

## Morphological Characterization of Some Ectomycorrhizal Mushrooms in Mount Popa Area

Ni Lar Cho<sup>1</sup>, Thandar<sup>2</sup>, Thida Myint<sup>3</sup>

### Abstract

The present survey was conducted to record the morphological characterization of some ectomycorrhizal mushrooms in Mount Popa area, during the July to October, 2016. The total of 15 ectomycorrhizal species belonging to two orders was recorded in the study area. The survey revealed that eight species are edible, four species are poisonous and three species are inedible. The genus *Russula* was found abundantly in the survey area among the other collected species. The specimens were deposited to Herbarium of Mandalay University (ASM). The present investigation emphasized the existence of a distinct biodiversity in macrofungi at Mount Popa area, in Mandalay region.

### Introduction

Plants associate with other life forms (animals, bacteria or fungi) to complete their life cycle, to fight against pathogens or to thrive in adverse environments. Mycorrhiza is one of the best examples of symbiotic<sup>1</sup> associations between plants and fungi. It has been estimated that about 50,000 fungal species form mycorrhizal associations with approximately 250,000 vascular and non-vascular plant species. It has been estimated that there are about 6000 species of ectomycorrhizal (EcM) fungi belonging to Ascomycota, Basidiomycota, and Zygomycota that associate with 20,000-50,000 species of plant lineages (Palacios 2016).

Most ectomycorrhizal fungi are basidiomycetes, with *Amanita*, *Cortinarius*, *Lactarius*, *Russula*, and *Sillus* among the best known ectomycorrhizal genera. There are about 7750 macrofungal species known to have ectomycorrhizal nature. The genus *Amanita* contains about 500 species, including some of the most toxic known mushrooms found worldwide. There are around 750 worldwide species of mycorrhizal mushrooms which compose the genus *Russula* (Pala *et al* 2012).

---

<sup>1</sup> Assistance Lecturer, Department of Botany, Meiktila University

<sup>2</sup> Professor and Head, Department of Botany, Meiktila University

<sup>3</sup> Professor, Department of Botany, Meiktila University

The present research investigation was described the brief morphological description, macro and microscopic details, and edibility of the 15 species of ectomycorrhizal belonging to genus *Amanita*, *Lactarius* and *Russula* collected from Mount Popa area.

Mount Popa is the only prominent volcano in Myanmar. Even though it is in the dry zone area, it is almost evergreen, due to elevation of 4981 feet above sea level and its fertile soil condition (Yin YinKyi 1997).

Ectomycorrhizal are considered as an integral component of the biology and ecology of soil that has a significant impact on the growth and absorption of nutrients and protection against disease (Reshi 2015).

The purpose of the present survey was to identify the ectomycorrhizal mushrooms up to genus and species level, to record the diversity of mushrooms and to conserve the mushrooms diversity.

## Materials and Methods

The ectomycorrhizal mushrooms were collected from Mount Popa area during July to October, 2016. The location map of study area was shown in Figure1.

The classification and identification of collected specimens were done by comparing the literature of Thomas(1948), Alexopoulous (1962), Krieger (1967), Pacioni (1981),Keizer (1998),Phillips (2006) and Weber(2007).The spore prints were taken according to the Krieger (1967). The fungal specimens were also preserved in Formalin, Acetic acid, Alcohol (FAA) by the ratio of 5:5: 90.

Finally, the herbarium specimens were deposited at the herbarium room of Mandalay University.

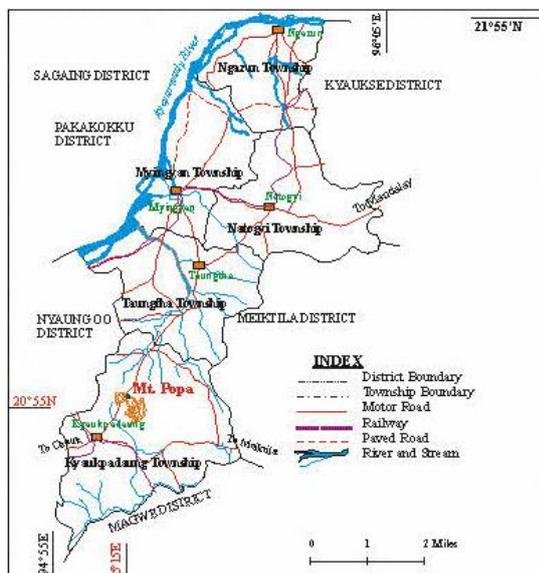


Figure 1. Location Map of study area

## Results

The total of 15 ectomycorrhizal mushrooms species belonging to genus *Amanita*, *Lactarius* and *Russula* were collected and identified in the Mount Popa area. According to the morphological and spores characters, these specimens were classified and identified. The list of collected species was shown in Table 1 and morphological characters shown in Table 2.

