

Wild edible fungal resources used by ethnic tribes of Nagaland, India

Tanti*Bhaben, Gurung Lisha & Sarma Gajen Chandra

Department of Botany, Gauhati University, Guwahati - 781 014, Assam, India

*E-mails: bt53@rediffmail.com, btanti@gauhati.ac.in

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The paper documents the knowledge about the wild edible fungal flora of Kohima district of Nagaland, India used by the indigenous tribes through structured questionnaires in consultations. The study revealed that more than 12 ethnic groups of Nagaland were found to be mycophilic and to have extensive traditional mycological knowledge. A total of 13 species of fleshy fungi under 9 genera and 6 families were identified. Further, mushroom selling was observed in Kohima town of Nagaland where women represented 83% of sellers, while indigenous people comprised 67.28%. The sale of some wild edible mushrooms, the large amounts of commercialization, the complicated intermediary process, as well as the insertion of mushrooms into different informal economic practices were all evidence of an existent mycophily in a sector of the population of this region. The study highlights the potentials of the ethno-mycological research and the need for documentation of wild edible fungal flora of Nagaland.

Keywords: Ethno-mycology, Mushroom, Ethnic tribes of Nagaland, Wild edible fungi

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The enormous increase in our population has necessitated more and more food production through alternate resources such as mushroom as the availability of land for traditional crops is not likely to increase. Edible mushrooms occupy a pivotal position among the lower organisms. In the developed countries, mushrooms have become one of the most important of all the horticultural crops. The production of mushrooms is increasing everywhere in the world, and now a days these are available all the year round and are used in enormous quantities to serve with all kinds of table dishes¹.

More than 2000 species of fungi are reported to be edible throughout the world, out of which about 283 species are reported to be available in India². The North Eastern hills of India are very rich in mushroom flora³. Nagaland is one of the North East Indian states with total geographic area of 16579 sq km. Nagaland is bounded by Myanmar in the East, Assam in the West, Arunachal Pradesh and a part of Assam in the North and Manipur in the South. It lies between 93°.20' to 95°.15' East longitude and 25°.6' and 26°.4' North latitudes. The recorded average annual rainfall of the state ranges from 2000 – 2500 mm. The temperature during the summer season remains

between the 16 - 31°C and drops as low as of 4° C in winter⁴. There are 11 districts, 52 blocks and 1317 villages in Nagaland. It offers rich incomparable traditional and cultural heritage. The various tribes that form the core of Nagaland ethnicity are known to have derived their origin from the Indo-Mongoloid family. The unique trait of the different ethnic groups of Nagaland is that they prefer to live in the rural zones of the state instead of the prominent and posh areas. The prominent tribes of Nagaland state which include *Chakhesang*, *Angami*, *Zeliang*, *Ao*, *Sangtam*, *Yimchunger*, *Chang*, *Sema*, *Lotha*, *Khemungan*, *Rengma*, *Konyak*, *Pochury* and *Phom*⁵.

During the present investigations, the background information on indigenous and traditional knowledge regarding use of wild edible fungi (mushroom) by few ethnic tribes of Kohima district of Nagaland, India was studied comprehensively as no scientific database is available.

Methodology

Regular surveys and collection of fleshy fungi were conducted in the Kohima district of Nagaland including forest areas and markets of the year during March 2008 to February 2009. The fleshy fungi were collected from different habitats such as forest, meadows, decaying wood, rotting plant parts, termite

* Corresponding author

nests, etc. The fungi were also collected from markets where the local inhabitants collected from nature and sale. The site of their collection and other related information was ascertained from the seller, village chiefs and even local men and women. During the study, prior Informed Consents have been taken from the knowledge providers. In total, 291 people were interviewed: 172 with modern stands and 119 with peasant stands out of which 158 were men and 133 were women. The participant observation method was employed and applied non-structured and semi-structured interviews⁶.

Each of the collected samples were wrapped in wax paper and brought to the laboratory for identification. The identification of each sample was done with the help of standard manuals studying carefully different microscopic and macroscopic characters^{2,7-10}. Further, the collected samples were preserved in 4% formaldehyde and deposited in the Museum of Botany Department, Gauhati University with the accession numbers as mentioned in Table 1.

