on Economic viability, technological gap and problems of mushroom cultivation in Mandi district of Himachal Pradesh. The study revealed that the fixed cost of production /100 bags for one crop of button mushroom varied from 44.47 per cent on small farms to 22.42 per cent on large farms. The variable cost varied from 55.53 per cent on small farms to 77.58 per cent on large farms implying the economical use of fixed and variable resources by large growers. The gross return per 100 bags basis ranged between ₹ 37,200 and ₹ 40,200 on small and large farms for one crop of button mushroom. The overall net returns per compost bag from one crop of button mushroom was ₹ 160 and per kg was ₹ 48 and the overall benefit-cost ratio for one crop of button mushroom was 1.87:1. Break-even output for one crop of button mushroom varied from 279 kg to 147 kg for small and large growers and break-even point was at 93 and 42 compost bags for small and large growers respectively.

Sharma *et al*. (2017) mentioned in their study that the global mushroom industry has expanded very rapidly in the last two decades by the addition of newer types of mushrooms for commercial cultivation. India's mushroom business saw average annual growth of 4.3 percent between 2010 and 2017. White button mushrooms account for 73% of all mushrooms produced, followed by oyster mushrooms (16%), paddy straw mushrooms (7%), and milky mushrooms (3%). In India, per capita intake of mushrooms is low compared to other vegetables; evidence suggests it is less than 100 g annually. The white button mushroom industry in India made ₹ 7282.26 lakhs per annum in revenue in the 2016–2017 fiscal year by exporting 1054 quintals in canned and frozen forms. It is anticipated that India needs between 8000 and 10,000 tonnes of spawn annually. The private sector provides the vast majority of this commercial spawn to the farmers, with only 10% of the spawn supply coming from public sector institutions.

Chitra *et al*. (2018) conducted research at the Department of Plant Protection's Mushroom Production Unit at the Anbil Dharmalingam Agricultural College & Research Institute in Tiruchirappalli. Cost analysis of mushroom production was performed in a cost-benefit analysis to establish whether the businesses generating mushrooms were profitable or not. It is vital to look at the producer's initiatives in this analysis. Substratum and spawn are the primary inputs needed for oyster mushroom cultivation. The overall cost was approximately ₹ 5760. The primary component of mushroom production is spawn. 8 packets of spawn typically cost around ₹ 30. According to the economic research, the cost of producing one kg of mushroom was ₹ 60.63. The total refund was ₹ 2000.00. The net profit was approximately ₹ 14240. The average return per kg was ₹ 149.89.

Singh and Singh (2018) conducted a study to work out cost and return structure of white button mushroom in Punjab. The study was conducted in Amritsar and Gurdaspur districts with a sample of 80 mushroom growers. The economics analysis showed that recurring and non-recurring expenditures per square metre of bed area spawned declines with increase in mushroom farm size due to the economies of scale. The gross returns are higher on medium mushroom farms due to

comparatively higher average price realization while the net returns are higher on large mushroom farms due to lower cost. The input-output ratio has been found highest (1.81) on large mushroom farms followed by medium (1.45) and small mushroom farms (1.35).

Selvaraj *et al.* (2018) conducted the study to gain a better knowledge of the Mettur Taluk's mushroom crop's cultivation costs and marketing effectiveness. The socioeconomic standing of mushroom growers, the reason for starting a mushroom farm in the research area as well as the challenges faced by producers were all examined. According to the study, the reason why small, marginal, and landless farmers choose to cultivate mushrooms is because it requires less capital in the form of land and money. Mushroom production in Mettur has higher marketing expenses and profit margins than other agricultural products due to significant issues with storage, defaulters, advertising, and transportation that growers must deal with.

Sharma *et al*. (2018) conducted a study on Economic analysis of production of white button mushroom (Agaricus bisporus) in Himachal Pradesh: A case study of Shimla district with the objectives to analyse the Socio-economic condition of mushrooms growers, analyse the cost, return and financial viability of mushroom production, study the existing marketing system and marketing efficiency, examine the problem faced by the mushroom growers. The study revealed that on per 100 bags the average return in term of money value was highest in case of large i.e. ₹ 12905.36 followed by Medium ₹ 9067.08 and Small ₹ 7606.81. The overall average return of mushroom was worked out to ₹ 9049.67. Mushroom contributed maximum in total farm income in case of Medium and large i.e. 43.44 per cent and 72.18 per cent respectively. At overall its contribution was found 49.42 per cent to the total farm income.

Chauhan (2019) conducted a study in Himachal Pradesh by taking 200 mushroom growers by simple random sampling methods from five major mushroom producing districts in the state. The study showed that nearly one-half of the mushroom growers had more than 5 years of experience and nearly one-fourth were new adopters and confined to both middle and aged group with formal primary,

matriculation and graduation level education. The business principles like know-how and training with regard to new enterprise prior its adoption followed by a market survey, etc, were given due consideration and nearly 53 per cent of them adopted enterprise with low scale of 50 or even a smaller number of spawned compost bags each weighing 20 kg with average unit investment of ₹ 22, 306. Majority (91%) of sample units confined to a single crop with average yield of 3.05 kg per spawned compost bag which increased with the size of unit from 3.10 kg on small to 3.40 kg on medium units. The financial test ratios revealed the economic feasibility and profitability of mushroom cultivation on large scale.

Ganeshkumar *et al*. (2020) carried out a study to investigate the value chain analysis, consumer awareness, and purchasing motivations for mushroom products. The study comes to the conclusion that although urban consumers in the analysed area were aware of the nutritional benefits of mushrooms, they consumed them at far lower rates than non-vegetarian urban customers.

Rawat *et al*. (2020) studied the costs, returns, and break-even point of mushroom farming in Uttarakhand as a sustainable source of income in rural areas. The outcome demonstrates that if actual production of oyster and button mushrooms in a growing cycle is not less than 59.25 kg and 441.11 kg, respectively, the price per kg of mushrooms would fall to ₹ 136.20 and ₹ 114.30, respectively. In Uttarakhand, a total of four production times per year are feasible. For the rural economy to continue to grow, expand, and diversify business and job prospects, mushroom producing farming may need to be strengthened. Small farmers may have revenue potential from mushroom production.

Radhakrishnan *et al*. (2021) conducted a study in the farmer's setting and laboratory of Krishi Vigyan Kendra, Wayanad. The data for economic analysis and farmers' constraints was the response data collated from Wayanad farmers who attended the training programmes on mushroom cultivation at KVK Wayanad. Experiments on mushrooms were conducted as FLDs and OFTs of KVK in the KVK laboratory and farmer's setting. Experimental trials prove that the respondents prefer Pleurotus cystidiosus due to its higher yield (2.16 kg), B: C ratio (1.41), and fewer

days for bud initiation (6th day). The comparative economic analysis of the various agricultural enterprises revealed that value addition in mushrooms is highly profitable. Results also unveil that unorganized market structure is the major constraint faced by the farmers.

2.2 Marketing of mushroom

Singh *et al.* (2000) in their study on marketing of mushroom in Punjab observed that channels I (grower, wholesaler, retailer, consumer) and channel II (grower, wholesaler, consumer) were the two main marketing channels, respectively accounting for around 52% and 43% of the total quantity marketed. For marketing channels I, II, III, and IV, respectively, the total cost per kg for mushrooms was Rs 7.39, ₹ 5.70, ₹4.02, and ₹ 1.12. The study came to the conclusion that the length of the marketing channel decreased as the overall cost of marketing decreased.

Carrera *et al*. (2005) revealed that the food products required efficient marketing systems to move from producers to consumers keeping high quality and price. Although mushroom production was well established and growing in many developing nations, the marketing channels were little understood. They used an institutional approach to study the routes of distribution for wild and cultivated mushrooms in Central Mexico between 1999 and 2004. For this study, representative locations included a large metropolis (Mexico), two medium cities (Puebla and Toluca), and a rural area (Cuetzalan). In addition to middlemen, wholesalers, retailers, "tianguis," public markets, retail food stores, and food services, a number other marketing channels were found and characterised. Additionally estimated were the mushroom marketing margin, the grower's portion, and the gatherer's share. The existing mushroom marketing system developed from a modest, centralised procedure to a blend of centralised and dispersed procedures comprising a small number of actions. Large private enterprises took over a range of marketing tasks during this period of change, assisting the decentralisation movement while stifling the growth of new businesses focused on the marketing and processing of mushrooms. Changes at the same time resulted in a market concentration of open market sales in substantial private businesses and useful wholesalers. The main

components, modes of operation, and developments of the Mexican mushroom marketing system were also investigated.

Khatkar *et al*. (2005) determined the costs and returns of mushroom production as well as the margins and costs of mushroom marketing in Haryana, India. Production data for the year 2001-02 were obtained from a sample of 30 mushroom growers in Sonepat district, while marketing data were collected from the Azadpur (Delhi) market. Results indicated that mushroom production was an economically viable enterprise but the middlemen had the highest share of the consumer's rupee. Thus, it was suggested that cooperative marketing and processing should be encouraged to increase the producer's margin.

Kumar (2008) conducted a study in Jharkhand state and reported that there are four prominent marketing channels used for the disposal of mushroom, NGOs and Co-operative marketing societies are playing major role in the marketing of mushroom in the state. The study revealed that complaints against NGOs and Co-operative were reported for low unit price paid by them to the growers. Thus, discouraging the growers to boost this enterprise to maximizing their production. If proper marketing facilities were provided to the mushroom growers in the study area they could have certainly improved their production in the future.

Sachan *et al*. (2013) studied the production and marketing of mushroom in Kanpur Nagar district of Uttar Pradesh.. The study revealed that woman cooperative society was the most important agency in the marketing of mushroom. Average quantity sold on per farm basis was 6.17 quintals. Half of the producer- sellers preferred to sell mushroom in 1 to 2 quintals size lot. Maximum quantity (66%) of mushroom was sold within village by majority (70%) of producer-sellers. Three channels were identified in the marketing of mushroom. ◊Producer’s share in consumer rupee was highest (98.53%) in channel –I (producer consumer). Retailer earned the maximum marketing margin (12.89%) in the marketing of mushroom.

Shabir and Shahid (2010) conducted their study on edible mushroom in Kashmir Valley and concluded that total marketing costs, including margins incurred

varied from ₹ 2.50 per kg to ₹ 10.65 per kg in three prevailing channels. Producers' share was maximum in the channel wherein they dealt directly with consumers. This channel also had a highest index of marketing efficiency. It was also observed that net margin received by each functionary was directly related to the costs incurred by them in the marketing process. The problems faced by growers were socio/organizational in nature and needed an active institutional participation.

Singh *et al*. (2010) analysed the cost, returns and break-even point of mushroom production on different categories of farms, and also investigated the existing marketing system along with marketing cost, margins and marketing efficiency in the district of Sonepat and Gurgaon in Haryana during the year 2003-04. They found that (i) the fixed capital investment was more than double in large and medium farms as compared to the small farms (ii) the use of compost has a positive relationship with the farm size (iii) there exists a positive relationship between mushroom production and farm size (iv) large farmers have lowest cost of mushroom production as compared to small and medium farms due to efficient utilization of fixed farm resources (v) the producer share in consumer rupee was highest in channel (Mushroom grower Consumer), followed by channels (Mushroom grower → Wholesaler/Commission agent → Consumer), (Mushroom grower → Retailer → Consumer)III and (Mushroom grower → Wholesaler/Commission agent → Retailer → Consumer,) respectively. The channel (Mushroom grower Consumer) was the least efficient due to the existence of more middlemen. The study has suggested that (a) mushroom cultivation being capital-intensive, the financial assistance through institutional agencies at cheaper interest rate would be the desirable entity (b) 12 mushroom being a highly perishable crop and prone to high temperature, and marketing infrastructures would be of immense importance.

Shirur and Shivalingegowda (2015) conducted a study to understand the marketing channels and mushroom consumer behavior among the people. The extent of variation in rice spread were observed in the average selling price when sold to consumers, retailers and wholesalers which varied between Rs 27-40. Perishability and lack of processing facilities for mushrooms turned out to be the main reasons for

such huge price escalation as the growers depend on the marketing channel to sell the produce.

2.3 Problems faced by mushroom growers

Paul *et al*. (2001) studied that the main challenges faced by mushroom growers included a lack of proper composting knowledge, losses due to the perishable nature of mushrooms, difficulty obtaining loans, and a lack of education among villagers regarding the nutritional value of mushrooms and storage facilities.

Singh and Ram (2007) found that insufficient funding, a lack of good spawn, the high cost of spawn, insect-pest and disease issues, among other issues, were discovered to be the main issues in the production of mushrooms. According to the study, financial aid provided through institutional organisations at a lower cost would be ideal.

Haimid *et al*. (2013) carried out the study in Malaysia to understand the potential of this industry, particularly the issues and challenges that could slow down its development from the perspective of growers. Study revealed that the three main issues of concern within this industry were related to production, marketing and government policies and initiatives.

