



## OCCURRENCE OF MUSHROOM DIVERSITY IN CHHATTISGARH PLAINS, NORTHERN HILLY REGIONS AND BASTAR PLATEAU OF CHHATTISGARH STATE

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**Abstract:** Seventy five mushroom flora were collected from Chhattisgarh Plains and Bastar Plateau of Chhattisgarh State during survey of mushroom fungi conducted during monsoon season in the year 2005 and 2006. These cultures were purified, some of them were sent to Directorate of Mushroom Research, Solan (H.P.) for further maintenance and some specimens were preserved in formalin. The mushroom flora commonly encountered during survey were: *Agaricus* sp., *Tuber* sp., *Russula*, *Boletus*, *Volvariella*, *Lactarius*, *Lepiota* etc. During the extensive survey of Chhattisgarh Plains and Northern Hilly Regions in 2005, 25 mushroom fungi and their species during monsoon season were collected from different substrates. Two species of *Termitomyces* and *Russula* were predominantly observed from most of the locality. During survey of mushroom fungi from Bastar Plateau of Chhattisgarh in 2006, 50 mushroom fungi were collected and identified during monsoon season. Out of these, 20 fleshy fungi were edible, 23 were non edible and *Amanita citrina* was poisonous. Other mushroom fungi viz., *Boletus lipidus*, *Clavaria* sp., *Collybia platyphylla*, *Collybia acerbata*, *Clitocybe geotropa*, *Gromphidius vicius*, *Hydrophorus protensis*, *Lactarius picinus*, *Lepiota* sp., *Maramuss rcorodomiis*, *Pholiota apida*, *Russula crescens*, *Scleroderma verrucorum*, *Termitomyces robustus*, *Tuber* spp., *Volvariella volvacia*, *Volvariella* sp., *Xylaria ploymorpha* and *Xylaria* sp., were found to grow widely on natural substrate.

**Keywords:** Mushroom fungi, Edible, Habitat, Substrate, Poisonous

### Introduction:

The diversity of climatic conditions prevalent in India made this country a natural habitat of a number of mushrooms. There are over 2000 species of edible fungi known to man out of 10,000 species of macrofungi. Watling and Gregory (1980) predicted that since India is richer in flowering plants than any other country of its size, the fungal wealth of India is also expected to be equally diverse. But, no concerted efforts have been made for any detailed study of natural mushroom flora in different parts of the country till today, although some sporadic attempts were made by some workers around the country (Verma, 1997). Similar is the situation in European countries, where the Agarics mycota is largely known, the fungi in many wet tropical forests have never been investigated and more than 20 to 40% of the species are undescribed. In India, some efforts have been made into the identification of the country's mushroom flora occurring in the diverse biogeographical regions of the country. Attempts were made to survey the areas mostly from South India, North West Himalayas and Eastern part but the North

India including M.P., U.P. and Chhattisgarh have received lesser attention (Shukla, 2005, Thakur et al., 2005). More than 283 species are reported to be the available in India. But, the systematic approach to study the available mushroom flora is still lacking. It is often a difficult proposition to record the morphological details of the collected specimens in its fresh form due to evanescent nature of most of the species. If a standard procedure for collection is adopted, it will be easy to identify these fungi. It requires extensive and intensive surveys to complete the cataloguing of our genetic resources of mushroom. Attempts have to be made to obtain them in pure cultures so as to conserve them *in vitro* and *in vivo*. These efforts need to be made at the earliest, so that these important organisms are saved before they are lost due to deforestation and other environmental degradation taking place in our country. Recently, a Mushroom Gene Bank has started functioning at Directorate of Mushroom Research (ICAR), Solan (H.P.) where a sum of 350 mushroom cultures are maintained which includes *Agaricus*, *Pleurotus* and other mushroom species. In the present paper, an attempt was made to

survey the wild edible / non edible / medicinal / poisonous mushroom flora from different agro climatic conditions of Chhattisgarh state with respect to their substrate and place of occurrence and suggest some ways and means to conserve them from erosion.

