

# Collection And Documentation Of The Wild Edible Mushrooms From Different Forest Of Ranchi District

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## Abstract

The wild edible mushrooms are very important in food security of tribal group throughout the Jharkhand. Despite of its commercial importance the diversity of the wild mushroom in Jharkhand has been little studied. The aim of this study is to produce a preliminary mushrooms checklist based on the collection and document the edible mushroom from different forest of Ranchi District. Extensive field visits and communication with ethnic groups were performed to collect the data on each mushroom. A survey was conducted in the rural areas as well as rural "Haat" of Ranchi District. A total of 10 varieties of wild edible mushroom were reported from the study area. Among the 10 most wild mushrooms irrespective of extent of availability, the most predominant was *Termitomyces clypeatus* R, Heim, followed by *Termitomyces heimii*, (Natrajan 1979). *Astraeus hygrometricus* (petrs) Morgan (1889). In the present paper details of ten species of wild edible mushroom has been discussed.

**Keywords:** wild edible mushroom, ethnic groups.

## Introduction

Jharkhand state is located in the eastern region of India, It lies between 23°15'N to 24°45'N longitudes and 83°17' East to 87°45' E latitude. The tropical forest of Jharkhand comprises of 29.45 % of its geographical area. The geographical area is 7,698 sq. Miles and its forest cover is 2,084 sq. miles. The tropical climate of Ranchi is suitable for growth of mushrooms. These mushrooms are consumed frequently by various tribes inhabiting nearby the forest. Jharkhand is agriculture based state with agrarian waste that provide suitable substrate for growth of wild edible mushrooms, it biogenesis their own nutriment from farming crops remnants. Mushrooms are decomposer so it abolishes rot, spoiled and return valuable and important nutrient to the soil, thus play very significant role in biodiversity restoration and nutrient recycling in an ecosystem and prevent the food chain to disintegrate. Jharkhand is inhabited by 32 major tribes. These tribal groups are engaged in collection and consumption of wild edible mushroom based on their traditional knowledge. Mushrooms are macro fungi with outstanding fruiting body that can be hypogenous or epigeous, large enough to be seen with naked eye and can be picked by hand. (Chang ST & miles 1992). Wild edible mushrooms are a natural resource and one of the main resources for the development of Drugs and neutraceutical (Lakhanpal & Rana 2005). Mushrooms occupy a place above vegetable and below the high proteins in meat, fish and therefore can solve world food scarcity problems. In addition to their pharmacological features, mushrooms are considered as essential food diet owing to their nutritional value consisting of high protein and low fat content (Agrahar & subbulakshmi 2005). In developing country like India, mushrooms are the source of progress in fields of food, medicine and unemployment (Khatun et al. 2011). Mushroom cultivation was introduced to Jharkhand around 1940 and since then mushroom production has been increasing. The consumption of edible mushroom in Jharkhand represents a cuisine tradition. Popular markets offer during the rainy season a wide variety of edible mushroom. Some species of mushrooms are traditionally eaten and received several popular local name as Bala khukhri, Patiari khukhri, Jamun khukhri, Chirkho khukhri etc. Knowledge about wild edible mushrooms and their nutritional value has been documented from Assam, Arunachal Pradesh, Meghalaya, Nagaland and Manipur in northeast India (Sarma 2010, Tanti et al. 2011, Tapwal et al 2013, Kumar et al. 2013, 2014, 2015 Kalita et al 2016) and western ghat and west coast of India (Karun N.C, Shridhar K.R 2013), but few literature are available from the Ranchi district, important among them are Srivastava Ak & Soreng (2012, 2014). In Ranchi district a large diversity of wild edible mushroom found growing on the forest floor, twigs, branches, rotting plants, cattle dungs. Although its difficult to estimate the number of extent of wild edible mushroom. The objective of the present work is to compile a list of wild edible mushroom in and around Ranchi District. Wild edible mushrooms are rich source of nutrient; hence play important role in food security of ethno botanical groups and tribal throughout the Jharkhand. In Ranchi District wild edible mushrooms are mainly collected during the rainy season and valued as a traditionally nutrient food and consumed by the localite and tribal community in great interest. These tribal communities are engaged in collection and consumption of mushrooms based on their traditional and ethno botanical knowledge. The present study is designed to collect and document the diversity of wild edible mushrooms from the biodiversity rich Ranchi District.