Table 1. List of ectomycorrhizal mushrooms (EcM) found in Mount Popa area

Orders	Family	N0.	Scientific Name	Status of Edibility
Agaricales	Amanitaceae	1.	<i>Amanita caesarea</i> (Scop.)Pers	edible
		2.	<i>Amanita constricta</i> Thiers&Ammirati	poisonous
		3.	<i>Amanitagemmata</i> (Fr.) Bertill	poisonous
		4.	<i>Amanita velosa</i> (Peck)Lloyd	poisonous
Russulales	Russulaceae	5.	<i>Lactarius resimus</i> (Fr.)Fr	inedible
		6.	<i>Russula betularum</i> Hora	edible
		7.	<i>Russula cyanoxantha</i> (Schaeff.)Fr.	inedible
		8.	<i>Russula delicata</i> Fr.	edible
		9.	<i>Russula emetica</i> (Schaeff.)Pers	edible
		10.	<i>Russula flava</i> Frost	inedible
		11.	<i>Russula foetens</i> Pres.	poisonous
		12.	<i>Russula mariae</i> Peck	edible
		13.	<i>Russula peckii</i> Singer	edible
		14.	<i>Russula roseipes</i> Secr.	edible
		15.	<i>Russula virescens</i> (Schaeff.)Fr.	edible

Table 2: Morphological characterization of collected mushrooms

No	Scientific Name	Pileus color	Ring	Volva	Spore shape	Spore texture	Status of edibility
1	<i>Amanita caesarea</i> (Scop.)Pers	orange	+	+	+	+	edible
2.	<i>Amanita constricta</i> Thiers&Ammirati	gray	-	+	-	+	poisonous
3.	<i>Amanita gemmate</i> (Fr.) Bertill	yellow	+	+	+	+	poisonous
4.	<i>Amanitavelosa</i> (Peck)Lloyd	white	-	+	+	+	poisonous
5.	<i>Lactariusresimus</i> (Fr.) Fr	white	-	-	-	-	inedible
6.	<i>Russulabetularum</i> Hor a	pink	-	-	-	-	edible
7.	<i>Russulacyanoxantha</i> (Schaeff.) Fr.	purple	-	-	-	-	inedible
8.	<i>Russuladelica</i> Fr.	white	-	-	-	-	edible
9	<i>Russulaemetica</i> (Schaeff.)Pers	rosy	-	-	-	-	edible
10	<i>Russulaflavida</i> Frost	yellow	-	-	-	-	inedible
11.	<i>Russulafoestens</i> Pres.	brown	-	-	-	-	poisonous
12.	<i>Russulamariae</i> Peck	purple	-	-	-	-	edible
13.	<i>Russulapeckii</i> Singer	rosy pink	-	-	-	-	edible
14.	<i>Russularoseipes</i> Secr.	dark pink	-	-	-	-	edible
15.	<i>Russulavirescens</i> (Schaeff.)Fr.	green	-	-	-	-	edible

(+) for present, ellipsoid and smooth; (-) for absent, globular and echinulate



Fig.1 *Amanitacaesarea* (Scop.)

