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WILD EDIBLE MUSHROOM OF UTTAR DINAJPUR, WEST BENGAL, INDIA: POTENTIAL SOURCES OF FOOD AND PHARMACEUTICALS

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ABSTRACT :

Wild edible mushroom (WEM) is known for its nutritious as well as pharmaceutical values all over the world. WEM have become one of the most alternative foods especially in the rural area where people are depending on agriculture and face the problem of malnutrition due to limited source of nutritious food. The present work intend to explore the diversity of WEMs and how it can be an alternative way for food security and food scarcity of nutritious healthy food for rural peoples of Uttar Dinajpur, West Bengal. About 33 different food and pharmaceutical important wild edible mushrooms were collected and identified during the peak mushroom growing season in the district of Uttar Dinajpur, West Bengal from May to September (2014-16). Traditional indigenous knowledge is used for distinguishing between edible and non-edible varieties of mushroom. The present documentation of WEMs can open door for present day workers for food security and its potential uses as valuable food resource.

KEYWORDS : *WEM ,Potential Sources ,Food And Pharmaceuticals*

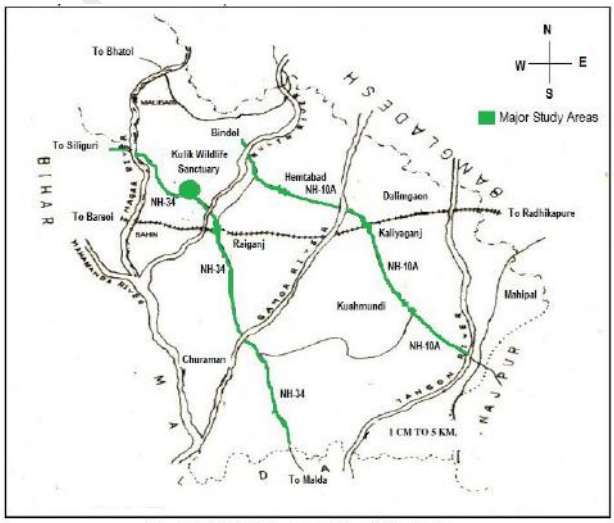
INTRODUCTION

Wild edible mushrooms (WEMs) have been hunted and consumed by tribal peoples for thousands of years. WEMs are important sources of essential amino acids, minerals (Ca, P, Fe, K and Na) and vitamin C, B complex (thiamine, riboflavin, folic acid and niacin), fibers, trace elements and low/no calories and cholesterol (Murugkar & Subbulakshmi, 2005) and secondary metabolites of pharmaceutical importance. Moreover, 2000 species of macro fungi as mushrooms are considered safe for human consumption and about 650 of these possess pharmaceutical properties (Rai *et al.,* 2005). Since ancient time, wild edible macro fungi have been consumed by man (Das, 2010). Macro fungi have been used for thousands of years as folk medicine and are considered to be Neutralceuticals while others can produce potential pharmaceuticals (Ribeiro *et al.,* 2007). From indigenous knowledge of usages, *Trametes versicolor* has been considered among the 25 major medicinal mushrooms worldwide (Boa, 2004) and polysaccharo-peptides purified from this species which show immune-modulatory potential and anti-cancer effects (Cheng & Leung, 2008). Provided that mushroom are considered as hidden sources of versatile secondary bioactive substances such as anti-bacterial, anti-fungal, anti-viral, anti-parasitic, anti-oxidant, anti-inflammatory, anti-proliferative, anti-cancer, anti-tumour, cytotoxic, anti-HIV, hypo-cholesterolemic, anti-diabetic, anti-coagulant, hepato-protective compounds, among others (Wasser & Weis, 1999; Ajith & Janardhanan, 2007). Wild Edible mushroom for its rich biodiversity can be a boon for progress in developing countries like India especially in the field of food, pharmaceuticals and unemployment (Wani *et al*., 2010). World production of edible

