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AN ETHNOBOTANICAL SURVEY OF WILD EDIBLE MUSHROOMS - A POTENTIAL RESOURCE OF FOOD AND INCOME GENERATION IN PABBAR VALLEY, HIMACHAL PRADESH, INDIA

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ABSTRACT

The Western Himalayan region is rich in wild mushrooms. The people living in this area have extensive traditional mycological knowledge. The wild edible mushrooms have been consumed from the earliest history and also possess medicinal properties. The seasonal collections of wild edible mushrooms constitute a food with nutritional value and a source of income for the rural local inhabitants. In the present day, mushrooms are valued as popular food because of low in fat, carbohydrate, and cholesterol-free, and rich in vitamins. The lifestyle change is now responsible for a severe reduction in the collection of these mushrooms. The knowledge in the local environment gets lost when it is not gathered. The study aimed to investigate the knowledge and use of wild edible mushrooms in Pabbar Valley, Himachal Pradesh. A total of 13 species of mushrooms belonging to 11 families were identified as edible from the area. *Morchella* spp. are collected mainly for trade purposes.

Keywords: Ethnobotany, Mushrooms, Wild edible, Pabbar Valley, Himachal Pradesh.

INTRODUCTION

The Fungi are distinct groups of organisms that include species with large and visible fruiting bodies (macrofungi). The best-known example of macrofungi is mushrooms. Mushrooms are fruiting bodies of certain types of fungi and they play a key role in the forest ecosystem due to their unique abilities to break down wood, leaves, and other organic matter and recycle nutrients back to nature (Brown *et al.*, 2006). Various indigenous strategies are followed to locate wild mushrooms suitable for human consumption. People belonging to ancient Greece, China, India, and Iran used mushrooms in ritualistic performances. The use of mushrooms as food and medicine is also documented in India in the ancient treatise Charaka Samhita (Singha *et al.*, 2020).

Wild edible mushrooms are collected for food and to earn money in more than 80 countries of the world. The wider significance of these wild edible fungi and their extensive subsistence use in developing countries are valued as valuable food supplements. The mushrooms have been used as an ingredient of many cuisines for their particular flavour. Several studies have indicated that wild edible mushrooms are not only important sources of food but also income generating sources for both developing and developed countries (FAO, 2004). The diverse climatic conditions in India lead to a rich mushroom diversity and form an alternative resource of food for indigenous people. The different type of wild mushrooms consumed by indigenous people as food or medicine purposes varies with locality and tribe. There are about 2000 species of mushrooms in nature but around 25 species are widely accepted as edible (Valverde *et al.*, 2014).

It is evident from several research studies that mushrooms are a rich source of proteins, vitamins, minerals, fiber, antioxidants, and have cholesterol-lowering properties (Wani *et al.*, 2010). The nutritional analysis of different species of mushrooms are reported to be rich in Protein (30-48%), carbohydrates (125-40%), fat (1-4%), ash (7-17%) and fiber (16-20%) (Pushpa and Purushothama, 2010; Ao, *et al.*, 2016). Edible mushrooms contain a high amount of ash 80-120 g/kg of dry matter mainly potassium, phosphorus, magnesium, calcium, copper, iron, and zinc. The wild mushrooms have been prescribed as nutraceuticals and have anti-oxidative, antiviral, antimicrobial, and anticancerous properties (Barros, *et al.*, 2008; Valverde *et al.*, 2014.).

Due to unscientific collection of wild mushrooms in forest area, deforestation and climate change the diversity of wild mushrooms are depleting very fast. Indian Himalayan region consists of the diverse agro-climatic condition is also rich in wild mushrooms. The Pabbar valley lies in the eastern part of the Shimla district in Himachal Pradesh, located in the North Western Himalayas. The valley is undergoing a socio-economic transition phase due to the introduction of horticultural cash crops. The dependence on wild food plants and the use of traditional meals appears to have reduced considerably in recent years. The systematic research works in the Western Himalayas to document wild edible mushrooms have been carried out by (Atri and Saini, 1989; Gautam *et al.*, 2009; Chauhan *et al.*, 2014; Semwal *et al.*, 2014; Chaudhary, 2015; Bhatt *et al.*, 2016; Chaudhary and Tripathy, 2016; Malik *et al.*, 2017). Very few systematic works have been carried out in this region. The present study was undertaken to survey the Pabbar Valley in different

seasons for the collection of wild mushrooms, identification, documentation, etymology, and possible income potential.