Kangotra and Chauhan (2014) conducted a study to evaluate economic viability of white button mushroom in Himachal Pradesh and reported that inadequate supply of quality spawned compost bags, lack of remunerative prices and incidence of disease were the major constraints requiring immediate attention of policy makers. For improving productivity, the study recommended the adequate supply of quality spawned compost bags at the doorsteps of growers at appropriate time and reasonable prices in addition to encouraging them to grow at least two crops in a year.

Shirur *et al*. (2016) carried out a study to assess component wise technology adoption and constraint analysis of enterprises in order to suggest precise policy interventions for bringing the mushroom industry to health and vibrancy. The research was conducted among the mushroom entrepreneurs in Karnataka State. The

constraint analysis revealed that, non-availability of spawn, lack of technical information and exploitation by consultants were major constraints. The increasing labour wages calls for adoption of mechanization in various activities of mushroom cultivation. The higher cost on electricity had rendered the cultivation of button mushroom less profitable in the State. For mushroom cultivation to pick up the pace there is need for capacity building of KVK staff about improved low cost cultivation technology for disseminating the same among the farmers and supply of quality spawn by State departments.

Shirur and Chandregowda (2017) conducted a study in which the constraints reported in mushroom entrepreneurship were analysed and a successful mushroom entrepreneur was identified among the mushroom growing entrepreneurs from Karnataka State in India. The case study and SWOT analysis was done to draw the inferences and lessons for new entrepreneurs to succeed in mushroom cultivation in India and in other tropical and subtropical countries with similar situations.

Singh *et al*. (2017) conducted a study to investigate the easily available and low cost technology of Oyster mushroom cultivation. Locally and easily available substrates such as corn cob, vegetable residue and waste paper were examined with the supplementation of rice bran and chicken manure separately. Data collected showed the constraints as expressed by mushroom growers were non availability of good quality spawn, non availability of spawn in time, difficulty in compost making, difficulty to maintain proper indoor temperature, lack of cold storage facilities, fluctuating price prevailing in the market, complicated procedure in getting loans and lack of government support in the form of loan and subsidy. Mushroom growers suggested that marketing of mushroom plays a vital role in cultivation of mushroom. The efficient marketing provides high return to the mushroom growers. Mushroom growers shared that they could not get the desired price for their produce due to price fluctuation and lack of marketing system. It is suggested that minimum support price also be fixed for mushroom.

Roy *et al*. (2020) conducted a study to assess perceived constraints of mushroom grower in terms of technical, economical, infrastructural, general and marketing constraints in mushroom production enterprise in Malda district in West Bengal. Unavailability of quality spawn was highest ranked technical constraints. High cost of spawn and poor supply of spawn at appropriate time were highest ranked economical and infrastructural constraints respectively. Poor knowledge about nutritive value of mushroom and lack of local market were highest ranked general and marketing constraints respectively.

Sohi *et al*. (2021) studied the major constraints in the adoption of white button mushroom cultivation by rural youth of district Barnala. The results revealed that issues related to agro processing unit (89.36%), constraint related to market at village level (86.20%) were the major constraints in adoption of this venture. The production of button mushroom in the district is low as compare to the other adjoining districts of Punjab state.

Chapter- 3

MATERIALS AND METHODS

Systematic methodology is the base of any scientific study as the precision; reliability and validity of scientific enquiry depend upon appropriate methodology. It is a requirement for a successful research project. It has a direct impact on the reliability of research findings. Standard research methods, design, and procedures for measuring variables and testing hypotheses are critical in the discipline of social science. The accuracy of the research results is determined by how well and rationally the sample technique is implemented. The technique used and the various instruments used to collect and interpret the study's results are described in this chapter.

3.1 Sampling procedure

3.2 Data collection

3.3 Analytical framework

3.4 Definitions of terms and concepts

3.5 Implications

3.6 Limitations of the study

3.1 SAMPLING PROCEDURE

3.1.1 Selection of study area

The main objective of the study was to examine the production and marketing aspects of mushroom and it attempts to describe the various facets of mushroom farming in study area. The study was conducted in Hamirpur, Bilaspur and Una districts of Himachal Pradesh as these districts cover the low hills of Himachal Pradesh. Fig 3.1 shows the location of study area in Himachal Pradesh.

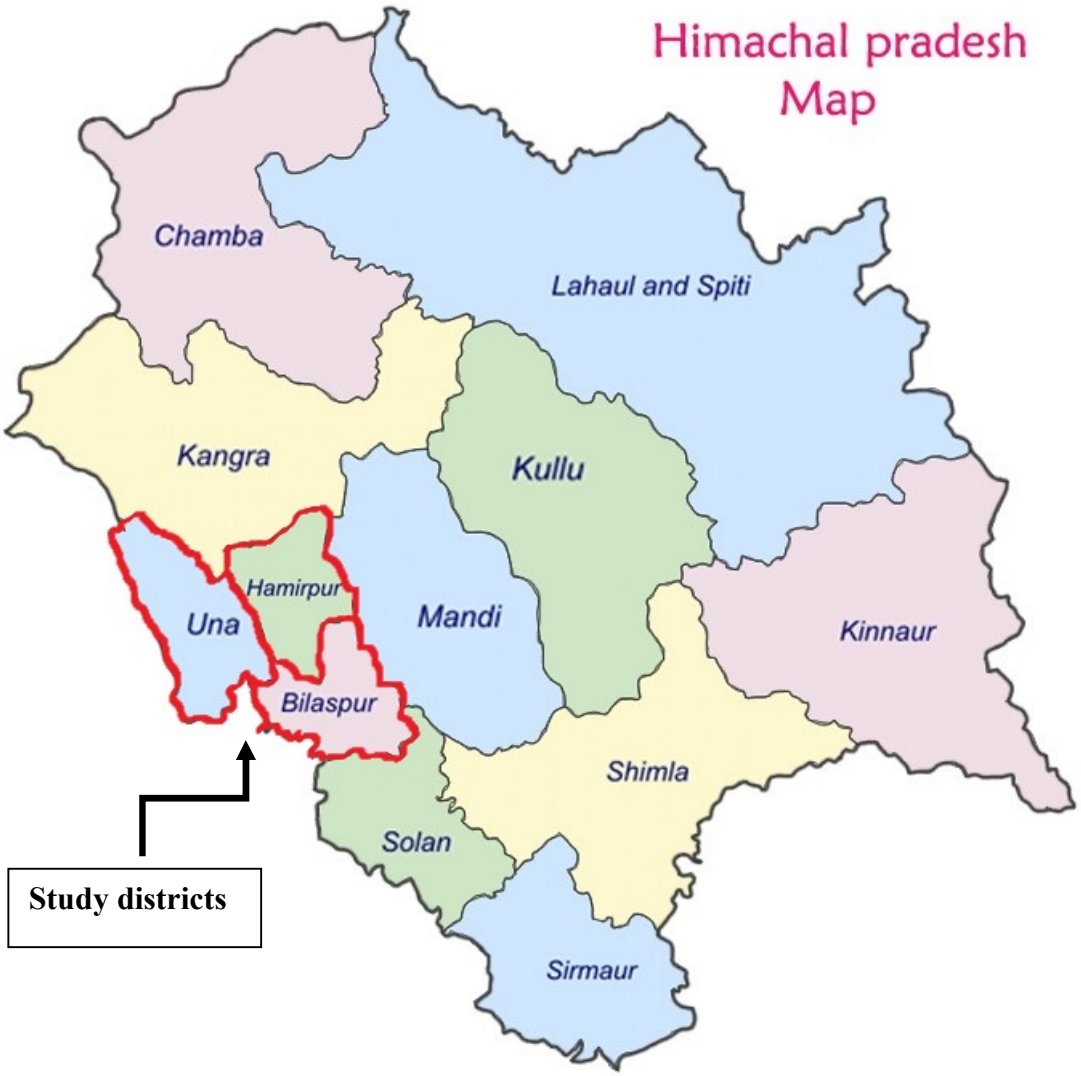

Fig 3.1: Map showing location of Hamirpur, Bilaspur and Una in Himachal Pradesh

3.1.2 Sampling design

For the selection of sample, stratified random sampling technique was adopted. A list of mushroom growers from different blocks of Hamirpur, Bilaspur and Una was procured with the help of Department of Horticulture and compost suppliers. From this list, a random sample of 60 mushroom growers was selected through proportional allocation in three districts. Depending upon the number of mushroom growers two blocks from each districts namely Sujanpur and Nadaun from

Hamirpur, Ghumarwin and Sadar Bilaspur from Bilaspur whereas Una and Amb from Una district were selected.

For the analysis of data all the mushroom growers were classified into three farm size categories on the basis of number of bag, viz., small farm size (≤ 300), medium farm size (301-600) and large Category (>600) using cumulative square root frequency distribution method (Dalenuis and Hodges, 1957). The distribution of the sampled mushroom growers according to their number of bags is presented in Table 3.1. It has been found that 51.67 per cent of farmers were small farmers and average bags per growers were 146 bags, 25 per cent of farmers were medium farmer with average of 453 bags per farm where as 23.33 per cent of farmers were large mushroom growers with an average of 1771 bags.

Table 3.1: Distribution of sample amongst different categories of mushroom growers

Sr. No.	Category	Number of compost bags	Number of growers	Average number of bags	Percentage of mushroom growers
1	Small	≤ 300	31	146	51.67
2	Medium	301-600	15	453	25.00
3	Large	> 600	14	1771	23.33

3.2 DATA COLLECTION

Both primary as well as secondary data were used for the study.

3.2.1 Primary data:

The primary data was collected from mushroom growers on well designed and pretested schedules through survey method by personally visiting the mushroom growers. The primary data on demographic features such as family size, age, education, occupation, economic parameters, cost of production, yield, marketing costs and problems faced by the growers in various aspects of production and marketing were collected in the study area during the year 2021-22.

3.2.2 Secondary data:

The secondary information pertaining to the list of registered and nonregistered mushroom growers was obtained from Department of Horticulture, Govt. of Himachal Pradesh and from the supplier of spawn and manure. Other relevant data related to the present study were also collected from different sources like books, journals, reports and various websites and used in the present study.

3.3 ANALYTICAL FRAMEWORK

To fulfill the specific objectives of the study, based on the nature and extent of availability of data, the following analytical tools and techniques have been adopted.

3.3.1 Tabular analysis

3.3.2 Economic analysis

3.3.3 Market analysis

3.3.4 Analysis of production and Marketing problems

3.3.1 Tabular analysis

Simple tabular analysis was used to examine socio-economic status of the growers, resource structure, income and expenditure pattern, marketing channels, price spread and grower's opinions about the production and marketing problems of mushrooms. Simple statistical tools like averages and percentages were used to compare, contrast and interpret the results. The sex ratio, literacy rate and index were calculated using the following formulae:

$$\text{Sex ratio} = \frac{\text{Total population of females}}{\text{Total population of males}} \times 1000$$

$$\text{Literacy rate} = \frac{\text{Total number of literate person}}{\text{Total population excluding non-school going below 5 years}} \times 100$$

$$\text{Literacy index} = \frac{\sum W_i X_i}{\sum X_i}$$

Where,

W_i = Weights (0, 1,2,3,4 and 5) for illiterate, primary, middle, matric, secondary and graduate & above respectively.

X_i = Number of persons in respective category

$$\text{Dependency ratio w.r.t. to workers} = \frac{\text{Number of dependents in family}}{\text{Total workers}}$$

$$\text{Dependency ratio w.r.t. to average size of family} = \frac{\text{Number of dependents in family}}{\text{Average family size}}$$

3.3.2 Economic analysis

To examine the economic viability, the cost of production and net returns of mushroom production were computed as under.

3.3.2.1 Fixed cost

These costs refer to those which remain unchanged over a short period of time. Fixed costs considered in present study included depreciation of mushroom house, mushroom inventory and interest on fixed capital.

i) Depreciation on fixed assets

Depreciation is a loss of value of an asset due to normal wear and tear from its use over time. It represents the amount by which a farm asset decreases in its value over time. In this study the depreciation was calculated by straight line method. The

depreciation on mushroom house was charged at the rate of 2 per cent and depreciation of various equipments like iron racks, wooden racks, hygrometer, thermometer, spray pumps, exhaust fans, weighing machine, packing machine, electricity fitting etc; was estimated at the rate of 10 per cent.

ii) Interest on fixed assets

Interest on fixed capital was charged at the rate of 12 per cent per annum which is concessional rate of interest charged by commercial banks for setting up of mushroom unit as an enterprise.

3.3.2.2 Variable cost

Variable costs were those costs which vary with the level of production. In making production decisions in the short run, only variable costs needed to be considered which include the cost of compost bags, the human labour and miscellaneous expenses.

