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Wild macrofungi (Mushrooms) diversity occurrence in the forest of Uttarakhand, India

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Abstract
There have been a some reports of the use of mushrooms for medicinal purposes, which may be due to lack of awareness. Mushrooms are woodland products that have been consumed for a long period as food, but very few have been used for medicinal purposes. In the proper hands, these magical organisms can be extremely beneficial in treating and preventing a wide range of disorders. The present study has been based on the Investigation of different Varieties of wild mushrooms, classified as edible and non-edible, containing some medicinal quality as per local societies of the Uttarakhand region. Uttarakhand is a northwestern Himalayan state which has a rich diversity of wild mushrooms due to good climatic conditions. There is a wide studying scope for mushrooms growing in this area. In the coming years, new novel drugs can be formulated and these novobiotics can act as a lifesaver for the people of the society. The present study is carried out in the monsoon season during the month of August 2019 to January 2020. A total of 18 macrofungi samples were collected, identified, which belong to 16 families from different geographical locations of Himalayan districts of the Uttarakhand region *viz*. Tehri, Rudraprayag Uttarkashi, Dehradun, Chamoli, and Pithoragarh region. The highest number of macrofungi was collected by Russulaceae, Polyporaceae, Amanitaceae, Ganodermataceae, and Agaricaceae families.

Keywords: edible, non-edible, novobiotics, Uttarakhand Himalayan, wild mushrooms

Introduction

The Japanese called mushrooms "The Diamond of the Forest." The beneficial healing therapeutic effect of mushrooms has been mentioned in the manuscript by Ancient Greeks, Egyptians, Chinese, Mexicans, and Romans for example Hippocrates, Pliny the Elder, and Dioscorides [1]. The variety of mushroom species is generally accounted for 0.14 million worldwide, 14,000 are known sp., while 7000 is considered as edible, approx 20,000 species are protected and 700 are reported to have extensive pharmacological properties [2].

Wild macrofungi grow in a natural dwelling like meadows, deadwood log, debris, leaf litter, dung and have wide medicinal properties *viz*., antibacterial, antifungal, antiviral, antiparasitic, antioxidant, anticancer, anti-inflammatory, anti-HIV, antitumor, antidiabetic, cytotoxic, anticoagulant, hepatoprotective, hypocholesterolemic, and antiproliferative [3].

Uttarakhand is a mountainous state in the northwestern Himalayan region of India. There are two divisions which are divided into two different parts which are known as Garhwal Mandal and Kumaon Mandal. This Himalayan state is constituted by 13 districts, 7 districts which includes in the Garhwal division i.e Tehri Garhwal, Uttarkashi, Pauri, Chamoli, Rudraprayag, Dehradun, Haridwar, whereas 6 districts i.e Almora, Bageshwar, Champawat, Pithoragarh, Nainital, Udham Singh Nagar are included in Kumaon division.

It has a total geographical area of 28’43” N to 31’28” N latitude and 77’34” E to 81’03” E longitude zone. The absolute space of the state is 53483 km which is 15.5% of the complete topographical space of western Himalaya and 1.63% of the total land space of India [4]. The total area of the record forest in Uttarakhand is 37999.53 square kilometers which is 71% of the total area of the state (according to Uttarakhand forest statistics). The existance of various tree species like, *Pinus* (common name cheed), *Cedrus* (common name deodar), *Abies* (common name jhilla), *Betula* (common name bhoj Patra), *Rhododendron* (common name burans), *Shorea*

(common name Sal), *Quercus* (common name Banj, oak**)**, *Lyonia* (common name Angyar), *Alnus* (common name kosh, piak), and *Cupressus* (common name devidiar) are found in the forest areas of the state which provides them a favorable environment for the growth of wild mushrooms.

This northwestern Himalayan state receives ample rainfall during the monsoon season mid-June to the end of September which is considered to be sufficient for mushroom growth. The region has a wide range of climatic conditions. Due to such climatic conditions as warm humid Terai belt, Terai bhabar region on one side, and cold desert on the other side i.e. Tibet border, this region has a vast majority of wild macrofungi and many are unexplored. The current probe deals with the discovery, collection, and identification of wild forest mushrooms.

Materials and Methods

Study area

A good number of edible and non-edible mushroom samples were collected from various local woodlands of different districts of Uttarakhand State, it includes Tehri, Uttarkashi, Chamoli, Rudraprayag, Dehradun, and Pithoragarh region (Fig1).