#### **Materials and methods:**

Chhattisgarh is divided into three agroclimatic zones viz., Chhattisgarh Plains, Northern Hilly regions and Bastar Plateau. Chhattisgarh Plain has vast forest covers including three wild life sanctuaries viz., Sitanadi, Udanti and Barnavapara. Of these, Sitanadi wild life sanctuary is a unique one in the sense that it is a sub tropical forest but the kinds of flora and fauna, it has equivalent to a temperate forest. Most of the flora and fauna of this forest including mushroom flora is unattended and unexplored. North hilly region including Manpat of Surguja distt, which is at higher altitude, had typical mushroom flora, which needs to be conserved and exploited. Bastar plateau is one, which is predominated by thick forest covers and most of the area is still unattended and unexplored. Sporadic attempts have been made in Chhattisgarh in the past to collect, conserve, identify and maintain the mushroom flora available so far. These efforts were made under All India Co-ordinated Mushroom Improvement Project of ICAR operating at Indira Gandhi Agricultural University, Raipur since 1988. A survey for the occurrence of wild mushroom flora in Chhattisgarh Plains, Northern Hilly regions was done in July, 2005 and for Bastar Plateau in July-August, 2006. The area under survey were the districts of Raipur, Bilaspur, Ambikapur, Raigarh and Jashpur Nagar, Kanker, Kondagaon and Jagdalpur. The Survey was made mainly on the way to different places. Both sides of the roads at irregular intervals extending from the roadside to ½km inside were surveyed and the kinds of flora observed were collected, isolated and preserved in formalin as wet preservation.

#### **Results:**

During the extensive survey of Chhattisgarh Plains and North Hilly Regions, 25 mushroom fungi and their species during

monsoon season were collected from different substrates. All these mushroom fungi were found associated mainly in termite mounds, soil, wood logs, tree trunk, leaf litter etc. Two species of *Termitomyces* and *Russula* were most predominantly observed from most of the locality (Table 1). However, during survey of Bastar Plateau, 50 mushroom fungi were collected and identified during monsoon season (Table 2). Out of these, 20 fleshy fungi were edible, 23 were non edible, five were medicinal and *Amanita citrina* was poisonous. Some of the species were collected, identified and deposited at National Research Centre for Mushroom, Solan (H.P.). All these fungi were found mainly from soil, wood logs, bamboo tree trunk, leaf litter. Fleshy fungi particularly mushrooms have been identified as articles of food from ancient times. Mushrooms have delicate flavours and have been considered as potential source of proteins, amino acids, vitamins and minerals. Several fleshy fungi appear during rainy season in grass land, abandoned areas and forest on decaying organic matter. The naturally grown fleshy fungi are collected by tribes, consumed by them as well as sold in local market. In all, 75 mushroom flora were collected and preserved in formalin. The mushroom flora commonly encountered during survey were: *Agaricus* sp. *Tuber* sp., *Russula*, *Boletus*, *Volvariella*, *Lactarius*, *Lepiota* etc. During the extensive survey of Chhattisgarh forest nineteen fleshy fungi viz., *Boletus lipidus*, *Clavaria* sp, *Collybia platyphylla*, *Collybia acerbata*, *Clitocybe geotropa*, *Gromphidius vicius*, *Hydrophorus protensis*, *Lactarius picinus*, *Lepiota* sp., *Maramuss rcorodonius*, *Pholiota apida*, *Russula crescens*, *Scleroderma verrucorum*, *Termitomyces robustus*, *Tuber* spp., *Volvariella volvacea*, *Volvariella* sp., *Xylaria ploymorpha* and *Xylaria* sp., were found to grow widely on natural substrate. Out of these seven i.e., *Clitocybe geotropa*, *Lactarius picinus*, *Marasnius acorodonius*, *Russula apida*, *Russula crescens*, *Termitomyces robustus*, *Tuber* sp. *Volvariella volvacea* and *Volvariella* sp. were edible and consumed by local people.

There were many mycorrhizal mushroom species which have been used as a food source by people traditionally from the wild and these species don't just grow on soil or wood but associate mutualistically with the roots of various host plants (Lakhanpal, 1995). These mycorrhizal mushrooms are actually fruit bodies of ectotomycorrhizal fungi associated with roots of sal plants and bamboo tree trunk in Chhattisgarh. Since, the mycorrhizal mushrooms can not be grown indoors, hence for some of them techniques have been standardized to cultivate them outdoors in the field / forest associating them with their specific host plants. Around 5000 species of fungi are known to form ectomycorrhize in the genera *Amanita*, *Tricholoma*, *Boletus*, *Cortinarius*, *Russula*, *Gomphidius*, *Cantharellus*, *Suillus*, *Hebeloma*, *Laccaria*, *Lactarius*, *Rhizopogon*, *Scleroderma* and *Pisolithus*. Some of these mushroom genus are also reported from Chhattisgarh during our survey (Thakur *et al.*, 2011). The edible mycorrhizal mushrooms are doubly beneficial. They are a source and income and increment to people and plants, respectively. Hence, these wild edible mushroom species need to be studied and researched for their biology, ecology and social aspects, particularly in relation to their role in stabilizing the forest ecosystem. Due to deforestation or environmental degradation the existence of these mushrooms may be put into danger. Hence, attempts are required to conserve them *in situ*.

