A CASE STUDY OF MUSHROOM CULTIVATION IN MATATIRTHA VDC, KATHMANDU

A Thesis Submitted to:
The Central Department of Rural Development,
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in partial fulfillment of the requirements for the
Degree of the Master of Arts (MA)
In
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Submitted by:
SUMAN MAHARJAN
Central Department of Rural Development
Tribhuvan University, Kathmandu
TU Regd. No: 34776-93
Exam Roll No.: 281597
February, 2017

Declaration

I hereby declare that the thesis entitled **A Case Study of Mushroom Cultivation in Matatirtha VDC, Kathmandu** submitted to the Central Department of Rural Development, Tribhuvan University, is entirely my original work prepared under the guidance and supervision of my supervisor. I have made due acknowledgements to all ideas and information borrowed from different sources in the course of preparing this thesis. The results of this thesis have not been presented or submitted anywhere else for the award of any degree or for any other purposes. I assure that no part of the content of this thesis has been published in any form before.

…….

Suman Maharjan

TU Reg No: 34776-93

Date: 06-02-2017

(2073-10-24)

Letter of Recommendation

This is to certify that the thesis entitled **A Case Study of Mushroom Cultivation in Matatirtha VDC, Kathmandu** submitted by Suman Maharjan has been completed under my supervision in partial fulfillment for the degree of Arts of Master in Rural Development. I, hereby, recommend this thesis for final evaluation and approval.

……

Mr. Ratna Mani Nepal

(Supervisor)

Date: 06-02-2017

(2073-10-24)

Letter of Approval

The thesis presented by Suman Maharjan entitled **A Case Study of Mushroom Cultivation in Matatirtha VDC, Kathmandu** has been approved and accepted as in partial fulfillment of requirement of Master of Arts in Rural Development.

Evaluation Committee

.....
Prof. Dr. Prem Sharma
Head of the Department and External

……
Mr. Ratna Mani Nepal
Supervisor

Date: 12-02-2017
(2073-11-01)

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Suman Maharjan

February, 2017

Abstract

Nepal is one of the countries where mushroom can be cultivated throughout the year under natural environmental condition. We can use most of agriculture wastage. We have plenty of raw materials for mushroom cultivation. Skilled farmers can earn a lot of money from its cultivation.

Oyster mushroom is very popular in Nepal where it can be grown all round the year. Mushroom farming is highly growing in Nepal as there are lots of places across the country, among them Kathmandu district is one where mushroom cultivation has higher potentiality. Kathmandu, a district that falls under the Central development region, lies in the Bagmati Zone of Nepal and it has suitable climate for production as well as market for the farmed product. This District has lots of areas that are suitable for farming but among them Matatirtha VDC is one of them, which around is 1 hour away from centre of Kathmandu.

The general objective of the study was to find out prospects and challenges of mushroom cultivation in Matatitha VDC of Kathmandu District. Whereas specific objectives of the study were to find out the technique, cost and benefit of mushroom cultivation of the study area and to analyze the problem and prospect of mushroom cultivation in the study area.

This study has been carried out mostly on the basis of exploratory research design; also descriptive method of research design is used in order to describe the findings during the study. Qualitative and quantitative data have been collected for the study using both primary and secondary sources. Of the total households, 50 households have been taken as sample for the study area by applying quto sampling technique.. To collect data, household survey, key informant interview, observation, method have been used and different computer program, simple statistical tools like table, graphs, have been used for data analysis and descriptive methods has been used for qualitative data.

After the research different findings were obtain. It was found that among respondents 68% were male and 32% were found female, 5 respondents were found age below 30 and 34 respondents were found age between (30 to 50), 11 respondents were found age above 50. 6 respondents were illiterate, 30 were literate and remaining 14

respondents had education level above SLC. It was found that Newar and Magar community dominates the study area. Among 50 respondents 38 respondents were engaged in farming, 3 were in teaching sector, 5 respondents were involved in private job or self employment and 4 respondents was in social service.

After the study it can be concluded that mainly used farming technique in the study area In terms of techniques of growing mushroom it was found that 80% of respondents use hanger technique to cultivate mushroom whereas tray and floor were not so popular. It was found that farmers have been following the planting method for the cultivation of mushroom rather than spraying method. It was found out that 92% respondent use hay and 8% respondent use mud as medium for mushroom farming. Mostly relying on traditional method of farming.

Study was made in order to find cost and benefit of mushroom farming in study area and after the completion of study we can conclude that it takes minimum 3 weeks for the mushroom production and per bag average production is 2 kg. At least 5 manpower are needed per day for the mushroom production. It was found out that mushroom on the field were sold at Rs. 95 where as in market after adding travelling cost it can be sold at Rs. 110 per kg. So there breakeven point is Rs. 110 but most of the farmers seem not so happy with the price they get in market.

Study was to analyze the problems and prospects of mushroom cultivation in study area so after the completion of study it can be concluded that most of the farmers are untrained and have been farming without using any modern means and techniques mainly due to lack of instruments.

Training on mushroom farming should be provided so that there won't be any shortage of manpower for mushroom farming. Different new modern equipments, tools and techniques with trained manpower should be provided for better result. The modern machines should be introduced in reasonable price so that farmers can enhance their production

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Acronyms

CBS	:	Centre Bureau of Statistics
CDO	:	Central District Officer
CDPS	:	Central Department of Population Studies
INGOs	:	International Non- Government Organization
INSEC	:	Informal Sector Service Center
NGO	:	Non- Government Organization
SLC	:	School Leaving Certificate
TV	:	Television
UNFPA	:	United Nations Fund for Population Activities
VDC	:	Village Development Committee

CHAPTER – I

INTRODUCTION

1.7 General Background

Mushrooms are the members of higher fungi belonging to class basic diomycetes and some are Ascomycetes. They are fleshy spore bearing organ of fungi and characterized by heterotrophic mode of nutrition. They may be apogeal and hypogeal like any other fungus .The vegetative part of mushroom consists of thread like thin mycelia, which under suitable environmental condition form fruiting bodies. Mushroom occurs under various ecological conditions from desert to forest. They comprise a large heterogeneous group with different shapes, size, color and edibility. They are abundantly found in nature during rainy season .It is difficult to calculate the number of species of fungi, which produce mushroom. Some of the mushrooms are edible and some of them are highly poisonous. Fortunately the number of poisonous genera and species are much fewer. To the context of Nepal its history of cultivation is not so long. Invention and cultivated mushroom was started from 1976but nowadays it is fast growing business due to its high profit. Farmers can get output within one month from pleurotus cultivation. Nepal is also one of the countries where mushroom can be cultivated throughout the year under natural environmental condition. But in some hot and cold countries it needs highly sophisticated building. It may not be affordable for farmer level. We can use most of agriculture wastage. We have plenty of raw materials for mushroom cultivation. Skilled farmers can earn a lot of money from its cultivation.

In Nepal some of the valuable wild mushroom are going to be extinct due to its early collection before mature. It is also necessary to develop cultivation technology of such valuable mushroom. Mushroom cultivation also helps to conserve such valuable mushroom. Some of the wild mushroom can take our life but cultivated mushroom are safe for consumption. It has high medicinal and nutritional value. It can solve the malnutrition problem like in our country. The oyster mushroom (Pleurotus sp.) grows under natural condition on wooden logs. This mushroom is also known as “wood fungus” and is commonly known “kannechyau” in Nepal. Oyster mushroom is very popular in Nepal where it can be grown all round the year. Being an agricultural country, we have plenty of raw materials for its cultivation. Farmers can get output within short period along with its high profit. Some of

the highly profitable and easy to cultivate mushroom species in Nepal are Pleurotus sp., Agaricus sp. and Lentinus sp. Among these Pleurotus is cultivated throughout the country while Agaricus is cultivated by highly experienced farmers and Lentinus is newly introduced mushroom which has been initiated to cultivate it by hardly a few farmers.