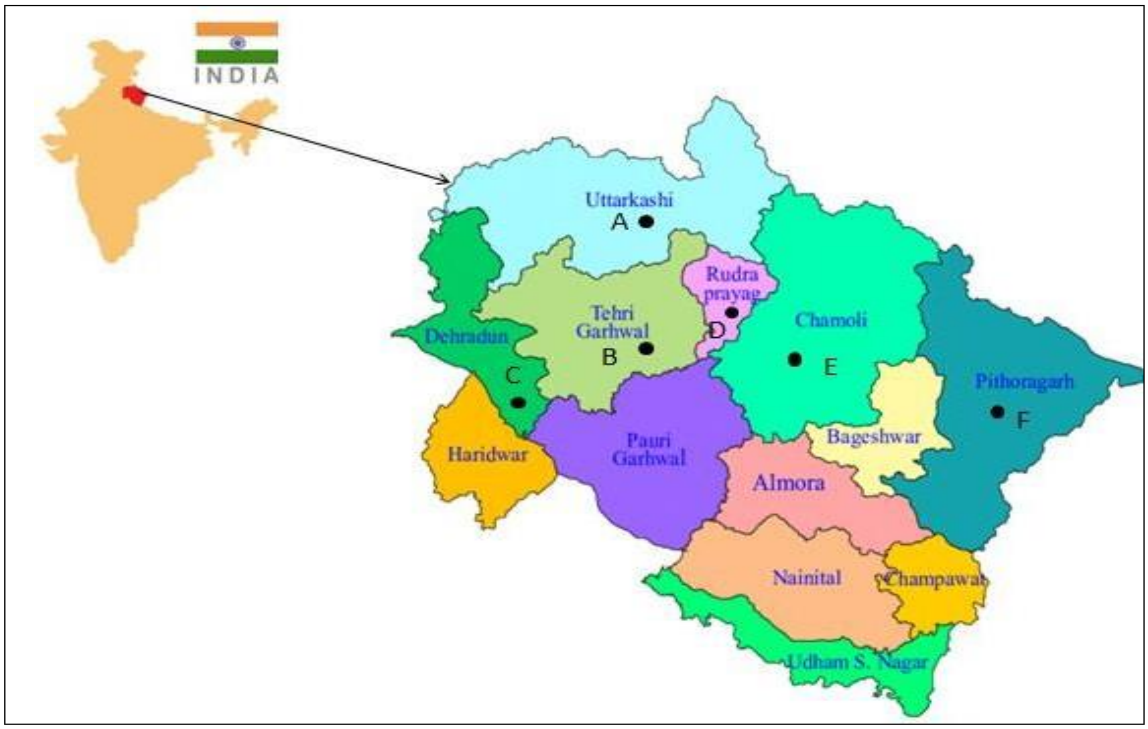


Fig 1: Map of screening sites: (A) Uttarkashi, (B) Tehri Garhwal, (C) Dehradun, (D) Rudraprayag, (E) Chamoli, (F) Pithoragarh.

Macrofungi collection

The survey was conducted in monsoon and wintertime during the years 2019 and 2020. The macrofungi samples were carefully collected during the field survey to avoid damage to the base and other parts of the samples. All standard methods were followed during the sample collection process [4].

Wearing colored clothes before going to the wild environment for sample collection was avoided as such colored clothes attract wild animals. Fabrics that are adapted to environmental conditions such as gray and green camouflage clothing were used.

Various tools such as a sterile hunting knife, digging tools, scissors, pocket notes, pen, first aid box, umbrella, raincoat, and paper bags were used during the collection of samples. Further Locality, habitat, color, odor, and shape of the specimen in their natural condition were also recorded as field notes. Wild fruiting bodies habitat was open field, hardwoods, dead log, grassland, Living tree trunk, and soil. Possible colors that were seen during the field collection were red, yellow, black, white, pink, creamy, brown was keenly observed during the collection procedure.

The sample was collected and kept in separate paper bags to avoid mixing. The date of collection, place of collection, name of the collector was appropriately mentioned in the paper bags. Polythene bags were not used for storing the collected samples, it was always avoided because they spoil the mushroom sample.

Photographs of fresh specimens were taken in the field as well as under laboratory conditions with the mobile phone (HONOR 7X) and (REDMI NOTE 5 PRO MI DUAL CAMERA). some specimens were sundried and some are dried by the commercial dryer(NOVA, NV-617B) [5]. whereas some dried by a hot air oven at 45–55°C for 48hr and preserved in paper bags for future studies. The leathery texture of the mushrooms has been preserved in the presence of 4% (v/v) formaldehyde solution whereas the soft texture mushrooms have been

preserved in 2% formaldehyde solution for future studies. A few characters might be changed after preservation and from time to time it was keenly noticed and mentioned.

