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Macrofungi in community managed forest, Rupandehi district, Nepal: An ethnomycological study

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Abstract

This investigation explores the macrofungi with their identification and documentation of indigenous knowledge. The study area occupies 633 hector and lies within a narrow limit of altitude between 225 and 265msl. The collected samples represented 31 species of Basidiomycetes belonging to 7 orders, 17 families and 22 genera. The dried specimens are deposited in the Tribhuvan University Central Department of Botany, Pathology Unit, Kathmandu, Nepal. The area embraces many mycophagous ethnic groups. The mycoelements prevailing in this area need sustainable development.

Kew words: Food value, local-medicines, macrofungal diversity, socio-economy.

Introduction

Fungi are achlorophyllous heterotrophic organisms. They exhibit remarkable diversity in form, ranging from microscopic unicellular as in yeast to large macroscopic bodies as in Ascomycetes and Basidiomycetes. Macrofungi are the macroscopic fruiting bodies, known as mushrooms (Rinaldi & Tyndalo, 1972).

Nepal is considered as the homeland for the mushroom floral diversity (Aryal *et al*., 2012). 817 mushroom species have been identified (Adhikari, 2009; Aryal & Budhathoki, 2013abc; Aryal *et al.*, 2014bc). 228 edible (Christensen *et al*., 2008), 66 poisonous (Pandey, 2008; Adhikari, 2009) and 88 medicinal species (Adhikari, 2009; Aryal & Budhathoki, 2014a) have been reported. The investigation and study on mushrooms of Nepal started since 19th century (Lloyd, 1808), since then several papers have been published and several botanical investigations have been done. Among these, very few reveal the studies and investigation on macrofungi from western Nepal. This area has not been previously investigated so far.

The study sites are rich in mushroom diversity and offer immense scope for ethnomycological studies. In spite of the fast modernization process, the local communities of this area still hold their traditional faith and depend on indigenous species for their various domestic needs and traditional medicines. The useful wild mushrooms and their ethno-information are being eroded as a result of degradation of appropriate habitat of the species, unsustainable land use activities and over-exploitation of natural resources.

Study area

The study area (Figure 1) is the southern belt of west Nepal and lies in Lumbini zone, Rupandehi district, Parroha VDC., W.N. 1,3,4,8 and 9. The total human population of the study area was 10146 (DDC, 2007.) with 2579 households (DFO, 2012). The vegetation in forest is dominated by members of the Dipterocarpaceae, Combretaceae and Leguminosae. Area of

VDC is 48,960 hector of which 6,873.6 hectare is covered by forest. This study area included 633 hector of forest, consists of sandy loam to loamy soil (DDC, 2007; DFO, 2012) and lies between 27.62851º-27.69856º N latitude and 83.29716º-83.36736^0 E longitude. The altitudinal range varies from 225-265m asl and average annual rain fall is 1391mm (GoN, 2010).

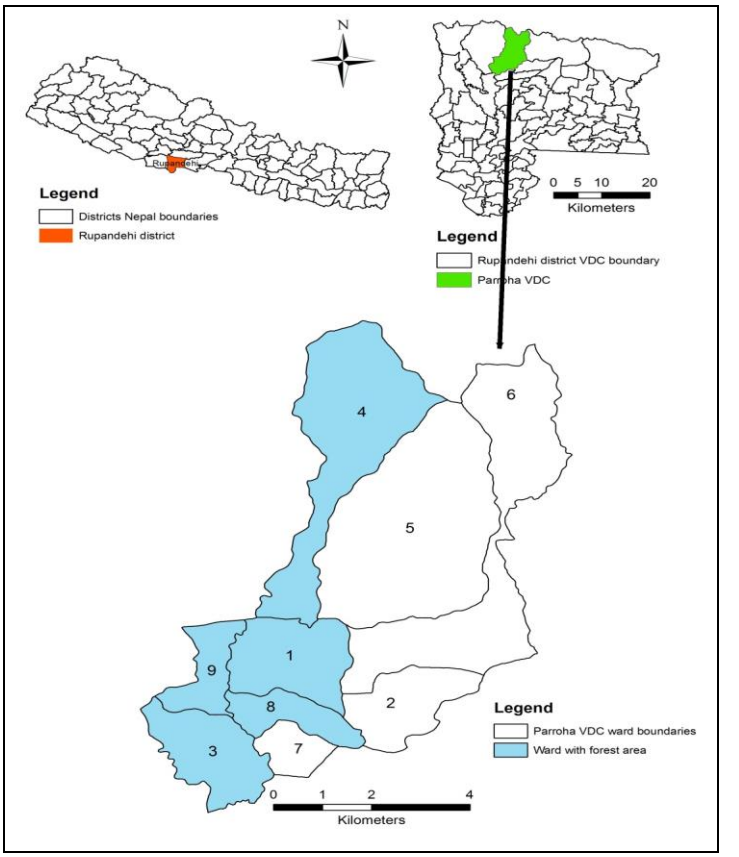

Figure 1. Sample collection sites.