The oriental mushroom Lenten's eddoes and Volvariellavolvacea have been cultivated for 2000 years in China and Japan. Their cultivation technology according to Singer (1961) must be a very ancient art. The method of cultivation of jaw's ear (Auricular sp) has been recorded in the ancient Chinese Publication Liki about 300Bc. The authentic record are available only for Agarics Bosporus(bottom mushroom).whose cultivation was introduced into Paris(France)around A.D.700 by an unknown French horticulturist in the open. Towards the end of the seventeenth century, someone whose name is not recorded involved a method of treating horse manure and planting it with the spawn of wild mushroom. But the first time published method of mushroom cultivation is by Tournefort a Frenchman (Kapoor, 1999). Although cultivation technology of different mushroom were developed in the foreign country much earlier, but to the context of Nepal, workshops and invention of mushroom cultivation was started later on. In 1974, Plant Pathology Division started research on mushroom cultivation. At first time research focused on Agarics about compost preparation by using horse dung with different ingredients. Finally by using solon formula, paddy straw compost was identified. Two seasons of cultivation were also identified as-Agarics can be harvested from March to May, if spawn is inoculated in compost January. Agaricscan be harvested from September- November if spawn is inoculated at July In 1977; the cultivation technology was extended to the farmers. In 1984, the number of mushroom grower was about 50-60 only. In 1984, the cultivation technology of Pleurotus was introduced to Nepal. After spawn preparation and lab test the cultivation technology extended to the farmers in 1984-85.At that time number of farmers was about 100-150. In 1992, Australian project helped to conduct training programmed at different places of Kathmandu, Lalitpur, Bhaktapur and Kabre. Outside the Kathmandu valley CAT worked on collaboration with different organization. In Kaski District, in collaboration with Li-Bird, CAT provided Technology and spawn to the Li-bird. CAT also trained to the trainees of Li-Bird and supervised mushroom growers. In Nawalparasi, in Collaboration with ILO programmed, cultivation technology for Pleurutus and Volvariella was introduced at Terai for winter and summer respectively (in1999-2000). In 2000-2003, research was carried for Shiitake on different fast growing trees by CAT(Centre for Agriculture Technology). Among them, Alnussp and Castonuses sp. were recommended for its cultivation. But still it seems

necessary to carry on further research on different wooden logs in context of Nepal. Nowadays, popularity of mushroom consumption is increasing. Therefore number of farm is growing up. Even private farms have started to prepare, distribute the spawn and provide the training for farmer.

1.8 Statement of the Problem

Mushroom farming has good potential of income generation of farmers. Due to the geographical and biological diversity, wide variety of mushroom can be produced. But currently there are various hurdles on its development.

There has been a lesser amount of study and research by government sectors or other private organization. No policies have been yet formulated for mushroom farming. It is not yet recognized as commodity by horticulturist. It has been placed under Plant pathology division in NARC because it is a fungi and fungi is one of the disease causing agent in crops.

Due to lack of good transportation network, market access is big challenge. Production of any kind of mushroom will first require development of road network. Also the market is mainly limited to urban centers only and is dominated by two kinds of mushroom only. Lack of linkage also acts as hurdle to technology transfer.

Currently, two varieties which are produced by farmers fail to compete at international market. The other species which can be exported are yet to be produced at large scale.

The farmers are also receiving less training. Many farmers are afraid to start mushroom farming because they do not have knowledge about investment, profits and loss that may be involved in this. Many mushroom farmers also have incomplete knowledge because of which they consider this farming as gambling and its production to be determined by fate. They often find themselves helpless when diseases spread in their farm.

There is also lack of awareness among consumers regarding the nutritional and medicinal value of mushroom. Due to this, there is no demand of high value mushrooms, and hence there is no supply.

There is also good opportunity for collaboration between community forest and mushroom farming. Shiitake for example, since it is produced from wood logs, can be good source of

income for community forestry user groups. Many researchers have seen this as great opportunity. But coordination between these two is yet to be build.

Technology transfer is also challenging issue considering the literacy level of farmer and long history of dependency on traditional method. Also very less researchers are involved in this, making technology transfer a more difficult job.

The export of mushroom has not gained much interest from businessmen either.

1.9 Objectives of the Study

The general objective of this study is to find out prospects and challenges of mushroom cultivation in the study area. The specific objectives of the study are as follows:

a) To find out the techniques of mushroom cultivation in the study area.
b) To find out cost and benefit of mushroom farming in the study area.
c) To analyze the problems and prospect of mushroom cultivation in the study area.

1.10 Significance of the Study

In the developing country like Nepal have many health problems in community. Health problem in the community are great challenges for all individual, society as well as nation. The study plays role to indicate and solve the health related issues of the community people. After the completion of this study it will help the following sectors.

(a) The study would be helpful to get knowledge for community people role of mushroom and apply in the practical life.
(b) The study would be applicable for improving the high nutrition mushroom and health related curriculum.
(c) The study would make an aware people to change natural life style.
(d) The study would be useful to find out superior herbs all the health sector people.
(e) The study would be useful to find out how to change leaving status.

1.11 Limitations of the Study

The study has following limitations:-

This study is concentrated with a particular area of Matatirtha VDC Kathmandu district to The case study of Mushroom Cultivation in Nepal**. Thus conclusions or generalization of this study may or may not applicable in the other part of the nation.**

i) **This study is based on sample size of the study area.**

ii) **Price of all commodities is calculated at the current price.**

iii) The study also includes limited statistical tools and techniques like data collection, interview, questionnaire, figure, percentage, average and ratio.

1.12 Organization of the study

The study has been divided into five chapters. The first chapter presents the introduction, statement of the problem, objectives, significance and limitation. The second chapter is related to the review of related literature. The third chapter presents about the methodology adopted while collecting data. Likewise, fourth chapter deals about the analysis and interpretation of the data. The fifth chapter contains the summary, findings and suggestions.

CHAPTER – TWO

REVIEW OF LITERATURE

The review of literature is an important aspect in the development of any research. Literature review is essential to conduct any research works so for this study review of different literature has been done under two different sections the conceptual and review of empirical studies.

For this study different available books journal previous research work report acts articles, published, unpublished and documents related to the subject are reviewed.

2.5 Conceptual Review

The consumption of edible fungi as food and drug is closely related to the history of mankind. Even the early men know the special properties of mushroom. They called them God's flesh. Mushrooms were first cultivated in France in 1650. The method of cultivation of temperate mushroom (Agaricus Bosporus) was first developed by a French Gardener in A.D. 1700. It was then taken up in England and from there spread to America. The cultivation of mushroom in the USA was first introduced in the later part of the 19th century. In the east mushroom began to be grown on commercial scale in the People's Republic of China, South Korea and Taiwan (Singh,1997),The oriental mushroom Lenten's erodes and Volvariellavolvacea have been cultivated for 2000 years in China and Japan. Their cultivation technology according to Singer (1961) must be a very ancient art. The method of cultivation of jaw's ear (Auriculariasp) has been recorded in the ancient Chinese Publication Liki about 300 Bc.

The authentic record are available only for Agaricusbiosporus (bottom mushroom).whose cultivation was introduced into Paris (France) around A.D.700 by an unknown French horticulturist in the open. Towards the end of the seventeenth century, someone whose name is not recorded involved a method of treating horse manure and planting it with the spawn of wild mushroom. But the first time published method of mushroom cultivation is by Tournefort a Frenchman (Kapoor, 1999),Reishimushroom can change an imbalanced body to a healthy one. There is no difference among human races, ancient or modern people. This herb has the same effects on everyone all over the world.

The context of Nepal its history of cultivation is not so long. Invention and cultivated mushroom was started from 1976.but nowadays it is fast growing business due to its high profit. Farmers can get output within one month from pleurotus cultivation. Nepal is also one of the countries where mushroom can be cultivated through out the year under natural environmental condition. But in some hot and cold countries it needs highly sophisticated building. It may not be affordable for farmer level. We can use most of agriculture wastage. We have plenty of raw material for mushroom cultivation .Skilled farmers can earn a lot of money from its cultivation .In Nepal some of the valuable wild mushroom are going to be extinct due to its early collection before mature. It is also necessary to develop cultivation technology of such valuable mushroom. Mushroom cultivation also helps to conserve such valuable mushroom. Some of the wild mushroom can take our life but cultivated mushroom are safe for consumption. It has high medicinal and nutritional value. It can solve the malnutrition problem like in our country. The oyster mushroom (Pleurotus sp.) grows under natural condition on wooden logs. This mushroom is also known as “wood fungus” and is commonly known “kannechyau” in Nepal.

Oyster mushroom is very popular in Nepal where it can be grown all round the year. Being an agricultural country, we have plenty of raw materials for its cultivation. Farmers can get output within short period along with its high profit. Some of the highly profitable and easy to cultivate mushroom species in Nepal are Pleurotus sp., Agaricus sp. and Lentinus sp. Among these Pleurotus is cultivated throughout the country while Agaricus is cultivated by highly experienced farmers and Lentinus is newly introduced mushroom which has been initiated to cultivate it by hardly a few farmers. Pleurotus species are characterized by the rapidity of the mycelia growth and high saprophytic colonization ability to breakdown cellulose and lignin bearing materials easily without fermentation.

The different species of Pleurotus that can be grown in temperature range of 15^{o}C to 30^{o}C. P. sajorcaju can tolerate temperature up to 30 ^{o}C although it bears fruiting bodies faster and produces larger basidiocarp at 25 ^{o}C. P. ostreatus is called low temperature Pleurotus with its fruiting bodies mostly at 12-20 ^{o}C.

