

Ethnomycological Knowledge on Wild Edible Mushroom of Khasi Tribes of Meghalaya, North- Eastern India

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Abstract:

Mushrooms have been recommended as an alternative nonconventional food with significant nutrient content to fight against malnutrition contributing to food security. Like any other tribes, the Khasi society of Meghalaya, Northeast India, is also very close to nature and have ample knowledge on utilization of different kinds of forest products. The society being mycophilic, have traditional mycological knowledge acquired from ages. The paper highlights the documentation of this traditional knowledge on identification of various edible wild mushrooms and then scientific identification of the most common species consumed by the Khasis from time immemorial. The mushroom samples were collected from forest, meadows, decaying woods, rotting plants during the monsoon season and identified. Many cases of mushroom poisoning have been reported in many parts of the country which is due to lack of knowledge on identifying the edible ones. However, this case is very rare in Meghalaya reflecting the ability of the Khasis in precise identification of the ones that are edible. Thus,

it is necessary to document such knowledge pertained by the Khasis in this matter so that further mushroom poisoning can be avoided.

Key words: Khasi society, Traditional mycological knowledge, Non-conventional food, Mushroom poisoning, Meghalaya, India

Introduction:

Human culture has been augmented by nature and natural resources since time immemorial and search for food has started since his origin on earth. Exploitation for food has led to the discovery of a large variety of food plants in the past. In the course of time man came across a wide variety of flora which could also be used as items of food. A glimpse of our ancient wisdom regarding uses of various natural resources as food is available in Vedic scriptures and commentaries. However, there is another unexploited source of knowledge, which comes from folklores of different ethnic groups of various territories. Perhaps ethno-biology is the first science that originated with the evolution or existence of man on this planet. People from ethnic tribal societies have close association with and have good knowledge about forest resources. They subsist mainly on the wild produce of the forests and have retained their traditional customs and folklores.

Studies reveal that some macro-fungi belonging to groups Basidiomycetes and Ascomycetes [1] can produce fleshy fruiting bodies known as mushrooms. Mushrooms remained as a delicacy in human diet since time immemorial. These wild mushrooms are valuable non-timber forest resource used by mycophilic societies and their use has been documented in many countries around the world [2][3]. These fleshy fungi are rich in polysaccharides, protein, triterpenes, ascorbic acid, sterols, lipids, alkaloids, glycoside, volatile oil and riboflavin, etc. They are sold in traditional markets[3][4]or commercially

exploited as food [5] or medicines[6]. Indigenous knowledge of edible mushrooms and their utilization by population of ethnic groups is an important component of ethno mycology. Traditional mycological knowledge of most Indian tribal groups have proven to be extensive and profound, consuming nearly 283 species of wild mushrooms out of 2000 species recorded the world over[7].

The indigenous knowledge system particularly that associated with utilization of forest products is ancient among the tribes of Meghalaya. The State is situated in the North-Eastern region of India. It is a landlocked territory lying between the latitudes of 25°47'N and 26°10'N and longitudes of 89°45'E and 92°47'E. Composed of wide variety of deciduous and semi deciduous trees that grow 15 to 40 meter in height, the pine forests of Meghalaya support a diversity of epiphytes, understory plants and macro fungi. These forests are found in small to large patches exploited for natural resources such as fire wood, timber, gathering of medicinal plants and wild mushrooms. These fleshy fungi are potential source of wood degraders and also a food resource as supplement to vegetables. The state is the traditional home of 4 major recognized tribal groups *viz* Khasi, Jaintia, Bhoi and Garo of which Khasis mainly inhabit West and East Khasi Hills Districts of the State. The people from Khasi community have acquired a good knowledge of mycology in course of their centuries-old association and intimacy with forest. Cultural believes that are embedded within the structure of their traditional knowledge are repeated again and again through socialization.

Wild mushrooms have been used extensively in traditional systems of health and subsistence throughout the history of Khasis. Several mycologists have reported ethnomycological usage of this natural resource wealth from different regions of India. However, in case of Meghalaya negligible amount of work has been done on documentation of the ethnomycological knowledge used by the local ethnic

communities. It is therefore, an urgent need to document this traditional knowledge before its extinction. Thus, our study documented the traditional knowledge Khasis to identify the wild edible mushrooms and then scientifically identified the mushrooms utilized mainly by the people of Khasi tribe of East Khasi Hills District of Meghalaya.