Table-1: Survey of mushroom fungi from Chhattisgarh Plains and North Hilly Regions of Chhattisgarh State

	phutu		Pali	
7.	-	<i>Polyporus</i> spp.	Katghora	Wood log
8.	Black ear	<i>Auricularia</i> sp.	Morga	Wood log
9.	Chharkoni phutu	<i>Astreaus hygrometricus</i>	Navapara	Sandy soil under sal plantation
10.	Alu phutu	<i>Tuber</i> sp.	Morga	Sandy soil
11.	Bhigora phutu	<i>Termitomyces clypeatus</i>	Morga Ambikapur	Termite mounds
12.	Bhigora phutu	<i>Termitomyces heimii</i>	Morga	Termite mounds
13.	Bhigora phutu	<i>Termitomyces</i> spp.	Raigarh	Termite nest
14.	Chikora phutu	<i>Termitomyces</i> spp.	Udaipur	Termite nest
15.	Patera phutu	<i>Termitomyces</i> spp.	Morga	Sandy soil with grasses
16.	-	<i>Russula</i> spp.	Katghora	Leaf litter
17.	-	<i>Russula</i> sp.	Morga	Wood
18.	-	<i>Pleurotus</i> sp.	Udaipur	Soil
19.	-	<i>Boletus</i> sp.	Morga	Leaf litter
20.	-	<i>Thelophoraceae</i>	Morga	Wood of Dhora tree
21.	-	<i>Laccaria laccata</i>	Morga	Leaf litter
22.	-	<i>Flammula</i> sp.	Khajurinala	Leaf litter
23.	-	<i>Volvaria</i> sp.	Manpatt	Soil (Rich in humus)
24.	-	<i>Volvariella volvacea</i>	Raigarh	Paddy straw heap
25.	-	<i>Ganoderma lucidum</i>	Raigarh	Tree trunk

S. No.	Common name	Scientific name	Location	Habitat
1.	Kanki Phutu	<i>Podabrella microcarpa</i>	College campus	Termite mounds
2.	-	<i>T. sulphuricum</i>	Damia, Pali Ambikapur road	Soil
3.	-	<i>Amanita</i> sp.	Morga, Navapara	Leaf litter
4.	Munda potu	<i>Termitomyces</i> sp. (Cultured)	Damia, Pali	Leaf litter
5.	-	<i>Lactarius</i> sp.	Damia, Pali	Leaf litter, root trunk
6.	Haldu	<i>Russula</i> sp.	Damia,	Leaf litter

Table-2: Survey of mushroom fungi from different districts of Bastar Plateau of Chhattisgarh State

