Prospects and Challenges of Mushroom Cultivation in Nepal: A Case Study of Lakuri Bhanjyang, Lalitpur

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Abstract – Nepal is predominantly agricultural country with almost 80 percent of population depending upon agriculture for their livelihood. The agriculture is traditional; subsistence based producing mostly food crop and very less amount of high value cash crop. The farmers are mostly of weak economic background, with small land holdings and lack of knowledge about technology. Though agricultural development for poverty alleviation and economic growth has been one of the focal points of national policies for a long time, there is still lack of implementation, adequate research and study done in this field. Climatic condition of the country varies from tropical in Terai region to alpine in Himalayan regions. 35 types of forest have been identified in Nepal. Biodiversity of Nepal is also remarkable with wide variety of species of flora and fauna. This gives opportunity for production of many high value products including mushroom. Due to this rich diversity, the potential for mushroom production for both food and medicinal purpose is immense. However resources endowed by the diversity have yet to be captured and utilized. This paper deals with the study of current status of mushroom farming, its potentials and challenges.

I. INTRODUCTION

Mushroom has been used by man from time immemorial. In Nepal too mushroom has been used as food and medicine for a long time. The cultivation by farmers however is recent and is developing slowly. Beginning from 1970s, mushroom farming is slowly becoming known to farmers and agriculture scientists. The wild varieties with medicinal properties are also becoming slowly known to other countries as well. There are few wild species of medicinal importance and high value which are exported to other countries. This however is in very small scale, without any institutional structure. Their commercial cultivation has yet to be done.

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. Straw mushroom is also being cultivated in Terai region which is tropical climate.

Due to wide variations of climatic condition, such as tropical, sub-tropical, temperate and alpine a wide variety of mushrooms are found in the forests of Nepal. In Nepal, 760 species of mushrooms have already been recorded as wild. Of these, 170 species have been tested and proven as ‘edible mushrooms’. However, only a few species have a high demand from abroad.

II. HISTORY OF MUSHROOM FARMING 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 mushroom was introduced to farmers in 1984. In the beginning a handful of farmers started this farming in Bhaktapur and Kathmandu district. After successful production of oyster mushroom, the number 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. At present, mushroom producers are mostly small farmers, producing 300-500 kg per day. They have been able to meet demand thus far.
III. CURRENT STATUS

A. Types of mushroom found in Nepal

Due to the geographic diversity many varieties of mushroom are found in Nepal. Though only few are domesticated, there are large numbers of wild mushrooms which are edible and has high nutritional and medicinal value. Very less has been study done regarding this. Many parts of Nepal still remain unexplored for mushroom. All the cultivated species are not indigenous. Table 1 gives utility value of mushroom species in Nepal.

<table>
<thead>
<tr>
<th>Edible</th>
<th>Medicinal</th>
<th>Toxic</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>110</td>
<td>13</td>
<td>45</td>
<td>6</td>
</tr>
</tbody>
</table>

(Adhikari 2000)

The types of mushroom in Nepal can be broadly classified as: a) Cultivated mushroom, b) Wild mushroom.

B. Types of cultivated mushroom

<table>
<thead>
<tr>
<th>Types</th>
<th>Name</th>
<th>Geographical Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>White button mushroom</td>
<td>Gobre chyau</td>
<td>Hilly region</td>
</tr>
<tr>
<td>Oyster Mushroom</td>
<td>Kanye chyau</td>
<td>Hilly regions, Terai region in winter</td>
</tr>
<tr>
<td>Shiitake</td>
<td>Mirge chyau</td>
<td>Midhills</td>
</tr>
<tr>
<td>Straw mushroom</td>
<td>Parale chyau</td>
<td>Terai region</td>
</tr>
<tr>
<td>Ganoderma</td>
<td>Laku</td>
<td>Hilly Region</td>
</tr>
</tbody>
</table>

C. Wild mushroom:

There are many species of wild mushrooms found in various areas of Nepal. Villagers consume wild mushroom, but the harvest of wild mushroom is in very less amount. Many species have been placed under medicinal plant by department of forest.