Materials and Methods:

Field surveys were conducted to different forest and rural areas of East Khasi hill district of Meghalaya. Three different selected sites were visited; *viz.* Mawlai, Upper Shillong and Lapalang. Mushrooms were collected with the help of an expert from the community and other old men and women were consulted through repeated queries to collect traditional and local information on various uses of mushrooms and their correct identity. Voucher specimen of these mushroom species were collected, identified and preserved in the Department of Environment Studies. The ethnomycological information on the mushrooms reported by the local people were compared with the available scientific literatures. The mushroom with leathery texture were preserved in 4% formaldehyde solution whereas the samples with soft texture were preserved in 2% formaldehyde solution and kept as herbarium specimens. Dried specimens were also preserved for identification, characterization and documentation. The habitat, colour, shape, size, growth, texture, odour and adaptation to the environment considered prior to the preservation of the collected mushrooms.

Results and Discussion:

There is always risk of eating a poisonous species mistaking it for an edible one. During the field work, enquiries in all the study areas revealed that there is no case of mortality due to

mushroom poisoning in the region. However, there is no methodology to differentiate between an edible and a poisonous mushroom. In the selected study areas, people were well aware of the existence of poisonous mushrooms and could differentiate them very easily. The mythology and the traditional knowledge is important factor to be aware with poisonous forms. People in these areas have sound knowledge in choosing the right variety of mushrooms that have been acquired from generation to generation. They use visual method and collect only familiar species. Sometimes to ensure correct identification people break the fruit body, smell and then say if it is edible or not. They use lots of garlic and ginger to minimize possible poisoning when experimenting with doubtful species. Addition of vinegar is a contemporary method to avoid poisoning, also adopted by the Khasis along with other condiments.

Table1: Beliefs about the palatability of wild mushrooms found in the study areas

Edible	Non edible
1.Turns black after touching	1.Turns white after touching
2. Have a flat, rounded cap	2. Have a pointed cap.
3.No remarkable colour change when boiled	3. Turn rice red when boiled.
4. Taste good.	4. Taste bad
5.Pale colored	5. Brightly colored
6. Attacked by flies/insects/ worms.	6. Insects/worms avoid toxic mushrooms

Tropical and sub-tropical forest floor of Meghalaya provides suitable substrate for the growth of a number of wild mushrooms. Khasis collect the edible forms from their village forest during monsoon months i.e. Edible mushrooms are collectively known among Khasis as *tit bam* ('tit' means mushroom; 'bam' means edible).

The forests abound in mushrooms which are found growing on the forest-floor, twigs and branches, rotting plant parts, in mycorrhizal association with higher plants, etc.

Identification of mushrooms:

On the basis of morphological studies, collected mushroom species have been identified and arranged alphabetically with their botanical names followed by family, local name, close meaning of local name and their palatability.

Table2: Some wild edible mushroom from Meghalaya

Botanical Name	Family Name	Local Name	Close meaning of local name	Palatability
<i>Agaricusbiosporus</i>	Agaricaceae	Tit bol	Ball like	Good
<i>Cantharellus cibarius</i>	Cantharellaceae	Tit khang paipylleng	Not available	Good
<i>Clavaria flava</i>	Clavariacea	Tit thynatsyiar	Head of a cock	Delicious
<i>Gomphus floccossus</i>	Gomphaceae	Tit dyndong	Funnelor vessel	Good
<i>Lactarius volemus</i>	Russulaceae	Tit doh/titung	Meatyor smelly	Good
<i>Ramaria boyrytis</i>	Gomphaceae	Tit lbonghati	Stem thick like elephant legs	Delicious



Fig. 1: Varieties of Mushroom found in the wild forest of Khasi Hills: 1) *Agaricus biosporus*; 2) *Cantharellus cibarius*; 3) *Clavaria flava* 4) *Gomphus floccosus*; 5) *Lactarius volemus*; 6) *Ramariaboyrytis*

***Agaricus biosporus*:**

Stem 2-8 cm long; 1-3 cm. thick; sturdy; more or less equal; smooth or with small scales below the ring; white, often bruising brownish; with a ring that sometimes disappears in maturity. Cap is 3-16 cm, convex to broadly convex or nearly flat in age; dry; smooth or with pressed-down fibers or small scales; white in color and shows brown spore print.