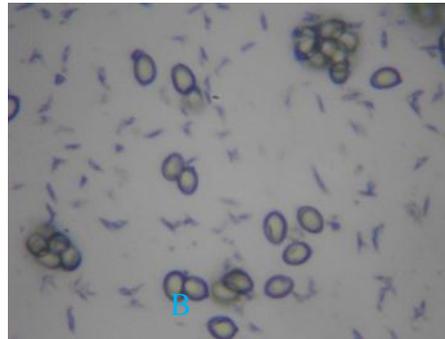


Fig.2 *Amanitaconstricta* Thiers & Ammirati

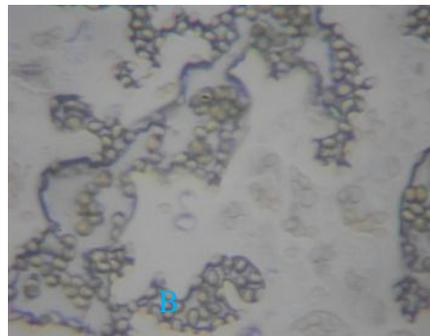


Fig.3 *Amanitagemmata* (Fr.) Bertill

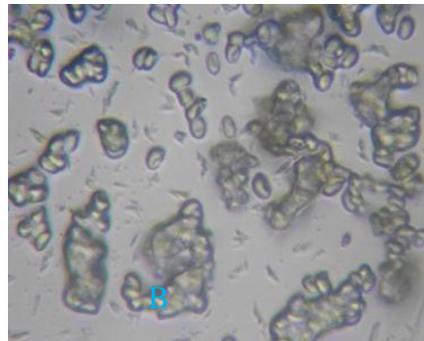


Fig.4 *Amanitavelosa* (Peck) Lloyd

A. Natural habit of mushrooms

B. spores

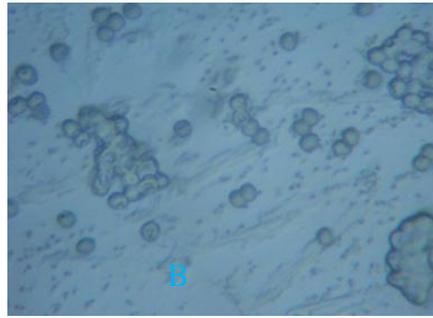


Fig.5 *Lactariusresimus*(Fr.) Fr

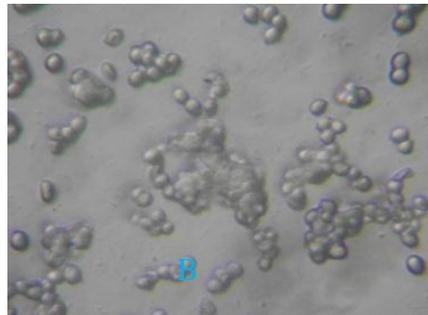


Fig.6 *Russulabetularum*Hora

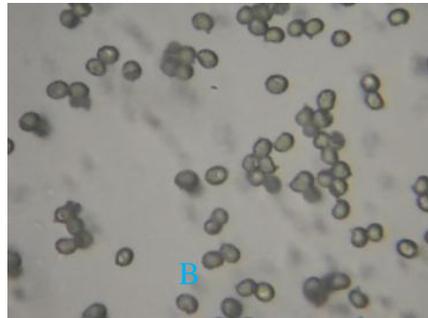


Fig.7 *Russulacyanoxantha*(Schaeff.) Fr.,

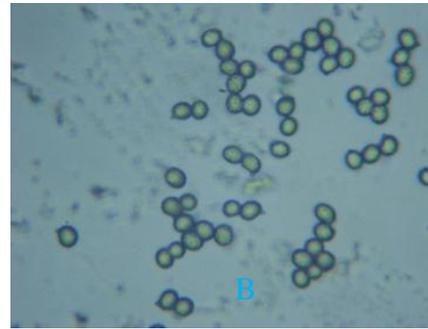


Fig.8 *Russuladelica*Fr.

A. Natural habit of mushrooms

B. spores

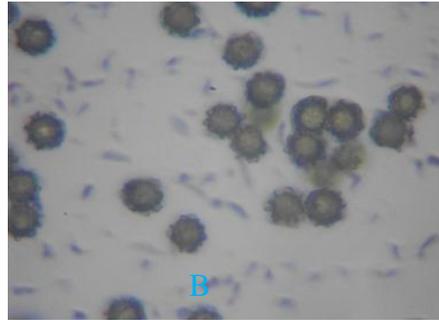


Fig.9 *Russulaemetica*(Schaeff.) Pers

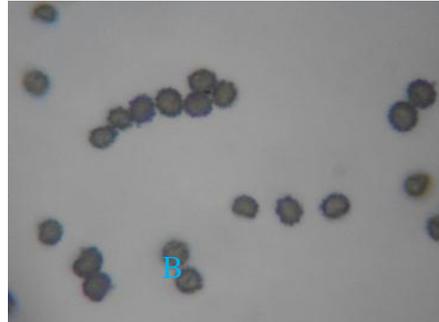


Fig.10 *Russulaflavida* Frost

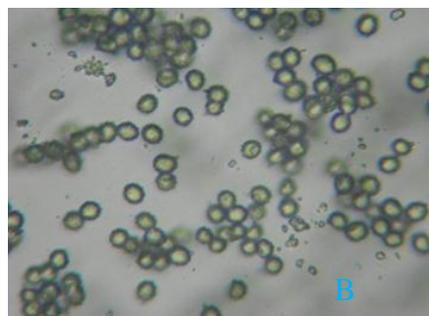


Fig.11 *Russulafoestens* Pres.

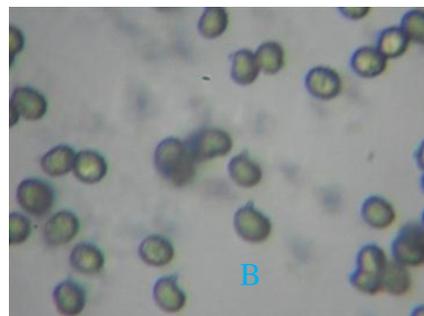


Fig.12 *Russulamariae* Peck

A. Natural habit of mushrooms

B. spores

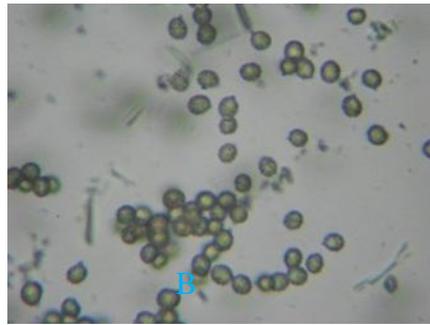


Fig.13 *Russula peckii* Singer



Fig.14 *Russula roseipes* Secr.