Identification

The specimen was preliminarily segregated through interviews and discussion with local villagers who had long been using wild edible mushrooms as food. Critical observations of the specimens and a review of relevant literature were used to make the identification (Singha *et al.*, 2020; Khadka and Aryal, 2021; Adhikari, 2000; Vishwakarma *et al.*, 2011; Bhatt *et al.*, 2018; Joshi *et al.*, 2013; Semwal *et al.*, 2014; Bhatt *et al.*, 2016; Debnath *et al*., 2020; Tibpromma *et al.*, 2017; Semwal and Bhatt, 2019; Ruán-Soto *et al.*, 2006; Kalita *et a*l., 2016; Singh *et al.*,2017) [6-9, 4, 10-14, 5, 16-18]. The identification was also done through the available field guide of macrofungi and online identification web resources http://www.mycokey.com/ newMycoKeySite/MycoKeyIdentQuick.htm, MykoWeb, www.mushrooms. The final identification and investigation were done on the basis of macro-morphological. All the identified specimens were further deposited microbiology Department, SGRRU Patel Nagar Dehradun Uttarakhand, India for further study.

Results and Discussion

A total of 18 macrofungi samples were collected, investigated, and identified which belong to the 15 families. All the mushrooms species were collected from open fields, hardwoods, conifers, leaf litter, dead logs, etc. from the Uttarakhand region, the sample collection was done in mid-July and September during the sufficient rainfall in the meantime (Fig 2).

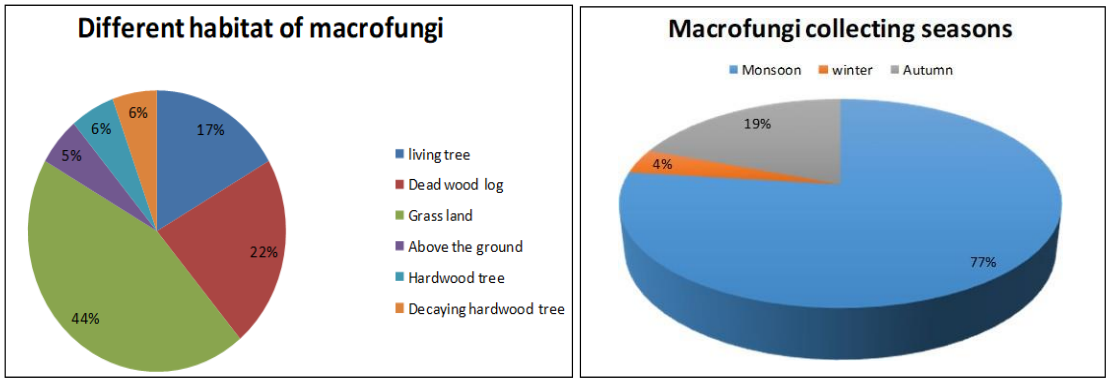


Fig 2: Habitat and appropriate season for collection of Mycofungi in Uttarakhand forest

Most of the macrofungi were collected during the monsoon season due to enough moisture and appropriate temperature in the atmosphere. Some macrofungi require little rainfall and can grow throughout the year such as the polyporous mushrooms. These macrofungi species also perform an important role in maintaining the forest ecosphere and biodiversity. In the present study, 18 species belonging to 15 families were identified, eleven species were collected from Tehri Garhwal, two species from Chamoli, two species from Uttarkashi, one species from Rudraprayag, one species from Pithoragarh, and one species from Dehradun Uttarakhand region.

Description of collected macrofungi

***Phellinus Pectinatus* (kiotzsch) Quel.**

Family: Hymenochaetaceae

Description: Basidiocarps perennial, Imbricate, Pileate, Ligneous, Often imbricate with sundry pilei from a not unusual base, up to 20cm huge, 14 cm extensive and 3-4cm voluminous nigh the bottom, woody tough and heavy whilst dry. The top surface is compressed when fresh, yellowish-brown color and a black surface protruded from the base. Fine sulcate with thin black layer, Margins completely exhausted. Pore surface golden to dark brown, round to Pointed, Pore tube 6mm long, Yellowish, Pore are tiny Hymenial base light yellow. Context 3mm thick, Hard, Brown to yellowish. Oder/ taste no distinctive.

Habitat: Found on the living tree of *Armenian Plum* (Local name – Khumani) Chir forest

Location of specimen examined: Chinyalisour, Uttarkashi, Uttarakhand, India

Collection Number: GK1462MF

Collected: 10 November 2019.

Elevation range: Around 909 meter, Latitude: 30°34′29′N, Longitude: 78°20′18′E

Edibility: Non edible

***Fomes fomentarius* (L.)**

Family: Polyporaceae

Description: Basidocarps perdurable, Woody, Hard, Usually on the trunk of a dead tree. Pileus 3-14cm wide, 5-15cm long, 4- 13cm thick, Its shape resembles the hoof of a horse, Surface Hard scab, Thick greasy, Oleaginous, It is visible in different colors of gray, not easy to crack. Margin brown in color, Context soft, 2-20mm thick, gray to brown. Tubes split up into layers, Deep of each layer up to 5mm, Surface of pore brown, spherical, globular, thicker than the edges. Oder/ taste no distinctive.