## Material and Method

Specimen samples of wild edible mushrooms were collected during the rainy season from June 2017 to September 2019 from the different forest and habitat of following places of Ranchi district. :-Ormanjhi, Namkum, Sadma, Pandra, Kanke, Angara, Mandar, Khelgaon, Baragain Basti. Samples were collected using sturdy knife to dig down to bases. Each collected mushrooms were carefully rolled in wax paper and then kept in zippered plastic bags with lots of air trapped in them to act as cushion. After collection specimens were kept in sterile container, each container was labelled with their date & place of collection and brought to the laboratory for identification and preservation. Identification of the specimen were done by morphological characteristic of fruiting body, traditional knowledge provided by ethnic tribal community and guideline mention in the manual of Purkayastha RP, and Aindrila 1978, identification keys of mushroom given at Kuo M. Contributors websites. Identification were also confirmed by BAU, Ranchi and ICAR research centre, Palandu, Ranchi. Specimen were preserved in 6:3:1 ratio of distilled water, ethanol, formalin and deposited in the Department of Botany, Ranchi University for further analysis.

## Result and Discussion

The specimens were collected from different region of Ranchi District. The area with the largest number of wild edible mushrooms were forest of Ormanjhi, sadma, and mandar. The forest of Ranchi District posses abundant Sal crop species; in rainy season these forest receives the heavy rainfall that is favourable condition for growth of mushrooms and act as a substrate for growing of the basidiospores of some wild edible species of mushroom. A total of 21 mushrooms species were collected and identified, out of the 21 species only nine species viz. *Calvatia gigantea*, *Boletus edulis*, *Astraeus hygrometricus*, *Termitomyces clypeatus*, *Volvariella volvacea*

, *T. heimii*, *T. microcarpus*, *Russula vesca*, *pleurotus ostreatus* belong to 7 families were confirmed as edible. Apart from these nine edible species *leucoagaricus* new varieties of edible mushroom were recorded from Sadma forest area. The growth of the varieties of wild edible mushroom of Ranchi district has appropriate geographical location as well ecological condition. There is a great variation in the quality within the substrate preferences by mushrooms and it affects the expansion of occurrences and nutrition content. Measurement of fruiting body were taken and Detailed morphological and microscopic characteristic of these ten species were carried out.

### DOCUMENTATION OF THE COLLECTED MUSHROOMS

Mushrooms were collected and documented using following features.

1. Local or vernacular Name
2. Habitat
3. Growth habit
4. Width of Pileus
5. Shape
6. Colour and colour change
7. Length of Stipe
8. Annulus: Present or Absent
9. Pseudorhiza : Present or Absent