The variable cost included expenditure on following items:

a) Compost bag (including spawn and transport expenses)

b) Human labour charges

c) Electricity charges

d) Packing material

e) Interest on variable capital

f) Miscellaneous expenses (chemicals etc.)

3.3.2.3 Total cost

The total cost was computed by summing-up fixed and variable costs.

TC = FC+VC

Where, TC = Total Cost

FC = Fixed Cost

VC = Variable Cost

3.3.2.4 Computation of Gross returns

i) The total returns from the mushroom growing were worked out by multiplying the per unit price with the total production.

GR = YM × PM

Where, GR = Gross returns (in Rs.)

YM = Yield of mushroom in kilograms (kg)

PM = Price of mushroom per kilogram (kg)

ii) Net returns over variable cost = Gross returns − Variable cost

iii) Net returns over total cost = Gross returns - Total cost

iv) $\text{BCR} = \frac{\text{Total returns}}{\text{Total cost}}$

3.3.2.5 Break-even point (BEP)

A particular volume level and its associated cost level generate a particular profit level. When consider different price levels, we have different profit levels, resulting through associated levels of volume and costs.

The BEP was computed as follow:

$$\text{BEP} = \frac{\text{TFC}}{\text{Py - AVC}}$$

Where, BEP = Break- even point in terms of physical units of production and compost bags

TFC = Total fixed cost in rupees

Py = per unit price of mushroom

AVC = Average variable cost of mushroom production in rupees

AVC = TVC/YM

TVC = Total variable cost

YM = Total mushroom output in kilograms

3.3.2.6 Financial test ratios:

To guide the financial viability of any business/ commercial activity it is essential to perform certain tests like the financial tests ratios as computed follow:

$$\text{Gross ratio} = \frac{\text{Total cost}}{\text{Total returns}}$$

$$\text{Operating ratio} = \frac{\text{Operating cost}}{\text{Total returns}}$$

$$\text{Rate of Returns on Capital} = \frac{\text{Net return}}{\text{Total fixed investment}}$$

$$\text{Capital Turnover ratio} = \frac{\text{Total returns}}{\text{Total fixed investment}}$$

3.3.3 MARKETING ANALYSIS:

3.3.3.1 Gross Marketing Margin

$$G_m = \frac{\text{TSV-TPV}}{Q}$$

TSV = Total sale value

TPV = Total purchase value

Q = Quantity of Mushroom handled

3.3.3.2 Absolute Margin

$$A_m = M_s - (M_b + M_c)$$

M_s = Selling price of middleman

M_b = Buying price of middleman

M_c = Cost incurred by the middleman

3.3.3.3 Producers's price is the net price received by the farmers and it is given as:

$$P_p = P_s + P_m$$

P_s = Selling price of farmer

P_m = Marketing cost incurred by the farmer

3.3.3.4 Producer's Share in Consumer's Rupee

$$P = \frac{Pp}{Pc} \times 100$$

P_p = Producer's Price

P_c = Price paid by consumer

3.3.3.5 Marketing channels

Marketing channels were defined as the chain of intermediaries through whom the produce of mushroom passed from producers to consumers. Various marketing channels patronized by the growers for the marketing of mushrooms in the study area were examined by personal survey of different intermediaries involved in the marketing process.

3.3.3.7 Price spread

The difference between the price paid by the consumer and price received by the farmer is called marketing margin or price spread. Generally the economic efficiency of marketing system is measured in terms of price spread. Smaller the price spread; greater is the efficiency of the marketing system.

3.3.3.6 Marketing efficiency

Marketing efficiency of the marketing channels indicate that the movement of goods from producer to consumer is at the lowest possible cost, consistent with the provision of services desired by the consumer. The marketing efficiency of various marketing channels of mushroom was worked out using Acharya's method (Acharya and Agarwal, 2001) as follows:

$$\text{Marketing efficiency} = \frac{FP}{(MC + MM)}$$

Where,

FP = Price received by farmer

MC = Total marketing cost

MM = Net marketing margin

3.3.4 PROBLEMS AND CONSTRAINTS:

Constraints in adoption of mushroom production enterprise were measured by Henry Garrett Ranking Method (Garrett and Woodworth, 1969). The respondents were asked to rank the factors given. The orders of merit, assigned by the respondents will be converted into ranks by using the following formula:

Percent Position of Each Rank = $100\ (R_{ij} - 0.5) / N_j$

Where,

R_{ij} = Rank given for i^{th} factor by j^{th} individual

N_j = Number of factors ranked by j^{th} individual

The percentage positions of each rank thus obtained were converted into scores by referring to the table given by Henry Garrett. Then for each factor the scores of individual respondents were added together and divided by the total number of respondents for whom the scores were added.

3.4 DEFINITIONS OF TERMS AND COST CONCEPTS USED

3.4.1 Inputs and costs

Following were the various inputs used in the mushroom cultivation.

Compost

A biological matrix of microorganisms combined with straw, manure and other organic substances and designed for mushroom fruitbody production. There are several formulae of ingredients for preparation of compost.

Spawn

Mushroom spawn is used to transfer mycelium onto any material from which mushrooms will grow. It is an aggregation of mycelium on a carrier material which is usually used to inoculate prepared substrates.

Casing

A layer of water retentive materials applied to a substrate to encourage and enhance fruitbody production.

Fixed cost

The fixed costs are those costs which do not vary with the level of output. These costs consist of depreciation of fixed assets and interest on fixed investment which were used in mushroom cultivation.

Variable cost

Variable cost includes the expenditure on labour and material input cost and interest on working capital etc. also included under variable cost.

Hired human labour cost

Hired human labour was estimated in terms of man-days where in 8 hours of work in a day was considered as one man day. The man days were valued at Rs. 400 per man day. Family labour cost was calculated on the basis of charges paid to hired labour.

Depreciation

The amount of depreciation for implements was calculated at the rate of 10 per cent per annum on implements and at the rate of 2 per cent per annum for buildings.

Interest on working capital

Interest on working capital is charged at the rate of 12 per cent per annum for half of the production period i.e. for 2 months because the production period of mushroom crop is about 4 months

Interest on fixed capital

The interest on the value of fixed capital investment at the rate of 12 per cent per annum was accounted while computing the fixed costs.

3.4.2 Market intermediaries

Wholesaler

Wholesaler played an important role in the marketing process. Wholesalers buy the produce from farmers/market intermediaries and sells to the Industry/retailer.

Retailer

They purchase the produce from the wholesaler and sell it to the ultimate consumer.

Consumer

Local practitioners or households are the ultimate consumers.

3.5 IMPLICATIONS

The proposed study will be useful in determining the value and present condition of the existing mushroom units under the study area of the state. This will assist in developing a state policy for the growth of the state's mushroom business. The study's conclusions will include valuable to researchers, extension staff, mushroom producers, and the agricultural industry citizens and decision-makers. A better grasp of agricultural costs will be provided by the study and the mushroom crop's effectiveness in marketing. The anticipated production and marketing system and mushroom crop surpluses will be of particular interest to research.

3.6 LIMITATIONS OF THE STUDY

The current investigation was conducted utilising a methodical scientific approach. Best efforts have been made to analyse various parameters. Cross checks in the survey schedules helped to assure the data's accuracy. However, some limitations, like with every socio-economic study, might not be completely overcome. Only 60 mushroom producers' observations from a sample were used to base the study. Since the sample growers didn't keep records, the information was gathered orally through a survey method, and the farmers' responses were relied on memory and prior knowledge. Due to scheduling constraints, only data from the 2 agricultural year 2021-22 were used.

Chapter-4

RESULTS AND DISCUSSION

This chapter deals with the findings and interpretations made as a result of data analysis. The acquired data were categorised, tabulated, and examined in the context of the study's goals.

The results have been divided into the following subheadings for clearer comprehension and understanding:

4.1 Socio-economic characteristics of sample farmers.

4.2 Existing resource structure.

4.3 Cost and return of mushroom cultivation.

4.4 Marketing of mushroom.

4.5 Problems faced by mushroom growers.

4.1 SOCIO-ECONOMIC CHARACTERS OF SAMPLE FARMERS

Before moving on to analyse a specific farm operation economically, it is important to consider the numerous socioeconomic features of the growers. This section discusses the many socioeconomic traits of mushroom farmers, such as their family size and composition, level of education and occupation.

4.1.1. Size and structure of family:

The major elements affecting farm output, which happens to be a family labour based employment at the village level, are family size and structure, labour force, and literacy status among the sampled farmers. These factors establish the family's socioeconomic status, which is essential for the operation of the farm and marketing efforts.

In Table 4.1, the size and structure of the sampled households in the study region have been determined. By examining the tables, it was revealed that the nuclear family system is more prevalent in the studied households as it reflects more than 83.33 per cent of such families. The average family size of the sampled mushroom growers was found to be 5.47 people per household. Out of all the adult members, 27.80 per cent were female and 29.22 per cent were male. The ratio of females to males per thousand varied from 966 for small farms to 1055 for medium and 976 for large farms with an overall sex ratio of 990.

Table 4.1: Farm category wise demographic profile of sample households in the study area

(Numbers)

Particulars	**Farm category**			
Family structure	**Small**	**Medium**	**Large**	**Overall**
Joint Family	6 (19.35)	1 (6.67)	3 (21.43)	10 (16.67)
Nuclear Family	25 (80.65)	14 (93.33)	11 (78.57)	50 (83.33)
Total	31 (100.00)	15 (100.00)	14 (100.00)	60 (100.00)
Family size				
Total Size	5.58 (100.00)	4.93 (100.00)	5.79 (100.00)	5.47 (100.00)
Male	1.58 (28.32)	1.40 (28.38)	1.86 (32.10)	1.60 (29.22)
Female	1.48 (26.59)	1.47 (29.73)	1.64 (28.40)	1.52 (27.80)
Children	2.52 (45.09)	2.07 (41.89)	2.29 (39.51)	2.35 (42.99)
Male	1.26 (22.54)	1.00 (20.27)	1.07 (18.52)	1.15 (21.04)
Female	1.26 (22.54)	1.07 (21.62)	1.21 (20.99)	1.20 (21.95)
Sex ratio	966	1055	976	990

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

4.1.2. Literacy status

In order to manage farms scientifically, implement recommended technology, market farm goods effectively and modernize, all of which eventually influence the living standards of households, the education level is essential. With this in mind, table 4.2 represents the distribution of the sample population by educational attainment. Overall male literacy rate was 93.94 per cent, while female literacy rate was 91.89 per cent with an overall of 92.88 percent. In summary, it can be said that mushrooms growing households had higher literacy rates for both men and women that were higher than the state average of 82.80 per cent.

Table 4.2: **Educational status of the family members on sample farms**

(Number per family)

Particulars	Farm category								
	Small		Medium		Large		Overall		
	Male	Female	Male	Female	Male	Female	Male	Female	Total
Illiterate	0.23 (8.13)	0.23 (8.36)	0.13 (5.42)	0.20 (7.89)	0.07 (2.39)	0.21 (7.50)	0.17 (6.06)	0.22 (8.11)	0.39 (7.12)
Primary	0.06 (2.12)	0.03 (1.09)	0.07 (2.91)	0.33 (13.04)	0.14 (4.78)	0.14 (5.00)	0.08 (3.03)	0.13 (4.90)	0.22 (4.02)
Middle	0.32 (11.31)	0.39 (14.18)	0.13 (5.42)	0.07 (2.75)	0.29 (9.89)	0.50 (17.50)	0.27 (9.70)	0.33 (12.25)	0.60 (10.81)
High school	0.77 (27.21)	0.84 (30.55)	0.47 (19.58)	0.60 (23.72)	0.64 (21.84)	0.71 (25.00)	0.67 (24.24)	0.75 (27.57)	1.42 (25.93)
Senior Secondary	0.61 (21.55)	0.90 (32.73)	0.60 (25.00)	0.87 (34.32)	1.00 (34.14)	0.86 (30.00)	0.70 (25.45)	0.88 (32.47)	1.58 (28.90)
Graduation	0.74 (26.15)	0.23 (8.36)	0.73 (30.41)	0.40 (15.53)	0.79 (26.96)	0.36 (12.50)	0.75 (27.27)	0.30 (11.03)	1.05 (19.20)
Non school going	0.10 (3.53)	0.13 (4.73)	0.27 (11.26)	0.07 (2.75)	0.00 (0.00)	0.07 (2.50)	0.12 (4.24)	0.10 (3.68)	0.22 (4.02)
Total	2.83 (100.00)	2.75 (100.00)	2.40 (100.0)	2.53 (100.00)	2.93 (100.00)	2.86 (100.00)	2.75 (100.00)	2.72 (100.00)	5.47 (100.00)
Literacy rate (%)	91.87	91.64	94.58	92.11	97.61	92.31	93.94	91.89	92.88
Literacy Index	3.35	3.08	3.66	3.14	3.61	3.05	3.48	3.08	3.28

