



## ETHNOMYCOLOGICAL STUDIES OF SOME WILD EDIBLE AND MEDICINAL MUSHROOMS IN KAMRUP DISTRICT OF ASSAM, INDIA

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### ABSTRACT

Macrofungi constitute a group of the high value non-wood forest resource worldwide. Mushroom is a general term utilized mostly for the fruiting body of the macrofungi and mainly belongs to higher fungi. It represents only a short reproductive stage in their life cycle. Macrofungi are significant as nourishment source for human beings and animals. A fraction of complete fungal wealth has been subjected to scientific scrutiny and mycologists continue to unveil the unexplored and hidden wealth. The indigenous people of Assam are mostly mycophilous and are frequently used to collect wild edible fungi (WEF) from the forests. In the district of Kamrup of Assam, India, the tribal people mostly use only 6 species of mushrooms as food and only 4 species of mushrooms in medicine. The species that were used as food included *Agaricus bisporus*, *Cantharellus cibarius*, *Cantharellus lateritius*, *Lentinus squarosulus*, *Termitomyces heimii* and *Termitomyces microcarpus*. The macrofungi which local people of Kamrup used in medicine were *Auricularia judae*, *Ganoderma lucidum*, *Lentinula edodes* and *Bovista plumbea*.

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### INTRODUCTION

Macrofungi are the higher fungi having hypogeous or epigeous distinctive fruiting bodies which can be seen with the unaided eye and be picked by hand (Chang and Miles, 1992). Macrofungi are defined as fungi that form large fructifications, such as gilled fungi, jelly fungi, coral fungi, stinkhorns, bracket fungi, puffballs and bird's nest fungi etc. (Hawksworth *et al.*, 1995; Richard's and Murray, 2002; Bates, 2006). There are thousands of species of macrofungi where each and every species is unique and beautiful in its own way. The group includes mainly terrestrial species of diverse forms and habitat and is a general term used mainly for the fruiting bodies of macrofungi (Ascomycota and Basidiomycota) and represents only a short reproductive stage in their life cycle (Das, 2010). The division Basidiomycota includes mushrooms, puffballs, corals, teeth and bracket fungi while the Ascomycota includes cup fungi, morels, etc.

Wild edible fungi (WEF) have been collected and consumed by people for thousands of years. 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 (Chang and Miles, 2004), whereas, 283 species are reported to be available in India (Purkayastha and Chandra, 1985). Ethnomycology is the study of wild edible macrofungi with their identification and documentation of nutritional potential and indigenous knowledge regarding their uses as medicine or in some other cultural traditions. It traces its roots to a landmark publication entitled "Mushrooms, Russia and history" (Wasson and Wasson, 1957). The traditional uses of macrofungi may differ from place to place. The species eaten in one country or region often differ from nearby areas and in some cases there are dramatic changes in utilization. Several mycologists have reported ethnomycological usage of macrofungi from different parts of India like ethnomycological studies from Jammu and Kashmir (Kumar and Sarma, 2011); Himachal Pradesh (Chauhan, 2014); Uttar Pradesh (Vishwakarma *et al.*, 2016); Goa (Kamat, 2011); Gujarat (Lahiri *et al.*, 2010); West Bengal (Dutta and Acharya, 2014); Jharkhand (Srivastava and Soreng, 2014) and many more. In north eastern part of India, consumption of wild edible mushrooms is very common, also is sold in the local markets and hence is known to provide sustenance to the local people and forest dwellers especially during the lean period when no other NWFPs are available in the forests (Harsh and Bisht, 1982). Such wild edible mushrooms are already reported from Assam (Gogoi and Sarma, 2012); Arunachal Pradesh (Sherpa, 2016); Manipur (Devi *et al.*, 2014); Meghalaya (Khaund and Joshi, 2013); Nagaland (Tanti *et al.*, 2011) and Sikkim (Das, 2010). Though the

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ethnic knowledge and documentation on their nutritional value and market cost is completely lacking.