Habitat: Found on Deadwood log (Chir forest)

Location of specimen examined: Bayadgoan, Tehri Garhwal, Uttarakhand, India

Collection Number: GK345MF

Collected: 15 November 2019

Elevation range: Around 2490 meter, Latitude: 30°32′13′N, Longitude: 78°19′13′E

Edibility: Non edible

***Amanita Ceciliae* (Berk. & Broome) Bas**
Family: Amanitaceae

Description: Fruiting body medium to large, cap 5-10cm wide, the cap has charcoal-grey patches, convex to plano-convex, umbonate dark brown in the center, smooth, dry, shiny, It is slightly tapered to the top. Has irregular cottony bands girding the base. Gills creamy white to grayish, short, smooth, crowed. Stem grey to light brown, tight or hard, no ring was seen in the stem, ranges 1-2cm dia., the stem is not swollen from the base. Spores white, spherical in shape. Oder/ taste no distinctive.

Habitat: Found on green grassland (Chir forest)

Location of specimen examined: Binakkhal, Tehri Garhwal, Uttarakhand, India

Collection Number: GK4086MF

Collected: 6 August 2019

Elevation range: Around 1975 meter, Latitude: 30°34′02′N, Longitude: 78°39′35′E

Edibility: Non edible

***Amanita Fritillaria* (Berk) Sacc.**
Family: Amanitaceae
Description: Pileus small to medium-sized, sometimes large, a cap is 4-8cm wide, convex to Plano-convex, flabbily facing downwards at the disc, gray to brownish, small brown floccose patches present, cap margin smooth.
Gills white, free, close, congestive, covered with decorated fibrils. Stem 6-12cm long, 1-5cm wide, gray to orange b, the basal bulb is 1-2cm wide, the ring is membranous, white. Upper part sheeted with blackish-brown to gray, fluffy remnants. Oder/ taste no distinctive.

Habitat: Found in a green grassland (Chir forest)

Location of specimen examined: Mayali, Rudraprayag, Uttarakhand, India

Collection Number: GK1144MF

Collected: 7 August 2019

Elevation range: Around 1339 meter, Latitude: 30°22′43′N, Longitude: 78°53′38′E

Edibility: Non edible

***Ganoderma lucidum (*Fr.) Karst**
Family: Ganodermataceae

Description: Pileus 3- 25cm broad, kidney-shaped, lengthed, thick, hard, red to dark reddish-brown or chocolate brown or brownish crimson color. Stem small, short or rudimentary, usually narrow towards the base of the stem and reddish-brown color. tube up to 2.5cm deep, tubes first white then become ochraceous, small circular pores perceptible to the naked eye, when these pores are young they are white and they turn brown with age or on bruising. Oder/ taste no distinctive. spore deposit reddish to brown in color.

Habitat: Found in a Decaying hardwood tree (Chir forest)

Location of specimen examined: Kwanli, Tehri Garhwal, Uttarakhand, India,

Collection Number: GK1089MF,

Collected: 29 September 2019.

Elevation range: Around 1524 meter, Latitude: 30°37′14′N, Longitude: 78°61′25E

Edibility: Edible

***Russula Pseudolepida* Singer.**
Family: Russulaceae

Description: Pileus 5-10cm diam., convex to plano convex, center is depressed, derm is voluminous, dry, apple red to pink-red, blackish to brownish in the center. Gills creamy to white, horde. Lamellae are thick, delicate, uniform in length. Stem 5-10cm long, 1.5- 3.5cm broad, slightly thinner towards the base, longitudinally slightly wrinkled, white, hard to teeming, sometimes pinkish or red. Spore print creamy white. Oder/ taste no distinctive. This species is similar to the *russula emetic* and *russula pseudointegra.*

Habitat: Found in a green grassland (Chir forest)

Location of specimen examined: Chinyalisour, Uttarkashi, Uttarakhand, India

Collection Number: GK8843MF,

Collected: 18 August 2019.

Elevation range: Around 909 meter, Latitude: 30°34′29′N, Longitude: 78°20′18′E

Edibility: Non edible

***Russula adusta* (Pers.) Fr.**
Family: Russulaceae

Description: Pileus 15-20 diam., convex to Plano-convex, surface depressed in the center, dry, shiny, gray from the edges and black in middle, looks like cracks in the center, the appearance of black patches over gray color. Lamellae are delicate, thick, adnate, white to creamy. Stem 1-2cm wide, 6-8cm high, leathery, hard, claviform, robust, cylindrical, white to gray. Spore print white. Oder/ taste no distinctive.