Some important wild mushrooms of very high commercial value are:

1. Boletus edulis (Cep, or Bolete)
2. Cantharellus cibarius (Chantharelle)
3. Cordyceps sinensis (Yarsagumba in Nepali)
4. Craterellus conmucopiodes (Horn of plenty)
5. Ganoderma lucidum
6. Morchella conica (Morel)
7. Morchella esculenta (Morel)
8. Tricholoma matsutake (Matsutake)

Among these, Cordyceps sinensis has become important source of income for many people in the mid western region. Most of morels collected in the forest of Nepal are exported abroad. It is not yet cultivated artificially.

Recognizing the medicinal importance of Ganoderma lucidum, CAT has been trying to cultivate it. This is yet to be transferred to farmers yet.

D. Places where mushroom farming is concentrated

Mushroom farming is mostly concentrated in peripheral areas around major urban centers such as Kathmandu valley, Pokhara and Narayanghat. The consumption is also found to be more in these areas. According to farmers these areas have highest demand. Kathmandu valley is the largest producer as well as largest consumer. Up to 8000-10000 kg of mushroom is consumed in Kathmandu valley alone (Manandhar 2005). The two species of mushroom are produced inside the valley during winter when temperature is low. During summer, which is off-season, farmers shift their cultivation to higher altitude in hills surrounding the valley. The main areas for mushroom farming are:

District | Areas
---|---
Kathmandu | Balambu, Kakani, Thankot, Gokarna, Sundarjal, Budhanilkantha, Sankhu
Lalitpur | Chapagaun, Lamatar, Lakuri Bhanjyang, Lele, Godawari
Bhaktapur | Sirutar, Balkot, Janagal
Kavre | Dhulikhel, Panauti, Nala
Chitwan | Padampur
Pokhara

E. Other potential species

There are many species which can be cultivated or collected from forest, processed and utilized. According to Dr Keshari L Manandhar, following species can be cultivated:

1. Auricularia
2. Flammulina
3. Photiotia nameko

IV. LAKURI BHANIYANG: A CASE STUDY

Lakuri Bhanjyang is a small village in northeast side of Lalitpur district. This village lies at altitude of 1800 meters. Due to its high altitude, this place has moderate climate even during summer, making it appropriate for production of button mushroom and oyster mushroom even in summer. The farmers of Chapagaun, a small town lying west to Patan, shift their cultivation to this village during summer. A group of farmers have leased land from local farmer to cultivate mushroom. They produce white button mushroom and oyster mushroom in tunnels made of bamboo framework and cover by plastic and straw. There are about 25 plastic tunnels, of about 4 x 20 meter, producing about 300-400 kilograms in season and 150-250 kilograms during off season.

The farmers here choose mushroom farming because of the good profit. They said that they could make profit up to 4 times their investment in average. The time period between cultivation and harvest is also important factor for them. Most of the farmers did not have strong economic background. They had to take loans and wanted to repay it as soon as possible. Mushroom farming gave them quick profit. The reason for not trying shiitake was also because of long time it took for growing. Most of the farmers hence wanted mushrooms which grew fast.

Most of the farmers here have received either minimum level of training or learned by working in others farms. It seemed that they had less knowledge about diseases and their treatment. Hence they considered this farming as gambling, all depending upon fate. They also had very less idea about the different species of mushroom that could be grown. They were however open to new variety and technology.

The main market for mushroom produced here is Lagankhel vegetable market in Lalitpur district. The farmers
pick mushroom early in the morning and take it to market to sell it to dealers. The farmers get almost same price around the year. The retail price is fixed by the dealer according to demand and availability. Lakuri Bhanjyang has motorable graveled road, but there is no regular service of transportation. Hence farmers had to carry mushroom in their motorcycles or rent trucks. They walked most of the time when they did not transport mushroom.

V. SMALL FARMERS AND MUSHROOM

According to the study, mushroom farming is increasingly becoming attractive to small farmers around urban centers. Mushroom farming done around Kathmandu valley is also dominated by small farmers as mentioned above. The farmers in rural areas are yet to be convinced about the profits of mushroom farming. In these remote areas, mushroom consumed are mostly wild mushroom brought from forest. Since there is lack of scientific technique to test the poisonous nature of wild mushroom, every year many people die due to its consumption.