Dr. Shigeru Yogi of Kinki University reported that mushroom is helpful to overcome liver disfunction. In his study he found that 10percent of liver disorders could be cured by taking red mushroom capsules for two months. He also found supervising result in treating dysentery, constipation, gastric, hyperacidity and peptic ulcer (Mainali, 2059).

Dr. Andrew Weil, at least four species of mushrooms are anticancer, antiviral immune enhancers. (esp. in patients during Chemo and radio +X), regulates blood pressure and blood sugar and decreases cholesterol, among these are ReishiGano (Weil, 2003).

Singh, (1997) reported that the consumption of edible fungi as food and drug is closely related to the history of mankind. Even the early men know the special properties of mushroom. They called them God's flesh. Mushrooms were first cultivated in France in 1650. The method of cultivation of temperate mushroom (Agarics Bosporus) was first developed by a French Gardener in A.D.1700.It was then taken up in England and from there spared to America. The cultivation of mushroom in the USA was first introduced in the later part of the 19 th century. In the east mushroom began to be grown on commercial scale in the People's Republic of China, South Korea and Taiwan.

Park (2000) in his book "The text book Preventive and Social Medicine" 16th, Premnagar, Jabbalpur, India status that socio –economic factors such as poverty, ignorance, insufficient education, lack of knowledge regarding the nutritive value of foods in adequate sanitary environment, large family size etc. bear most directly on the quality of life and are the true determinants of malnutrition in society.

"It is reported the ultimate supplement of these red mushrooms, scientific researchers and experiments has proved that it contains polysaccharides, adenocine, triterpenoids sterol, organic germanium, protein and fiber etc. There are essential for proper cells division and also helps to regulate body functions. Its prime function is to remove toxin from the body. The factors in red mushroom help to fight cancer tumor, decrease cells damage, decrease harmful cholesterol, increase plasma insulin, increase blood circulation, brain rest and decrease the pain and for other important body functions." (The Himalayan Times, 2003, November 11).

According to Dr. Ranjan, S. M.D. (Cardiology) The beating heart ensured that every cell of the body has an uninterrupted supply of food, oxygen and other essentials so, powerful antioxidant helps to scanenge the free radicals which are injurious to the cells. Consumption of Reishi can help in the prevention of heart diseases, especially heart attack by its powerful antioxidant effects. It has been proved to reduced cholesterol levels. (One Apple a day keeps the doctor away, One Rg./Gl a day keeps the Cardiologist away, DXN Life Volume -17)

According to Lishi-Zhen, the famous physical and pharmacologist in Chinese history, "Long-term consumption of Reishi will promote a strong and healthy body and assure longevity. It has been proved by modern medical research the Reishi has a wide range of beneficial effects. (Healthy Ganoderma). “GanodermaLucidum supplement extract benefit, side effects, dosage, sinense”. Mushroom and Tsugae information and research studies.(RaySahelian, M.D.)

Raymond Y. Chang, Meridian Medical Group at the institute of East-West medicine and department of medicine, Cornell medical college. “Ganoderma has been used as folk medicine since ancient Periods and it is a popular health food frequently promoted as a cancer cure. It is now well established from in vitro and animal studies that the polysaccharide function of Ganoderma is largely responsible for its anti-tumor efficacy. Although there is yet no controlled clinical trials in humans for Ganoderma against cancer to date the indications for its supplemental use can be indirectly supported with clinical trial data from comparable fugal polysaccharides because of a common final pathway of action mediated via beta-glucan receptor. Based on such indirect data, indications for Ganoderma used in cancer include supplementation (to reduce side effects during chemotherapy or radio therapy)

"Ganoderma works directly on the body starting from its cell (not on the disease). Thus making it possible for the body to treat the root cause of any disease including those believed to be incurable, chronic or recurrent.Ganoderma is not a drug; it is classified under food category by the food and Drug Regulating Authorities." (Medical Research on Linchi)

Dr. Tara Kiyobara, Hospital of plastic & Reconstructive Surgery, Ganoderma is also effective in treating Gynecological problems such as menstrual cramps, Vertigo menopause disturbances."

Dr. Taro Tamura, Kinki University, Taking Ganoderma together with chemotherapy may have significant result for patients who have has surgery for breast colon and gastric cancer."

Professor Wang from TaipelYougchong Medical Research Center said that," Ganoderma polysaccharides are anti-allergy, anti-tumor and can promote secretion of immunity cells."

A professor of Education University in Shanghai who had done research on those who suffered from fatigue, insomnia poor memory revealed that this herb can improve body

weakness, protect liver and anti-ageing. Believed by the Chinese as the **"Miraculous King of the Herbs"** GanodermaLucidum is highly regarded for its medicinal properties that help to improve human body's healing ability while helping its user to maintain good physical shape aside from promoting longevity. A fungus known by its name like 'Reishi', 'Ling Chi' and 'Mannen Take' among others, GanodermaLucidum, for hundreds or even thousands of years, is recognized as powerful medicinal fungi because it has properties often associated with health and healing, long life, knowledge and happiness. In fact during the ancient Period, it is believed that the GanodermaLucidum in medicine was considered so promising that its medicinal value has been attested in a 2,000 years old Chinese Medical text-known as an authentic text book of Oriental Medical Science. (Terry Dunn).

2.6 History of Mushroom Farming

The history of mushrooms goes far back. Mushrooms have probably been eaten for as long as there are people on this planet. For centuries, our ancestors had to make due with mushrooms that could be found in fields and forests. Even the Romans had mushrooms on the menu, and the more ancient Aztecs and Egyptians considered the edible fungus to be the food of the gods. However, these records all concern wild mushrooms. This changed in the middle of the seventeenth century. A melon grower near Paris accidentally stumbled upon an important discovery. He poured water, used to wash wild mushrooms, over some melon leftovers. A little while later, many mushrooms sprouted in this spot. It was the start of the era of the cultivated mushroom. This new mushroom quickly gained the name champignon de Paris. The ‘champignon de Paris’ became an institution in the world of food lovers.

The change in profession from melon grower to mushroom grower was such a profitable one that others followed suit and Paris became the mushroom centre of the world. At the start of the eighteenth century, a step forward was taken. It is thought that people discovered that one could find plenty of mushrooms in horse meadows. Attempts to grow mushrooms on horse manure in gardens were successful. The disadvantage of this method was that people were not able to control the humidity in the air or the temperature, leaving them dependent on the weather gods. The weather gods, however, have no influence overcaves. In 1780, French gardener Chambry discovered that caves have the ideal climate for growing mushrooms (a humidity of nearly one hundred per cent and a temperature of ten degrees Celsius). In the vicinity of Paris and the French town of Saumus, there are many

deserted marl caves, which led to an outbreak of mushrooms farms in these areas (http://www.sceltamushrooms. com/history-of-mushrooms).

Cultivation and Harvesting

Mushroom cultivation is a technical process. As mushroom professionals often talk in a technical language, a few of these terms will first be explained:

Mycelium – the fungal threads (comparable to plant roots) that sprout the mushrooms.

Spores – miniscule mushroom 'seeds' that are kept safe in the brown gills under the cap of the mushroom (almost impossible to see with the naked eye).

Grain spawn– sterile grain inoculated with mushroom spores. The mycelium sprouts from the spores and retrieves food from the grain.

Compost – a mixture of horse manure, straw, gypsum and chicken manure.

Permeated compost – compost that has been mixed with grain spawn. The mycelium permeates the compost. The grower creates the perfect conditions under which the mycelium will start sprouting mushrooms.

Casing – a layer of peat covering the compost to regulate the humidity of the compost. The peat is often mixed with foam soil (spent lime), a by-product of the sugar industry.

Flush – a cropping cycle of mushrooms, from the moment they pop their heads above the casing.

Cell – space used to grow mushrooms. Equipped with a high tech climate control system guaranteeing a constant temperature and humidity. Cells can be as long as 70m and 7m wide.

Tray – Metal container in which the mushrooms are grown.

Manual harvesting – pickers harvest the mushrooms by hand.

Mechanical harvesting – mushrooms are harvested using a harvesting machine.

In the early years of mushroom culture in the Netherlands, compost was scooped into the mushroom trays and then inoculated with spores. A nine week wait followed, until the mycelium spawned sufficiently, flushing started and the grown mushrooms could be harvested by hand.