Habitat: Found in wet soil in green meadows. (Oak Forests)

Location of specimen examined: Binakkhal, Tehri Garhwal, Uttarakhand**,** India

Collection Number: GK7085MF,

Collected: 30 August 2019.

Elevation range: Around 1975 meter, Latitude: 30°34′02′N, Longitude: 78°39′35′E

Edibility: Non edible

***Cantharellus cibarius* Fr.**
Family: Cantharellaceae

Description: Fruiting body moderate to large, Pileus 3-9cm diameter, convex, funnel-shaped, shallowly depressed, yellow to deep egg- yolk yellow, moist, incurved, glabrous, margin irregular, decurrent and thick. Hymenium has lines gills- like which run almost downwards, which basically bends down the cap. Stem 3cm long, 1-2cm thick, solid, pale yellow, colorful with the cap, Slightly downwards, and lighter tapering at the downwards, the stem is often curved and sometimes joined together near the base. Spore print yellow to creamy white. Odor like apricot, pleasant, fruity. Test slightly peppery.

Habitat: Found in a Green grassland (Chir forest).

Location of specimen examined: Binakkhal, Tehri Garhwal, Uttarakhand, India

Collection Number: GK7473MF

Collected: 3 July 2019.

Elevation range: Around 1975 meter, Latitude: 30°34′02″N, Longitude: 78°39′35″E

Edibility: Edible

***Ophiocordyceps sinensis* (Berk.) G.H. Sung, J.M. Sung, Hywel-Jones & Spatafora**
Family: Ophiocordycipitaceae

Description: common name keeda jari, Caterpillar fungus, Fruiting body 3-5cm long, yellow to dark brown, claviform, solid, oblique, granular, overhead portion is fertile. Stem glabrous, cylindrical, grooves, longitudinally bounded or pendent. Head little swollen, skew, and slightly separated from the stem. a dead worm is attached to the larva under the soil. Spore not found. Oder/ taste no distinctive.

Habitat: Grassland, Growing over the dead larva scattered from the solitude. (alpine pasturelands)

Location of specimen examined: Bhyundar valley, Chamoli, Uttarakhand, India

Collection Number: GK1126MF

Collected: 10 July 2019.

Elevation range: Around 3353 meter, Latitude: 30°43′44″N, Longitude: 79°36′22″E

Edibility: Edible

***Trametes Versicolor* (L.) Pilat**
Family: Polyporaceae

Description: common name turkey tail, Basidiomata sessile or Plicated. Pilus 4-8cm wide, 5-10cm long, 0.6cm thick, hemisphere, surface tough, dry, imbricate, connected with each other bracket, velvet, very alterable in color, a concentric realm in different shades of brown-reddish to bluish-grey. Context yellowish to creamy white, tough or unpalatable, up to 0.5cm thick. Tubes up to 2-3mm deep. Pore surface white to polygonal creamy or grey colored, pore spherical to angular, leathery, stationary on bruising. White spore deposit, smooth. Oder/ taste no distinctive.

Habitat: Found in a Living tree trunk (deodar forest).

Location of specimen examined: Cloud End, Dehradun, Uttarakhand, India

Collection Number: GK8551MF

Collected: 4 January 2020.

Elevation range: Around 2005 meter, Latitude: 30°27′58″N, Longitude: 78°00′31″E

Edibility: Edible (but due to its rigid texture, it cannot be used directly in food

***Trametes cinnabarina* (Jacq.) P. Karst**
Family: Polyporaceae

Description: Basidocarps sessile, up to2- 6cm wide, 12-14cm long, 1-2cm thick, leathery, Pileus is short or elongated. Surface rough or stiff, corky, convex, bright orange to red, fading pale orange, oleaginous or glossy, dry. Lower surface bright red to orange. Pores small, rounded to angular and thick at the edges, cinnabar bright red. Tube 2-4mm deep. White spore deposit, spore cylindrical, or sausage. Oder/ taste no distinctive.

Habitat: Found in a Deadwood log (Chir forest)

Location of specimen examined: Gaurihat, Pithoragarh, Uttarakhand, India

Collection Number: GK2043MF

Collected: 10 October 2019.

Elevation range: Around 1627 meter, Latitude: 29°34′15′N, Longitude: 80°22′58E

Edibility: Non-edible

***Gloeophyllum sepiarium* (Fr.) P.Karst.**
Family: Gloeophyllaceae

Description: Basidiomata perennial, 1-6cm wide, 2-7cm long, 0.6-1.0cm thick, frequently expanded or flattened, infrequently imbricate, sometimes rose-shaped jewel or salver shaped. Surface yellowish to brown, zones are usually found in a variety of colors, often wrinkle or withered. Context 1-6cm thick, hard to stiff, bright brown looking like rust. Lamellae 15-22cm on the margin side, 6mm deep, brownish, hard, and leathery.