MATERIAL AND METHODS

Study area

The study was conducted in Pabbar Valley of District Shimla, Himachal Pradesh. The valley is known for its ethnic identity having rugged mountains, naturally long and open pastures at the high area, with elevation ranging from 1200m to 5200m. The area is located between 77° 29'40" to 78° 18'42" and 30° 57'0" to 31° 25' 20" North in Rohru Sub-division consisting of three different blocks Jubbal, Rohru, and Chirgaon. The study area shares its border with the tribal district of Kinnaur and Uttarakhand State. The climate of the region ranges from Sub-temperate to Alpine.

Field data collection

The present study was conducted to explore and identify the wild edible mushrooms and record the indigenous knowledge of utilization of these resources. The survey was conducted from 2017 and 2018 and the information was collected through semi-structured questionnaires, group discussion, and field observations. The questionnaire consists of questions on the local knowledge of identification of habitat, local name, edible mushrooms, mode of consumption, availability, and season of collection. The informants were also asked to share knowledge about the market transaction of mushrooms. The photographs of edible mushrooms were also taken in natural settings. The collected specimens were identified from manuals and standard literature (Purkayastha and Chandra, 1985; Roy & De, 1996, Kirk, *et al.*, 2001; Lakhanpal *et al.*, 2010) and other publications from the area.

RESULTS

Generally, the wild fungi in Pabbar Valley grow in coniferous and Oak forests composed mainly of *Pinus wallichiana*, *Cedrus deodara*, *Picea smithiana* and *Abies spp.* In general, most edible wild mushrooms are saprophytic or ectomycorrhizal in nature. In this present study, a total of 13 wild edible mushroom species belonging to 11 genera and 11 families were collected and identified from the area (Table-1). 9 genera were represented by single species each and 2 genera with 2 species each. The habitat wise 10 species were saprophytic and 3 were found mycorrhizal. The highest numbers of mushrooms were available for collection during the monsoon season. One species was rare, 6 common and 6 were found abundantly in the area.

The wild mushroom species are most often boiled, fried, or eaten raw. Most of the wild edible mushrooms in the present study are cooked fried similar to a vegetable. Traditionally, the precautionary steps taken while consuming wild mushrooms is that they are boiled first, decanted and then cooked. Only one species *Rhizopogon vulgaris* (Vittad.) M. Lange can be eaten raw or cooked. The most appreciated species being *Morchella spp.* followed by *Sparassis crispa* (Wulf) Fr. and *Cantharellus lateritius* (Berk.) Singer.

The locals are aware that all mushrooms should be collected and taken at a tender age. However, the mushrooms can be dried and consumed later on. *Lactarius deliciosus* (Fries) S.F. Grey is the most consumed species. The easy availability and abundance make this species as most consumed species. The colour change will decide the

edibility of the mushroom. *Sparassis crispa* (Wulf) Fr species are thoroughly washed and boiled first before being fried and cooked. *Cantharellus lateritius* (Berk.) Singer grows on decaying *Ulmus* tree logs. The traditional knowledge of the growth habitat of this mushroom is exploited by locals by felling *Ulmus* trees to have a continuous supply of this mushroom year after year on its decaying logs. *Sparassis crispa* (Wulf) Fr are found growing on an ectomycorrhizal fungi on *Cedrus* & Oak spp. recurring at the same location year after year. Rest of spp. mentioned in this paper are used occasionally. Consumption of these wild mushrooms is decreasing slowly in the valley due to changes in food habits. *Morchella spp.* are the only species that is always taken in dried form and rarely consumed due to its high commercial value.

DISCUSSIONS

The present study reveals that the local people of Pabbar valley have good traditional knowledge of wild edible mushrooms. The edibility status of these mushrooms reported from the area was also confirmed from the literature and has been found widely consumed in North-western Himalaya (Chauhan *et al.*, 2014, Malik *et al.*, 2017). Most edible mushrooms are collected while visiting forests for day to day work. The indigenous knowledge is used by local people to identify wild edible mushrooms. The information is learned by the new generation while working with elders in the forest. This tradition of passing knowledge from generation to generation is carried on, however, the change in lifestyle and fewer visits to the forest with elders are causing depletion in the transfer of this ethnomycology knowledge.