The cultivation process hasn't changed that much, but the way the successive steps are performed differ immensely. Hardly anything is done by hand anymore in modern mushroom farming. These changes started to take place when three young mushroom growers from Mook set up the 'CoöperatieveNederlandseChampignonkwekersvereniging' (Cooperative Dutch Mushroom Growers Association: CNC) in 1953. One of their activities was to organize the preparation of compost, resulting in the delivery of ready prepared compost permeated with spawn to most mushroom growers' doors. Mushroom cultivation can be divided into five phases:

Phase 1: Composting

The growing cycle of mushrooms starts with compost. Compost preparation starts with horse manure. The compost factories get the horse manure from large horse breeding companies that pay the compost factories to collect the manure. Straw, gypsum, chicken manure and water are added to the horse manure. The straw improves the structure, gypsum ensures the proper acidity and the two manures are the nutrients. The compost is produced in tunnels in order to prevent the smell from becoming a nuisance. As manure emits ammonia, compost factories purify the air with ammonia wash to prevent the emission of gases. The indoor fresh compost looks like earth from a forest. Dark brown, full of trampled bits of straw. The compost is steaming, due to the composting process: heat is generated which digests the components. What's left is a very fertile, nutritious source for mushrooms. On one batch of compost, two to three flushes of mushrooms can be grown. A square metre of compost (which is equal to 90 kilos) yields a maximum of 35 kilos of mushrooms. After that it's no longer lucrative to reuse the compost. The leftover compost can still be used as a soil conditioner in other agricultural companies.

The largest producer of mushroom compost in Europe is Walkro, with production facilities in Belgium, Germany and the Netherlands.

Phase 2: Spawning

In a tunnel, the indoor fresh compost is pasteurized at 57-60 degrees Celsius. This kills all possible bacteria. The compost stays in the tunnel to mature for six days, after which the compost is mixed with spawn that will produce the mushrooms: the mycelium. The compost is then moved to another tunnel where the mycelium can spread through the compost. The mycelium grows quickly; after two weeks it has completely permeated the compost, which means that is has reached the point that it is ready for the growers. At this time the compost looks like light brown peat.

Most mushroom growers do not produce their own spawn, as it is a very sophisticated process. Specialized companies produce the spawn by inoculating grain with spores. The grain is sterilized first to prevent infection and it's kept moist, exactly the way mushrooms like it. Ten kilo of spores (22 pounds) provides about five hundred kilos of inoculated grain (1100 pounds). The grain is incubated in a bag for two weeks at 25 degrees Celsius (75 degrees Fahrenheit), then transferred to a refrigerator at 2 degrees Celsius (35 degrees Fahrenheit) to harden it. In this way, the spawn gets a shelf life of 6 months without the mycelium losing its vitality.

Phase 3: Casing

The matured compost is spread onto long stainless steel boxes, the mushroom beds. The beds are inside special dark rooms called cells. The temperature in the cells is kept nice and warm, at about 23 degrees Celsius. A layer of peat casing material is added on top of the compost to keep the compost moist. Over a period of six days, 20 to 25 litres of water is sprinkled on each m2 in each cell because more moisture is needed. After this, the fungus has two days to grow through the covering layer of casing soil.

Phase 4: Pinning

Mushrooms only grow in the wild in autumn. However, they can be cultivated year round by recreating autumn conditions. Therefore, the temperature in the cell is

gradually lowered from 23 to 17 degrees Celsius over four days. The mushroom grower starts to lower the temperature once he sees that the mycelium has grown to its full extent. The temperature shock is a sign for the mycelium to start sprouting the mushrooms. The same thing happens in nature. Mycelium grows well in mild autumn weather, and after an October storm, the mushrooms will start appearing. The mycelium starts to form little buds, which will develop into mushrooms. Those little white buds are called pins. In this phase, air temperature and humidity can influence growth. Low air temperature and low humidity produce more buds, which yield smaller mushrooms. Higher air temperature and humidity produce fewer but larger mushrooms.

Phase 5: Harvesting

After this, the temperature is kept steady at 18 degrees Celsius. Mushrooms grow best at this temperature; they' will grow 3 cm (1 inch) in a week, which is the normal size for harvesting. In week 3 the first flush is harvested. Mushrooms destined for selling fresh are still harvested by hand; mushrooms destined for preserving are being picked and sorted mechanically. Although hand-picking is a lot of work, it offers the best guarantee that the mushrooms will be removed from the beds undamaged. On average, a picker can harvest between 18 and 30 kilos of mushrooms an hour. The mushrooms are picked from the beds with a rotating motion and sorted by the pickers based on quality, size and weight. Nine days after the first flush, the second flush will be harvested. The second flush often consists of larger, but fewer mushrooms than the first flush.

After the second flush of mushrooms has been picked, the cells need to be cleaned. First the cell is pasteurized with steam to kill any remaining fungus to ensure that there is no transfer from cycle to cycle. During steam-cleaning, the temperature in the cells reaches 70 degrees Celsius for eight hours. After steam-pasteurization, the compost is removed from the beds. The empty cell is thoroughly cleaned one more time and then it is ready to be filled again.

2.7 Mushroom Cultivation in Nepal

Mushroom cultivation is relatively new in Nepal. The research for mushroom cultivation began in 1974 under Nepal Agriculture Research Council (NARC). Cultivation of white button mushroom in 1977 was first mushroom farming done by farmers. Plant pathology division in NARC began distribution of spawn. Oyster ng in Bhaktapur and Kathmandu district. After successful production of oyster mushroom, the nmushroom was introduced to farmers in 1984. In the beginning a handful of farmers started this farmiumber of farmers increased to 50. At present there are about 5000-6000 mushroom farmers in Kathmandu alone. The average production is about 8000- 10000 kilograms per day. Pokhara and Chitwan are other major mushroom producers. Other districts also produce these two species but in very less amount, barely enough to meet local demand.

The research for other species has also begun lately. Research for Shiitake and Ganoderma is being done from 2001, by NARC as well as a private organization, Centre for Agriculture Technology (CAT) under one of the pioneer scientist in mushroom, Dr. Keshari L Manandhar. In few areas in and around Kathmandu, Shiitake is being produced successfully. Other than these, straw mushroom farming was started in Terai region.

Initially, spawn distribution was done by NARC only. But now, spawn are being produced by private companies as well. Currently there are 9-10 spawn distributing private organizations in Kathmandu.

Though in Pokhara too this was tried, the spawn produced there was not satisfactory. Hence, almost all spawn is distributed from Kathmandu.

Mushroom farming started in small scale among small farmers. There had been few big producers, such as Snow white mushroom, Himalayan Mushroom. They had capacity to produce 5000 kg per day. But these companies failed to make profit due to high cost of production and eventually closed down.

Mushroom cultivation is actively growing business in Nepal.Mostly four types of mushrooms are very popular in Nepal. They are Agiricus, PleurotusVolverella and Lentinus(Shiitake). Shiitake is newly introduced mushroom in Nepal. Its popularity is increasing day by day due to the plenty of wooden logs and less labor as compared to other mushroom, high selling

price and long time production. Another important cause of increasing interest of farmers to cultivate mushroom is available of raw material for all kind of mushrooms and good environmental condition where mushroom cultivation can be done throughout the year under natural condition or on little modified environment. Training was given about Pleurotus and Shiitake. They prepared 60 balls for Pleurotus. Shiitake training was given just for introduction and knowledge because this is not a good season for shiitake cultivation on natural logs. But farmers were very interested to cultivate shiitake then Pleurotus. At the end of training 10 bottle spawn and 1 kg plastic bag was provided to each farmer to cultivate mushroom on their own houses. Because the training place was very remote with out transportation facility some farmers came to the training place by walking the distance of two days to take training. This shows their keen interest on mushroom cultivation. The training appeared quite fruitful. Its success was illustrated by cheerful face and excitement of participants during training period. Farmers are highly motivated and hopeful to improve their living standard by highly profitable with low investment technology. Farmers were eager to extend their cultivation in large scale. Hope farmers will get high profit from its production and motivated to continue its cultivation next time (www.forestrynepal.org)

2.4 Conclusion of the Review

Literatures reviewed above were similar to the context and methodology of present study, which are considered to provide basic guidelines. Most of the above studies are related to history of mushroom and its use as food items in daily life style. After the study of litereature it can be seen that mushroom have been used as medicinal purpose too.

Literature review has helped to determine the mushroom cultivation process, uses, history, benefit of its uses. Study helps to find outabout the mushroom cultivation not only in terms of Nepal but all across the globe too.

So, study will be helpful tofind out the present scenario of mushroom cultivaton in study area, their challenges and remedies for solving the problems of mushroom cultivators in the study area.

CHAPTER – THREE

METHODOLOGY

Research methodology is an essential part of the thesis paper which forms the framework for obtaining all necessary inputs of the study. In the present study the methodology includes research design, nature and sources of data, sampling procedure, data collection techniques and tools, data processing, analyzing methods and presentation.

3.8 Research Design

This study was carried out mostly on the basis of exploratory research design as because the study was done focusing on Potentiality and challenges of mushroom farming in the study area. The study had tried to explore and cover all aspects of mushroom farming and its role for the rural development in the study area.