Results and discussion

Preliminary market survey of Kohima revealed that the state is rich in wild edible fleshy fungi. During the investigation, a total of 13 species of fleshy fungi under 9 genera and 6 families were identified. Fleshy fungi collected and identified along with their respective families are listed in Table 1. Of the 13 edible species reported in the present study many of the species were reported earlier by few workers available in the other North-Eastern Hills of India^{3,11}. Few fleshy fungi including *Agaricus silvaticus* and *Lentinus conatus* were found to form ectomycorrhizal

association with different forest trees¹²⁻¹⁴. Many of the edible species like *Termitomyces eurrhizus*, *Lentinus conatus*, *Schizophyllum commune*, *Tricholoma giganteum* and *Pleurotus* spp. are collected by the local people during the season not only for their own consumption but also for sale. Some of the common wild edible fungi available in Kohima district, Nagaland, have been documented.

Mushroom selling was observed in the markets of Kohima in Nagaland round the year. Mushroom sellers were mainly women and considerable amounts were indigenous. Women represented 81.82% of sellers, while indigenous people comprised 68.18%. Mushroom collectors gather the resource in places with secondary vegetation, farmed areas and cattle fields. The sale of some wild edible mushrooms, the large amounts of commercialization of *Termitomyces eurrhizus*, *Tricholoma giganteum* and *Pleurotus ostreatus*, the complicated intermediary process, as well as the insertion of mushrooms into different informal economic practices are all evidence of an existent mycophily in a sector of the population of this region of the Kohima district of Nagaland. Mushrooms were packaged in nylon bags or wrapped in banana leaves. Each pack had approximately 200 gm humid weight and was sold for Rs. 40, i.e. Rs. 200/Kg. Fleshy fungi (mushroom) available in the market of Kohima, Nagaland their tentative market price have been listed in Table 2.

From the total of interviewees, peoples from urban areas (60% of informants) didn't provide information when asked about mushrooms or their reasons for being in the market. On the other hand, peoples from rural areas (30% of informants) possessed

Table 1—Wild edible fleshy fungi of Nagaland with their accession numbers

Order	Family	Scientific name	Accession No
Agaricales	Tricholomataceae	<i>Termitomyces eurrhizus</i> (Berk.) Heim (Fig. 1)	GUBOT121
		<i>Tricholoma virgatum</i> (Fig. 8)	GUBOT122
		<i>Tricholoma giganteum</i> Mass (Fig. 4)	GUBOT123
	Agaricaceae	<i>Agaricus silvaticus</i> Schaeff. (Fig. 6)	GUBOT124
		<i>Agaricus campestris</i> L. ex Fr.	GUBOT125
Aphylliphorales	Polyporaceae	<i>Lentinus conatus</i> Berk (Fig. 2)	GUBOT126
		<i>Lentinus cladopus</i> Lev. Fig. 5)	GUBOT127
		<i>Pleurotus ostreatus</i> (Fig. 7)	GUBOT128
		<i>Pleurotus flabellantus</i>	GUBOT129
	Schizophyllaceae	<i>Schizophyllum commune</i> Fr. (Fig. 3)	GUBOT130
Lycoperdales	Lycoperdaceae	<i>Lycoperdon</i> sp.	GUBOT131
		<i>Calvatia gigantea</i>	GUBOT132
Auriculariales	Auriculariaceae	<i>Auricularia delicata</i> (Fr.) Henn.	GUBOT133