Habitat: Found in a Deadwood log (Chir forest)

Location of specimen examined: Binakkhal, Tehri Garhwal, Uttarakhand, India

Collection Number: GK2678MF

Collected: 6 September 2019.

Elevation range: Around 1975 meter, Latitude: 30°34′02′N, Longitude: 78°39′35′E

Edibility: Non-edible

***Tremella fuciformis* Berk.**
Family: Tremellaceae

Description: common name white brain, jelly mushroom. Fruiting body 11cm across×3cm high, Diaphanous white, viscous-jelly like, gelatinous, the body is a very complex or irregular lobed-like brain-shaped, thin, surface, glossy, smooth, Context glutinous, creamy to white and transparent. Stem none, directly connected to the substrate. Spore deposit not detected. Oder/taste no distinctive.

Habitat: Living tree branch (oak tree, oak forest)

Location of specimen examined: Binakkhal, Tehri Garhwal, Uttarakhand, India

Collection Number: GK4212MF

Collected: 6 September 2019.

Elevation range: Around 1975 meter, Latitude: 30°34′02′N, Longitude: 78°39′35′E

Edibility: Edible

***Schizophyllum commune* Fr. Observ. mycol. (Havniae)**
Family: Schizophyllaceae

Description: Pileus 1-4cm wide and 0.2 to 1cm thick, convex to a plane, fan-shaped, white to gray, the cap was covered with a dense hairy-like structure, fibrils, linked to the base with other brackets. Gills white to grey or pink, splendent, radial, parochial, distant, longitudinal subtly divided to patronize generative surface in arid

conditions. Stem the stem is very short, often it is not visible above the surface of the substrate, white spore deposit, Oder/taste no distinctive.

Habitat: Found in a Deadwood log (Chir forest)

Location of specimen examined: Kwanli, Tehri Garhwal, Uttarakhand, India.

Collection Number: GK9817MF

Collected: 8 September 2019.

Elevation range: Around 1524 meter, Latitude: 30°37′14″N, Longitude: 78°61′25E

Edibility: Edible

***Laccaria laccata* (Scop. ex Fr.) Cooke**
Family: Hydnangiaceae

Description: Pileus 1-4cm cross, small to medium, convex to Plano-convex, occasionally uplifted and wavy from the margin, usually with depression of the central part and oleaginous margin, brown to reddish or orange. Stipe 2-3cm long, up to 1.4cm thick, smooth, usually compressed or bent, equal to or thinner than the base, same color as the cap. Gills reddish to brown, distant, connected, and closed with the stem. Spore print white to yellowish. Oder/taste no distinctive.

Habitat: Found in a green grassland (Chir forest)

Location of specimen examined: Binakkhal, Tehri Garhwal, Uttarakhand, India.

Collection Number: GK9942MF

Collected: 30 August 2019.

Elevation range: Around 1975 meter, Latitude: 30°34′02″N, Longitude: 78°39′35′E

Edibility: Edible

***Chlorophyllum molybdites* (Meyer ex Fr.) Mass. Kew Bull.**
Family: Agaricaceae
Description: Basidocarp large, Pileus 10 - 30cm wide, convex to plano-convex, smooth, soft or fleshy, elliptical, dry, white surface with brown to red patches in the center. Gills are white to gray or greenish, close, free and expanded, soft, crowded, they become red in color when they get bruised or cut in the gills. Stem 10 – 20cm long, 1-2cm thick at pinhead, extension from the base, white, smooth, fragile, dry, cylindrical, stuffed, annulus preferable, moveable, double-edged, when the stem is cut the oxidation reaction causes a color change that starts from yellow or orange to brown color. Spore print white to grey or creamy white.

Habitat: Found in a green grassland (Chir forest)

Location of specimen examined: Kwanli, Tehri Garhwal, Uttarakhand, India

Collection Number: GK6819MF,

Collected: 3 August 2021.

Elevation range: Around 1524 meter, Latitude: 30°37′14″N, Longitude: 78°61′25E

Edibility: Non-edible

***Morchella esculenta* (L.) Pers.**
Family: Morchellaceae

Description: Fruiting body 4-6cm long, 2-4cm wide, miniature to moderate, conical, yellowish with black lining, outer surface with irregular pits and cut. The ribs along the middle ridges of the pit are usually slightly lighter than the inner side of the pit. Stem 4-6cm long, 1-2cm Wide, white to pale yellow, hollow, wrinkled, slightly extended from the base with an apparent depression. Oder/taste no distinctive.

Habitat: Found in a sandy pebble stone soil above the ground (Sub-alpine forests)

Location of specimen examined: Valley of flowers, Chamoli Uttarakhand, India

Collection Number: GK0817MF

Collected: 12 July 2019.