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

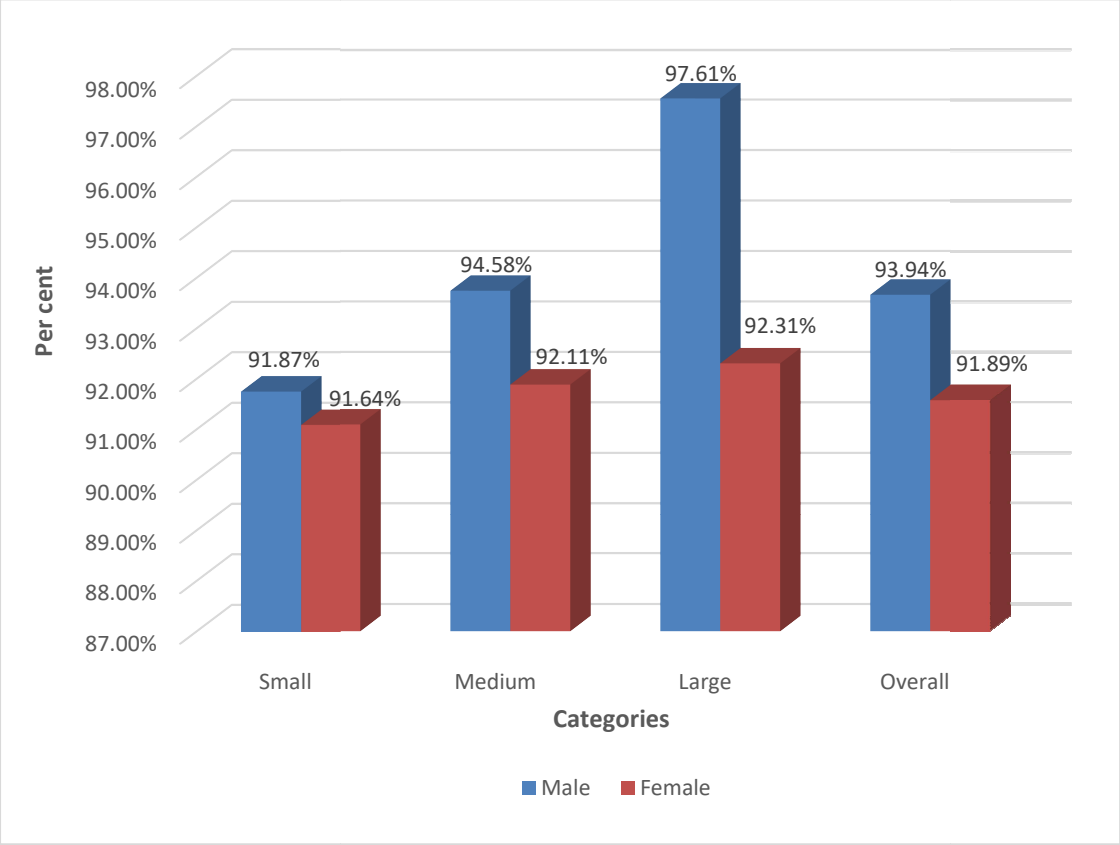

Fig 4.1: Literacy rate of sample households

4.1.3. Occupational distribution

Table 4.3 estimates the per-household occupational structure for the sampled mushroom farmers. The figures indicate that overall, agriculture was the primary occupation with 65.76 per cent of the labour force in the study area engaged in farming, 17.29 per cent engaged in public or private services, 10.51 per cent operating their own business and 6.44 per cent working as a daily wage. In large size farms, more people engage in business activity (20%) as compared to public or private services (14.67%) while in the small farm size category, more people were engaged in service (16.99%) and wage labour (11.11%). The average number of workers was in the range of 4.47 to 5.36. The overall average number of workers was computed to be 4.92.

Table 4.3: Occupation distribution of family workers

(Numbers)

Occupation	Farm category			
	Small	**Medium**	**Large**	**Overall**
Service (Public/Private)	0.84 (16.99)	0.93 (20.90)	0.79 (14.67)	0.85 (17.29)
Business	0.29 (5.88)	0.47 (10.45)	1.07 (20.00)	0.52 (10.51)
Agriculture	3.26 (66.01)	2.93 (65.67)	3.50 (65.33)	3.23 (65.76)
Wage labour	0.55 (11.11)	0.13 (2.99)	0.00 (0.00)	0.32 (6.44)
Average workers	4.94 (100.00)	4.47 (100.00)	5.36 (100.00)	4.92 (100.00)

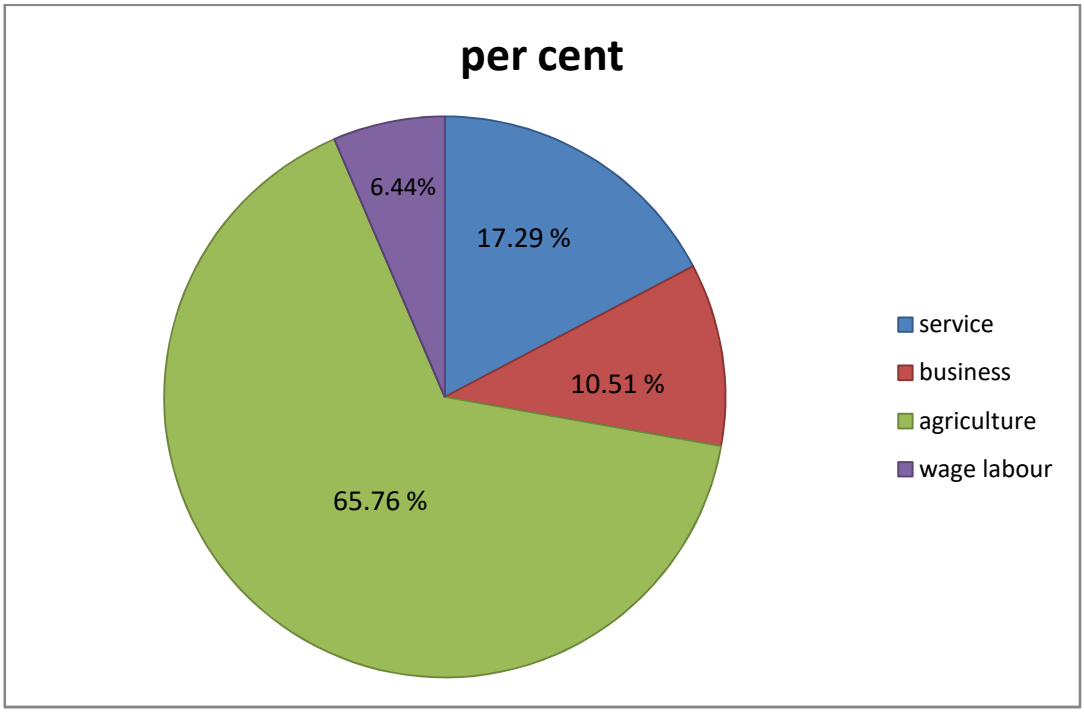

Fig 4.2: Occupation distribution of family workers

4.1.4. Work force

The economies of households depend on the strength of active workers. Per household, the distribution of workers and dependents of the sampled households was calculated and presented in Table 4.4. The proportion of active workers was found to be highest (92.57%) for large farms, followed by medium farms (90.50%), and lowest (88.35%) for small farms. People in between the age group of 14 to 65 were considered to be members of the active labour force as they were actively engaged in productive economic enterprise. The overall dependency with respect to workers was determined to be 0.12, with the small farm category having the highest level (0.14), followed by the medium farm size (0.11) and least in large size farms (0.08). It is concluded from the dependency ratio that, a worker in the study area typically has to support less than one family member.

Table 4.4: Category wise distribution of workers and dependents of the sample households

(Numbers)

Particulars	**Farm category**			
	Small	**Medium**	**Large**	**Overall**
Average number of workers	4.93 (88.35)	4.48 (90.50)	5.36 (92.57)	4.92 (89.87)
Average number of dependents	0.65 (11.65)	0.47 (9.5)	0.43 (7.43)	0.55 (10.13)
Average size of family	5.58 (100)	4.93 (100)	5.79 (100)	5.47 (100)
Dependency ratio w.r.t. to workers	0.14	0.10	0.08	0.12
Dependency ratio w.r.t. family	0.12	0.09	0.07	0.10

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

4.2 EXISTING RESOURCE STRUCTURE

This section deals with the existing resource structures like land, labour, cropping patterns, livestock, farm investment, etc. Category wise results in different aspects are given below:

4.2.1. Land use pattern

Table 4.5 shows the pattern of land use for the households in each group and for the entire study region. The type of farming system in a region is determined by the land use pattern. According to the data, mushroom growers owned 0.75 hectares of land in total. 82.67 per cent of the total operating area was occupied with cultivated land accounting for the highest share (68.00 %), followed by orchard area (14.67%). Overall, 8.00 per cent total land holding is used for animal pastures, and 9.33 per cent is used for non-agricultural purposes.

Table 4.5: Land utilization pattern in study area

(Area in Hectare)

Sr. No.	Land use and classes	Farm category			
		Small	Medium	Large	Overall
I.	Cultivated area	0.53 (77.94)	0.53 (67.06)	0.48 (60.00)	0.51 (68.00)
a)	IR	0.22 (32.35)	0.24 (30.36)	0.26 (32.50)	0.23 (30.67)
b)	UIR	0.31 (45.59)	0.29 (36.70)	0.22 (27.50)	0.28 (37.33)
II.	Orchard Area	0.08 (11.76)	0.11 (13.96)	0.13 (15.00)	0.11 (14.67)
a)	IR	0.05 (7.35)	0.07 (8.86)	0.03 (3.75)	0.06 (8.00)
b)	UIR	0.03 (4.41)	0.04 (5.10)	0.09 (11.25)	0.05 (6.67)
III	Total operational area (I+II)	0.61 (89.70)	0.64 (81.02)	0.60 (75.00)	0.62 (82.67)
IV	Pasture land	0.06 (8.83)	0.09 (11.39)	0.01 (1.25)	0.06 (8.00)
V	Land put to non agricultural use	0.01 (1.47)	0.06 (7.59)	0.19 (23.75)	0.07 (9.33)
VI	Total land holding (III+IV+V)	0.68 (100.00)	0.79 (100.00)	0.80 (100.00)	0.75 (100.00)

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

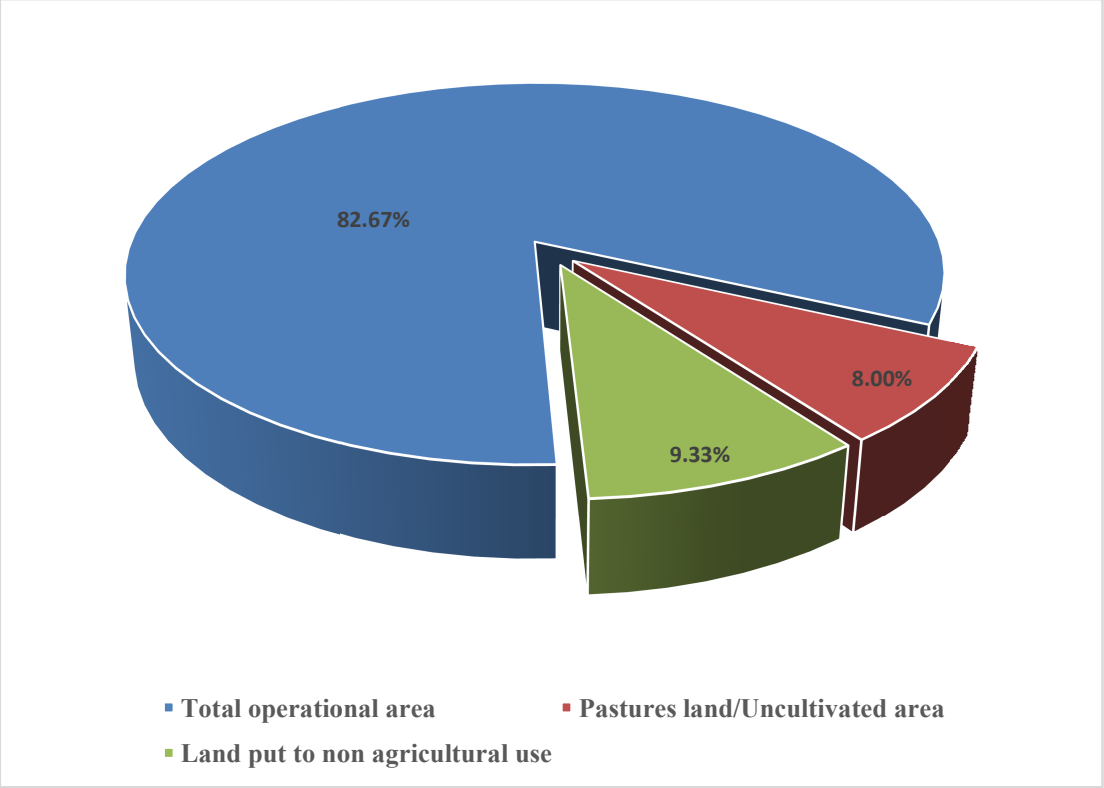

Fig 4.3: Overall land use pattern of sampled mushroom growers

4.2.2 Cropping pattern

Cropping patterns are crucial because they show what proportion of the land is used for particular crops at any given time. This was a reflection of the relative proportions given to various crops in the farming period. This factor aids in determining the level of crop intensification on farms. The cropping patterns of the sampled farms were examined, and the findings are shown in table 4.6. The Table clearly shows that small mushroom growers (187.87%) had the highest cropping intensity, followed by medium mushroom growers (184.93%), and large mushroom growers (180.33%). Crop intensity was calculated to be 182.35 per cent at the overall level. Analysis of the data in the table further revealed that at an overall level, maize occupied 20.06 percent of the total cropped area in the kharif season. The area under vegetable crops was 20.65 per cent. In the Rabi season, the area under vegetables was greater (0.25 ha) as compared to the kharif season (0.23 ha).