The local people have a belief that after rain and lightning in March, the *Morchella* (Gucchi) will suddenly erupt and this is time for the collection of this highly prized gift of nature. *Morchella spp.* are one of the most valued edible fungi in local as well as in national and international markets. The dried mushrooms fetch a very high value of Rs.6000/- to Rs.12,000/- per kg which is even more in international markets. This species provides off-season income to poor rural people. Due to high market value, this species is overexploited in nature and becoming scarce. The unscientific collection of *Morchella*, where they are picked from the soil along with mycelium has led to a decrease in the population of this species in a natural setting. It is thus essential to protect this valuable species in the natural environment. However, interestingly one species *Morchella deliciosa* Fries of this mushroom nowadays is found growing in apple orchards.

The incidents of food poisoning due to wild mushrooms are rare. *Aminata spp.* may be misjudged by an inexperienced collector. However, besides other features, the easy way to identify edible species as per local knowledge is that those growing on tree stump are safer than growing on soil.

Different wild mushrooms grow easily in a healthy forest ecosystem, can be a chief source of nutritious food for local people often regarded as "poor man's meat" (Ao, *et al.*, 2016). There is a need of promoting the cultivation and more use of these mushrooms. Wild mushrooms as not only a good source of food supplements but also have medicinal properties. For example, most of *Auricularia* species are grown in China. The *Auricularia spp.* has potential medicinal properties and is effective to reduce LDL, Cholesterol, and

aortic atherosclerotic plaque (Yu *et al.*, 2014; Valverde *et al.*, 2015).

The present study might provide useful information for further research on wild mushrooms in this area. More such investigations are needed which may yield numerous other edible spp. from the area. Moreover, there is immense scope for using wild edible mushrooms as a potential source of dietary supplements and for medicinal purposes and can be a source of income generation for rural people.

Glossary of ethnic names

The vernacular names have been provided and documented here. Indigenous people have their methods of identification and naming of mushrooms. The local people identify the mushrooms based on phonological characters. The following are common vernacular terms used for different mushrooms in Pabbar Valley:

Chhatri = Umbrella like, all mushrooms having umbrella-like caps are commonly called *chhatri*. They are further classified based on growing substrate. For example= *Maran kee chhatri* (Mushrooms growing on the *Ulmus* – (Maran local dialect) tree logs).

Chhatr= Big covering on head mainly of deities (Shape), Shuntu= Similar to broom (A small broom used indoor, in & around *the chulla*). All *Romaria* species having branching patterns similar to broom are called *Shuntu*.

kan = ear (Mushroom having a shape similar to ear). *Mundhotra*= Mushroom growing on *Munda* (Tree stumps). *Bakra* (Baktu) = Similar to Goat (Based on shape and colour). *Chinchdoo*= means broken in many parts. The local names provide important clues to the uses and importance of edible mushrooms to people and there is much to gain from their study (Namera and Kandikere, 2017).

CONCLUSION

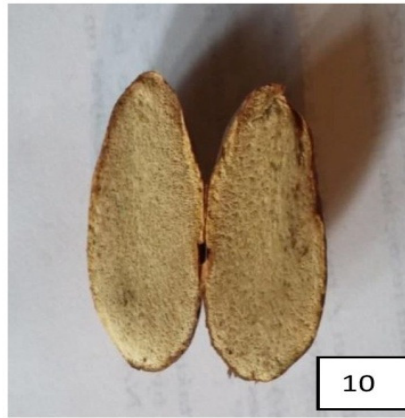
Mushrooms have a long association with humankind and are a chief source of nutrient-rich food easily available in nearby forests. There is a need to analyze the nutritional value of local species and develop species-specific cultivation techniques for commercialization. The results showed that wild mushrooms are not only sources of food and nutrients to local communities, but could also a means of income generation. The high commercial value and demand of *Morshell spp.* have led to its over harvesting in natural settings. Therefore, sustainable management of this species is needed for the well-being of local communities. The spp. need to be conserved in situ for its value as an off season source of income generating to local people. There is a strong emphasis on sustenance uses of wild edible mushrooms and their importance in developing countries, but still, there is a significant gap in the information and more and more such studies are needed to fill this gap.