Besides, the study had made an attempt to describe the thing related to mushroom farming such as history of mushroom farming; potentiality and constraint of this farming and awareness among the farmer and consumer about this farming have been described. Thus, this study can be categorized as both descriptive and exploratory.

3.9 Rational of the Selection of the Study Area

Mushroom farming has higher potentiality in Matatirtha VDC of Kathmandu district. This district is located at central development region and has suitable climate for agriculture. Its access of transportation helps the farmer to cultivate and market its product. This is why this district has large area covered by farming as well as capital city as market for the farmed product. Different types of ethnic caste live in this village. Among which called higher caste (Brahaman,Chettri, Newar, Magar etc.) are literate so they are attracted towards cash farming product due to its advantages. Researcher choose this area to find out their thinking to find out the potentiality and challenges of mushroom cultivators.

3.10 Universe, Population, Sampling Procedure

The universe of the study was the people of the Matatirthda VDC of Kathmandu district. Households having mushroom farming are treated as population. It constitute 381 households. Among them 50 (13.12%) household have been taken as sample for this study. The 50 sample have been selected by applying quota sampling method.

3.11 Nature and Sources of Data

Socio economic data are collected for the study. The collected data are both qualitative and quantitative. Both primary and secondary data sources are used to describe and analyze the study area. The primary data have been collected through structured questionnaire. Interview and direct apparition also have been applied to collect primary data, whereas secondary data has been collected from different published and no published written documents from individuals, experts and organization related to the mushroom farming sector.

3.5 Techniques and Tools of Data Collection

No research can be completed without collection of valid data, so for this research too researcher have collected both primary and secondary data. Secondary data were collected from different articles, prints, brochure, books etc. To collect primary data, the structured questionnaire, semi or unstructured interview and observation methods has been applied.

3.5.1 Consumer's Survey

To generate accurate and realistic data structured questionnaire was prepared. Thus the questionnaire was filled by the respondents of the sample households head. Hence required information was collected.

3.5.2 Key Informant Interview

The primary data was also collected from the key informants using the semi or unstructured questionnaire interview method on the basis of prepared checklist. The interview was taken as cross checking for data obtained from questionnaire. The information was collected from farmers, consumers, and labor involve in farming.

3.6 Field Work

For the collection of data, the researcher himself visited all respondents during the data collection. Researcher took a local facilitator because he needed support to collect data. When the researcher did not meet the target persons at the situation he collected data from nearer place and after finishing the task, these were taken back and with the help of interview further information collected from the head of the family as soon as possible. Different techniques were used for the production of mushroom according to the types/varieties of mushroom so to determine the different ways/ technique used by respondents. For e.g., floor, hanger, tray (see annex III)

3.7 Data Analysis and Interpretation

The data are analyzed in two ways; descriptive and analytical. Descriptive analysis consists of concrete description about the cultivated mushroom and it's cost and benefit with the help of available source of data. It further presents the input to output feedback of the cultivation to identify the problems of the growers. Collected data was carefully checked to minimize the errors showing in data processing. Raw data was copied in master chart by editing and tabulation. This data was presented in simple descriptive method, table, figures, pie chart and bar diagram as per as convenience and necessity.

CHAPTER – FOUR

DATA ANALYSIS AND PRESENTATION

This chapter analyzes the cultivation technique, cost and benefit and also problems and prospect of mushroom cultivation along with characteristics of the respondents and the issue of Mushroom cultivation in the study area.

4.4 Socio-Economic Characteristics of the Respondents

Socio economic characteristics of the mushroom cultivator is important to study for finding out their technique, present status of cost and benefit and problem and prospects. The socio economic characteristics of the respondents was analyzed and interpreted in terms of their caste, sex, age, marital status, educational status and so on. The detail of it is discussed in following section.

4.4.1 Respondents by Caste

Caste is a social phenomenon which distinguishes one person from another on the basis of ethic based variables. Different castes are residing in the study area. The caste structure of the respondents on mushroom farming is given the table below.

Table 4.1: Respondents by Caste

Castes	No. of Household	Percentage
Newar	16	32%
Brahman	4	8%
Chhetri	8	16%
If other specially / Magar	22	44%
Total	50	100%

Source: Field Survey, 2016

Above table show the respondents' caste. Data shows that 32% were Newar and 8% were Brahman. In this way, 16% were Chhetri. 44% respondents were Magar. Among them caste

and ethnicity Magar were highest then other caste and Brahmin was lowest participation in the Mushroom farming.

4.4.2 Respondents by Age

Age determines the participation of the people in any work and so does in Mushroom Cultivation. The respondents were found as different age group. The age structure of them is presented in following table.

Table 4.2: Respondents by Age

Age Group	No. of Household	Percentage
20-30	5	10 %
30-35	7	14%
35-40	4	8%
40-50	23	46%
50-65	11	22%
Total	50	100%

Source: Field Survey, 2016

Above table show the age composition of the respondents. Data shows that 10% were between 20-30 years and 14% were between age group 30-35. In the same way, 8% were between age group 35 between 40 years age group. Similarly, 46% were between age group 40-50 years and 22% were between age group 50 to 65. It shows that majority of the respondents were between age group 50to 65and minority on age group 35 to 40.

4.4.3 Gender of Respondents

Gender is the range of physical, biological, mental and behavioral characteristics pertaining to, and differentiating between, masculinity and femininity. Depending on the context, the term may refer to biological sex (i.e. the state of being male, female or intersex), sex-based social structures (including gender roles and other social roles), or gender identity.

During the study, respondents were both male and female, questionnaire were asked to respondents randomly without pre mind-set whether to ask for male or female. So the findings of the respondent's gender are presented in following table.

Table 4.3: Respondents by Sex

Gender	No. of respondents	Percentage
Male	34	68%
Female	16	32%
Total	50	100%

Source: Field Survey, 2016

From the above table it can be understood that among the total respondents 34 as 68% of respondent were male and 16 as 32% of respondent were female who were chosen as sample for collecting information to fulfill the primary data needed for the study. From the above table it is known that female respondents are more than male.

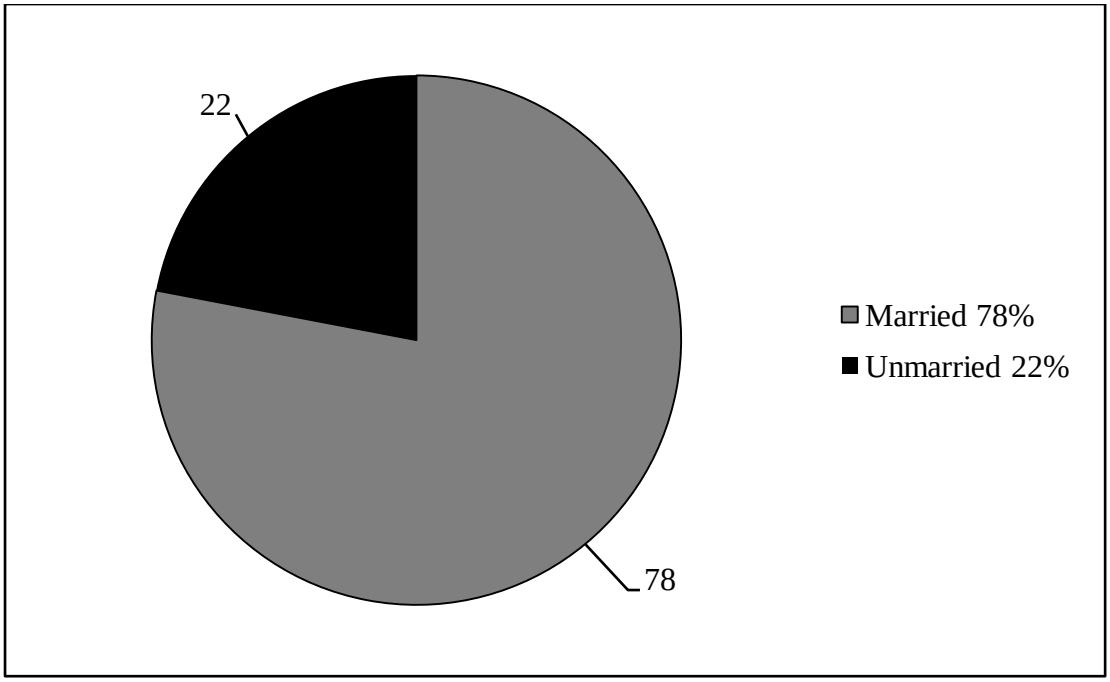
4.4.4 Marital Status of the Respondents

Marriage (also called matrimony or wedlock) is a socially or ritually recognized union or legal contract between spouses that establishes rights and obligations between them, between them and their children, and between them and their in-laws.