Table 4.6: Cropping pattern of sample farms

(Area in Hectare)

Season/crop	**Farm category**			
	Small	**Medium**	**Large**	**Overall**
Total *kharif* crop	0.58 (46.77)	0.62 (45.92)	0.49 (44.54)	0.57 (45.96)
Maize	0.27 (21.77)	0.21 (15.56)	0.16 (14.55)	0.23 (18.55)
Paddy	0.02 (1.61)	0.08 (5.93)	0.08 (7.27)	0.05 (4.03)
Vegetables	0.23 (18.55)	0.24 (17.78)	0.24 (21.82)	0.23 (18.55)
Kharif fodder	0.06 (4.84)	0.09 (6.67)	0.01 (0.91)	0.06 (4.84)
Total *rabi* crops	0.58 (46.77)	0.62 (45.92)	0.49 (44.54)	0.57 (45.96)
Wheat	0.28 (22.58)	0.29 (21.48)	0.20 (18.18)	0.27 (21.77)
Vegetables	0.24 (19.35)	0.25 (18.52)	0.28 (25.45)	0.25 (20.16)
Rabi fodder	0.06 (4.84)	0.08 (5.93)	0.01 (0.91)	0.05 (4.03)
Fruits	0.08 (6.45)	0.11 (8.15)	0.12 (10.91)	0.11 (8.87)
Gross cropped area	1.24 (100.00)	1.35 (100.00)	1.10 (100.00)	1.24 (100.00)
Net sown area	0.66	0.73	0.61	0.68
Cropping Intensity (%)	187.87	184.93	180.33	182.35

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

4.2.3. Livestock

Livestock rearing is an integral part of the farming system in the hilly states. They are not only direct suppliers of milk, meat, wool, and manures, but they are also the primary source of ploughing fields and FYM. It is a good supplementary source of income for the farmers. The livestock population was defined in terms of adult

cattle units (ACU) as per definition. The ACU is defined as; one cow/bullock = 1 ACU, young stock of buffalo/cow = 0.75 ACU, sheep/goat = 0.15 ACU and one buffalo = 1.50 ACU (Pandey, 2011). Details of different types of livestock being kept on different categories of selected farms were analysed and the data is presented in Table 4.7. One of the significant features of the table is that the medium and large categories were keeping fewer animals as compared to small size farmers. This means that small category farmers rear more livestock to diversify their income stream.

The Table reveals that buffalo were the most preferred farm animal in the study area. The average livestock population of the sampled farms was 1.97. In total livestock, buffaloes accounted for 56.85 per cent of the overall categories, followed by cows, which was about 21.31 per cent, young stock (14.73%), bullocks (5.08%) and goats accounted for 2.03 per cent.

Table 4.7: Inventory of livestock on sample farms

(ACU)

Particulars	**Farm category**			
	Small	**Medium**	**Large**	**Overall**
Cow	0.39 (18.66)	0.47 (23.98)	0.43 (25.00)	0.42 (21.31)
Buffalo	1.16 (55.50)	1.10 (56.12)	1.07 (62.21)	1.12 (56.85)
Young stock	0.36 (17.23)	0.20 (10.20)	0.22 (12.79)	0.29 (14.73)
Goat	0.05 (2.39)	0.06 (3.07)	0.00 (0.00)	0.04 (2.03)
Bullock	0.13 (6.22)	0.13 (6.63)	0.00 (0.00)	0.10 (5.08)
Total	2.09 (100.00)	1.96 (100.00)	1.72 (100.00)	1.97 (100.00)

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

4.2.4 Investment on farm buildings

The overall investment in mushroom housing amounted to ₹ 2,68,000, followed by ₹ 2,66,166.67 for residential houses and ₹ 27,916.45 for livestock sheds

(Table 4.8). In total, the mushroom farmers invested ₹ 5,66,249.78 in buildings that, on an average varied from small farm cost of ₹ 3,33,064.07 to large farm cost of ₹ 12,38,571.86. Table 4.8 demonstrated that, generally, residential housing accounted for the majority of total investment in farm structures for small (73.12%) and medium (60.22 %) sized farmers whereas, large scale farmers invested heavily on mushroom house (71.23%). The overall investment in the mushroom house was 48.06 per cent, ranging from 17.63 per cent in small to 71.23 per cent in large farm units.

Table 4.8: Investment pattern on building of sample farmers

(Rs/farm)

Particulars	Farm Size			
	Small	**Medium**	**Large**	**Overall**
Residential building	243548.39 (73.12)	253333.33 (60.22)	330000.00 (26.64)	266166.67 (47.01)
Cattle shed	30806.00 (9.25)	23333.00 (5.56)	26429.00 (2.13)	27916.45 (4.93)
Mushroom house	58709.68 (17.63)	144000.00 (34.32)	8821242.86 (71.23)	272166.67 (48.06)
Total	333064.07 (100.00)	420666.33 (100.00)	1238571.86 (100.00)	566249.78 (100.00)

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

4.2.5 Investment on farm implements and assets on sample farms

The farm implements and machinery were the tools used by the farmers to perform various farm operations. The value of farm implements was an important indicator of the level of capital formation in agriculture. Keeping this in view, the investment in implements and assets was studied and the results have been presented in Table 4.9.

In all categories, mushroom houses accounted for the highest percentage of investment made on farm machinery and assets. Overall, it accounted for 76.78 per cent of total investment, which was ranging from 71.18 per cent in small farms to 77.71 per cent in large farms. Iron racks, wooden racks, hygrometer, thermometer, room heater, exhaust fan, weighing machine, etc. were the other important

equipment. On an overall level, the fixed capital on implements and assets was estimated at ₹ 3,54,484.31.

Table 4.9: Investment on farm implements and assets on sample farm

(Rs/farm)

Sr. No.	Particulars	Farm size			
		Small	**Medium**	**Large**	**Overall**
1	Mushroom house	58709.68 (71.18)	144000.00 (76.83)	882142.86 (77.71)	272166.67 (76.78)
2	Iron Racks	11129.03 (13.49)	28666.67 (15.25)	223571.43 (19.69)	65083.33 (18.36)
3	Wooden racks	9096.77 (11.03)	8000.00 (4.26)	5000.00 (0.44)	7866.67 (2.22)
4	Hygrometer	145.16 (0.18)	393.33 (0.21)	1114.29 (0.10)	433.33 (0.12)
5	Blower/Heater	438.33 (0.53)	1143.33 (0.61)	685.71 (0.06)	672.31 (0.19)
6	Thermometer	111.29 (0.13)	234.67 (0.12)	757.14 (0.07)	292.83 (0.08)
7	Spray pump	237.10 (0.29)	1226.67 (0.65)	4285.71 (0.38)	1429.17 (0.40)
8	Exhaust fan	438.71 (0.53)	1086.67 (0.58)	3028.57 (0.27)	1205.00 (0.34)
9	Weighing balance	233.87 (0.28)	336.67 (0.18)	600.00 (0.05)	345.00 (0.10)
10	Packing machine	195.16 (0.24)	476.67 (0.25)	5182.14 (0.46)	1429.17 (0.40)
11	Electricity fitting	825.81 (1.00)	1050.00 (0.56)	5764.29 (0.51)	2034.17 (0.57)
12	Bucket/Water tank	451.61 (0.55)	676.67 (0.36)	1685.71 (0.15)	795.83 (0.22)
13	Miscellaneous	472.58 (0.57)	633.33 (0.34)	1407.14 (0.12)	730.83 (0.21)
	TOTAL	82485 (100.00)	187924.67 (100.00)	1135225.00 (100.00)	354484.31 (100.00)

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

4.3 COST AND RETURNS OF MUSHROOM CULTIVATION

4.3.1 Cost of mushroom production

For various types of mushroom farms, the cost of mushroom cultivation was calculated using the fixed cost and variable cost concepts of standard farm management and is shown in Table 4.10. Interest on fixed capital as well as depreciation on the mushroom house and implements utilised were fixed costs. Compost bags, medicines, electricity costs, packing supplies, labour costs, transportation costs, etc. were all included in the variable cost category as they vary with the level of production.

The cost of mushroom cultivation per farm is presented in table 4.10. At an overall level, the fixed cost items that made up approximately 12.88 per cent and 5.00 per cent of the total cost respectively, were interest on fixed capital and depreciation on buildings, whereas depreciation on implements (such as iron racks, wooden racks, hygrometers, thermometers, packing machines, exhaust fans, coolers, etc.) made up 7.49 per cent of the total cost. On average, fixed costs on farms were estimated to account for around 25.37 per cent of total costs. Compost bags and labour costs were the two main expenditures in the variable cost category contributing about 46.50 per cent and 16.49 per cent of the total cost respectively. The high cost of production was reflected in the high cost of compost bags and labour.

On a per 100 bag basis, the average cost of mushroom growing for various farm categories was also calculated and shown in Table 4.11. The cost of cultivation per 100 bags was calculated as ₹ 20,059.27 for small farm size category mushroom growers, ₹ 22032.80 for medium and ₹ 17238.25 for large farm size category of mushroom producers. The cost of cultivation decreased as the number of compost bags or total production increased. This demonstrates the effectiveness of mass production.

Table 4.10: Per farm cost of mushroom cultivation on sample farms

(Rupees/farm)

Sr. no.	Particulars	Farm category			
		Small	**Medium**	**Large**	**Overall**
A	**Fixed Cost**				
1	Interest on fixed capital (@ 12 per cent)	3266.41 (10.12)	7441.82 (8.82)	44954.91 (14.73)	14037.58 (12.88)
2	Depreciation on building (@ 2 per cent p.a.)	1174.19 (3.64)	2880.00 (3.42)	17642.86 (5.78)	5443.33 (5.00)
3	Depreciation on implements (@ 10 per cent p.a.)	2330.28 (7.22)	4329.13 (5.14)	25167.50 (8.25)	8158.68 (7.49)
	Subtotal	6770.89 (20.98)	14650.95 (17.38)	87765.27 (28.77)	27639.59 (25.37)
B	**Variable cost**				
1	Mushroom bags (compost+ casing+ spawn)	16841.94 (52.19)	52133.33 (61.84)	124000.00 (40.64)	50668.33 (46.50)
2	Transportation	1464.52 (4.54)	4533.33 (5.38)	28864.29 (9.46)	8625.00 (7.92)
3	Electricity charges	327.42 (1.01)	576.67 (0.68)	4285.71 (1.40)	1313.33 (1.21)
4	Packing material	262.10 (0.81)	533.33 (0.63)	642.86 (0.21)	418.75 (0.38)
5	Labour	5691.13 (17.64)	9993.33 (11.85)	53696.43 (17.60)	17967.92 (16.49)
6	Medicine	182.26 (0.56)	293.33 (0.35)	1064.29 (0.35)	415.83 (0.38)
7	Miscellaneous	219.35 (0.68)	273.33 (0.32)	435.71 (0.14)	283.33 (0.26)
	Total (1-7)	24988.71 (77.44)	68336.66 (81.06)	212989.29 (69.81)	79692.50 (73.14)
8	Interest on variable capital (@ 12 per cent for 2 months)	509.77 (1.58)	1394.07 (1.65)	4344.98 (1.42)	1625.73 (1.49)
	Sub total	25498.48 (79.02)	69730.73 (82.62)	217334.27 (71.23)	80899.48 (74.63)
	Total	32269.37 (100.00)	84381.68 (100.00)	305099.53 (100.00)	108957.82 (100.00)

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

Table 4.11: Per 100 bags cost of mushroom cultivation on sample farms

(Rupees/100bags)