## MATERIALS AND METHODS

Macrofungi were collected from the different reserve forests of Kamrup district of Assam (Figure 1) India between 2010-2012 particularly during autumn and spring. The details of the reserve forests are given in table. The morphological and ecological characteristics of the specimens were recorded and photographed in their natural habitats, and then, brought to the laboratory. The local consumption of macrofungi and their local names were recorded by interviewing local people. A semi-structured questionnaire was used to collect the detail information about macrofungi and their traditional uses among local inhabitants of Kamrup district of Assam. A total of 150 respondents were selected randomly from 15 villages under 15 different Reserve forests of the study area.

*edodes*. The photographs of these species are given in Figure 2. Three most commonly available macrofungi which were consumed the most in this region and were also sold in the local markets viz. *Cantharellus cibarius*, *Cantharellus lateritius* which are shown in Figure 3 and *Lentinus squarosulus*. Different tribal population thriving in the forest villages generally consume mushrooms as a very delicious food item the taste of which they compare with that of meat. People of all ages are interested in foraging for mushrooms growing in the wild. They generally collect the mushrooms early in the morning or sometimes in evening without the knowledge of the nutritional benefits of these WEF.

## DISCUSSION

The present study demonstrated that many people of the Kamrup district of Assam collect and consume different types of wild mushrooms as food and also use them for