The definition of marriage varies according to different cultures, but it is principally an institution in which interpersonal relationships, usually intimate and sexual, are acknowledged. In some cultures, marriage is recommended or considered to be compulsory before pursuing any sexual activity. When defined broadly, marriage is considered a cultural universal.

Marital status of the respondents is categorized in two types i.e. married and un-married. In which it was found out that 11 respondents among the total sample was found unmarried and remaining 39 were married.

Figure 4.1 :Marital Status of the Respondents



Source: Field Survey, 2016

In above figure small quarter shows the unmarried portion of the respondent i.e. 22% and bigger quarter represent the married respondent i.e. 78% of the total sampled population.

4.4.5 Religion of the Respondents

A religion is an organized collection of beliefs, cultural systems, and world views that relate humanity to an order of existence. Many religions may have organized behaviors, clergy, a definition of what constitutes adherence or membership, holy places, and scriptures.

The practice of a religion may also include rituals, sermons, commemoration or veneration of a deity, gods or goddesses, sacrifices, festivals, feasts, trance, initiations, funerary services, matrimonial services, meditation, prayer, music, art, dance, public service or other aspects of human culture. Religions may also contain mythology. The word religion is sometimes used interchangeably with faith, belief system or sometimes set of duties.

Table 4.4: Religion of the Respondents

Religious background	Number of the respondents	Percentage
Hindu	40	80%
Buddhis	10	20%

Total	50	100%

Source: Field Survey, 2016

According to presented figure 40 respondents who belong to dalits family i.e. 80% of respondents follow Hinduism and remaining 10 out of 50 i.e. 20% are follower of Buddhism.

4.4.6 Education Status of the Respondents

Education in its general sense is a form of learning in which the knowledge, skills, and habits of a group of people are transferred from one generation to the next through teaching, training, or research. Education frequently takes place under the guidance of others, but may also be autodidactic. Any experience that has a formative effect on the way one thinks, feels, or acts may be considered educational. Education is commonly divided into stages such as below primary, primary school, below secondary, secondary, higher and then college, university or apprenticeship.

Education is the key to any success. It is the cornerstone of the development also. Higher the level of the education means better will be the opportunities. The education level of the local respondents has been listed on the following table;

Table 4.5: Education Status of the Respondent

Levels	**No. of Respondents**	**Percentage**
Illiterate	6	12%
Literate	30	60%
Above SLC	14	28%
Total	50	100%

Source: Field Survey, 2016

From the above tabulated data it can be said that 60% of respondents were literate, whereas 12% couldn't read and write, remaining 28% have passed SLC and few were University student too.

4.4.7 Business Scale Structure of the Respondents

Respondents from the study area were mostly cultivating mushroom as their side work or income activities. It was found that some of them have been cultivating mushroom since more than decades ago whereas most of the respondents have started lately. Those respondents who have been in this business since decades ago have established their farm in large scale business some of the respondents have been running this cultivation as mid-scale business and most of them were involved in mushroom farming partially.

Table 4.6: Organizational Structure of the Business of Respondents

Scale of business	Number of the respondents	Percentage
Large scale business	3	6%
Mid-scale business	12	24%
Small scale business	35	70%
Total	50	100%

Source: Field Survey, 2016

From above table we can study that 6% of the respondents are doing mushroom cultivation in large scale and 24% of farmers are running this farming as Mid scale business whereas most number i.e.70% of the respondents are doing their business for side income activities as low/small scale business.

4.4.8 Major Occupation of the Respondents

Most of the people of the study area were involved in agriculture beside some of them are found to be engaged in different other sector as well. From the sampled population they were distributed in following tables on the basis of their involvement in different occupation.

Table 4.7: Major Occupation of the Respondents

Occupation	No. of the respondents	Percentage
Farming	38	76%
Teacher	3	6%
Private job holder	5	10%

Social worker	4	8%
Total	50	100%

Source: Field Survey, 2016

From the above figure it can be studied that 38 people among 50making 76% were involved in agriculture or farming, 3 people among 50 making 6% were from teaching background, representation from private job holder were 5 respondents being 10% of total respondents and social worker were 4 people i.e. 8% from our research. So, we can say after the study that maximum number of people are involved in farming as their major occupation where as least number that being 3 respondents were involved in teaching sector.

4.4.9 Land Used patterns of the respondents

Land is one of the important factors for any type of farming activities. For the cultivation of mushroom too. According to the nature and scale of mushroom cultivation usage of land has been found after the study. Land used by farmers for the cultivation mushroom in study area has been presented in following table.

Table 4.8: Land Used

Land used in ropani	No of respondent	Percentage
2	16	32%
3-5	24	48%
Above 5	10	20%
Total	50	100%

Source: Field Survey, 2016

From the above figure it can be studied that 16 people out of 50 respondents 32% of total respondents use 2 ropani and 24 people out of 50 people being 48% of respondents are using 3 to 5 ropani and 10people out of 50 i.e. 20% of total respondents are using above 5 ropani land use of the among total respondents.So, we can say from above study that maximum respondents are using 3-5 ropani land that is by 24 respondents and least number of people that being 10 respondents are using above 5 ropani of land.

4.4.10 Family size of the Respondents

Members of the immediate family may include a spouse, parent, brother and sister, and son and daughter. Members of the extended family may include grandparent, aunt, uncle, cousin, nephew and niece, or sibling-in-law.

Family size of the sampled population were determined from the respondents who were representing household having home stay service and without having home stay service and representative from different organization. So the following table shows the family size of the respondents:

Table 4.9: Family Size of the Respondents

Family member	No. of respondents	Percentage
2	6	12%
3-5	37	74%
Above 5	7	14%
Total	50	100%

Source: Field Survey, 2016

So from the above table it can be determined that family having 3-5 members were of 37 respondents, where as family whose members were less than 3 were 6 respondents, and 7 respondents were from the family whose members were more than 5.

4.5 Technique of Mushroom Cultivation in the Study Area

4.5.1 Medium of Mushroom Cultivation

While doing study on mushroom cultivation in the study area researcher have found that mostly there are two ways of cultivating mushroom. It was found that Hay and Mud are the two medium in which mushroom can be cultivated. So after the study collected data on the medium of cultivating mushroom has been tabulated below.

Table 4.10: Medium of Mushroom Cultivation in the Study Area

Description	No of respondent	Percentage
Hay	46	92%
Mud	4	8%
Tolal	50	100%

Source: Field Survey, 2016

By the survey most of the population used hay type mushroom cultivation. The table shown 92% respondent i.e. is out of 50 respondents 46 people are using hay as their raw materials for mushroom cultivation where as 4 people out of 50 respondents making 8% of total are using mud as their medium for mushroom cultivation in the study area.

4.5.2 Season for Mushroom Cultivation

For any agricultural activities season and weather plays a vital role, so while study of mushroom cultivation respondents were asked whether the production of mushroom was better in winter or summer and the received data has been presented here below:

Table 4.11: Season for Mushroom Cultivation

Description	Production	Effect
Summer	90%	Best
Winter	75%	Good

Source: Field Survey, 2016

From the above table it can be said that summer season has more production than in winter season.So form above gained data maximum production can be achieved during summer is best as 90% production can be achieved where as during winter only 75% production can be achieved so in comparison of winter summer seems better for the mushroom cultivation in the study area.

4.5.3 Techniques use on Mushroom Production

Different techniques were used for the production of mushroom according to the types/variety of mushroom so to determine the different ways/techniques used by respondents for the mushroom cultivation questionnaire was prepared and the collected data by researcher has been presented as below:

Table 4.12: Technique Use on Mushroom Production

Description	No. of respondent	Percentage
Floor	5	10%
Hanger	40	80%
Tray	5	10%
Total	50	100%

Source: Field Survey, 2016

So from above presented table it can be said that 80% of respondents that being 40 people out of 50 use hanger technique to cultivate mushroom, 5 people i.e. 10% of total respondents uses floor similarly tray are used by 10% that being 5 people out of 50. So it can be concluded that hanging techniques is the best for mushroom cultivation in the study area.

4.5.4 Process of Cultivating Mushroom

There are different ways of growing mushroom for farming; son in order to find out the process used by respondents in study area questionnaire has been prepared and the outcome has been tabulated.

Table 4.13: Process of Cultivating Mushroom

Process	No. of respondents	Percentage
Planting	40	80%
Spray	10	20%
Total	50	100%

Source: Field Survey, 2016

In above tabulated data we can study that 40 respondents that is 80% of the total respondents out of 50 are using planting process for mushroom cultivation where as only 10% out of 50 people only 10 people are using spray method for mushroom cultivation in the study area.So, from above presented data we can say that most of the farmers have been following the planting method for the cultivation of mushroom rather than spraying method.