**Classification of identified mushrooms species**

<b>Scientific Name</b>	<b>Local name</b>	<b>Classification</b> <a href="http://Wikipedia.Org/wiki/">http.Wikipedia.Org/wiki/</a>	<b>Colour &amp;Size</b>	<b>Growth Habit and Habitat</b>	<b>Uses</b>
<b><i>Calvatia gigantea</i></b> (Batsch exPers) <b>Lloyd</b> commonly known as giant puffball	<b>Gend Khukhri</b>	<b>Kingdom: Fungi</b> <b>Phylum: Basidiomycota</b> <b>Class: Agaricomycetes</b> <b>Order: Agaricales</b> <b>Family: Agaricaceae</b> <b>Genus: Calvatia</b>  <b>Species: C.gigantea</b>	Young Calvatia gigantea have a white fleshy interior .Once mature its colour changes to yellow and brown. fruiting body are without pseudorhiza Length of stipe:<7cms width:<10cms Annulus: : present Shape: Oval	Grows solitary in the edge of field, on log land, meadows forest.	Used as food and medicine.
<b><i>Termitomyces clypeatus</i></b> R. Heim(Bull. Jard.etat 21:207-1951	Chirkho or baala khukhri	<b>Kingdom: Fungi</b> <b>Division: Basidiomycota</b> <b>Class: Agaricomycetes</b> <b>Order: Agaricales</b> <b>Family: Lyophyllaceae</b> <b>Genus: Termitomyces</b> <b>Species:Termytomyces Clypeatus</b>	They are white gilled mushrooms with brown cap. It has long stipe with pseudorrhizae. Length of stipe;< 8cm,Width of pileus:<13cms Annulus:Absent Shape: circular	Grows solitary or in small group Found in soil beneath the fence of plant, in grass land, play ground on paddy field.	Excellent taste, edible. Used as food and medicine.
<b><i>Termitomyces heimii</i></b> (Natrajan 1979) Known as Patiyari khukri	Patiyari or tekno khukhri	<b>Kingdom: Fungi</b> <b>Division: Basidiomycota</b> <b>Class: Agaricomycetes</b> <b>Order: Agaricales</b> <b>Family: Lyophyllaceae</b> <b>Genus: Termitomyces</b> <b>Species: T.heimii(Roger heim)</b>	large fleshy pinkish gills with whitish cap and psudorrhizae. Length of stipe< 6cms ;width of pileus:<10cms Annulus:Presents hape:oval	Grows gregarious. found naturally in forest,termite nest..soil beneath the fence of plant	Used as food and medicine
<b><i>Termitomyces Microcarpus</i></b> (Berk & Broome 1871)R.heim1942	Teelha khukhri	<b>Kingdom: Fungi</b> <b>Division: Basidiomycota</b> <b>Class: Agaricomycetes</b> <b>Order: Agaricales</b> <b>Family: Lyophyllaceae</b> <b>Genus: Termitomyces</b> <b>Species: T. Microcarpus</b>	small size fleshy gills with white cap ,fruiting body are without pseudorrhiza length of stipe:<1cm; width of pileus:<2cms ,Annulus;Absent shape:oval	Grows in groups or cluster; Found in termite infested region of forest, termite mounds.	As delicious food cuisine.
<b><i>Astraeus hygrometricus</i></b> ( Pers.) Morgan (1889)	<b>Rugra putu or putka</b>	<b>Kingdom: Fungi</b> <b>Division: Basidiomycota</b> <b>Class: Agaricomycetes</b> <b>Order: Boletales</b> <b>Family: Diplocystaceae</b> <b>Genus: Astraeus</b> <b>Species:A.hygrometrics</b>	White and brown colour fruit body with 1cm -4.5cms in diameter. 7cms-9cms broad after the rays have spread out. .shape:spherical	Grows in clusterProduce fruiting bodies in association with sal and other forest trees ,especially in sandy soil	Food and medicine