Materials and Methods

Mushroom samples collection and interview with local informants were performed. Indigenous knowledge survey was done from 15th to 31st May and specimens were collected from 1st June to 31st Oct in 2011 and 2012. They will be randomly chosen by Random Block deign method (RBD) (Elliott, 1971). The Participatory Rural Appraisal (PRA) technique (Frendenberger, 2011) was done with local people aimed at getting information largely on nutritional aspects. Data was obtained by combined semi-structured questionnaire, participatory discussions and field observations.

Mushroom samples were photographed in their natural habitat and their morphological characters were noted. The samples were well dried and packed in wax paper bags with proper tag numbers. The habitat including ecological parameters *viz.* altitude, vegetation composition, soil type, soil pH, soil moisture, humidity, and temperature were recorded. The frequency class was calculated by the formula: $\frac{\text{No. of Plots in which species 'x' occurs}}{\text{Total no. of plot}} \times 100$

The paper bags were brought to Central Department of Botany, Tribhuvan University, for further microscopic examination. The identification was done with the help of relevant literatures (Bakshi, 1971; Dickinson & Lucas, 1979; Singer, 1986; Kumar *et al.*, 1990) and on line data base such as: Biodiversity Library.org; Index Fungorum; Mycobank.org; tropicos.org).

Results

In the survey 31 species of Basidiomycetes from 7 orders belonging to 17 families and 22 genera were recorded with their brief descriptions.

Table 1. Wild mushroom species collected from Parroha community managed forest, Rupandehi District, Nepal

SN	Scientific name	Order Family	Local name	Host/Substratum	Ecology	Application
1	*Amanita caesarea* (Scop.) Pers.	Agaricales Amanitaceae	Suntale Chyau	Soil	Mycorrhizae	Used as vegetable
2	*Amanita chepangiana* Tulloss & Bhandary	Agaricales Plutaceae	Salleu, Kukhura phule chyau	Soil	Mycorrhizae	Used as vegetable
3	*Amanita pantharina* (D C.) Kromb	Agaricales Amanitaceae	Bhut chyau	Soil	Mycorrhizae	Deadly poisonous
4	*Agaricus augustus* Fr.	Agaricales Agaricaceae	Kaile Chyau	Soil	Saprophyte	Used as vegetable
5	*Agaricus sylvicola* (Vittad.) Peck	Agaricales Plutaceae	Sal chyau	Soil	Saprophyte	not edible
6	*Armellaria mella* (Vahl.:Fr.) Kummer	Agaricales Marasmiaceae	Todke chyau, Kale chyau (shyamo)	On decay log from crevices in moist shady place	Parasite	Edible, vegetable
7	*Auricularia auricular-judae* (Bull.) Quel.	Auriculariales auriculariaceae	Kane chyau	Log(*Shorea robusta*)	Saprophyte	Edible, used to prepared soup
8	*Bovista nigricans* Pers.	Agaricales Lycoperdaceae	Vakunde Chyau	Open grassland on soil	Saprophyte	Inedible
9	*Coltricia cinmmonea* (Pers.) Murrill	Hymenochaetales Hymenochaetaceae	Mayur pankhen Chyau	On leaf mould soil	Saprophyte	Inedible
10	*Conocybe broneola* Kuhn. ex Kuhn. & Watl.	Agaricales Bolbitiaceae	Tikka Chyau	On tree trunks stumps	Saprophyte	Inedible
11	*Cpprinus Comatus* (O.F. Miill.)Pers	Agaricales Coprinaceae	Gobre Chyau	Soil	Saprophyte	Edible at young, dried powder with rice/milk induced sleep to child
12	*Coprinus plicatilis (Curtis)* Fr.	Agaricales Coprinaceae	Payeje Chyau	On log (*Acacea catechu)*	Saprophyte	Poisonous
13	*Dacryopinax spathularia* (Schwein.) G.W. Martin	Tramelles Decrymycetaceae	Putali Chyau	rotten wood (*Shorea robusta*)	Saprophyte	not edible
14	*Ganoderma lucidium* P. Karst.	Polyporales Ganodermataceae	Dadhu chyau	Trunk(*Bombax ceiba)*	Parasite	Medicinal, remove evil spirit, in decoration.
15	*Laetiporus sulphureus* Murrill	Polyporales Polyporaceae	Kath-phule chyau	tree on forest (*Tectona grandis)*	Parasite	Young edible, used for culinary purpose.
16	*Leucopaxillus giganteus* Boursier	Agaricales Tricholomataceae	Soli Chyau	open grassland	Saprophyte	Edible, but not popularly used.
17	*Macrolepiota fuliginosa* (Barla) Bon.	Agaricales Agaricaceae	Gobbre chyau	soil	Saprophyte	used as vegetable.
18	*Macrolepiota rhacodes* (Vittad.) Sing	Agaricales Agaricaceae	Gobbre chyau	soil	Saprophyte	Edible, used as vegetable.
19	*Marasmius oreade* (Bolt.) Fr.	Agaricales Marasmiaceae	Kanike Chyau	soil	Saprophyte	Edible but not popularly used.
20	*Psathyrella candolleana* (Fr.) Quel.	Agaricales Coprinaceae	Kirkounle Chyau	Log (*Dalbergia latifoliya*)	Saprophyte	Inedible.
21	*Pycnoporus cinnabarinus* (Jacq.) P. Karst.	Polyporales Polyporaceae	Sindure chyau	Stump (*Syzygium cumini)*	Saprophyte	Medicine, for relief ear pain, Mumps