Elevation range: Around 3352Meter, Latitude: 30°43′41′N, Longitude: 79°36′20′E

Edibility: Edible

***Pleurotus ostreatus* (Jacq.) P. Kumm.**
Family: Pleurotaceae

Description: Fruiting body medium to large, pileus 10- 15cm broad, convex to Plano-convex, white to creamy or light grayish, smooth, depressed from the center with wavy margins. Gills white, close, inferior or decurrent, eccentric or lateral. Stem smooth, short, sometimes stemless, white or creamy, white hairs towards the base. Spore print white. Oder fennel and taste delicious.

Habitat: Found in a hardwood tree (Chir forest)

Location of specimens examined: Binakkhal, Tehri Garhwal, Uttarakhand, India

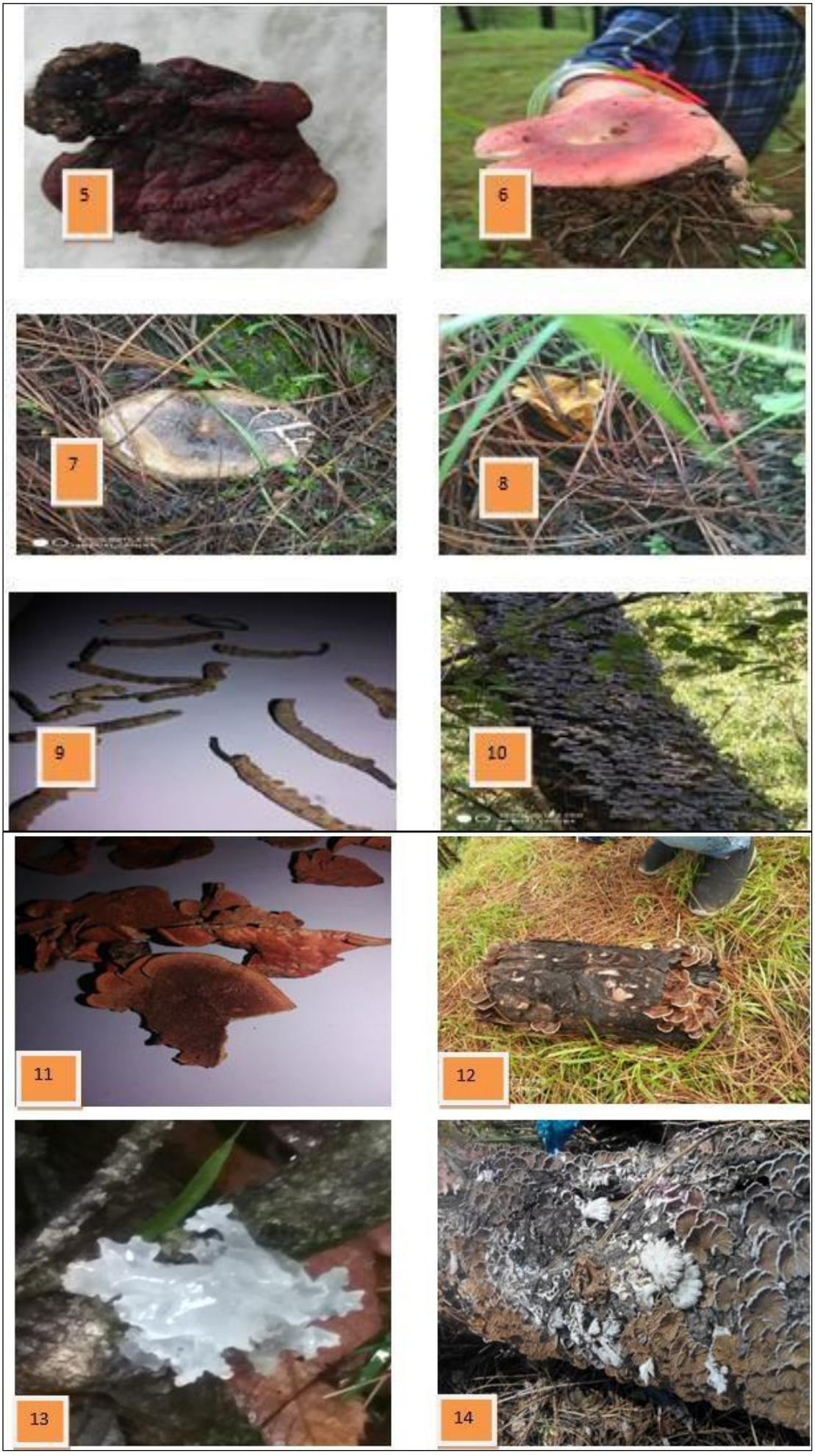
Collection Number: GK1120MF

Collected: 7 August 2019.

