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Wild edible macro-fungi- A source of supplementary food in Kinnaur District, Himachal Pradesh, India

Joginder Chauhan [1], A. K. Negi [2], A. Rajasekaran [3], Nazir A. Pala [4*]

1. Himalayan Forest Research Institute, Conifer Campus Panthaghati, Shimla Himachal Pradesh-171009
2. Department of Forestry and Natural Resources, H.N.B. Garhwal University, Srinagar Gharhwal- 248174
3. Institute of Forest Genetics and Tree Breeding, Coimbatore, Tamil Nadu India
4. Dept. of Forestry, Faculty of Agriculture, Himgiri Zee University Sherpur Chakratra Road Dehradun [E-mail: nazirpaul@gmail.com]

The paper documents information on use of wild edible macro-fungi as supplementary food in Kinnaur district, Himachal Pradesh, India, collected through interviews and discussions with informants. Study revealed that twelve edible macro-fungi belonging to ten families and ten genera were used by people as supplementary food. Family Morchellaceae had three species, while all other nine families had one species each. *Sparassis crispa* and *Ramaria botrytis* were found the most significant supplementary food species. Most of the fungi had fruiting bodies as sources of food. This paper also highlights the potentials of wild edible macro-fungi as supplementary food and need for ethno-mycological research on these species.

Keyword: Interview, Ethno-mycology, Informants, Vegetable.

1. Introduction

Fungi are not plants but belong to their own kingdom and this distinct group of organisms includes species with large and visible fruiting bodies. They typically reproduce by spores and exist by deriving their food and energy from other organisms. There are many species of fungi which are beneficial to mankind and also used for edible purposes. Edible mushrooms are sources of food all over the world and have high nutritional value almost twice that of any vegetable and are also rich in vitamins B, C, D and mineral elements [1, 2]. Of the 14,000 mushroom species, nearly 7000 species are well studied to possess varying degree of edibility and more than 3000 species spread over in 31 genera are regarded as prime edible. Thus far, only 200 of them are experimentally cultured, 100 economically cultivated, approximately 60 commercially grown and about 10 have reached an industrial scale [3], Whereas, 283 species are reported to be available in India [4].

Wild edible mushrooms have been collected and consumed by people since thousands of years. Archaeological evidences reveal edible species associated with people living 13000 years ago in Chile [5]. But it is in China where the eating of wild fungi was first reliably noted several hundred years before birth of the Christ [6]. Many cultures, especially in the Orient, identified that certain mushrooms could have profound health-promoting benefits [7]. Mushrooms have been exploited commercially world over and may be cultivated or gathered from the wild. The size of the gathered wild edible fungus market globally has been estimated as several million tones with a value of at least US$2 billion in 2004[8]. Several mycologists have reported ethno-mycological usage of this natural resource wealth from some regions of India [9, 10, 11, 12, 13, 14] reported wild edible fungal resources from Nagaland [15]. reported the diversity of wild edible mushroom from the Jammu and Kashmir.

However, indigenous knowledge about edible and medicinal mushrooms has not been given significant attention in Kinnaur district of the state and presently no significant literature on this vital aspect exists in present study area, there are some clues to suggest that local use of macro-fungi does occur but has yet to be described. Most of the edible macro-fungi found in study area are considered as poisonous and hence these are not used by the people. The knowledge about the use of many important macro-fungi is scarce and mainly restricted to few elderly people. Therefore, it is important to carry out ethno-mycological research and document the use of these delicious species. Keeping this in a view present efforts were undertaken to document the wild edible macro-fungi from the study area. Moreover, the rate of consumption of fleshy fungi in many countries has increased in recent years and hence it becomes imperative to explore the treasure of wild macro-fungi in their natural habitats.

2. Materials and Methods

District Kinnaur is one of the twelve administrative Districts of Himachal Pradesh and lies between 77° 45' 00" to 79° 00' 35" East Longitudes and 31°55'50" to 32°05'15" North Latitudes. The documentation of wild edible macro-fungi used as supplementary food was collected through semi-structured questionnaire interviews and discussions with the residents of study area. Frequent field visits were carried throughout the District Kinnaur from July 2009 to October 2012 to document the edible macro-fungi. This involved reconnaissance survey and interactions with the village headman and the people in groups, so as to build confidence with them and to get acquainted with area. After reconnaissance survey, a total of seventeen villages from three blocks viz. Nichar, Kalpa and Pooh were selected. Informants/households were first identified through informant referral by other informants as knowledgeable. In order to verify the identity of macro-fungi species mentioned by the respondents, field visits were undertaken with the respondent and in his or her inability other person of his or her family and village. The macro-fungi specimens were collected and verified from the respondents who had mentioned the species as wild edible. These have been presented here alphabetically with their botanical name, local name, family, part used, distribution and mode of use.

3. Results and Discussions

Twelve wild edible macro-fungi namely *Agaricus campestris*, *Gyromitra* sp, *Helvella compressa*, *Hygrophorus sp*, *Lactarius deliciosus*, *Lycoperdon* sp, *Morchella conica*, *Morchella deliciosa*, *Morchella esculenta*, *Ramaria botrytis*, *Rhizopogon vulgaris* and *Sparassis crispa*, were recorded from the Kinnaur district, Himachal Pradesh. These species were represented by ten different families and ten genera. Family Morchellaceae had three species, while all other nine families had one species each. All the edible fungi recorded are used fresh as well as in dried form depending upon the quantity of the collection by the local people. Fresh fruiting bodies of all the edible fungi are boiled, water squeezed and fried in oil. Similar mode of preparation is also followed for dried form of macro-fungi. Species collected in larger quantity are sun dried on the roof of houses or in open and stored for winter uses. It is pertinent to mention here that *Morchella* spp are rarely used as supplementary food since these have high market value (₹ 8000-12,000/kg) locally and nationally, whereas, other species of macro-fungi are collected for domestic purposes only. *Morchella* spp are collected in the month of April-May as well as in Monsoon season, whereas as all other nine wild edible macro-fungi are available in the monsoon season. The best time for wild edible macro-fungi collection in the study area starts with the onset of rains, the period when the conditions are conducive for the mushroom growth and these are available in more quantity. Species of *Morchella* were mainly collected from deodar, fir and spruce forest and rarely found in

other habitats such as community land and agricultural field boundary.

