



Diversity of Different Edible Mushrooms in Baramulla District of Jammu and Kashmir

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Abstract: The present study entitled “Diversity of different edible mushrooms in Baramulla district of Jammu and Kashmir” was conducted during the year 2018-2019. The aim of this study was to investigate the edible mushroom diversity from various locations of Baramulla district of Jammu and Kashmir. Periodic field trips were undertaken in different localities of Baramulla district. Mushroom hunters, locals and old aged people from tribal communities and local Bakharwals were consulted and taken as guides for collection of mushroom species. The species of mushrooms collected from the different sites of Baramulla area were identified on the basis of morphological, reproductive and other characteristics. During the study, 11 species of mushrooms were collected from the study area and were identified on the basis of macroscopic and microscopic characters. These mushroom species belongs to 9 families and 10 genera. Among these 11 species, 10 were Basidiomycetes and 1 belongs to Ascomycetes. The results revealed that district Baramulla has huge diversity of mushrooms. The present investigation stresses upon a great need, careful and comprehensive macro-fungal forays for further collection of these important group of organisms existing in various locations of the state.

Keywords: Baramulla, Diversity, Mushrooms, Edible

1. Introduction

Mushrooms are cosmopolitan heterotrophic organisms that are quite specific in their nutritional and ecological requirements. They constitute the most relished food commodities among the number of nonconventional foodstuffs primarily because of their unique flavor and texture. The Indian state of Jammu and Kashmir, which lies in the north-west Himalaya, is a rich repository of the unexplored macrofungal wealth due to its varied climatic and topographic conditions, thus providing congenial environment for the lavish growth of this heterogenous group of fungi [1]. 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 but it is in China

where the eating of wild fungi was first reliably noted several hundred years before birth the of Christ. Many cultures, especially in the Orient, identified that certain mushrooms could have profound health-promoting benefits. Mushrooms act as antibacterial, immune system enhancer and cholesterol lowering agents, additionally, they are important sources of bioactive compounds. As a result of these properties, some mushroom extracts are used to promote human health and are found as dietary supplements. Some mushrooms are used to study as possible treatments for diseases particularly their extracts including polysaccharides, glycoproteins, and proteoglycans [2]. Historically in traditional Chinese medicine, mushrooms are believed to have medicinal value [4]. Mushrooms have become attractive as a functional food and as a main source for the development of drugs and nutraceuticals, because of antioxidant, antitumor, and antimicrobial properties [6, 3].

Mushrooms are becoming more important in diet due to their nutritional value particularly high protein and low fat [7]. Scientific studies have confirmed that substances extracted from mushrooms can reduce blood pressure, blood cholesterol and blood sugar level as well as inhibit platelet aggregation. It is well known that mushrooms are rich in proteins, vitamins, minerals, fiber, antioxidants and cholesterol lowering properties and are known as " host defense potentiators [12]. Mushrooms can be used for dyeing wool and other natural fibers. The chromophores of mushroom dyes are organic compounds and produce strong and vivid colors, and all colors of the spectrum can be achieved with mushroom dyes. Before the invention of synthetic dyes, mushrooms were the source of many textiles dyes [11].

Mushrooms and other fungi play a role in the development of new biological remediation techniques, (example using mycorrhizae to spur plant growth) and filtration technologies (example using fungi to lower bacterial levels in contaminated water [5]. The present study is an attempt to study diversity of mushroom in Baramulla district of Jammu & Kashmir.

2. Materials and Methods

2.1. Collection of Mushroom Specimen and Characterization of Mushroom Species

Periodic field trips were undertaken in different localities of Baramulla district. District Baramulla lies in extreme north of the valley [9], situated between 34.19° North latitude and 74.36° East longitude. Baramulla district comprises of 16 Tehsils and 26 Blocks [10]. The field trips were carried out during March to June 2019. Mushroom hunters, locals and old aged people from tribal communities and local Bakharwals were consulted and taken as guides for collection of mushroom species. They provided valuable information about the mushrooms growing in these areas (Rafiabad forests and some adjoining areas viz. Hadipora, Achabal, Doabghah, Ningli forest nursery Sopore, etc). During survey various mushroom species were collected. Necessary knife, paper bags, plastic jars, formalin, notebook, pen etc were taken along with the surveyed areas. Photographs of mushrooms in their natural habitat were taken using digital camera (Sony DSC-P92). The mushrooms were dug to the base with the help of a knife for collecting the whole part for easy and useful identifications. The mushrooms were cleared off the mud and other intact debris and were kept in paper bags. A drop of formalin was sprayed over mushrooms for preservation. The paper bags containing mushrooms were then placed in plastic boxes without crushing them. The species of mushrooms collected from the different sites of Baramulla area were identified on the basis of morphological, reproductive and other characteristics. The important characters which were used for the identification of mushrooms were: habit, habitat, season, color, size, shape, flesh color of mushrooms.