4.5.5 Types of Mushroom Cultivated in the Study Area

During the study it was found that only two types of mushroom are being produced namely Gobre and Kanya mushroom. So it was asked to the farmers whether they were producing both types of mushroom or not.

Table 4.14: Types of Mushroom Farming

Types	No. of respondents	Percentage
Gobre	5	10%
Kanya	45	90%
Both	0	
Total	50	100%

Source: Field Survey, 2016

From the above table it can be study that 90% of respondents that being 45 people out of 50 have been cultivating Kanya mushroom and only 10% farmers means only 5 people out of 50 have been cultivating Gobre mushroom. So, it can be said that kanya mushroom is the favorite one in the study area.

4.6 Cost and Production Analysis of Mushroom Cultivation

4.5.1 Time Duration for Production

Every agricultural product need certain time duration for the production so for the mushroom cultivation. After the completion of the study by researcher it was found that minimum time duration for the production of mushroom is 3 weeks as per the response of the respondents.we can study that total duration for the production of mushroom takes 3 weeks as by the unanimous response from the respondents. As time duration for the mushroom cultivation varies from the types of the mushrooms per the study area most of the farmers have been farming same species of mushroom so they normally start harvesting their product by three weeks.

4.5.2 Production per Bag

As most of the mushroom in the study area is done in plastic bag, mushroom production can be vary on the basis of quality of hay, environment of shed, amount of water supply though after the research it was found out that in average per bag production is 2 kg.

Table 4.15: Average Production per Bag

Production per bag	No. of respondents	Percentage
2 kg	50	100%
Total	50	100%

Source: Field Survey, 2016

After the study it was found that an average production from a plastic bag hanged with stuffed hay produce 2 kg of mushroom, so it is shown in above table as by the information given by the respondents.

4.5.3 Cost Per kg during Production

According to the respondents it was found out that average cost of mushroom per kg is Rs. 95 while cost rises up to Rs.110 after adding transportation cost while transporting product to the product. While if farmers get price more than Rs.110 then they starts to get profit if their products get less than Rs.110 then it's loss as breakeven point of the product is Rs.110.

Table 4.16: Cost Perkg during Production

Cost per kg during production	No. of respondents	Percentage
Rs. 95	50	100%
Total	50	100%

Source: Field Survey, 2016

So, in above table it is shown by the unanimous response from the total respondents of 50 respondents it was found total amount cost per kg is 95 whereas after the addition of transportation cost from the study area to market total cost reach up to Rs,110.

4.5.4 Manpower Supply

No agricultural activities can be done without the proper supply of man power, so in terms of mushroom cultivation too enough supply of man power is needed in order to achieve desired goal. On the basis of response of respondents it was found that at least 5 people per day is needed to look after the farm.

4.5.5 Transportation

Road transportation is one of the easiest and accessible ways to reach the main market. It is eassy to supply from four wheeler vehicle in our city anywhere, any time. Mostly production sold on city market e.g. Kalimati , Balkhu fruits and vegetables market and less sold on locale market.

4.6 Challenges and Problems of Mushroom Farming

4.6.1 Lack of Training in the Mushroom Farming

Regarding the training availability 10 percent have got opportunity of training related to the Mushroom farming while 90 percent farmers have not got any opportunity of training. According to the farmers, they have been given training such as about shed management, hay selection, equipment management etc.

Table 4.17: Lack of Training in the Mushroom Farming

S.N	Description	Households	Percentage

1	Trained	5	10%
2	Untrained	45	90%
	Total	50	100%

Source: Field Survey-2016

From the above table it can be study that only 5 people out of 50 respondents making 10% are trained for the mushroom cultivation where as large number of respondents i.e. 45 people or 90% out of total people are farming mushroom without any proper training. So, it can be said that training is essential for the farmers.

4.6.2 Satisfaction status from Selling Price

Out of sampled households twenty percent households seem satisfied with selling price of mushroom, whereas forty percent households are not-satisfied with selling price of product.

Table 4.18: Satisfaction Status from Selling Price

S. N.	Description	Households	Percentage
1	Satisfied	10	20%
2	Not-satisfied	40	80%
	Total	50	100

Source: Field Survey-2016

So, after the study we can say that on the basis of above tabulated data that most of the farmers are not really satisfied by the selling price market. As 10 people out 50 people making 20% respondents are satisfied by the price of their product in market that resulting 40 respondents out of 50 people i.e. 80% farmers are not satisfied by the selling price in market.

4.6.3 Application Status of Modern Techniques in Mushroom Farming

Modern technique is essential part for farming, in mushroom cultivation too. But only few farmers use modern techniques, so they are worried about their farming system.

Table 4.19: Application of Modern Technique in Tomato Production

S. N.	Description	Households	Percentage
1	Applied	5	10%
2	Not-applied	45	90%
	Total	50	100%

Source: Field Survey- 2016

The table shows that 10% household that is only 5 respondents out of 50 people have applied modern techniques in their farming and 90% that is 45 people of study area are just following the traditional way or self taught techniques for mushroom cultivation in study area. So we conclude that lack of modern techniques in their farming

4.6.4 Causes of Not Application of Modern Techniques

The role of modern techniques and tools are significance in Mushroom farming. Modern tools and techniques help producing quality mushroom and also reduce the number of labors. But, as discussed earlier very few people are using it's mainly because people have very few knowledge about it and machine are not available easily. The main reason behind the lack of such modern machines is lack of knowledge about such equipment. Other reasons are as follows:

Table 4.20: Causes of Not-application of Modern Techniques

S. N	Description	Households	Percentage
1	Lack of Knowledge	5	10%
2	Unavailability of Instruments	40	80%
3	Too Risky	5	10%
	Total	50	100%

Source: Field Survey-2016

Above, table shows that 5 respondents out of 50 people making 10% people are not using or applying modern techniques in their farm is because of lack of knowledge where as maximum number that is 80% respondents being 40 people out of 50 people response that reason behind not applying modern techniques in their farm is because of unavailability of

instruments and 5 respondents out of 50 making 10% respondents said that they are too afraid or they think that its too risk to use modern tools and techniques.

4.7 Prospects

Generally, all the prospects have some problems. Similarly, Mushroom farming also has some problems as mentioned above. However it has bright prospects in the study area. Commercially, it is more profitable than other cultivation of traditional cereal crops. Topographically and climatically, the study area is suitable for mushroom production. At the same time there is not serious problem in transportation facility also. So, it has better economic prospects for the cultivation of mushroom farming. Thus if all the farmers of the study area grow the mushroom instead of other prevailing traditional crops then they can certainly receive better income. Better income helps them to improve their economic status by improving educational status, health status, social status etc.

Currently about five species of mushroom are cultivated in commercial scale. Among them white button mushroom and oyster mushroom is produced more and is consumed more. But mainly kanya mushroom are cultivated in study area some farm do have gobre mushroom being cultivated.

The production of mushroom has not only given the better income for growers, it has also created additional employment opportunities for people at various levels such as orchard operations, transport media, storage and processing factory, technical personnel etc. The prevailing situation of disguised unemployment can also be removed to some extent by growing mushroom cultivation, as most of the respondents have been getting financial benefits from mushroom farming in study area.

CHAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.4 Summary of the Study

So, after the study made by researcher it was found that study area has diverse ethnic groups, magar dominates the study are as 44% of respondents were magar beside that newar, Brahmin and chettri community can be found in the study area.

Study shows that majority of the respondents were between age group 50to 65and minority on age group 35 to 40 as 22% respondents were between age group 50 to 65.

From the study it was understood that among the total respondents 68% of respondent were male and 32% of respondent were female.

It was found out that 11 respondents among the total sample was found unmarried and remaining 39 were married.

According to study it was figured that 40 respondents who belong to dalits family i.e. 80% of respondents follow Hinduism and remaining 10 out of 50 i.e. 20% are follower of Buddhism.

It was found that 60% of respondents were literate, whereas 12% couldn't read and write, remaining 28% have passed SLC and few were University student too.

We can conclude that 6% of the respondents are doing mushroom cultivation in large scale and 24% of farmers are running this farming as Mid scale business whereas most number i.e.70% of the respondents are doing their business for side income activities as low/small scale business.

It was found that 38 people among 50 were involved in agriculture or farming, 3 people were from teaching background, representation from private job holder were 5 and social worker were 4 from our research.

It was found that 16 people use 2 ropani and 24 people 3 to 5 ropani and 10people use above 5 ropani land use of the among total respondent.

it can be concluded that family having 3-5 members were of 37 respondents, where as family whose members were less than 3 were 6 respondents, and 7 respondents were from the family whose members were more than 5.

It was found out that 92% respondent use hay and 8% respondent use mud as medium for mushroom farming.

About season it was found that summer season has more production than in winter season.

In terms of techniques of growing mushroom it was found that 80% of respondents use hanger technique to cultivate mushroom whereas tray and floor were not so popular.