Table 1 : Wild Edible Mushrooms of Pabbar Valley

Sr. No	Name of Mushroom	Common Name	Family	Habitat	Season of Collection	Occurrence frequency	Edibility
1	<i>Alloclavaria purpurea</i> (Fr.) Dentinger & D.J. McLaughlin	Shuntoo	Clavariaceae	On soil	July-September	Abundant	Fruiting body cooked
2	<i>Amanita bisporigera</i> G.F. Atk.	Chhatar , Mundothra	Amanitaceae	On dead stumps of <i>Pinus</i> etc.	June -August	Common	Fruiting body cooked
3	<i>Auricularia</i> Spp.	Kan	Auriculariaceae	On soil	July-August	Common	Fruiting body cooked
4	<i>Cantharellus lateritius</i> (Berk.) Singer	Maran kee Chhatri	Cantherellaceae	On rotten logs of <i>Ulmus</i> trees	July-September	Common	Fruiting body cooked
5	<i>Helvella crispa</i> (Scop.) Fr.	Bakra	Helvellaceae	On soil	July-August	Abundant	Fruiting body cooked
6	<i>Helvella compressa</i> (Synder) N. S. Weber	Baktu	Helvellaceae	On soil	July-August	Abundant	Fruiting body cooked
7	<i>Hydnum repandum</i> L.)Fr.	Chhatri	Hydnaceae	On soil	July- September	Abundant	Fruiting body cooked
8	<i>Lacterius deliciosus</i> (Fries) S.F. Grey	Chhatri	Russu laceae	Saprophytic on soil	Monsoon season	Abundant	Fruiting body cooked
9	<i>Morchella esculenta</i> (L.) Pers	Cheyauun,	Morchellaceae	Saprophytic on soil & litter	March-August	Common	Fruiting body cooked
10	<i>Morchella deliciosa</i> Fries	Cheyauun,	Morchellaceae	Saprophytic on soil & litter	April- November	Common	Fruiting body cooked
11	<i>Ramaria botrytis</i> (Pers.) Ricken	Shoontu	Gomphaceae	Saprophytic on soil	Monsoon season	Abundant	Fruiting body cooked
12	<i>Rhizopogon vulgaris</i> (Vittad.) M. Lange	Zanda	Rhizopogonaceae	Saprophytic on soil	September- November	Common	Edible Raw or cooked
13	<i>Sparassis crispa</i> (Wulf.) Fr.	Chinchadoo	Sparassidaceae	Conifer roots	July- August	Rare	Fruiting body is boiled first and then cooked

Figure.1

1. *Alloclavaria purpurea* (Fr.) Dentinger & D.J. McLaughlin 2. *Amanita bisporigera* G.F. Atk. 3. *Auricularia* Spp.
 4. *Cantharellus lateritius* (Berk.) Singer 5. *Helvella crispa* (Scop.) Fr. 6. *Helvella compressa* (Synder) N. S. Weber
 7. *Hydnum repandum* (L.)Fr. 8. *Lacterius deliciosus* (Fries) S.F. Grey

Figure-2

9. *Ramaria botrytis* (Pers.) Ricken 10. *Rhizopogon vulgaris* (Vittad.) M. Lange
 11. *Sparassis crispa* (Wulf.) Fr. 12. *Morchella esculenta* (L.) Pers
 13. Morel (*Morchella spp.*) vendor at local Market