22	*Russula emetica* (Schaeff.) Pers.	Russulales Russulaceae	Ratteyou	litter	Mycorrhizae	Poisonous Medicine that cause vomiting,
23	*Russula foetens* Pers.	Russulales Russulaceae	Gandhe chyau	Soil	Mycorrhizae	Poisonous
24	*Russula nigricans* Fr.	Russulales Russulaceae	Handi chyau	Soil	Mycorrhizae	Edible, pickle
25	*Schizophyllum commune* Fr.: Fr.	Agaricales Schizophyllaceae	Pankha chyau	decayed wood: *Shorea robusta*	Saprophyte	Edible, Religious, cultural Culinary
26	*Scleroderma bovista* Fr.	Bolatales Sclerodermataceae	Alu chyau	Soil	Mycorrhizae	vegetable Edible/Medicinal
27	*Scleroderma citrinum* Pers.	Bolatales Sclerodermataceae	Dalle chyau	Soil	Mycorrhizae	Inedible/Medicinal; causes gastric or acute indigestion.
28	*Sparasis crispa* (Wulfen.) Fr.	Polyporales sparadiaceae	Cauli chyau	Log (*Tectona grandis)*	Parasite	Edible, used as soup.
29	*Termitomyces clypeatus* R. Heim.	Agaricales Tricholomataceae	Dhamere chyau	Termites nest	Obligate sumbiont	Edible, Medicinal, Feaver. Miseales
30	*Termitomyces eurrhizus* (Berk.) Heim.	Agaricales Tricholomataceae	Dhamere chyau	Termites nest	Obligate sumbiont	Edible, Medicinal, Fever, Miseales, used mixed with herbs as a lotion in skin diseases
31	*Volvorella volvecea* (Bull.:Fr.) Sing.	Agaricales Plutaceae	Kathemuse chyau	On wood (*Adena cardifolia*)	Saprophyte	Edible. Excellent. Used as vegetable

(Col. No. = Sample collection Number)

A notable frequency of *Amanita caesarea, A. chepangiana, A. pantherina, Agaricus augustus, A. sylvicola, Coprinus comatus, C. plicatilis, Macrolepiota fuliginosa, M. rhacodes, Russula emetica, R. foetens, R. nigricans, Scleroderma bovista, S. citrinum, Termitomyces clypeatus,* and *T. eurhizeus,* were observed. Out of the total collection 61% mushrooms fall under Agaricales followed by, Polyporales, Russulales, Boletales, Auriculariales, Hymenochaetales and Tremellales.