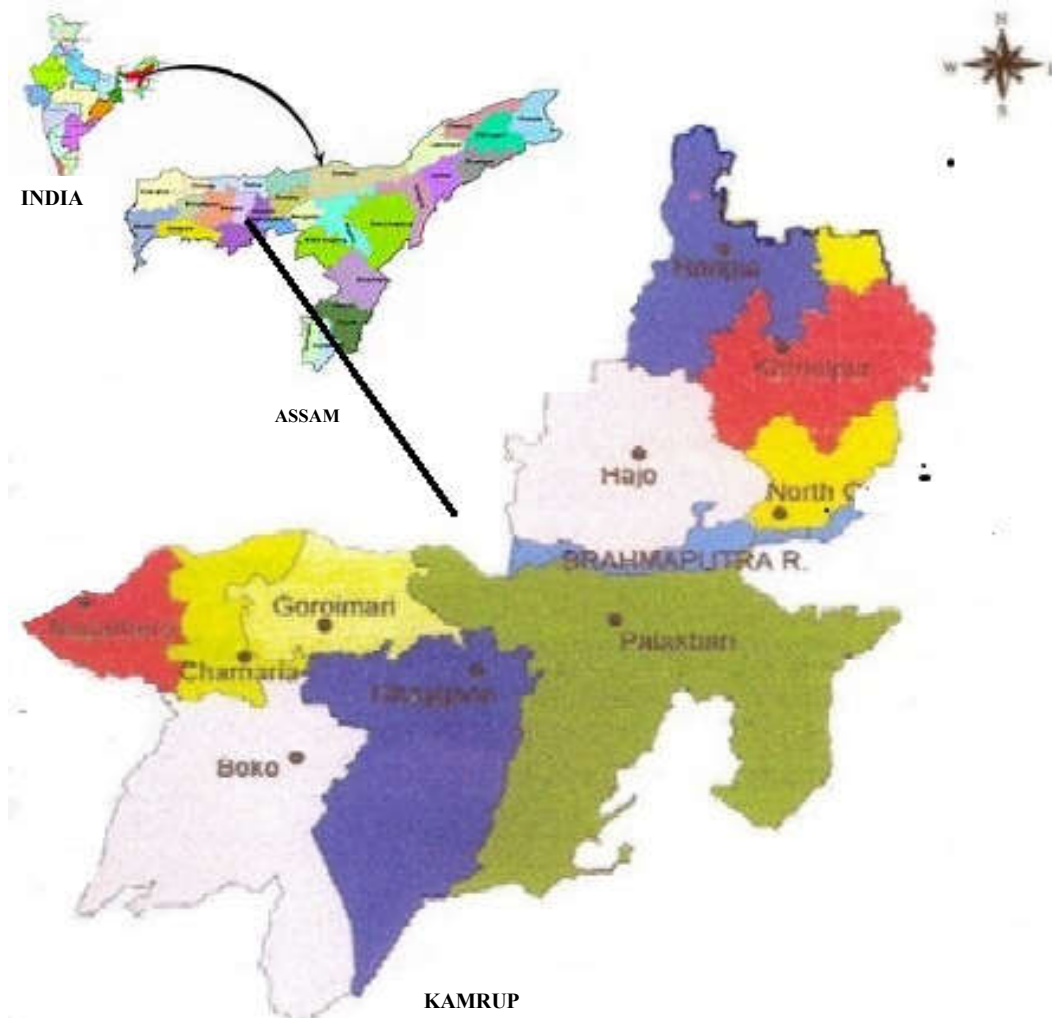


Figure1 Map of the study site

## RESULTS

Ten species of macrofungi were ethnomycologically utilized by the local people of the district. The species and local names are given along with their modes of utilization in Table 1. The species which were edible are *Agaricus bisporus*, *Cantharellus cibarius*, *Cantharellus lateritius*, *Lentinus squarosulus*, *Termitomyces heimii* and *Termitomyces microcarpus* and the species used in medicine are *Auricularia judae*, *Bovista plumbea*, *Ganoderma lucidum* and *Lentinula*

treatment of some specific ailments. Macrofungi has been traditionally used by the people in many countries as food and medicine (Harsh and Bisht, 1982; Akapaje *et al.*, 2003; Sanmee *et al.*, 2003; Atri *et al.*, 2010, etc). Such positive social disposition of locals towards mushrooms can be scientifically translated as mycophilia (Purkayastha and Chandra, 1985). Majority of the regional ethnic population have mycophilic inclination and during the monsoon season, mushrooms play a significant role in sustaining their livelihood (Dutta and Acharya, 2014).

**Table 1** The ethnomycological details of macrofungi utilized by the local people in Kamrup district of Assam, India

Species of macrofungi	Local Name	Time of appearance	Utilization	Nutritional and medicinal values	Mode of preparation
<i>Agaricus bisporus</i>	Maikhun/ Legum	Rainy season	As food	Consumed for its meaty taste	Fried with oil.
<i>Auricularia judae</i>	Maikhun/ Legum	Rainy season	As medicine	Healing of wound; given to mothers after child birth for overcoming weakness	Cooked and made into a soup
<i>Bovista plumbea</i>	Maikhun/ Legum	Rainy season	As medicine	To boost immunity and as a health drink	Boiled with water.
<i>Cantharellus cibarius</i>	Maikhun/ Legum	Rainy season	As food	Relished for its taste and and as a substitute of meat	Cooked with other vegetables like carrot, radish, etc.
<i>Cantharellus lateritius</i>	Maikhun/ Legum	Rainy season	As food	Relished for its taste and and as a substitute of meat	Cooked with other vegetables like carrot, radish, etc.
<i>Ganoderma lucidum</i>	Maikhun/ Legum	Summer, rainy and winter season.	As medicine	To treat ulcers of skin	Decoction is made and applied.
<i>Lentinula edodes</i>	Maikhun/ Legum	Summer and rainy season	As medicine	For increasing immunity boosting up energy levels	Tonic is made by boiling in water.
<i>Lentinus squarosulus</i>	Maikhun/ Legum	Summer and Rainy season	As food	Consumed for its taste	Fried in oil and eaten
<i>Termitomyces heimii</i>	Uri Maikhun/ Legum	Summer and Rainy season	As food	Relished for its flavor and taste	Eaten as a fry or cooked with meat.



**Figure 2** Macrofungi used as edible fungi (A) *Agaricus bisporus*, (B) *Cantharellus cibarius*, (C) *Cantharellus lateritius*, (D) *Lentinus squarosulus*, (E) *Termitomyces heimii* and (F) *Termitomyces microcarpus*.