Sr. no.	Particulars	Farm category			
		Small	Medium	Large	Overall
A	**Fixed cost**				
1	Interest on fixed capital (@ 12 per cent)	2229.99 (10.12)	1641.58 (8.82)	2537.78 (14.32)	2154.70 (10.74)
2	Depreciation on building (@ 2 per cent p.a.)	801.76 (3.64)	635.29 (3.41)	995.97 (5.78)	805.46 (4.02)
3	Depreciation on implements (@ 10 per cent p.a.)	1590.20 (7.22)	954.96 (5.13)	1420.75 (8.24)	1391.85 (6.94)
	Sub Total	4621.95 (20.98)	3231.83 (17.36)	4954.49 (28.74)	4352.01 (21.70)
B	**Variable cost**				
1	Mushroom bags(compost +casing +spawn)	11500.00 (52.19)	11500.00 (60.78)	7000.00 (40.61)	10450.00 (52.10)
2	Transportation	1000.00 (4.54)	1000.00 (5.37)	1629.44 (9.45)	1146.87 (5.72)
3	Electricity charges	223.57 (1.01)	127.21 (0.68)	241.93 (1.40)	203.76 (1.02)
4	Packing material	178.96 (0.81)	117.65 (0.63)	50.90 (0.30)	133.75 (0.67)
5	Labour	3886.01 (17.64)	2204.41 (11.84)	3031.25 (17.58)	3266.17 (16.28)
6	Medicine	124.45 (0.56)	64.71 (0.35)	60.08 (0.35)	94.49 (0.47)
7	Miscellaneous	149.78 (0.68)	60.29 (0.32)	24.59 (0.14)	98.20 (0.49)
	Total (1-7)	17062.78 (77.44)	14223.90 (80.99)	12038.18 (69.83)	15393.24 (76.74)
8	Interest on variable capital (@ 12 per cent for 2 months)	348.08 (1.58)	307.51 (1.65)	245.58 (1.42)	314.02 (1.57)
	Sub Total	17410.86 (79.02)	15381.78 (82.64)	12283.76 (71.26)	15707.26 (78.30)
	Total	22032.80 (100.00)	18613.61 (100.00)	17238.25 (100.00)	20059.27 (100.00)

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

4.3.2 Returns and benefit-cost ratio

Per-farm returns were assessed, and it was noted that the cost of cultivation per kg of mushroom was estimated to be ₹ 95.10, ranging from ₹ 81.52 for large farms to ₹ 104.48 for small farms (Table 4.12). The higher cost of production per kg of mushroom for small growers suggests that they were unable to effectively utilise the fixed assets needed for mushroom cultivation. As a result, there is room to increase the number of bags in order to make the best use of the available space and other investments. At an overall level, the average production was estimated at 1271.58 Kg. The average return in terms of money value was ₹ 39770.48, ₹ 119997.00 and ₹471304.90 in small, medium and large sized farms, respectively. The overall average return of mushrooms was worked out to be ₹ 291147.33. The overall return per rupee investment was estimated at Rs 0.35 which varied between ₹ 0.23 in small sized farms to ₹ 0.54 in large sized farms. The benefit-cost ratio was observed to be 1.23, 1.42 and 1.54 on small, medium and large farm categories respectively. The overall benefit-to-cost ratio was estimated at 1.35.

Table 4.12: Per farm returns and benefit-cost analysis on different categories of sample mushroom farms

(Rs/farm)

Particulars	Farm size			
	Small	Medium	Large	Overall
Total fixed cost	6770.89	14650.95	87765.27	27639.59
Total variable cost	25498.48	69730.73	217334.27	81318.23
Total cost	32269.37	84381.68	305099.53	108957.82
Total production (kg)	308.87	954.67	3742.85	1271.58
Gross return	39770.48	119997.00	471304.90	291147.33
Net return over total cost	7501.12	35615.32	166205.37	51560.66
Net return over variable cost	14272.00	50266.27	253970.63	79200.25
Net return per rupee investment	0.23	0.42	0.54	0.35
Cost per Kg	104.48	88.39	81.52	95.10
Benefit-Cost Ratio	1.23	1.42	1.54	1.35

From Table 4.13, it was observed that the average production per 100 bags was recorded highest in the case of large sized farms, i.e., 211.29 Kg followed by small-sized farms at 210.90 Kg and medium-sized farms at 210.59 Kg. Overall, the average production was estimated at 210.91 kg. The average return in terms of money value was highest in the case of large sized farms at ₹ 9367.39 followed by medium sized farms at ₹ 7861.76 and small sized farms at ₹ 5122.68. The overall average return from mushrooms was worked out to be ₹ 6796.88. It can be observed from the table that with an increase in the farm size, the cost of mushroom production per 100 bags is decreasing and net farm income is increasing.

Table 4.13: Per 100 bags returns and benefit-cost analysis on sample mushroom farms

(Rs/100 bags)

Particulars	**Farm size**			
	Small	**Medium**	**Large**	**Overall**
Total fixed cost	4621.95	3231.83	4954.49	4352.01
Total variable cost	17410.86	15381.78	12283.76	15707.26
Total cost	22032.80	18613.61	17238.25	20059.27
Total production (kg)	210.90	210.59	211.29	210.91
Gross return	27155.48	26475.37	26605.64	26857.16
Net return over total cost	5122.68	7861.76	9367.39	6797.88
Net return over variable cost	9744.62	11093.59	14321.88	11149.89
Net return per rupee investment	0.23	0.42	0.54	0.35
Cost per kg	104.47	88.39	81.59	95.11
Benefit- Cost Ratio	1.23	1.42	1.54	1.35

4.3.3 Break-even analysis

The total cost incurred on mushroom farms was segregated into fixed and variable costs to find out the break-even output. The fixed costs included interest on fixed capital investment and depreciation on buildings and equipment. All other operational expenditure is included in the variable cost.

Break even analysis revealed that small farm size farmers who produced 146.53 kg of mushrooms did not gain profit or lose under the given total cost. However, for the medium and large farm categories, the break-even output was worked out to be 278.25 kg and 1293.43 kg respectively. According to the break-even analysis presented in physical terms, small, medium and large category growers would experience a no profit, no loss scenario if they installed at least 70, 132, and 616 compost bags at respective locations. However, at an overall level, the number of compost bags to be placed giving no profit or loss was 213.

Table 4.14: Per farm Break-even point for sampled farms

(Per farm)

Particulars	**Farm category**			
	Small	**Medium**	**Large**	**Overall**
Total fixed cost(Rs)	6770.89	14650.95	87765.27	27639.59
Total variable cost(Rs)	25498.48	69730.73	217334.27	81318.23
Total cost(Rs)	32269.37	84381.68	305099.53	108957.82
Total production(kg)	308.87	954.67	3742.85	1271.58
Price per kg	128.76	125.70	125.92	127.33
Break-even output(kg)	146.53	278.25	1293.43	447.07
Break-even output (No. of compost bags)	70.00	132.00	616.00	213.00

Further, break even analysis revealed that overall break even output is 84.08 kg per 100 bags. Farms needed to produce 100.03 kg, 61.35 kg, and 73.09 kg to cover the cost of 100 bags in the small, medium, and large categories, respectively.

To sum up, it can be concluded that the break-even point for mushroom units in the study region was calculated at 84.08 kg of mushroom production derived from 40 compost bags.

Table 4.15: Per 100 bags Break-even point for sampled farms

(Per 100 bags)

Particulars	Farm size			
	Small	**Medium**	**Large**	**Overall**
Total fixed cost(Rs)	4621.95	3231.83	4954.49	4352.01
Total variable cost(Rs)	17410.86	15381.78	12283.76	15707.26
Total cost(Rs)	22032.80	18613.61	17238.25	20059.27
Total production(kg)	210.90	210.59	211.29	210.91
Price per kg(Rs)	128.76	125.70	125.92	127.33
Break even output(kg)	100.03	61.35	73.09	84.08
Break-even output (No. of compost bags)	48.00	30.00	35.00	40.00

4.3.4 Financial ratios

Financial test ratios were computed to assess the economic sustainability of mushrooms for different mushroom farm sizes and grower types (Table 4.16).

The capital turnover ratio for large mushroom producers was found higher (0.62), followed by medium growers (0.57), and small growers (0.50). The overall capital turnover ratio was observed to be 0.60.

The rate of return on capital was computed by dividing net returns with total fixed capital and it was observed to be 0.11, 0.22 and 0.26 in the case of small, medium and large farms, with an overall rate of return turning out to be 0.25.

The gross ratio for small, medium and large farms was discovered to be 0.81, 0.70, 0.65 respectively, with an overall ratio of 0.37 which displayed the complete cost per unit of the total return. Large producers were found to be more economical because their overall cost per unit was the lowest. Due to the comparative low value (0.46) of the operating ratio in case of large farms, which was calculated by dividing operating costs by total returns, large farms were determined to have a better efficiency than medium (0.58) and small units (0.64).

Table 4.16: Per farm financial test ratios

Particulars	Farm size			
	Small	Medium	Large	Overall
Gross ratio	0.81	0.70	0.65	0.37
Operating ratio	0.64	0.58	0.46	0.58
Rate of return on capital	0.11	0.22	0.26	0.25
Capital turnover ratio	0.50	0.57	0.62	0.60

4.4 MARKETING OF MUSHROOM

The goal of every commercial activity is to guarantee a sufficient market for its goods and services. Marketing is given top priority because it assures the activity's revenue. In most cases, it implies both the economic and physical transfer of products. Even if a farmer is employed in one of the most profitable businesses or has adopted advanced production techniques, a weak financial foundation without an effective marketing strategy might have a negative impact on their situation. The marketing organisation affects the production objectives by determining a price that is rewarding and by providing adequate marketing resources. Like any other producer, mushroom growers will be hesitant to start a mushroom farm unless they can be certain of an effective marketing strategy. While there are only a few regions in Himachal Pradesh that are actively engaged in mushroom growing, the state's output is only expected to rise.

As a result, this aspect was also evaluated during the fieldwork for the survey, and data on the marketing infrastructure, including the manner of marketing, the channels involved in marketing, marketing costs, and money received by the intermediary, was also acquired.

4.4.1 Marketing management and marketing systems

Picking of mushrooms begins before the cap opens and the gills become visible. Individual mushrooms are chosen by holding them between the forefingers and thumb and carefully removing them from the casing bed when the caps grow to reach around 3 to 3.5 cm in diameter at button stage. Mushrooms are cleaned, the dirt

is scraped off with a knife, and then they are placed in collecting baskets. The strain of spawn utilised, the quality of the compost, and effective crop management all affect the yield, which is highly variable. The lifespan of picked mushrooms is extremely brief. The mushroom starts to lose its quality in 1-2 days at 20^0 C. Deterioration after harvesting appears as browning and discoloration of the buttons. To avoid browning and discolouration of the buttons, the selected mushrooms are dipped and washed in potassium metabisulphite (KMS) solution.

4.4.2 Weighing and packing

The harvested mushrooms are thoroughly cleaned, and then weighed on an electronic and manual balance before being placed in 150 g or 200 g polythene bags or trays. In order to allow for aeration, the polythene bags are sealed with candles and punctured with tiny needles. Large farmers use packing machines for mushroom packaging. Everything is placed in huge handbags for portability.

4.4.3 Sale procedure

The shelf life of fresh mushrooms is relatively short. Without a facility for chilled transport, these cannot be carried across long distances. As a result, items are offered for sale in the local markets. Some mushroom producers struggle with an oversaturated market due to the short shelf life and small marketing region during the growing season. Few of them are consequently compelled to sell their produce for less than the prevailing rate in the market. Few consumers who are well known to the growers arrive at their door to make purchases and receive fresh materials at fair prices. The local area's mushroom growers also received orders for a large quantity of mushrooms for weddings, birthday parties, and other religious and social events. Some mushroom farmers have established relationships with hotels, eateries, schools, hotels and dhabas that made soup. The majority of growers have market connections and directly supply to wholesalers and retailers. Produce consumption at the individual level ranges from kg to quintals per day and is conveniently transported in handbags or boxes and by personal or public transportation.

4.4.4 Mode of payment

The mushroom farmers were paid in cash on the same days, and there were very few instances of payments being delayed.

4.4.5 Marketing channels

A marketing channel is a channel that a commodity follows as it travels from producer to end consumer. The primary mushroom marketing channels were determined based on the volume of mushrooms sold by mushroom producers in various markets. The majority of mushroom farmers marketed their products to the retailers on an individual basis.

There are primarily two types of market intermediaries: retailers and wholesalers. In order to bridge the gap between the producer and the final consumers, retailers and wholesalers were introduced in the marketing of mushrooms in the research area. Despite the fact that they provide incredibly valuable services, all of these intermediaries are driven by profit. Mushrooms growers in the study area used the following channels for marketing of produce (Table 4.17). According to the table, producers were disposing of their produce through three important marketing channels in the study area.