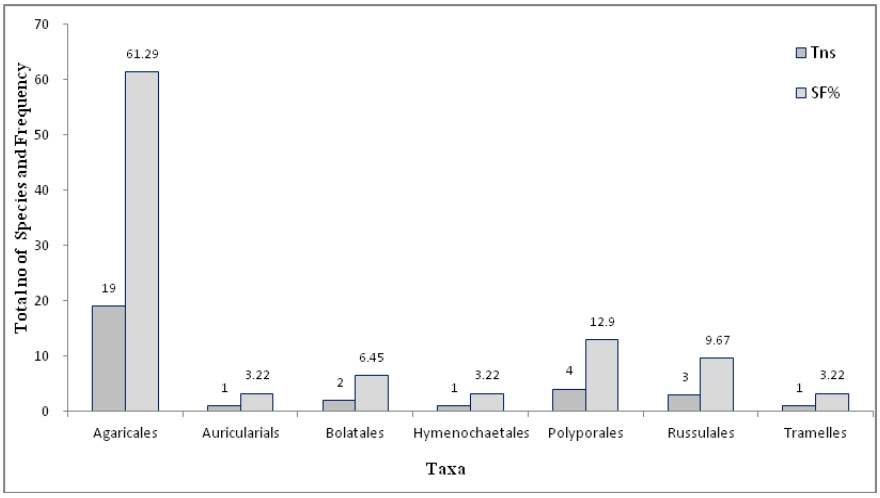

Figure 2. Showing the total No. of species (Tns) and % of frequency of groups (SF %) of Basidiomycotina.

Indigenous knowledge and therapeutic use

On the basis of information collected, 98% of the collected mushrooms are used as food, 2% as medicine. The consumption data reveals that mushrooms are maximum used as food by 55% women, followed by 30% children and 15% men. People use these mushroom for the remedy of

different types of diseases and ailments. Out of 200 respondents, 42% people use it for the remedy of measles, 25% yellow fever, 15% jaundice, 6% in appetence, 5% constipation, 4% stomach pain, 1.5% muscular pain, 1% skin diseases and 0.5% for mumps, ear pain, cut wounds etc.

Discussion

Macrofungi found in this area are not only an important source of food but also use them for medicinal purpose by the local people. The present study revealed that there are plenty of edible species. The most common among them are collected, sacked in bags and carried to market for selling (e.g. *Scleroderma bovista, Termitomyces clypeatus, T. eurrhizus* and *Volvorella bombaycina etc*).

Among the 31 collected taxa, 17 are edible, 6 Inedible, 4 poisonous, 3 medicinal and 1 has religious value. Some of the the edible species viz. *Scleroderma bovista* and different species of *Termitomyces* are also used for medicinal purpose (Aryal & Budhathoki, 2013d; 2014a). The medicinally important tropical polypore like *Pycnoporus cinnabarinus*is is used for the remedy of infectious disease (Mump), Ear pain etc. *Scleroderma citrinum* the medicinal species is also used as food. The cosmopolitan inedible species *Schizophyllum commune* is sometimes used for culinary purposes in food deficit condition. This species has religious value also and is used as 'Sagun' for better happening in the Marriage ceremony in Newar community (Aryal & Budhathoki, 2013d).

During surveys, it was found that the population of *Macrolepiota fuliginosa, Russula nigricans, Termitomyces clypeatus, T. eurhizeus* and *Volvariella bombycina* is declining since the last two decades due to deterioration of forest. *Amanita caesarea, A. chepangiana, A. fulva, A. pantherina, Agaricus augustus, A. sylvicola, Coprinus comatus, C. plicatilis*, *Scleroderma bovista, S. citrinum, Termitomyces clypeatus* and *T. eurrhizus* were found in abundance during sample collection. Being saprophytic, obligatory symbionts as well as part of the mycorrhizal association, these macro fungi play an important role for increase the soil fertility in the forest by biodegradation as well as decomposition of the lignocelluloses compounds of leaf litter. The litter debris of vascular flora favors the regulation and maintenance of temperature and moisture in the soil for these macrofungi. The toxic species listed are *Amanita pantherina, Coprinus plicatilis, Russula emetica* and *R. foetens.*

Conclusion

The reported mushrooms are widely spread throughout the country in tropical to temperate belts. It needs extensive investigation to find out their species richness, distribution pattern, species diversity and ethnomycological uses. Some of the important macrofungi (*Scleroderma, Termitomyces, Volvorella* spp.), need special attention to be conserved against the threat to avoid their unmanaged and unscientific exploitation. Harvesting should be done more scientifically rather than using traditional methods. The mycoelements prevailing in this area need sustainable conservation and utilization.

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