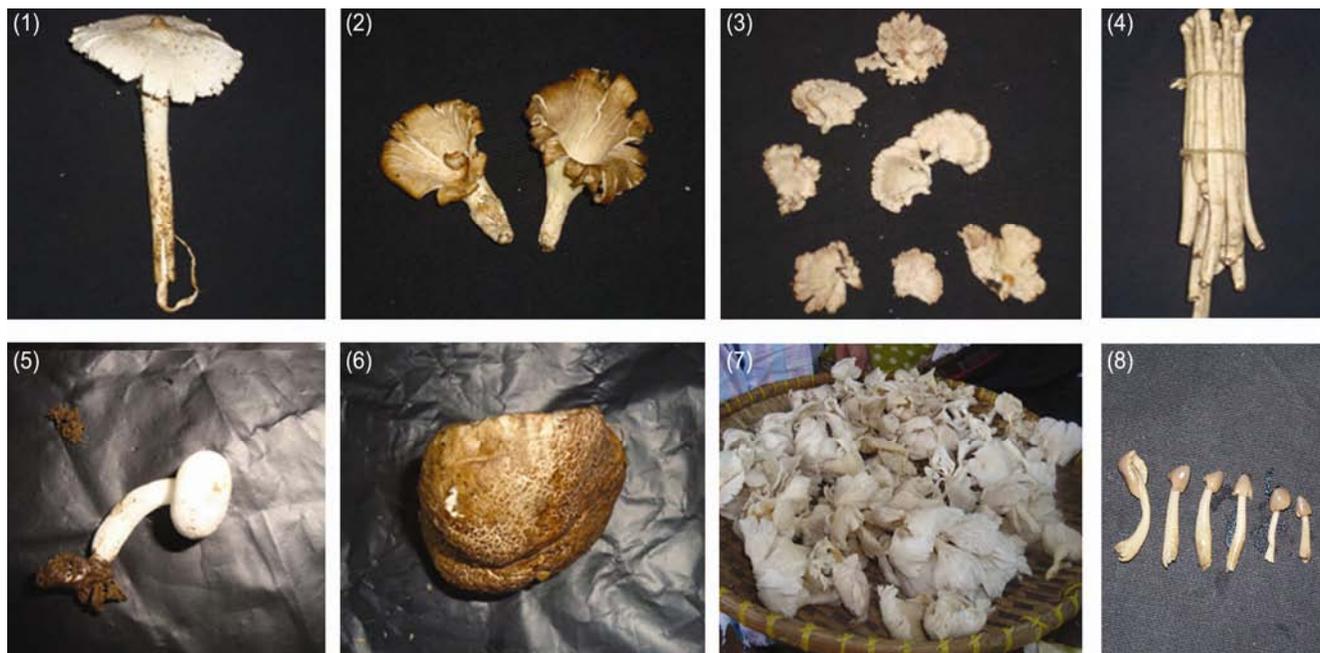


Fig. 1—*Termitomyces eurrhizus*; Fig.2—*Lentinus conatus* Berk; Fig.3—*Schizophyllum commune* Fr. (Berk.) Heim; Fig.4—*Tricholoma giganteum* Mass; Fig.5—*Lentinus cladopus* Lev; Fig.6—*Agaricus silvaticus* Schaeff; Fig.7—*Pleurotus* sp; Fig.8—*Tricholoma virgatum*

Table 2—Wild edible fleshy fungi found in the market of Kohima district, Nagaland

Name	Period of availability	~ Price (per kg.) [in INR]
<i>Termitomyces eurrhizus</i> (Berk.) Heim	April-August (fresh)	200
<i>Lentinus conatus</i> Berk.	March-June (fresh)	200
<i>Schizophyllum commune</i> Fr.	Throughout the year (dried)	300
	April-August (fresh)	200
<i>Tricholoma giganteum</i> Mass	June-August (fresh)	120-150
<i>Tricholoma virgatum</i>	June-September (fresh)	150-170
<i>Pleurotus ostreatus</i>	Throughout the year (dried)	300
	April-August (fresh)	120-150

more mushroom related knowledge although they did not particularly appreciate them as food product. However, indigenous inhabitants of rural areas (10% of informants) showed a more detailed local mycological knowledge as well as a wider acceptance as an edible resource. Although most of the interviewees were not mycophilic, a percentage of them were truly mycophilic and they all shared the fact of being indigenous and inhabitants of rural areas.

Conclusion

Mycophilic people are those, which demonstrate special interest towards fungi, such as an important food or cultural activity item. Nagaland ethnic groups are considered to be mycophilic and to have extensive traditional mycological knowledge. The market for mushrooms continues to grow due to interest in their culinary, nutritional and health benefits. They also show potential for use in waste management. The choice of species to raise depends both on the substrates available and on market considerations. Therefore, it was observed that in spite of having rich wild edible fungal resources, only *Pleurotus* sp., which grow on many substrates and easiest for cultivation, are available in the market. Further, in Kohima district of Nagaland, it was found that small scale mushroom production represents an opportunity for small farmers interested in an additional enterprise, especially option for farmers without much land. If technology for artificial cultivation of wild edible fungal flora of Nagaland can be developed to make it available even during off-season it can uplift the economy of the people of Nagaland up to certain extent^{15,16}. At the same time, strategic approach is required for mass awareness about the wild edible fungal flora.

The present findings however, have greater significance in a broader perspective as different

edible fungal flora used by the ethnic tribes of Kohima district, Nagaland were identified and documented.

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