Table 4.17: Prevailing marketing channels among sample farmers

Marketing Channel	**Marketing intermediaries**
Channel A	Producer → Consumer
Channel B	Producer → Retailer → Consumer
Channel C	Producer → Wholesaler → Retailer → Consumer

4.4.6 Disposal pattern

The decision by the mushroom producer to dispose of their produce through a certain marketing channel was influenced by a number of factors. These included the availability of means of transport, distance of the farm to the market, the amount of time available for the disposal of produce, the producers' awareness of prices, the preferred method of payment, the quantity of produce to be sold, and the mushroom farmers' access to refrigerated storage facilities. As a result, depending on the factors listed, each group of mushroom growers selected a distinct method of disposing of their produce.

a) Direct sale to customer

Through this channel, a direct connection is made with the customer. This channel makes a higher share of the producer in the consumer's rupee. This channel sold approximately 21.87 per cent of the total produce (Table 4.18).

b) Sale through retailer

Produce is bought by retailers from the producer directly before being sold to the consumer. Through this channel, the producer sold about 56.23 per cent of the total produce to the merchant (Table 4.18). The highest proportion of the total marketed surplus of mushrooms was sold through this channel in the sampled area. Generally, small and medium sized growers sell directly to retailers in the market to fetch a good price.

c) Sale through wholesaler

Wholesalers sell/auction the mushrooms in the wholesale market to retailers or buyers. In the study area, about 21.91 per cent of the produce was disposed off through this channel (Table 4.18).

Table 4.18: Disposal pattern of mushroom through different channels

(Per cent)

Farm size	Channel A	Channel B	Channel C
Small	22.15	74.67	3.18
Medium	13.63	57.11	29.26
Large	30.05	14.45	55.50
Overall	21.87	56.23	21.91

4.4.7 Marketing cost and margins in the marketing of mushroom

The phrase "marketing cost" refers to the actual costs experienced by mushroom producers and other middlemen during the sale of their products. Marketing margins are the difference between the price paid and received by a particular agency during the transfer of the mushrooms from the growers to the consumers.

It is preferred that the cost of moving commodities from the producer to the consumer be as low as is consistent with the supply of services. Price is one of the most fundamental and important factors governing capital returns to producers. Low prices paid to growers may cause them to lose interest in managing their businesses, which would have a negative impact on production and ultimately increase product prices against customers' best interests. The public will be unwilling to buy mushrooms and switch to another good. Therefore, the product should be priced so that the producer can afford to keep up the flow of product and the customer is willing to buy it.

a) Cost incurred by producer

Marketing expenses and profit margins of various functionaries involved in various marketing channels is presented in Table 4.19. The data shows that in the case of Channel-A, farmers sold their produce directly to customers, in the nearby market or by the side of the road. In this channel, the producer's total marketing expenses came to ₹ 1.50 per kg. Producers in Channel-B sold their goods to retailers in the neighbourhood markets or at the vegetable shop. The producer's overall marketing expenses in this channel came to ₹ 2.50 per kg. In Channel-C, producers sold their goods to wholesalers in Sabzi Mandis or at the marketplace, and their total marketing expenses came to ₹ 3.00 per kg.

b) Marketing cost incurred by retailer

Retailers' sale prices in the two channels where they were present were discovered to be identical. In Channel B and Channel C, the retailer paid marketing expenses of ₹ 2.00 per kg and ₹ 3.50 per kg, respectively. The expected retailers' margin was ₹ 11.00 per kg and ₹ 8.00 per kg, respectively in channels B and C.

c) Cost incurred by wholesaler

In Channels C, the main operators were the wholesalers. The key components of the wholesaler's marketing expenses were the wastage/spoilage, Mandi tax and handling fees. In channel-C, the wholesaler spent ₹ 4.70 per kg on the marketing process.

Table 4.19: Marketing costs and margin of various functionaries in the different marketing channels

(Rs/Kg)

Particulars	Channel A	Per cent of consumer price	Channel B	Per cent of consumer price	Channel C	Per cent of consumer price
Farmer's selling price	135.00	100.00	135.00	90.00	120.00	80.00
Marketing cost incurred by producers	1.50	1.11	2.50	1.67	3.00	2.00
Transportation cost	0.00		1.00	0.60	1.50	1.00
Packing material cost	1.50	1.11	1.50	1.00	1.50	1.00
Commission charge	0.00		0.00		0.00	
Net price received by grower/ production's price	133.50	98.89	132.00	88.33	117.00	78.00
Marketing cost incurred by Wholesaler	-	-	-	-	4.70	3.13
Gross price paid by Wholesaler	-	-	-	-	120.00	80.00
wastage/spoilage	-	-	-	-	2.50	1.67
Handling	-	-	-	-	1.00	0.67
Mandi Tax	-	-	-	-	1.20	0.80
Net Wholesalers Margin	-	-	-	-	10.30	6.87
Wholesaler Selling price/ Retailer purchase price	-	-	-	-	135.00	90.00
Marketing cost incurred by Retailer	-	-	2.00	1.33	3.50	2.33
Gross price paid by Retailer	-	-	135.00	90.00	135.00	90.00
Wastage/Spoilage	-	-	2.00	1.33	2.00	1.33
Loading / unloading	-	-	0.00	0.00	0.00	0.00
Transportation cost	-	-	0.00	-	1.50	1.00
Mandi Tax	-	-	0.00	-	0.00	0.00
Retailer Margin	-	-	11.50	7.33	8.00	5.33
Retailer Selling price	-	-	150.00	100.00	150.00	100.00
Consumer' Purchase Price	135.00	100.00	150.00	100.00	150.00	100.00

4.4.8 Price spread

The table 4.20 shows that the producer's price fluctuated amongst different outlets, ranging from ₹ 117.00 per kg in large farms to ₹ 133.50 per kg in small farms. The highest gross marketing margin was discovered in Channel-C at ₹ 33 per kg, followed by Channel-B at ₹ 17.50 per kg and Channel-A at ₹ 1.50 per kg. Channel-A had the highest producer's share in consumer's rupee (98.89%), followed by Channel-B (88.33%), and Channel-C (78%). Net marketing margin per kg of the crop varied from ₹ 11.00 in Channel B to ₹ 18.30 in Channel C. Different marketing channels had different marketing costs per kg, ranging from ₹ 1.50 in Channel A to ₹ 11.25 in Channel C.

Table 4.20: Price spread of Mushroom among the different marketing channels

(Rs/Kg)

Particulars	**Channel A**	**Channel B**	**Channel C**
Producer selling price	135.00	135.00	120.00
Net price	133.50	132.00	117.00
Consumer's price	135.00	150.00	150.00
Gross marketing margin (GMM)	1.50	17.50	33.00
Marketing cost	1.50	4.50	11.25
Net marketing margin	0.00	11.00	18.30
Producer's share in consumer rupee (%)	98.89	88.33	78.00
Price spread	0.00	15.00	30.00

4.4.9 Marketing efficiency

Table 4.21 represents the marketing efficiency findings, which is a measure of the general effectiveness of the marketing channels. The results show that Channel-A (89.00) has the highest efficiency, followed by Channel-B (8.55), and Channel-C (3.97). Channel A was calculated to be the most efficient channel.

Table 4.21: Marketing efficiency in different marketing channels

(Rupees/kg)

Particulars	Channel A	Channel B	Channel C
Total marketing cost	1.50	4.50	11.20
Price Received by the farmers	133.50	132.00	117.00
Net marketing margin	0.00	11.50	19.00
Index of Marketing efficiency	89.00	8.55	3.97

4.5 PROBLEMS AND CONSTRAINTS FACED BY MUSHROOM GROWERS

Mushroom growers in general face many problems in production as well as marketing. The problems faced by growers were ranked with the help of Garrett's ranking method and the results were presented in Table 4.22. Nine problems were identified among mushroom growers where major problems faced were the incidence of disease (70.95) followed by insect and pest attack (67.88). Lack of market information (57.00), high transportation charges (54.62), lack of extension facilities (45.48), difficulty of loan processing (42.00), wastage/spoilage (39.65), lack of awareness (37.90) and non-availability of spawned compost bags (34.52) were the noted constraints and problems faced by mushroom growers.

Table 4.22: Problems and constraints faced by mushroom growers

Problems	Total Garrett score	Garrett mean score	Rank
Incidence of diseases	4257	70.95	I
Insect and pest attack	4073	67.88	II
Lack of market information	3420	57.00	III
High transportation charges	3278	54.62	IV
Lack of extension facilities	2729	45.48	V
Difficulty of loan processing	2520	42.00	VI
Wastage/spoilage	2379	39.65	VII
Lack of awareness	2274	37.90	VIII
Non availability of spawned compost bags	2072	34.52	IX

Chapter-5

SUMMARY AND CONCLUSIONS

Mushroom production and consumption are rapidly increasing around the world. Out of 3000 edible mushroom species 20 species are cultivated commercially. Button mushroom (*Agaricus bisporus*) is dominating with largest market share. With a favourable agro-climate, an abundance of agricultural wastes, relatively low-cost labour and a diverse fungal community, India's biodiversity provides a fantastic opportunity to cultivate a variety of mushrooms with different environmental requirements. Button mushroom production is 73 per cent of the total mushroom production in India. Total mushroom production in the year 2020-21 was 243 thousand MT.

Himachal Pradesh is one of the major mushroom producing state in India contributing about 6.09 per cent of the total mushroom production in the year 2020-21. With suitable climatic conditions of low hills of Himachal Pradesh during growing season, relatively less land requirement and easily available raw material, mushroom growing is gaining popularity among farmers.

Present study "Production and marketing of white button mushroom in low hills of Himachal Pradesh: An economic analysis" was undertaken to evaluate the status, cost, returns and marketing aspects of mushroom production in Hamirpur, Bilaspur and Una districts of Himachal Pradesh. The following objectives were undertaken:

1. To analyse socio-economic condition of mushroom growers.

2. To analyse the cost, return and financial viability of mushroom production.

3. To study the existing marketing system and marketing efficiency.

4. To identify problems and constraints faced by the mushroom growers.

Major findings of the study:

- Socio-economic indicators revealed that overall, 83.33 per cent of the sampled household live as nuclear family. The proportion of nuclear families ranging from 78.57 per cent in large farm category to 93.33 per cent in medium farm category.
- Overall average family size was 5.47 out of which average number of worker was 4.92. Sex ratio ranged between 966 in small farm category to 1055 in medium farm category with an average number of females per thousand males being 990 at overall level.
- The overall literacy rate for males was 93.94 per cent and females were 91.89 per cent with an overall literacy index of 3.28.
- Sampled households engaged in agriculture ranged between 65.33 per cent in large farm category to 66.01per cent in small farm category with overall 65.76 per cent of total workers engaged in agricultural work.
- Average operational area at an overall level was 0.62 ha, out of which 0.51 ha of area was under conventional farming and 0.11 ha of land was under orchard area. Average land holding at an overall level was 0.75 ha.
- Overall, Maize is the most grown *kharif* crop growing in 0.23 hectare of the gross cropped area whereas wheat is the most grown *rabi* crop grown in 0.27 hectare of land in *rabi* season. Cropping intensity for conventional farming was 182.35 per cent at overall level.
- Small size farmers kept more livestock (2.09) as compared to medium (1.96) and large size farmers (1.72). Buffalo was the most preferred livestock among the farmers of study area. At an overall level, 56.85 per cent of the total livestock was buffalo.
- Average investment on mushroom house was ₹ 272166.67 which was 48.06 per cent of the total investment on buildings by the sampled farmers. Large scale farmers had their majority of investment in mushroom houses owning up to 71.23 per cent of their total investments in buildings whereas small scale farmers had only 17.63 per cent of their investment in mushroom houses.

- Overall investment on farm implements and assets on sampled farms was ₹ 354484.31 out of which 76.78 per cent was the cost of mushroom house.
- Overall per farm cost of production was ₹ 108957.82, where fixed cost was calculated to be 25.37 per cent and variable cost was 74.63 per cent of the total cost of production which for per 100 bags turn out to be ₹ 20059.27.
- Overall per farm benefit-cost ratio was 1.35 and the average break-even output was 447.07 kg which comes to around 213.00 bags. Break-even output for per 100 bags was ranging between 73.09 kg in large farms to 100.03 kg in small farms. Overall per 100 bags break-even output is 84.08 kg which was about 40 bags.
- Three marketing channels were followed by the farmers:
    - Channel A: Producer → Consumer
    - Channel B: Producer → Retailer → Consumer
    - Channel C: Producer → Wholesaler → Retailer → Consumer
- Overall 56.23 per cent of the total production was moved through Channel B which made Channel B the most followed channel amongst the sampled farmers.
- Producers' net selling price varied from ₹ 117.00 in Channel C to ₹133.50 in Channel A. The gross marketing margin was maximum in Chancel C ₹33.00 per kg followed by channel B ₹ 17.50 per kg and channel A ₹ 1.50 per kg.
- Retailers' margin in channel B was ₹ 11.50 while it was ₹ 8.00 in Channel C. Wholesalers' margin was ₹ 10.30 in Channel C.
- Price spread in channel B and C it was ₹ 15.00 and ₹ 30.00, respectively.
- Marketing efficiency index of Channel A, B and C were 89.00, 8.55 and 3.97 respectively.
- Most prominent problem faced by mushroom growers was incidence of diseases followed by insect and pest attack.