<p><i>Boletus edulis</i> <b>Bull(1782)</b> Known as Jamun Khukhri by Tribal and local community</p>	<p><b>Jamun khukhri</b></p>	<p><b>Kingdom: Fungi</b> <b>Division: Basidiomycota</b> <b>Class: Agaricomycetes</b> <b>Order: Boletales</b> <b>Family: Boletaceae</b> <b>Genus: Boletus</b> <b>Species: B.edulis</b></p>	<p>The fruiting body is whitish when young, but ages to a greenish yellow and brown in colour without pseudorhizae length of stipe: &lt;7cms width of pileus: &lt;10cms Annulus: absent Shape: Elliptical or spindle or Oval</p>	<p>Grows solitary or in small groups Found in forest with association of black berry tree.</p>	<p>Food and medicine</p>
<p><i>Pleurotus ostreatus</i> <b>(Jacq.ex.Fr.)</b> <b>P.Kumm</b> <b>(1871)</b></p>	<p><b>Dhingri khukhri</b></p>	<p><b>Kingdom: Fungi</b> <b>Division: Basidiomycota</b> <b>Class: Agaricomycetes</b> <b>Order: Agaricales</b> <b>Family: Pleurotaceae</b> <b>Genus: Pleurotus</b> <b>Species: P.ostreatus</b></p>	<p>White to grey or tan to dark brown, lobed or wavy gills. fruit bodies are without pseudorhiza length of stipe: &lt;9cms, width of pileus: &lt;14cms annulus: present Shape: Enrolled when young and smooth, Variable in size and shape.</p>	<p>Grows in groups or cluster Found growing naturally in living and dead tree, sub tropical and tropical forest</p>	<p>Excellent taste &amp; edible used as cuisine.</p>
<p><i>Volvariella volvacea</i> <b>(Speg.1898)</b></p>	<p><b>Pual or dhaan khukhri</b></p>	<p><b>Kingdom: Fungi</b> <b>Division: Basidiomycota</b> <b>Class: Agaricomycetes</b> <b>Order: Agaricales</b> <b>Family: Pluteaceae</b> <b>Genus: Volvariella</b> <b>Species: volvacea</b></p>	<p>Deep salmon pink or orange gills. fruit bodies are without pseudorhizae length of stipe: &lt;3cm; width of pileus: &lt;5cm Annulus: Absent shape: ovaliform</p>	<p>Grows gregarious Found growing naturally in rotten paddy straw, agrarian waste</p>	<p>Excellent taste &amp; edible used as cuisine.</p>
<p><i>Russula vesca</i> <b>Fr(1836)</b></p>	<p><b>Patra khukhri</b></p>	<p><b>Kingdom: Fungi</b> <b>Division: Basidiomycota</b> <b>Class: Agaricomycetes</b> <b>Order: Russulales</b> <b>Family: Russulaceae</b> <b>Genus: Russula</b> <b>Species: R.Vesca</b></p>	<p>It has venerable cap of Red, Orange or Yellow colour. fruit bodies are without pseudorhizae length of stipe: &lt;4cm; width of pileus: &lt;6cm Annulus: Absent shape: oval</p>	<p>Grows Caespitose Present beneath the dry leaves of Sal, Eucalyptus deciduous forest and agricultural waste</p>	<p>Edible and very delicious</p>
<p><i>Leucoagaricus leucothites</i> <b>(Vittad.)Wasser</b> <b>(1977)</b></p>	<p><b>Machu khukhri</b></p>	<p><b>Kingdom: Fungi</b> <b>Phylum: Basidiomycota</b> <b>Class: Agaricomycetes</b> <b>Order: Agaricales</b> <b>Family: Agaricaceae</b> <b>Genus: Leucoagaricus</b> <b>Species: L.leucothites</b></p>	<p>White colour cap and gills with brown pore cap. fruiting bodies are without psudorhizae length of stipe: &lt;3.5cms width of pleus: &lt;5cms Annulus: present</p>	<p>Grows Caespitose in forest, agrarian waste</p>	<p>Edible and used as cuisine</p>

			shape:Elleptical		
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Among the wild edible mushrooms pleurotus species was the rarest and collected only from the forest of Palandu. *Boletus edulis* was the rare and substrate specific collected only nearby Blackberry tree during month of June to July. *Termitomyces* species were found to be most dominant species as it was collected from all locations of study area. Certain species of *Termitomyces* are favoured then other varieties of mushrooms but they are dependent on season for their availability. Among all the species of *Termitomyces* only *Termitomyces heimmi* were found to possess a thick annulus. All *Termitomyces* species retain pseudorhizae except *T. microcarpus*. *Pleurotus ostreatus* and *Volvariella volvacea* are wild as well as grown commercially. Mushroom collection and its selling is an income generating activity and its consumption is important food source for rural tribes and localities of Jharkhand. Tribes and villagers have different means and ways to identify the edible mushroom. They identify the edible mushrooms based on the following features, Adhikari M. K et al. (2005)