While comparing the edibility status of these macro-fungi, the choice of local people was clear. Species such as *Morchella* spp were reported edible and the most preferred by the all the respondent interviewed. However, macro-fungi such as *Sparassis crispa* and *Ramaria botrytis* were most used species by the people of the area for making vegetables since these are highly delicious. Remaining species namely, *Rhizopogon vulgaris, Helvella compressa, Lactarius deliciosus, Agaricus campestris, Lycoperdon* sp, *Gyromitra* sp and *Hygrophorus sp* are not much used by the local people of the area. During the study it was found that the knowledge about the use of macro-fungi is dwindling and is mainly restricted to elderly people. Study also revealed that many edible macro-fungi such as *Gyromitra* sp., *Helvella compressa*, *Hygrophorus* sp and L*ycoperdon* sp were considered as poisonous by more than eighty percent respondents interviewed. Edibility of some of these wild edible macro-fungi has been reported throughout the northern hemisphere, South Africa and New Zealand [16,17]. The usage of these fruiting bodies both commercially and domestically may be in part a result of their better taste and easily identifiable by the locals as safe for consumption. Several mycologists in India have also reported the edibility of these species from various states [18, 19, 20, 21, 22, 23]. The brief description of the macro-fungi recorded during present study is given in table 1.

Table 1: Important edible wild mushrooms reported from study area.

Botanical Name	Local Name	Family	Mode of use	Time of collection
Agaricus campestris Linn.	Kammu, Khorpotey, Shong	Agaricaceae	Fruiting bodies are used fresh for making vegetables by boiling in water, decanting hot water and then fried in edible oil.	July - September
Gyromitra sp	Chianjuh	Discinaceae	Fresh fruiting bodies are used for making vegetables. Most of people were not aware about the edibility of the species.	August-September
Helvella compressa (Synder) N.S. Weber	Aayokan, Maein	Helvellaceae	Fresh fruiting bodies are used for making vegetables by boiling in water, decanting hot water and then fried in edible oil. Most of people were not aware about the edibility of the species	July - September
Hygrophorus sp	Rachela	Hygrophoraceae	Freshly collected fruiting bodies are used for making vegetables by boiling in water, decanting hot water and then fried in edible oil. Most of people were not aware about the edibility of the species.	July-September
Lactarius deliciosus (L. ex Fr.) S.F. Gray	Chanmoo, Jadmoh, Migang	Russulaceae	Fresh fruiting bodies are used for making vegetables by boiling in water, decanting water and then fried in edible oil	July-August
Lycoperdon sp Pers	Lalari, Lalrishal	Lycoperdaceae	Fresh fruiting bodies are used for making vegetables by boiling in water, decanting hot water and then fried in edible oil. These are also dried and stored for winter uses	July-September
Morchella conica Pers. Ex. Fr	Gopal, guchhi	Morchellaceae	Fresh as well as dried fruiting bodies is used for making vegetables. But people rarely used it for vegetables since fruiting bodies are sold in market. It fetches high price of ₹ 8000-12000/kg	March-April and August-September
Morchella deliciosa Fries	Gopal, guchhi	Morchellaceae	Fresh as well as dried fruiting bodies are used for making vegetables. But people rarely used it for vegetables since fruiting bodies are sold in market. It fetches high price of ₹ 8000-12000/kg	March-April and August-September

Morchella esculenta Fr.	Chlango, Guchhi Jamoo, Shaime	Morchellaceae	Fresh as well as dried fruiting bodies are used for making vegetables. But people rarely used it for vegetables since fruiting bodies are sold in market. It fetches high price of ₹ 8000-12000/kg	April-May and July - August
Ramaria botrytis (Pers.Fr.) Ricken	Mooh	Gomphaceae	Fresh fruiting bodies are used for making vegetables by boiling in water, decanting water and then fried in edible oil. These are also dried and stored for winter uses.	August-September
Rhizopogon vulgaris (Vittad) M.Lange	Khorpatey, Migang	Rhizopogonaceae	Fresh fruiting bodies are used for making vegetables by boiling in water, decanting water and then fried in edible oil. Most of the people are not aware about the edibility of the species	July-August
Sparassis crispa Fr.	Aayokan, Kathmooh, Mohin, Moohcho-Sho	Sparassidaceae	Fresh fruiting bodies are used for making delicious vegetables. These are boiled, water decanted, squeezed and fried in oil. Species is likened by the people of area very much and collect it more quantity. Fructification is also dried and stored for winter uses, when other vegetable are not available.	July- August

4. Conclusion

A few wild edible mushrooms from the forests of the Kinnaur district are being marketed locally. Scientific community is beginning to develop an appreciation for the biological and economic value of this special resource. Extensive communication and cooperation among the public, industrial land owners, and governmental agencies is essential. Research and monitoring are important factors in developing strategies that will both protect and promote the edible macro-fungi of the region in particular and in general in whole of the western Himalaya. Knowledge about the edibility of wild edible macro-fungi is diminishing especially among young generation; therefore, they have to be made aware about it. Also, more attention need be paid towards the conservation of these important species to cater the need of nutritional requirements of the future generation

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