Suggestions and policy implications:

- Cost of mushroom production per 100 bags is more in case of small growers compared to medium and large growers. Therefore, co-operative marketing society should be promoted to ensure better price for fresh produce.
- Credit facilities should be provided to the mushroom growers at lower interest rates.
- Government must promote the mushroom cultivation by providing good quality spawned compost bags to the farmers with subsidized rates and better transportation facilities.
- Efficient system of spawn testing for ensuring superior quality of spawn, storage facilities and value addition support should be provided by the Department of Horticulture to promote the mushroom cultivation.
- To check for disease prevalence and insect pest attacks, experts in the field must visit the mushroom producing units regularly.
- Growers should be made aware of latest technical knowledge as well as improved processes in mushroom production through extension education efforts.

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Title of thesis	**:**	**"Production and marketing of white button mushroom in low hills of Himachal Pradesh: An economic analysis".**
Name of the student	**:**	Himanshu sharma
Admission number	**:**	NF-2020-01-M
Major Advisor	**:**	Dr. Chaman Negi
Major field	**:**	Agricultural Production Economics
Minor field	**:**	Statistics
Number of Pages in thesis	**:**	66 + I-X
Number of words in Abstract	**:**	375

ABSTRACT

The present study was conducted in Hamirpur, Bilaspur and Una districts of Himachal Pradesh with 60 muhsroom growers selected from two blocks from each districts and categorized them as small, medium and large size growers based on number of bags they put in production. The study revealed that average sex ratio of the study area was 990. The overall literacy rate was estimated to be 92.88 per cent with a literacy index of 3.28. The average landholding of the farmers was 0.75 hectares with crop intensity of 182.35 per cent. On an average, mushroom house estimated about 47.68 per cent of the investment on farm implements and assets on sampled farms. Per 100 bags cost of cultivation of mushroom was estimated ₹ 22032.80, ₹ 18613.61 and ₹ 17238.25 for small, medium and large farm categories respectively. Net returns per 100 bags were turned out to be ₹ 5122.68, ₹ 7861.76 and ₹ 9367.39 for small, medium and large farms respectively. Per 100 bags break-even output for small, medium and large farms were estimated around 100.03 kg, 61.35 kg and 73.09 kg respectively. The overall Benefit-Cost ratio was estimated to be 1.35. Three channels were identified which were used by farmers in study area to move the produce from grower to consumer. Channel A (Producer → Consumer), Channel B (Producer → Retailer→ Consumer) and Channel C (Producer → Wholesaler → Retailer → Consumer). Channel B is the most favoured channel as 56.83 per cent of the produce moved through this channel. Marketing efficiency was found most in Channel A (89.00) followed by Channel B (8.55) and Channel C (3.97). Major problems and constraints faced by mushroom growers were incidence of disease, incidence of insect and pest attack, lack of market information, high transportation cost, lack of extension facility, difficulty in loan processing, wastage, lack of awareness and non availability of compost bags in the study area. It is suggested by the farmers that there is an emergent need to enhance mushroom growers knowledge about latest techniques of mushroom marketing. Frequent visits by the experts should be extended to check the prevalence of the diseases and insect attack and give correct solutions. Proper facilities should be there to provide credit to the farmers at lower interest rate.

Signature of Major Advisor **Signature of the Student**

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APPENDIX – I

Input- Output prices

Sr. No.	Particulars	Unit(s)	Value per kg
1.	Button mushroom	Per kg	150.00
2.	Mushroom compost bags on public units	Per bag of 10 kg	115.00
3.	Mushroom compost bags on privet units	Per bag of 10 kg	125.00
4.	Cow milk	Per liter	60.00
5.	Buffalo milk	Per liter	70.00
6.	Daily wage labour	Per day	400.00
7.	Wheat straw	Per Quintal	700.00
8.	Spawn	Per kg	80.00
9.	Formalin	Per liter	160.00
10.	Urea	Per 50 kg	300.00
11.	Calcium carbonate	Per 25 kg bag	200.00
12.	Chicken manure	Per kg	30.00
13.	Cocopeat	Per kg	25.00
14.	Packing material	Per kg	200.00

APPENDIX II

Household schedule for collection of data on production and marketing of mushroom in low hills of Himachal Pradesh.

General information: **Date:**

Name of mushroom grower	
Age	
Education status	
Village and Panchayat	
Block	
Tehsil and District	
Type of family: Nuclear/Joint	
Telephone number Landline Mobile	

Socio-economic structure of family

Sr. No.	Relation with the head of the family	Age (years)	Gender (M/F)	Education	Occupation		Approximate annual income(Rs)	
					Primary	Secondary	Primary	Secondary
1								
2								
3								
4								
5								
6								

Land holding and other asset:

Sr. No.	Particulars	Total land	Irrigated	Unirrigated	Source of irrigation
1	Owned land				
2	Leased-in				
3	Leased-out				
4	Total holding(1+2+3)				
5	Cultivated land				
6	Grassland				
7	Orchard land				
8	Cultivable wasteland				
9	Farrow land				
10	Other(specify)				
11	Total holding				

Inventory of farm building

Sr. No.	Particulars	No.	Type of building (kuccha/ pucca/mixed)	Year of purchase/ construction	Present value (Rs)	Annual repairs (Rs)	Remarks
1	Farm building						
2	Residential building						
3	Cattle shed						
4	Incubation house						
5	Mushroom house						
6	Any other						

Tools and implements:

Sr. No.	**Particulars**	**No.**	**Year of purchase**	**Present value (Rs)**	**Annual Repairs**
1	Racks (a) Iron (b) Wooden				

2	Picking tray (a) Iron (b) Wooden				
3	Bucket				
4	Room heater				
5	Exhaust fan				
6	Rope				
7	Thermometer				
8	Electricity fitting				
9	Sterilization equipments				
10	Tank for straw wetting				
11	Pipe (plastic)				
12	Stray pump a) Hand operated b) Foot operated				
13	Gunny bags				
14	Packing machine				
15	Plastic sheet				
16	Gloves				
17	Hygrometer				
18	Transportation material				
19	Weighing machine				

Ingredients used:

Sr. No.	**Particulars**	**Quantity (kg)**	**Amount (kg)**
1	Wheat straw		
2	Spawn		
3	Chicken Manure		
4	Rice straw		
5	Urea		
6	Gypsum		
7	Lime		
8	Compost Bags		

Cropping pattern

Sr. No.	Crop	Area	Production (q)	Value (Rs)
	KHARIF			
	RABI			

Livestock inventory and livestock products

Sr. No.	Particulars	No.	Animal product realized/day/shearing		Present values (Rs)
			Name and Qty	Value (Rs)	
1	Cow (local) Dry				
	In milk				
2	Cow(improved) Dry				
	In milk				
3	Buffalo Dry				
	In milk				
4	Bullocks				
5	Heifer Cow				
	Buffalo				
6	Calves Cow				
	Buffalo				
7	Sheep				
8	Goat				

Requirements of mushroom production:

Sr. No.	particulars		
1	**First crop**		
i)	Weight of compost bags(kg)		
ii)	Number of compost bags		
iii)	Quantity of spawn(kg)		
iv)	Source of compost/spawn		
	Shop		
	KVK		
	Other		
2	**Second compost**		
	Weight of compost bags(kg)		
	Number of compost bags		
	Quantity of spawn(kg)		
	Source of compost/spawn		
	Shop		
	KVK		
	Other		
3	**Third crop**		
i)	Weight of compost bags(kg)		
ii)	Number of compost bags		
iii)	Quantity of spawn(kg)		
iv)	Source of compost/spawn		
	Shop		
	KVK		
	Other		

Mushroom production and disposal pattern

Sr. No.	Crop	Production (kg)	Home consumpt-ion	Gift (kg)	Kind payment (kg)	Marketable surplus	losses	Marketed surplus
1	**1st crop**							
2	**2nd crop**							

Mushroom production schedule:

Sr. No.	Pickings	Date/Interval	Quantity (kg)	Price (kg)	Total value
a)	**First crop**				
i)					
ii)					
iii)					
iv)					
v)					
b)	**Second crop**				
i)					
ii)					
iii)					
iv)					
v)					

Cost of mushroom production:

Sr. No.	Items	Quantity	Price/unit	Amount (Rs)
I)	**Crop I (Mushroom)**			
1	Spawned compost bag			
2	Transportation charges			
3	Casing soil			
4	Insecticides (formalin, bavistin, bleaching powder)			
5	Labour (Hrs/day)			
	a) Daily watch b) Picking			
	Washing			
6	Sorting			
7	Packing			
8	Packing material used/kg of mushroom			
9	Electricity bill for crop I			
10	Others			
II	**Crop II (Mushroom)**			
1	Spawned compost bag			
2	Transportation charges up to home			
3	Casing soil			
4	Insecticides (formalin, bavistin, bleaching powder)			
5	Labour (Hrs/day)			

	c) Daily watch d) Picking			
6	Washing			
7	Sorting			
8	Packing			
9	Packing material used/kg of mushroom			
10	Electricity bill for crop II			
11	Others			

Marketing channels:

Sr. No.	**Channel**	**Channel followed**	**Quantity sold (kg)**
I	Producer→ Consumer		
II	Producer→ Retailer→Consumer		
III	Producer→Wholesaler→Retailer→Consumer		
IV	Producer→Trader/Contractor→Retailer→Consumer		
V	Producer→ mushroom co-operative society→Retailer→Consumer		
VI	Producer→Processor→Wholesaler→Retailer		
VII	Any other (specify)		
Total			

Marketing cost and price spread

Sr. No.	**Items**	**Channels**						
		I	**II**	**III**	**IV**	**V**	**VI**	**VII**
I	First Crop							
•	Net price received by growers							
•	Net price paid by consumer							
	Cost incurred by growers							
1	Wastage/ Spoilage							
2	Packing charges							
3	Storage charges							

4	Transportation							
5	Sale price of grower							
II	Second crop							
•	Net price received by growers							
•	Net price paid by consumer							
	Cost incurred by growers							
1	Wastage/ Spoilage							
2	Packing charges							
3	Storage charges							
4	Transportation							
5	Sale price of grower							

Borrowings (credit status of mushroom growers):

Sr. No.	**Purpose**	**Source**	**Nature of loan**	**Type of security**	**Period**	**Amount received (Rs)**	**Rate of interest % p.a.**	**Subsidy amount if any (Rs)**	**Previous loan outstanding (Rs)**

Annual off farm income of mushroom growers:

Sr. No.	**Particulars**	**Per month(Rs)**	**Period (months)**	**Total annual amount(Rs)**
1	Service(Govt. and private)			
2	Business			
3	Pension			
4	Work as non-farm labour(MGNREGA, etc)			
5	Work as farm labour			
6	Trade/ shopkeepng			
7	Poultry, floriculture , horticulture, Beekeeping etc.			
8	Pickle/jam making			
9	Others(if any)			

Main problems and constraints faced by farmers in mushroom growing:

Sr. No.	Particulars	Rank			Suggestions
i.	Lack of Technical Knowledge				
ii.	Lack of extension facility				
iii.	Non-availability of spawn of desired quality/quantity				
iv.	Wastage/spoilage				
v.	High incidence of diseases and insects				
vi.	Difficulty of loan processing				
vii.	Inadequate support from government for investing and marketing				
viii.	High transportation charges				
ix.	Lack of market information				
x.	Delayed payment				
xi.	Lack of organized market				
xii.	Inadequate training facilities				
xiii.	Lack of interest in mushroom production of family members				
xiv.	Inadequate space				
xv.	Any other				

General Information:

1) **Did you get any training before starting: Y/N**
   (Placeand Duration)
2) **Have you paid fees for training: Y/N**
   Amount paid(Rs)
3) **When did you start your enterprise?**
4) **Do you face any difficulty regarding market:**
5) **Do you prepare pickle/jam: Y/N**
6) **Incidence of diseases**
7) **Attack of insects**

BRIEF BIO-DATA

Name	:	**Himanshu Sharma**
Father's Name	:	Sh. Hitesh Kumar Sharma
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Academic Qualification :

Examination passed	Year of passing	University/Board	Division	OGPA/CGPA
10th	2014	CBSE	First	8.8
12th	2016	HPBOSE	First	88
Graduation B.Sc (Hons.) Horticulture	2020	Dr Y. S. Parmar U. H. F. Nauni, Solan (H.P.)	First	7.33

Whether sponsored by some state/ Central Govt./Univ./SAARC	:	NA
Scholarship/Stipend/Fellowship, any other financial assistance received during the study period	:	NA

(Himanshu Sharma)