- i. Presence of worm or termites,
- ii. Absence of scales on the surface of the cap
- iii. Enjoyable fragrance
- iv. The colour of the fruiting body doesn't turn dark after smashing.
- v. Edible mushrooms possess oval/elliptical/spherical/rounded cap.

They refer the poisonous mushroom as *surp/saap kukhri*. Poisonous and non edible mushroom possess following features.

- i. Absence of worm or termite,
  - ii. Presence of warts on the surface of the cap.
  - iii. Unpleasant fragrance
  - iv. Non edible mushroom have pointed cap.
  - v. The colour of the fruiting body turn black or dark on smashing.
- Local tribes and ethnic groups are aware that some wild edible mushroom like *Astraeus hygrometricus* erupt suddenly when rain falls on the dry soil especially sandy soil. *Termitomyces heimii*, *Boletus edulis* occurs during ultimate rain. Some mushrooms like *Termitomyces microcarpus* grow on termite nest. Some mushroom like *Volvariella volvacea* grow on degrading grass, bunds of paddy field. Tribal communities describe the mushrooms by various terms like *Bhorunda khukhri*, *Sugga Khukhri* for mushroom that grow on soil. *Tetanus Khukhri*, *Patiyari Khukhri* for mushroom grow near Termite nest. It has been found that, if the period between collection and consumption of wild edible mushroom is more it may lead to maturity of mushroom as gills colour changes so its consumption may be lethal. The tribal community of Ranchi district commonly called mushrooms "KHUKHRI" and use it mainly as food and medicine.

Ethnic tribal people have been using wild edible mushroom since ancient time, tribal man who had the knowledge of using mushrooms for food medicine and other uses passes their knowledge to the next generation. Local ethnic tribes of Ranchi have huge knowledge on wild edible mushrooms and it should be given importance to economically uplift the society.

### Wild edible mushroom species of Ranchi District



**Fig.1 *Termitomyces Microcarpus* (Berk & Broome)**



**Fig.2 *Termitomyces heimii* (Natrajan 1979)**



**Fig . 3 *Termitomyces clypetus***



**Fig.4 *Astraeus hygrometricus* ( Pers.) Morgan**



*Fig.5 Calvatia gigantea* (Batsch ex Pers.) Lloyd



*Fig.6 Termitomyces spp.* (unidentified edible spp. of termitomyces)



**Fig.7 *Pleurotus ostreates*(Jacq.ex.Fr.)P.Kumm**



**Fig.8 *Boletus edulis* Bull**





**Fig.9** *Leucoagaricus leucothites* Wasser (1977)



**Fig.10** *Russla vesca* (fr)

### **Conclusion**

Total of ten species were studied, these mushrooms are wild edible and distributed in the forest and other areas of Ranchi district. Out of ten species, 3 species are distributed over Genus *Termytomyces* of class agaricomycetes. Tribal people of Ranchi have extensive knowledge of wild mushrooms. There is a need to cultivate these varieties for the economically benefit and alternative to plant and animal derived food. Wide range of cultivation is required, same time in order to store these species; some sort of value addition is required. It has been seen that there is a huge market of these species in the rural as well as urban mass. It is also found that the tribal communities have the most knowledge about the nutritional and medicinal value of wild mushrooms. Wild edible mushrooms are widely distributed in Ranchi district and it is important source of nutrient, health, and income generation. There is urgent need to increase uses and consumption of wild edible mushrooms for welfare of state. The uses of wild edible mushroom can help in improvement of livelihood of local people.

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