Figure 3 Macrofungi used as medicinal fungi; (A) *Auricularia judae* (B) *Ganoderma lucidum* (C) *Bovista plumbea* (D) *Lentinula edodes*



Figure 4 Wild edible fungi sold in markets of Kamrup district of Assam, India (A) and (B) *Cantharellus cibarius* (C) and (D) *Cantharellus lateritius*

Due to deforestation and urbanization, existence of different groups of the organisms including macrofungi are threatened and has resulted in the loss of traditional knowledge about their uses which is acquired over hundreds years of experience and understanding of environment. In this regard, ethnomycological survey was conducted in the selected reserve forests of Kamrup district of Assam through a semi-structured questionnaire, which was randomly recruited. A total of 150 respondents were questioned regarding the utilization of macro fungi. This survey markedly established that respondents in the urbanized areas hardly possessed any information about the edibility and other uses of macrofungi. However, in the rural areas, people hold substantial knowhow about edibility, recipes and medicinal utility of macrofungi. Similar observations were also derived by Kumari *et al.* (2012) in north western India. Many species of macrofungi were regularly collected during the monsoon season for personal consumption. Altogether 10 species were found to be consumed or used by the tribal people of this region among which 6 mushroom species were edible and 4 were used for medicinal purposes. The WEF used by the ethnic people of this district include *Agaricus bisporus*, *Cantharellus cibarius*, *C. lateritius*, *Lentinus squarosulus*, *Termitomyces heimii* and *T. microcarpus*. An ethnomycological and traditional knowledge about the 7 edible species of *Termitomyces* viz. *T. microcarpus*, *T. radicans*, *T. badius*, *T. medius*, *T. heimii*, *T. striatus* and *T. mammiformis*.

*Macrolepiota* species namely *Macrolepiota procera*, *M. dolichaula* and *M. rachodes* mushrooms which are frequently hunted by local people of North West India during monsoon season was earlier documented (Kumari *et al.*, 2012). The health benefits of wild mushrooms are tremendous. They improve the health of skin, boost energy levels, lower cholesterol and are packed with numerous vitamins and minerals. In Kamrup district, three wild mushroom species i.e. *Auricularia judae*, *Ganoderma lucidum*, *Lentinula edodes* and *Bovista plumbea* were recorded to be used in medicine. The WEF species *Cantharellus lateritius*, *C. cibarius* and *Lentinus squarosulus* were every so often seen being sold in local markets to be used as food. *Cantharellus lateritius*, commonly known as the smooth chanterelle, is an edible fungus in the Cantharellaceae family of mushrooms and also an ectomycorrhizal species, found in Asia, Africa, and North America. Its fruit bodies are brightly colored yellow to orange, and usually highly conspicuous.

In this region, mushroom nomenclature is not well developed amongst any of the tribes as shown by the fact that many mushroom species including edible ones don't have specific local name, but generally referred by a general term "Maikhun" by the Bodos and "Legumm" by the Karbis. Some mushrooms were named specifically like uri- maikhun for fungi growing on termite mound and dawdi- maikhun for *Bovista* sp. The consumption of WEF in many developed and developing countries have been marginal as compared to other food. They are untapped resources of nutrition and palatable food of the future. Due to high protein content they can be used to bridge the protein malnutrition gap. Edible mushrooms are sources of food and are cogitated as one of the delicious food all over the world. They have a high nutritional value almost twice that of any vegetable or fruit (Sivrikaya *et al.*, 2002).

## CONCLUSION

A total of 10 different ethnomycologically important wild macrofungi were recorded from this area, out of which used 5-6 different species of wild mushrooms were used as food and 4 were used in medicine. The Wild edible fungi used as food by the ethnic people of Kamrup district of Assam, India included *Agaricus bisporus*, *Cantharellus cibarius*, *Cantharellus lateritius*, *Lentinus squarosulus*, *Termitomyces heimii* and *Termitomyces microcarpus*. In medicine, *Auricularia judae*, *Ganoderma lucidum*, *Lentinula edodes* and *Bovista plumbea* were being used for cure of some ailments and to increase immunity. Three most commonly available macrofungi viz. *Cantharellus cibarius*, *Cantharellus lateritius* and *Lentinus squarosulus* were consumed the most in this region were also seen being sold in the local markets.

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