The reasons behind popularity of mushroom farming among small farmers are:

i. It requires relatively less time to grow and harvest mushroom. White button mushroom can be harvested within 3 months and oyster mushroom can be harvested within 1 to 2 months. Hence farmers can earn profits within short time. With few techniques, it can also be grown in off season. So it gives income to farmers around the year. This is also reason why other species are not much grown. Shiitake takes about 8 months to grow. Hence farmers claim that they cannot wait for so long as they have to pay back their loans.

ii. This farming can be done with less investment. The farmers can decide to grow according to the amount they can invest. This is very crucial factor considering the weak economic condition of most of the farmers in Nepal. The investment required in this farming makes it feasible for farmer. Mostly agriculture by-products are used, which is easy for farmers to obtain. There is however issue to availability of loans at affordable rate of interest.

iii. The farming is concentrated around urban centers because of transportation and market access. Since it is perishable good, it has to be brought to market within fixed time depending upon the type of mushroom. Though rest of country has equally appropriate climatic condition, it has not spread to these areas because of difficulty in market access. Storage and preservation technology is not much developed. The consumption in rural areas is almost zero.

iv. With lack of good transportation network, access to market becomes a challenge. Because of this too, mushroom farming appears to be concentrated in villages near to cities.

VI. CHALLENGES

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. The challenges can be listed as follows:

i. 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.

ii. 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.

iii. 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.

iv. 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.

v. 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.

vi. 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.

vii. 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.

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

VII. CONCLUSION

Mushroom farming can be good opportunity for farmers to earn decent income. So far farmers have found it to be profitable, requiring less investment. With more research, there is possibility to produce many high value mushrooms, from which local people can be benefited economically. The main challenge lies in carrying out thorough research. The few private agencies involved do not have adequate fund and government has not given much importance to this area yet. There is however growing optimism among farmers to try and grow new varieties. They however need assurance that they will not have to bear loss.

There is also need to promote marketing of mushroom along with production. The consumers should be made aware
about different kinds of mushroom, their nutritional and medicinal values to create demand of mushroom.

Also the farmers need to have easier access to loan at reasonable rate of interest. With subsidies, farmers may be encouraged to take risks too. Also with Nepal's successful community forestry, Community Forest User Groups can utilize the forest resource and take forestry and mushroom farming together. For the species of wild mushroom which cannot be cultivated this can a way.

VIII. POTENTIAL AREAS

The most feasible areas for mushroom farming, according to our study would be in hills surrounding the valley or any other areas near urban centers. Since the market is concentrated in these areas, farming would be most appropriate in these areas. Important factor to be considered are:

i. Since these areas are near to cities, market access will not be problem. Most areas also have motorable roads, which makes transportation easier.

ii. These areas though near cities, are agriculture dominated. The farmers too, due to vicinity to cities are more open to new technology for farming, which is essential for introduction of any new crop.

iii. The poverty level of these areas also needs to be addressed. Though they are near to cities, they have been constantly overlooked by any form of development.

iv. Areas around Kathmandu valley also have good climatic condition for mushroom farming.

Mushroom cultivation is also one of popular activities for women targeted development programs. Many women are producing mushroom from the agricultural by product, straw in their own homes at small amount, giving them opportunity to generate income. Hence, it can be concluded that mushroom cultivation is one of the most potential income generation activity. With the remarkable diversity, Nepal has immense potential for cultivation of many kinds of mushroom which can contribute in poverty reduction.

IX. REFERENCES

Singh, S.C., Status of Mushroom Cultivation in Nepal with reference to world production and consumption trend.

X. PERSONS INTERVIEWED

A. Experts and researchers

1. Dr. Keshari L Manadhar, Center for Agriculture Technology, Imadole, Lalitpur
2. Dr. B. R Khadge, Department of Plant Pathology, Nepal Agriculture Research Council, Khumaltar, Lalitpur
3. Mr. Bhimsen Khadga, Researcher, Department of Plant Pathology, Nepal Agriculture Research Council, Khumaltar, Lalitpur

B. Farmers

1. Hari Prasad Chaulagai, Sankhu, Kathmandu
2. Jetha Lama, Lakuri Bhanjyang, Kathmandu
3. Dev Bahadur Budhthoki, Balaju, Kathmandu
4. Krishna Bahadur Deshar, Chapagaun, Lalitpur
5. Hari Prasad Ghimire, Chapagaun, Lalitpur