REFERENCES

- Ao, T.; Seb, J.; Ajungla, T. and Deb, C.R. (2016). Diversity of Wild Mushrooms in Nagaland, India. *Open Journal of Forestry*, 6: 404-419.
- Atri, N.S. and Saini, S.S. (1989). Family Russulaceae Roze-a review. In: Plant science research India. Trivedi ML, Gill G.S.; Saini, S.S. (Eds.) New Delhi, India: *Today and Tomorrow's Printers and Publishers*, pp115-125.
- Barros, I.; Baptista, P.; Correia, D.M.; Casal, S.; Oliveria, B. and Ferreira, I.C.F.R. (2007). "Fatty acids and sugar compositions and nutritional value of five wild edible mushrooms from Northeast Portugal". *Food Chemistry*, 105(1): 140-145.
- Bhatt, R.P.; Singh, U. and Stephenson, L. (2016). Wild edible mushrooms from high elevations in the Garhwal Himalaya-I. *Current Research in Environmental & Applied Mycology*, 6(2): 118-131.
- Brown, N.; Bhagwat, S. and Watkinson, S. (2006). Macrofungal diversity in fragmented and disturbed forests of the Western Ghats of India. *Journal of Applied Ecology*, 43: 11-17.
- Choudhary, M.; Devi, R.; Datta, A.; Kumar, A. and Jat, H.S. (2015). Diversity of Wild Edible Mushrooms in Indian Subcontinent and Its Neighboring Countries. *Recent Advances in Biology and Medicine*, 1: 69-76.
- Chaudhary, R. and Tripathy, A. (2016). Diversity of wild mushroom in Himachal Pradesh (India). *International Journal of Innovative Research in Science, Engineering and Technology*, 5(6): 10860-10886.
- Chauhan, J.; Negi, A.K.; Rajasekaran, A. and Pala, N.A. (2014). Wild edible macro-fungi – A source of supplementary food in Kinnaur District, Himachal Pradesh, India. *Journal of Medicinal Plants Studies*, 2(1): 40-44.
- FAO (2004). Non wood forest products, wild edible fungi: A global overview of their use and importance (Eric Boa ed.) FAO Publications, Rome.
- Gautam, S.; Kumar, A. and Bhadaurai, S. (2009). Some important supplementary food plants and wild edible fungi of Upper Hill region of District Shimla (Himachal Pradesh), India. *Ethnobotanical leaflets*, 13:1-7.
- Kamal, C.S.; Bhatt, V.K. and Stephenson, S.L. (2018). A survey of macrofungal diversity in the Bharsar region, Uttarakhand Himalaya, India. *Journal of Asia –Pacific Biodiversity*, 1: 560-565.

- Kirk, P.M.; Cannon, P.F.; David, J.C. and Stalpers, J.A. (2001). *Dictionary of the fungi*. 9th edition. Wallingford, UK, CAB International.
- Lakhanpal, T.N.; Shad, O. and Rana, M. (2010). *Biology of Indian Morels*. I.K. International Publishing House, Pvt. Ltd. New Delhi.
- Malik, A.R.; Wani, A.H.; Bhat, M.Y. and Parveen, S. (2017). Ethnomycological knowledge of some wild mushrooms of Northern Districts of Jammu and Kashmir, India. *Asian Journal of Pharmaceutical and Clinical Research*, 10(9): 399-405.
- Namera, C.K. and Sridhar, K.R. (2017). Edible wild mushrooms of the Western Ghats: Data on the ethnic knowledge. *Data in Brief*, 14: 320:328.
- Purkayastha, R.P. and Chandra, A. (1985). *Manual of Indian Edible Mushrooms*. Today and Tomorrow's Printers and Publishers, New Delhi.
- Roy, A. and De, A.B. (1996). *Polyporaceae of India*, International Book Distributors Dehradun.
- Semwal, K.C.; Stephenson, S.L.; Bhatt, V.K. and Bhat, R.P. (2014). Edible mushrooms of the Northwestern Himalaya, India: a study of Indigenous knowledge, distribution and diversity *Mycosphere*, 5(3): 440-461.
- Singha, K.; Sahoo, S.; Roy, A.; Banerjee, A.; Mondal, K.C.; Pati, B.R. and Mohapatra, P.K.D. (2020). Contributions of wild mushrooms in livelihood management of ethnic tribes in Gurguripal, West Bengal, India. *International Journal of Pharmaceutical Sciences and Research*, 11(7): 3160-3171.
- Yu, I.; Sun, R.; Zhao, Z. and Wang, Y. (2014). *Auricularia polytricha* polysaccharides induce cell cycle arrest and apoptosis in human lung cancer A549cells. *International Journal of Biological Macromolecules*, 68: 67-71.
- Valverde, M.E.; Hernandez-Perez, T. and Paredes-Lopez, O. (2015). Edible mushrooms: Improving human health and promoting quality life. *International Journal of Microbiology* Article ID 376387, 14 pages, 2015. <https://doi.org/10.1155/2015/376387>.
- Wani, B.A.; Bodha, R.H. and Wani, A.H. (2010). Nutritional Medicinal importance of mushrooms. *Journal of Medicinal Plants Resources*, 4(24): 2598-2604.