mushroom exceeds 3 million tons annually with world market value of U.S $ 10 billion. The countries like Ireland, Belgium, Netherlands and Poland are major exporting countries of fresh edible mushrooms in the world. China is the highest exporter of preserved mushrooms followed by Netherlands and Spain (Harsh & Joshi, 2008). U.S.A, Germany and France are considered to be major consuming countries of prepared and preserved mushrooms. India has a great potential to be an important producer of different macro fungi in the future for its species, climatic and substrate diversity at different zones. Currently, India ranked 54th in the world for producing mushrooms. Now a day mushroom have become increasingly popular as cottage cultivation for foods and pharmaceutical effects on human health due to their antifungal, antibacterial, antioxidant and antiviral properties (Guillamon *et al.,* 2010; Wani *et al*., 2010). Wild edible macro fungi are not well documented in many places of India and remain unexplored or fairly studied. The FAO of the UN has emphasized the adoption of mushrooms as nutritious health food in agriculture based developing countries for its contribution to global food scarcity and food security. Wild edible macro fungi are consumed as food and medicine by the indigenous tribes of Similipal Biosphere Reserve (SBR) of Odisha, India. Around 10 different ethnic groups were reported in this area to be mycophilic (Sachan *et al*. 2013). The macro fungi found in the Similipal Biosphere Reserve are similar to many parts of India which are reported by some authors in the North-Eastern hills of India (Verma *et al.,* 1995; Singh *et al*., 2007; Tanti *et al*., 2011), North Western Himalayas (Atri *et al*., 1997) and Kanyakumari district (Davidson *et al.,* 2012). No works has been done on wild edible macro fungi or mushroom in Uttar Dinajpur, West Bengal. The purpose of the present study was identification and documentation of macro fungal diversity in Uttar Dinajpur, West Bengal and its potential uses as a valuable food resource.

Materials And Methods

During several visit from May to September (2014-16) in different tree plantation areas along two major roads (NH-34 & NH-10A) and Kulik Wild Life Sanctuary (Raiganj Bird Sanctuary) of Uttar Dinajpur, West Bengal (See **Map**), we collected many macro fungal species those were then preserved in an liquid preservative (25:5:70ml of alcohol, formalin and distilled water) following the preservation procedure of Hawksworth *et al*., (1995). A portion of collected materials were dried in a hot air oven. Identification of the macro fungal specimens was done by using standard keys (Arora, 1986; Singer, 1986; Hawksworth, 1974; Jorden, 2000; Pegler and Spooner, 1997; Kuo, 2003; Upadhyay *et al*., 2008). All the specimens were deposited in the museum, Department of Botany, Raiganj University, West Bengal. For collection of the macro fungal specimens various equipments were used such hunting knife, plough, scissor, digging tools, papers, rubber band and camera.



Map of Kulik Wildlife Sanctuary, Raiganj, Uttar Dinajpur

RESULTS AND DISCUSSION

Different wild edible mushroom were collected from different localities of Uttar Dinajpur, West Bengal for their nutritional values and pharmaceutical potential. Some important feature is recorded during field survey such as habit, single/groups, colour of fruiting bodies and spore print. The edible wild macro fungi with pharmaceutical importance collected during this study are *Armillaria ostoyae, Auricularia auricula-judae, Antrodia malicola, Collybia dryophila, Cymatoderma elegans, Ganoderma lucidu, Ganoderma applanatum, Ganoderma australe, Hericium coralloides, Hypholoma marginatum, Inonotus glomeratus, Macrolepiota procera, Marasmius androsaceus, Marasmius armeniacus, Marasmius haematocephalus, Phallus indusiatus, Pleurotus ostreatus, Podoscypha petalodes, Schizophyllum commune, Sparassis crispa, Termitomyces microcarpu, Trametes hirsuta, Trametes versicolor, Pholiota squarrosoides, Volvariella volvacea* given in (**Table-1 & Figure-1**). Out of 80 macro fungal specimen, only 25 specimens were identified up to species level. This preliminary study shows that this area is very rich in wild edible macro fungal diversity. This similar work for occurrence of wild edible macro fungal diversity has been performed by several authors in different places. Singer (1989) reported 1320 species of edible mushroom with 129 genera belong to Agaricales. Sharma and Doshi (1990) reported new hosts of *Pleurotus* species from Rajasthan. Pradeep *et al*., (1998) reported the occurrence of macro fungi from Western Ghats. Thakur *et al*., (2011) reported biodiversity of macro fungi of Chhattisgarh region. Dwivedi *et al.*, (2012) reported biodiversity of macro fungi from Amarkantak biosphere reserve forest of central India. Pushpa and Purushothama (2012) reported macro fungal diversity of Karnataka. The present work highlights the ethno-mycological potential of different wild edible mushroom in the district of Uttar Dinajpur, West Bengal. Further studies need to be carried out thoroughly to assess the ethno-mycological potential of wild macro fungi for searching of biological active secondary compounds for pharmaceutical applications.

Table-1: List of Wild Macro Fungi (WMF) as edible and pharmaceutical importance found in Uttar Dinajpur, West Bengal, India.