2.2. Preparation of Spore Prints and Spore Slides

Spore prints of mushroom species were taken. The spore print of mushrooms were obtained both on glass slide and clean paper sheets with contrasting color to that of gills or pores. To obtain the spore print, a mushroom with a fully opened cap and exposed gills or pores was taken and with a sharp sterilized blade, the stipe was cut off from the cap as close as possible. The fertile surface (undersurface) of the cap was placed on a clean sheet of paper and covered with a bell jar or clean inverted bowl for 24 hours. In case the spores were light, the cap was slightly tapped with the flat surface of spactula to lose many spores from the gills or pores. The spore print obtained gives the color of spores, density and arrangement of gills or pores, and were used for identification of collected mushrooms. The species of mushrooms collected from the different sites of Baramulla area were identified on the basis of morphological, reproductive and other characteristics.

3. Results and Discussions

During the study, 11 species of mushrooms were collected from the study area and were identified on the basis of macroscopic and microscopic characters. These mushroom species belongs to 9 families and 10 genera. Among these 11 species, 10 were Basidiomycetes and 1 belongs to Ascomycetes. The results revealed that district Baramulla has huge diversity of mushrooms. Among the surveyed sites 11 number of species were reported from Baramulla locality, 4 from Ningli Forest Nursery site Sopore, 1 from Ningli Project site Sopore, 2 from Hadipora Rafiabad site, 1 from Achabal Rafiabad site, 2 from Doabghah Rafiabad site and 1 from Rafiabad site. During the study it was also observed that the local people use many of the mushrooms as food knowing their medicinal importance and other health benefits. The mushroom species which were identified are given in the table 1.



Figure 1. Collection of mushrooms.



Figure 2. Identified Mushrooms (1. *Agaricus campestris*, 2. *Boletus edulis*, 3. *Bovista plumbea*, 4. *Coprinus micaceous*, 5. *Coprinus atramentaria*, 6. *Ganoderma lucidum*, 7. *Lentinus tigrinus*, 8. *Morchella esculenta*, 9. *Pleurotus ostreatus*, 10. *Ramaria botrytis* 11. *Scleroderma citrinum*).

Table 1. Identified mushrooms in district Bramulla.

S. No.	Species	Pileus	Stipe	Gills	Spores	Spore Print	Edibility	Season
1	<i>Boletus Edulis</i>	Convex Reddish brown	Club shaped yellowish	Decurrent	Elliptical to spindle	Olive Brown color	Edible	Spring
2	<i>Coprinus micaceous</i>	Oval Yellowish Black	White Hallow	Decurrent	Sub elliptical to mitriform	Black color	Inedible	Spring and summer
3	<i>Coprinus atramentaria</i>	Oval, Brown	White hallow	Decurrent	Elliptical, smooth	Black color	Edible	Spring and summer
4	<i>Ganoderma lucidum</i>	Fan shaped, grey, brownish	Thick twisted	.....	Elliptical, Double walled, smooth	.....	Edible	Spring
5	<i>Letinus tigrinus</i>	Scaly dark brown in colour	Scaly with brown scale	Decurrent Crowded	Ellipsoidal	White color	Edible	Spring
6	<i>Morchella esculenta</i>	Pale brown	White to pale	.....	Ellipsoidal	.....	Edible	Early Spring
7	<i>Pleurotus ostreatus</i>	Fan shaped pale-dark brown	Whitish hairy	Decurrent close	Cylindrical, Ellipsoidal, Smooth	White color	Choice	Spring
8	<i>Ramaria Botrytis</i>	Pale yellow, cylindrical	.....	.....	Ellipsoidal	Yellowish	Edible	Summer
9	<i>Summer</i>	.....	.....	.....	Oval	Brownish, Black	Edible	Summer
10	<i>Agaricus compestris</i>	White, fan shaped	White	Dark brown, decurrent	Elliptical	Brownish Black	Edible	Summer
11	<i>Bovista plumbia</i>	White, Oval	.....	.....	Roughly spherical	.....	Edible	Summer

Many workers reported edible species from different parts of the world. Watling and Abraham [13] reported two species of genus *Lentinus* from Kashmir. The Present study also reported *Lentinus tigrinus* from Baramulla district of Kashmir valley. Pala *et al.* [8] described six unreported Basidiomycetous macro fungi viz, *Agrocybe molesta*, *Coprinus plicatilis*, *Inonotus hispidus*, *Paxillus involutus*, *Psathyrella condolleana* and *Russula fragilis* from forest area of Pulwama district of Jammu & Kashmir. Frature [2] collected three mushroom species in Libyan Desert and found three species *Podaxis pistillaris*, *Tulostoma*

caespitosum and *Schizostoma laceratum* as new records for the country.

4. Conclusion

The present study reports a good number of species from Baramulla district of Kashmir, as this part has not been explored yet, fully for mushroom flora. In conclusion, the present investigation stresses upon a great need, careful and comprehensive macro-fungal forays for further collection of these important group of organisms existing in various

locations of the state. The study also recommends regular surveys over an extended period in order to assess the patterns of abundance of mushrooms in different seasons. From such information, harvesting strategies and management plans can be formulated and implemented to ensure the lasting presence of these socially and economically important species.

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