It was found that farmers have been following the planting method for the cultivation of mushroom rather than spraying method.

In terms of variety of mushrooms 90% of respondents have been cultivating Kanya mushroom and only 10% farmers have been cultivating Gobre mushroom.

After the completion of the study by researcher it was found that minimum time duration for the production of mushroom is 3 weeks as per the response of the respondents.

As most of the mushroom in the study area is done in plastic bag so after the completion of the research it was found out that in average per bag production is 2 kg.

According to the respondents it was found out that average cost of mushroom per kg is Rs. 95 while cost rises up to Rs.110 after adding transportation cost while transporting. While if farmers get price more than Rs.110 then they starts to get profit if their products get less than Rs.110 then it's loss as breakeven point of the product is Rs.110.

In the mushroom farming sector farmers of the study area are not so happy with the price they have been getting in market.

On the basis of response of respondents it was found that at least 5 people per day is needed to look after the farm.

Regarding the training availability 10 percent have got opportunity of training related to the Mushroom farming while 90 percent farmers have not got any opportunity of training.

In terms of applying modern techniques it was found that 10% household applied modern techniques in their farming and 90% households said that not applied.

After the study it was found that in the study area farmers lacks use of modern tools and the main reason behind the lack of such modern machines is lack of knowledge about such equipment.

Despite having many challenges this place has more potentiality for developing this area as mushroom cultivating sector. This area has great future to be developed as mushroom cultivating area in near future if the challenges and constraints are mitigated in the proper way.

5.5 Conclusion

Nepal is small and landlocked country but it has a diverse climate, so Nepal has huge potentiality of different types of farming. The study area is geographically and climatically suitable for farming, at the same time there is no problems of transportation facility, in this area most of the people have less land.. This farming is easy in the study area as mushroom can be cultivated in the shed built in small land area; also study area being near to the city area it's easy to different types of facilities available like information technology, availability of large numbers of labor, fertile land and indigenous knowledge etc.

After the completion of study it can be concluded that mainly used farming technique in the study area in terms of techniques of growing mushroom use hanger technique whereas tray and floor were not so popular.

It was found that farmers have been following the planting method for the cultivation of mushroom rather than spraying method. It was found out that 92% respondent use hay and 8% respondent use mud as medium for mushroom farming. Mostly relying on traditional method of farming.

It was found out that mushroom on the field were sold at Rs. 95 where as in market after adding travelling cost it can be sold at Rs. 110 per kg. So there breakeven point is Rs. 110 but most of the farmers seem not so happy with the price they get in market.

Another objectives of the study was to analyze the problems and prospects of mushroom cultivation in study area so after the completion of study it can be concluded that most of

the farmers are untrained and have been farming without using any modern means and techniques mainly due to lack of instruments.

Commercially, mushroom farming is more profitable than other cultivation of traditional cereal crops. Topographically and climatically, the study area is suitable for mushroom production The production of mushroom has not only given the better income for growers, it has also created additional employment opportunities for people at various levels.

Despite having many challenges this place has more potentiality for developing this area as mushroom cultivating sector. This area has great future to be developed as mushroom cultivating area in near future if the challenges and constraints are mitigated in the proper way.

5.6 Suggestions

Central region that too being in the capital district of nation with proper environment for mushroom farming and it's market study area holds the great capacity of being the best supplier of mushroom to the huge crowd of capital city. Based on the findings and conclusion, following suggestions have been made:The government should take some action for the proper transportation facility to the study area though there is availability of roads but it's not in good condition.

All the farmers are to encourage to take their farming to commercial level as for now most of them are just doing it as part time activities. As this can be the best way of income. Different varieties of mushroom farming techniques can be introduced in the study area so that farmers can choose the best one for themselves. Trainings and ideas should be share to the farmers so that they can produce mushrooms in equal quantity in all seasons.

In terms of variety of mushrooms different varieties of mushroom should be introduced as for now only kanya and few people are cultivating gobre mushroom. Different medicines and tools and techniques should be introduced for the production of mushroom in good quantity. In the mushroom farming sector farmers of the study area are not so happy with the price they have been getting in market so proper channel for the distribution and price determination should be prepared for better market of products.

Training on mushroom farming should be provided so that there won't be any shortage of manpower for mushroom farming. Different new modern equipments, tools and techniques with trained manpower should be provided for better result. The modern machines should

be introduced in reasonable price so that farmers can enhance their production

- The modern machines should be distributed in low price to the farmers so that production cost can be minimized resulting decent production.
- Modern techniques of mushroom production should be encouraged among farmers for better production as most of the farmers are still following the traditional method.
- One of the most important things is that farmers should be given the confidence that the produced mushroom can be sold at reasonable price at reasonable time.
- After studying different aspects, it is concluded that we can develop and expand the mushroom plantation area and launch package program in selected area to make cultivation more reliable and trustworthy.
- In Nepal, mushroom cultivation is a cash crop that's why technical knowledge is lacking over here. To make technical manpower efficient, there should be a provision of abroad training to related personals.
- The district level and village level mushroom cultivation group should be supported by giving them technical, economic, physical and other helps. They are the real organization of field workers.
- The way of mushroom cultivation, marketing management and way of taking, should be advertised through newspapers, pamphlet, slide, radio, T.V. etc.
- The government should establish an organization that involves in research and development in mushroom cultivation.

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ANNEX-I

Research Questionnaire

Name of Interviewer: ……Date of Interview: .....

Name of Respondent: ……

1. **Ward No:** ….....
2. **Ethnicity:**
   a. Newar, b. Brahman , c. Chhetri , d. Datit , e. If others Specify
3. **Age:**
4. **Sex:**
   a. Male b. Female
5. **Marital Status:**
   a. Married [1], b. Unmarried [2]

6. Educational Status

a. Below Primary, b. Primary, c. lowers secondary, d. secondary, e. Higher

7. Type of enterprise:

8. Years of enterprise registration:

9. Additional Occupation of the respondent despite agriculture:

1) Services 2) Business 3) if others specify

10. How much land you possess? (Land holding in Ropani, Ana & paisa)

11. What is your family size?

a) 2 b) 2-5 c) 5 above

12. How to grow mushroom in the study area?

a) Hay b) mud

13. At what time of the year do mushroom grow?

a) Winter b) summer c) both

14. Which technique are you using for mushroom cultivation in the study area?

a) Floor b) Hanger c) Tray

15. How to grow mushroom in hay balls?

a) Planting b) spray

16. How is it useful for health?

a) Oily b) Non oily

17) What nutrition we can get form mushroom?

a) Protein b) carbohydrate

18) Is it hard to farming?

a) Easy b) Hard

19) Where do you get the market?

a) Local market b)Town market c) Both

20. How many types of mushroom you are farming?

a) 1 b) 2 c) 3 d) 4

21) How long it takes time for one product?

a)3 weeks

b)5 weeks

c)7 weeks

22. How many kilos product in one bag?

a) 4 b) 7 c) 9

23. How much cost for one kilo? (production)

a) 50 b) 80 c) 95

24. How much cost for one kilo? (market)

a) 100 b) 120 c) 150

25. Are you satisfy for market price?

a) Yes b) no

26. How many labor takes for one lot mushroom production?

a) 2person/day

b) 3person/day

c) 5person/day

27. What problems are facing the farmers in the study area?

a) Transportation b) cost c) market

28. Do you know what should we have take procuration when we work? (safety)

a) Yes b) no

30) Is it hard to get market?

a) Easy b) Hard

31) How hard to go to market? (transport)

a) Easy b) Hard

32) Is it easy to find labor?

a) Easy b) Hard

33. Have you ever got training opportunity for mushroom farming/cultivation?

a) Yes b). No

If yes, please specify.

i. Who gave the training?

a. Government b. Cooperatives c. NGOs/INGOs

d. Private sectors e. if others please specify

i. What are the sources of labor supply for mushroom cultivation?

a. Family member's b. Hired labor

c. Exchange labor d. If others specify

34. Where did you get knowledge and skills about the mushroom farming?

a. Government office b. NGOs/INGOs/Private sectors c. Relatives

d. Own experience. E. If others please specify

ANNEX-II

Checklist For KII

- Why are you interested in Mushroom farming?
- How much amount of money do you spend for farm in a year?
- Whether you have profit from Mushroom farming? If so, could you tell, how much amount you obtain as the profit in a year?
- Have you faced any problem in Mushroom farming in your farm? What are the major of yours?
- Have you ever received any financial and technical support from the government sector?
- Do you have adequate knowledge of planting, cultivating, harvesting and using pesticides in Mushroom farming? If you have them how did you get such knowledge, please share your idea.
- Have you got an access of market in your locality to sell the products?

ANNEX-III

Photos