Elevation range: Around 1975 meter, Latitude: 30°34′02′N, Longitude**:** 78°39′35′E

Edibility: Edible

Photographs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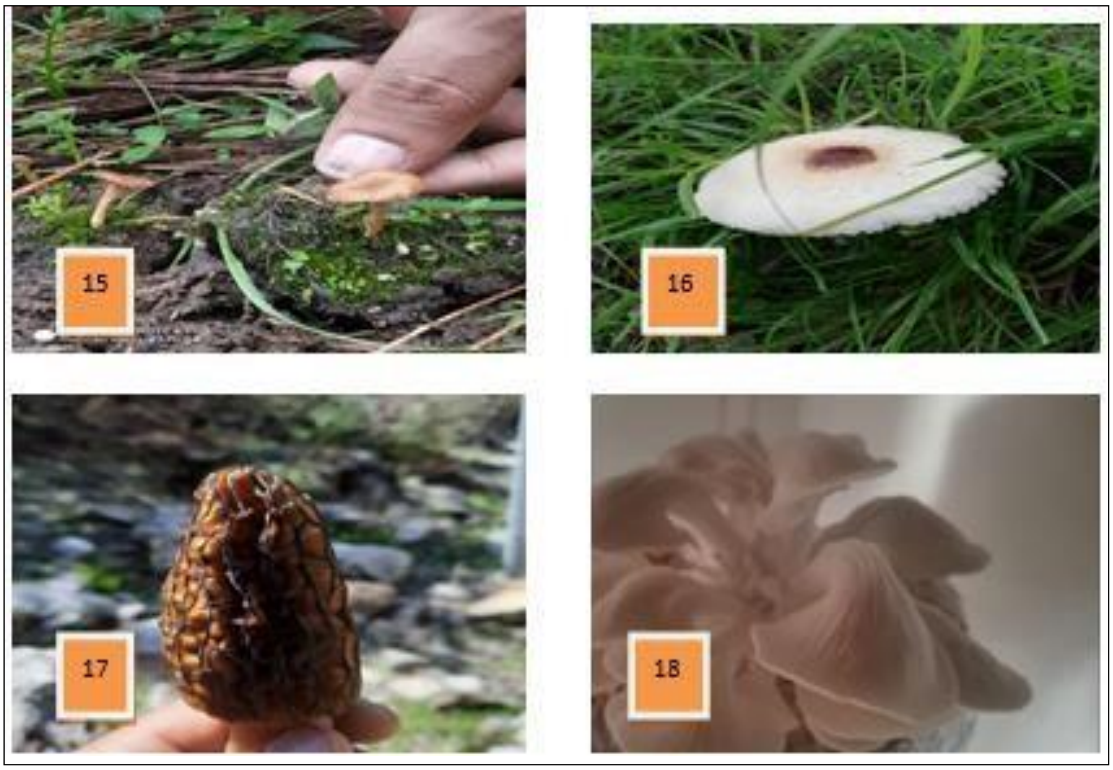

Fig 3

Legends

Wild macrofungi occurrence in Uttarakhand state. (1) *Phellinus pectinatus* (klotzsch) Quel, (2) *Fomes fomentarius* (L.) Fr., (3) *Amanita ceciliae,* (4) *Amanita Fritillaria,* (5) *Genoderma lucidum* (6) *Russula Pseudolepida,* (7) *Russula adusta,* (8) *Cantharellus cibarius,* (9) *Ophiocordyceps sinensis,* (10) *Trametes Versicolor,* (11) *Trametes cinnabarina,* (12) *Gloeophyllum sepiarium,* (13) *Tremella fuciformis,* (14) *Schizophyllum commune,* (15) *Laccaria laccata,* (16) *Chlorophyllum molybdites,* (17) *Morchella esculenta,* (18) *Pleurotus ostreatus.*

Coclusion

Previously the diversity of macrofungi in different areas of Uttarakhand state was studied from time to time by several researchers like Semwal *et al.*, 2014; Bhatt *et al,*. 2016; Semwal and Bhatt, 2019; Bhatt *et al.*, 2018; Vishwakarma and Bhatt, 2013. and their medicinal edible and non-edible properties were mentioned earlier.

Due to the presence of various bioactive compounds in wild mushrooms like steroids, flavonoids, polyketides, and alkaloids, It could be a great pave to discover new pharmaceutical drugs such as antibiotics and other medicinal drugs and can also be taken as edibles. For this usefulness, there is a urgent need for the conservation of forest mushrooms on a permanent basis. So that in future good research can be done on them and good results can come out. In this paper in continuation of previous studies reveals the recent diversity of wild mushroom in Uttarakhand region of Himalayan.

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