***Cantharellus cibarius* :**

A funnel-shaped cap of diameter up to 10 cm and has a wavy irregular margin. Colour varies from light yellow to deep egg-yolk yellow, but sometimes a fine white bloom masks the background color. The stem has the same colour or paler than the cap; not more than 2cm long and merging into the cap. When growing in clumps, as is often the case, the stems are often curved and occasionally joined together near the base. Spore print is pale yellow to creamy white, sometimes with a slight pinkish tinged.

***Clavaria flava*:**

3-7 cmtall, 2-4 cm broad, branched 3-4 times, tips with short and tooth like projections, consisting of fused branches, white becoming cream, sometimes tinged yellowish in age. Shows white spore print.

***Gomphus floccosus*:**

The cap is funnel shaped. The stem is about 2 cm long, stout and the cap is 5-8 cm across and grey brownish in colour. Adult fruiting bodies are trumpet- or vase-shaped with a scaly cap 5–15 cm in diameter and colored various shades of reddish- to yellowish-orange. The spore print is brownish.

Lactarius volemus:

The cap may be up to 11 cm wide. The pale golden yellow gills on the underside of the cap are closely spaced. It also has a distinctive fishy smell, which does not affect the taste. The fruit body has a fleshy and firm cap with a velvety or smooth surface and a shape that changes with maturity: it starts off convex, with edges curved inwards, and then later grows flat with a depression in the middle. With a typical diameter of 5 to 11 cm, its colour ranges from apricot to tawny. The stem is thick and has a slightly lighter colouration than the cap. It is firm, with a velvety or smooth surface that sometimes has depressions running longitudinally up and down its length. Spore print is white.

Ramaria boyrytis:

The fruit bodies produced by the fungus are 7-15 cm wide and 6-20 cm tall. These are fleshy cauliflower-like masses with a stout central stem that splits into a few lower primary branches before branching densely above. The stem is short and thick between 1.5 and 6 cm in diameter and tapers downward. The branching pattern is irregular with the primary branches few and thick, typically 2-3 cm and the final branches slender (2-3 mm), and usually terminated with 5-7 branchlets. The branchlet tips are pink to purplish-red.

Results on moisture content showed that the values ranged from 82-96%. Although variability may be exclusively dependent on mushroom species, other interfering parameters such as post-harvest period, temperature and relative humidity during growth may also contribute to such differences. The highest amount of moisture (96%) was found in the matured fruit bodies of *Cantharellus cibarius* and minimum was recorded for *Clavaria flava* (86%).

During the survey it was observed that in all the study sites, the collection of wild mushrooms was undertaken early in the morning. This is because of intense competition for

mushroom gathering, especially for the varieties with higher commercial value. Mushroom collectors throng the areas during the growing season to gather the delicious ones in larger amount. Women and children were more involved in these activities compared to men. Children of both the sexes frequently accompany the women, as they were good at locating mushrooms because of their sharp eyes and proximity to the ground and crevices where the occurrence of the mushroom is highest. A major chunk of the population consumes mushroom because of their availability, meaty taste, flavor and medicinal value. Mushroom is a major item in the food culture of the Khasis, though its availability is seasonal.

Conclusion:

Mushrooms with its huge health benefits can solve many problems of under nutrition and malnutrition. Wild mushrooms perform ecological functions and are integral to the forest health and can be used to enhance the sustainable management of the natural environments that will, in the end, improve human welfare. Apart from North Eastern states, people in other states of India are mostly vegetarian. In order to meet their proteins and carbohydrates requirement, particularly among the underprivileged sections of the society mushrooms can serve as a good alternative source of food. Although majority of mushrooms do not cause violent physical or psychological reactions or illness, there are few widely distributed species that when consumed, cause hallucinations, stomach irritation, vomiting and in a few cases, rapid death. So, this traditional knowledge of Khasis can be used to identify edible mushrooms to avoid unwanted case of mushroom poisoning.

At present we have the lowest rate of protein consumption and due to population explosion the problem of protein hunger will become more acute. Under prevailing

circumstances all possible sources of protein products will have to be exploited to save the country from hunger and malnutrition. Edible mushrooms can therefore be used as a weapon against starvation because of its high protein and vitamin content. And in a way contribute to food security by being easily available, affordable and usable.

The study has shown that the Khasi people of Meghalaya have a long mushroom heritage which is yet to be documented scientifically and systematically. The youth of the present generation pays scant regard to the traditional food culture of the community. So it is necessary to document properly the traditional knowledge of the people from this community for future generations before it is lost.

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