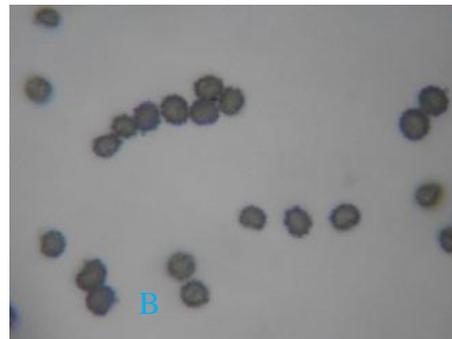


Fig.15 *Russula virescens* (Schaeff.) Fr.

B. Natural habit of mushrooms

B. spores

## Discussion and Conclusion

The present investigation deals with the morphological characterization of ectomycorrhizal mushrooms from the Mount Popa area during July to October, 2016. In this study, 15 ectomycorrhizal macrofungal species belonging to genus *Amanita*, *Lactarius* and *Russula* were collected and identified (Table .1).

Although these species were ectomycorrhizal mushrooms, their morphological characters are totally differences. The morphological characters of *Amanita*, the stipe have ring or annulus and the stipe base have volva, the spores texture is smooth and shape are ellipsoidal. The genus *Amanita* contains some of the most deadly poisonous mushrooms, and also some of the species are edibles (Webster 2007). In this investigation, *Amanita constricta* Thiers & Ammirati, *Amanita gemmate* (Fr.) Bertill and *Amanita velosa* (Peck) Lloyd were poisonous mushrooms and *Amanita caesarea* (Scop.) Pers was edible one.

(Atkinson 1900) stated that the genus character of *Lactarius* is easily distinguished from the other species by the presence of a milky or colored juice which exude from wounded or cut, on the fresh mushroom. In this research, *Lactarius resimus* (Fr.) Fr, the gills white but when wounded or cut the gills color changes from white to the ochraceous brown. In genus *Russula*, the seven species were edible, two species were inedible and one species was poisonous.

*Russula* and *Amanita* represent two major genera having multifarious medicinal properties besides their mycorrhizal role. They have been found to live in symbiotic association with a wide variety of coniferous and deciduous trees (Wasser 2002).

The wild macro fungi play an important ecological role for the healthy maintenance of the ecosystem, besides their tremendous medicinal value, therefore it becomes quite necessary to explore, document and conserve their nature.

## Acknowledgements

We would like to greatly thank to Dr Myat Myat Moe, Professor and Head, Department of Botany, Dagon University, for her invited to present “2<sup>nd</sup> Myanmar-Korea Conference on Useful Plants” and her permission to present this research paper.

## References

- Alexopoulos, C.J.1962. Introductory mycology, Second Edition. John Wiley and Son, Inc. New York and London.
- Keizer, G.J.1998. The complete encyclopedia of mushrooms. Rebo International, Lisse, Netherland.
- .Krieger, C.C. and Schaffer.R.L. 1967. The mushroom hand book. Dover Publications, Inc., New York.
- Pacioni, G. 1981. Guide to mushrooms. A fireside book published by Simon & Schuster Inc.
- Pala, S.A., Wani A.H.,Ahmad, R..2012. Diversity of macro fungal genus *Russula* and *Amanita* in Hirpra wildlife Sancuary, Southern Kashmir Himalayas.
- Palacios A,M,V.,2016.Ectomycorrhizal fungi in Amazonian tropical forests in Colombia
- Reshi, Z,2015. Ecological function of Ectomycorrhizal fungi.University of Kashmir.143 Publications 607 Citations.
- Roger Phillips, 2006. Mushrooms.Adivision of Macmillan Publishes Limited Pan Macmillan, 20 New Wharf Road, London.
- Thomas, W.S. 1948. Field book of common mushrooms.New and enlarged Third Edition, G.P. Putnam's Sons, New York and London.
- WasserSP. 2010. Medicinal mushrooms as a source of antitumor and immunomodulationpolysaccharides.ApplMicrobiol Biotechnology 60:258-274.
- Webster. J. and R.W.S.Weber. 2007. Introduction to Fungi. Published in the United States of America by Cambridge University Press, New York.
- Yin YinKy, 1947.Preliminary Report on vegetation and flora of Mount PopaAssistant Director of the forest ResearchInstitute, Yezin, Pyinmana Township, Myanmar.