Sr No.	Scientific name	Common name	Location	Habitat	Edibility
1.	<i>Agrocybe erebia</i>	-	Tirathgarh	On soil	E
2.	<i>Amanita citrina</i>	-	-	-	P
3.	<i>Armillaria mellea</i>	-	-	-	E
4.	<i>Astreaus hygrometricus</i>	-	-	-	M
5.	<i>Auricularia sp</i>	-	Narayanpur	On wood logs	E
6.	<i>Boletus sp</i>	-	Tirathgarh	On soil	E
7.	<i>Bovista apendicellata</i>	-	-	-	NE
8.	<i>Calocybe sp</i>	-	Tirathgarah/ Makdi	On wood	E
9.	<i>Cantharellus sp</i>	Banspihari	Boribeda	On bamboo trunk	E
10.	<i>Calvatia cyanthiformis</i>	-	-	-	E
11.	<i>Clavaria fumosa</i>	-	Bhanpuri	-	NE
12.	<i>Clavaria sp</i>	-	-	-	N
13.	<i>Clitocybe gestrpoa</i>	-	-	-	E
14.	<i>Crepodorus sp</i>	-	Bhanpuri	-	N
15.	<i>Cyathus limbatus</i>	-	-	-	M
16.	<i>Daldunia concentrica</i>	-	-	-	M
17.	<i>Ganoderma lucidum</i>	-	Makdi & Kondagao	On died wood logs	M
18.	<i>Ganoderma sp</i>	-	-	-	M
19.	<i>Goeastrum fimbriatom</i>	-	-	-	NE
20.	<i>Hygrocybe marchee</i>	-	Makdi	-	E
21.	<i>Hypholoma udum</i>	-	Tirathgarh	On soil	E
22.	<i>Hypoxylon ftagiformal</i>	-	Narayanpire Tirathgarh	-	
23.	<i>Incrustoporia semipileta</i>	-	-	-	
24.	<i>Laccaria laccata</i>	-	-	-	
25.	<i>Lactarius aceverimus</i>	-	Bastar	-	
26.	<i>Lactarius vellereus</i>	-	Bangdongri	-	
27.	<i>Lepista sp</i>	-	Makdi	-	
28.	<i>Microglossum viride</i>	-	Bhanpuri	-	
29.	<i>Nalanla farinalens</i>	-	Bhanpuri	-	
30.	<i>Omphalina ericetorum</i>	-	Bhanpuri	-	
31.	<i>Panaiolina foeniscie</i>	-	Bhrambela	-	
32.	<i>Pleurotus florida like</i>	-	Narayanpur	-	E
33.	<i>Pleurotus sajar caju like</i>	-	Narayanpur	-	E
34.	<i>Pleurotus stramonius like</i>	-	Bhanpuri	-	E
35.	<i>Podoscypha muttazonata</i>	-	Kondagoon	-	
36.	<i>Polyporus Varius</i>	-	Narayanpur	On soil	
37.	<i>Ramaria formosa</i>	-	Bangdangri	On wood logs	
38.	<i>Rozites caperata</i>	-	-	-	
39.	<i>Russula aeruginla</i>	-	-	-	E
40.	<i>Russula apida</i>	-	Jagdulpur	-	E
41.	<i>Russula atropurea</i>	-	Tirathgarh	On soil	E
42.	<i>Russula Mairei</i>	-	-	On soil	E
43.	<i>Russula norvegica</i>	-	Tirathgarh	On soil	
44.	<i>Scleroderma Verrucosum</i>	Gharkoniph uty	Tirathgarh	-	E
45.	<i>Stereum sp</i>	-	Bangdongri	-	
46.	<i>Stropharia Semiglobata</i>	-	Tirathgarh	-	
47.	<i>Termitomyces heimii</i>	-	Bhanpuri	-	E
48.	<i>Trametes versicolor</i>	-	Bangdangri	-	
49.	<i>Tuber sp</i>	-	Tirathgarh/Bastar	On soil	E
50.	<i>Volvariella sp like</i>	-	Bhanpuri/Baster	-	E

E-Edible (20), NE - Not Edible (23), Medicinal (m) - 5, Edible Fair (EF) -1 - P-1

NC=Not Confirmed edibility

**Discussion:** Seventy five mushroom flora were collected from Chhattisgarh Plains and Bastar Plateau of Chhattisgarh State during

survey of mushroom fungi conducted during monsoon season in the year 2005 and 2006. Most of these flora have also been reported

by Thakur *et al* (2011), Sharma *et al* (2012), Sarbhoy (1997) during survey of mushroom fungi under AICRP on Mushroom at Raipur during 1997-2004. Some of the mushroom flora commonly encountered during survey were: *Termitomyces*, *Russula*, *Agaricus* sp. *Tuber* sp., , *Boletus*, *Volvariella*, *Lactarius*, *Lepiota* etc (Anonymous, 1997-98, Anonymous, 2000-2001, Anonymous, 2001-2002). During the extensive survey of Chhattisgarh Plains and North Hilly Regions, 18 mushroom fungi and their species during monsoon season were collected from different substrates. Many of these fungi like *Termitomyces* spp. and others were also reported by Kumar *et al.*, 1991. Two species of *Termitomyces* and *Russula* were predominantly observed from most of the locality.

#### **Conclusion:**

Seventy five mushroom flora were collected from Chhattisgarh Plains, Northern Hilly regions and Bastar Plateau of Chhattisgarh State during survey of mushroom fungi conducted during monsoon season in the year 2005 and 2006. Many of them were edible, non edible, medicinal and poisonous.

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