Name of the species	Habitat	Colour of Fruiting body	Spore print
Armillaria ostoyae (Rom.)Herink (Family-Physalacriaceae)	Grows in groups on ground	Dull brown to blackish	White
Antrodia malicola (Berk. & M.A. Curtis) Donk; (Family-Fomitopsidaceae)	On decaying trunks	Whitish greyish brown	Whitish.
Armillaria mellea (Vahl) P.Kumm. (Family-Physalacriaceae)	Grows in groups on ground	Yellowish brown	White to cream.
Auricularia auricula-judae (Bull.) Wettst. (Family-Auriculariaceae)	On dead logs and branches of trees	Blackish brown	Whitish
Collybia dryophila(Bull.) P. Kumm (Family-Tricholomataceae)	On fallen branches and leaves in groups	Whitish brown	White to cream.
Ganoderma lucidum (Curtis) Kummer (Family-Ganodermataceae)	On dead and living trunk	Brownish white	Brown
Ganoderma applanatum(S.F.Gray) Pat. (Family-Ganodermataceae)	On dead and living trunk	Brownish black	Brown
Ganoderma australe(Fr.) Pat. (Family-Ganodermataceae)	On dead logs	Blackish brown	Brown
Hericium coralloides (Scop.) Pers (Family-Hericiaceae)	On dead bark of trees	White	Whitish.
Ossicaulis lignatilis(Pets.) Redhead & Ginns (Family-Lyophyllaceae)	On ground in groups	White	white to cream

Hypholoma marginatum J. Schrot (Family-Strophariaceae)	On ground	Whitish yellow	Brown to black
Inonotus glomeratus(Peck) Murrill (Family-Hymenochaetaceae)	On dead logs	Greyish brown	Whitish yellow
Macrolepiota procera (Scop.) Singer (Family-Agaricaceae)	On ground	Dull brown	White to pinkish
Marasmius androsaceus (L.) Fr. (Family-Marasmiaceae)	On fallen branches and leaves in groups	Yellowish brown	White to cream
Marasmius armeniacus Gilliam (Family-Marasmiaceae)	On fallen branches and leaves in groups	Light whitish yellow	White to cream
Marasmius haematocephalus (Mont.) Fr. (Family-Marasmiaceae)	On fallen branches and leaves in groups	Chocolate red	Brown
Phallus indusiatus Vent. (Family-Phallaceae)	On ground	Whitish purple	Olive brown
Pleurotus ostreatus (Jacq. ex Fr.) P.Kumm. (Family-Pleurotaceae)	On dead logs in groups	White	White to cream
Podoscypha petalodes (Berk.)Pat. (Family-Meruliaceae)	On ground	Brownish grey	White
Schizophyllum commune Fries (Family-Schizophyllaceae)	On branches of dead wood and cut timber	Brownish white	White to cream
Sparassis crispa (Wulfen) Fr. (Family-Sparassidaceae)	On dead wood	White	White
Pholiota malicola (Kauffman) A. H. Sm. (Family-Strophariaceae)	On fallen plants parts	Whitish yellow	Brown
Termitomycemicrocarpus (Berk. & Broome) R.Heim (Family-Termitomyceae)	On ground in termite mount soil	Whitish brown	White
Trametes hirsuta (Wulfen) Lloyd (Polyporaceae)	On dead logs	Greenish white	White
Trametes versicolor (L.) Pilat (Family-Polyporaceae)	On dead logs	Greyish brown	White
Pholiota squarrosoides (Peck) Sacc. (Family-Strophariaceae)	On fallen plants parts	Whitish yellow	Brown
Volvariella volvacea (Bul.) Singer (Family-Pluteaceae)	Grows on dead and decaying leaves	Grayish brown	Brownish pink

Figure-1. Some wild macro fungi of edible and pharmaceutical importance at Uttar Dinajpur, West Bengal:

A=Armillaria ostoyae; B= Auricularia auricula-judae; C= Antrodia malicola; D= Collybia dryophila; E= Cymatoderma elegans; F= Ganoderma lucidu; G= Ganoderma applanatum; H= Ganoderma australe; I=Hericium coralloides; J= Hypholoma marginatum; K= Inonotus glomeratus; L= Macrolepiota procera; M=Marasmius androsaceus; N=Marasmius armeniacus; O= Marasmius haematocephalus; P= Phallus indusiatus; Q=Pleurotus ostreatus; R=Podoscypha petalodes; S= Schizophyllum commune;T= Sparassis crispa; U= Termitomyces microcarpu; V=Trametes hirsuta; W=Trametes versicolor; X= Pholiota squarrosoides; Y=Volvariella volvacea

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