



CENTRAL LUZON STATE UNIVERSITY



**SPECIES LISTING OF BRACKET MACROFUNGI FOUND IN HUNGDUAN
AND MAYOYAO, IFUGAO PROVINCE**

CARLO M. MIGUEL

An Undergraduate Thesis Presented to the Faculty of the Department of
Biological Sciences, College of Arts and Sciences, Central Luzon
State University, Science City of Muñoz, Nueva Ecija,
Philippines, In Partial Fulfilment of the
Requirements for the Degree

BACHELOR OF SCIENCE IN BIOLOGY

JUNE 2017



Republic of the Philippines
CENTRAL LUZON STATE UNIVERSITY
Science City of Muñoz, Nueva Ecija

COLLEGE OF ARTS AND SCIENCES
Department of Biological Sciences

APPROVAL SHEET

The Undergraduate Thesis entitled: **SPECIES LISTING OF BRACKET MACROFUNGI FOUND IN HUNGDUAN AND MAYOYAO, IFUGAO PROVINCE** prepared and submitted by **CARLO M. MIGUEL** in partial fulfilment of the requirements for the degree of **BACHELOR OF SCIENCE IN BIOLOGY** is hereby approved and accepted.

Amdeleon
ANGELES M. DE LEON, PhD

Adviser

Date Signed

mbalaw
SOFRONIO P. KALAW, PhD

Critic

5/29/17

Date Signed

[Signature]
RICH MILTON R. DULAY, MSc
Department Research Coordinator

5/29/17

Date Signed

Accepted in partial fulfillment of the requirements for the degree of **BACHELOR OF SCIENCE IN BIOLOGY**.

[Signature]
EVARISTO A. ABELLA, PhD

Department Chair

Date Signed

[Signature]
ANNA MARIA LOURDES S. LATONIO, PhD

College Research Coordinator

Date Signed

[Signature]
MYRNA R. UMAGAT, PhD

Dean

Date Signed



BIOGRAPHICAL SKETCH



PERSONAL INFORMATION

Name : CARLO M. MIGUEL
Date of Birth : August 28, 1996
Place Of Birth : San Jose City, Nueva Ecija
Address : Bantug, Science City of Munoz, Nueva Ecija
Religion : Roman Catholic
Civil Status : Single
Parents : Mr. Richard B. Miguel
: Mrs. Sheila M. Miguel

EDUCATIONAL BACKGROUND

TERTIARY : Central Luzon State University
(A.Y. 2013-2017) Science City of Muñoz, Nueva Ecija
Bachelor of Science in Biology

SECONDARY : San Sebastian School
(A.Y. 2009-2013) Science City of Muñoz, Nueva Ecija

ELEMENTARY : Bantug Elementary School
(A.Y. 2003-2009) Science City of Muñoz, Nueva Ecija

ON THE JOB TRAINING

BPI- Baguio National Crop Research, Development and Production Support
Center, Guisad Valley, Baguio City.
June- July 2016

SEMINARS ATTENDED

ISSAAS Philippines 2016, National Congress and General Meeting
Philippine Carabao Center, Science City of Munoz, Nueva Ecija, October 16-19,
2016



Participant

Technical Seminar on “Animal Genetic Resources in Japan and an International Collaboration (A SATREPS PROJECT)”

Briefing room, Ground Floor LBC Building, Philippine Carabao Center, National Headquarters and Genepool, Science City of Muñoz, Nueva Ecija
February 15, 2017

Special Lecture on Cryobanking of Animal Genetic Resources

RET Amphitheatre, Central Luzon State University, Science City of Muñoz, Nueva Ecija
February 15, 2017

Scientific Interlude of a Rooster and a Mushroom (A Seminar on Innovative Research)

Biotechnology and Analytical Laboratory, Department of Biological Sciences , College of Arts and Sciences, Central Luzon State University, Science City of Muñoz, Nueva Ecija
January 21, 2017

Symposium on Philippine Biodiversity and the National Museum

University Auditorium, CLSU, Science City of Muñoz, Nueva Ecija
March 22, 2016

24th Psychology Students Research Congress with the theme “Usaping Pampulitika sa Lenten g Sikolohiya”

University Auditorium, Central Luzon State University, Science City of Muñoz, Nueva Ecija
April 29, 2016

Symposium on HIV: AIDS “Survival of the fittest. The Human Culture Media”

University Auditorium, CLSU, Science City of Muñoz, Nueva Ecija
November 21, 2015

Symposium on Current Trends in Food Safety and quality Assurance

CLSU Gymnatorium, Science City of Munoz, Nueva Ecija
August 30, 2014

Direct Seeding: A Response to Economical and Technological Challenges in Rice Farming

Central Luzon State University, Science City of Muñoz, Nueva Ecija
September 7, 2013



MEMBERSHIP

Biology Supreme Student Council
Vice-President
S.Y. 2016-2017

Biology Supreme Student Council
Public Information Officer
S.Y. 2015-2016

Biological Society
Lifetime Member
Since 2016

International Society for Southeast Asian Agricultural Sciences, Inc. (ISSAAS)
Philippines Chapter
Student Member
2016

Philippine Folk Dance Society
Member
Since 2015



ACKNOWLEDGEMENT

The researcher would like to express his sincerest appreciation and gratitude to all the persons who shared their ideas, time and effort to make this thesis possible.

The author is most grateful to his thesis adviser, Dr. Angeles M. De Leon, first and foremost for accepting the researcher as one of her advisee, for imparting her knowledge and expertise and for extending her help through all means by giving him guidance, love, support, trust and unending patience throughout this study.

He is highly indebted to his critic, Dr. Sofronio P. Kalaw, for helpful criticisms, thoughts, time, guidance and suggestions during proposal defense and final oral defense for the improvement of this study.

Team ifugao version 2.0, Jam, Mumay, Paul, Jana and Anna, who have been with him since the start of this unforgettable journey, Thank you for the help and support. All those memories we have shared together inspired the author to finish this study.

The author would like to express his genuine thanks to expert mycologist, Dr. Renato G. Reyes who helped him in the identification of his samples.

To his friends Alex, Alfred, Angelli, Cristy, Chin, Ivan, James Kennard, Julius, Lianne, Hannah, Mao, Pauline and Ruth for the support either spiritually, morally, financially and physically, thank you very much.

To entire Ifugao community, for allowing me to conduct the study and for being accommodating at all times.



Faculty members of Department of Biological Sciences, especially to Dr. Evaristo Abella, Sir Rich Milton Dulay, Ma'am Karen, Ma'am Kristine Waing, Ma'am Jhane Valentino and Ate Liezel for accommodating his needs during the conduct of the study.

His parents Mr. Richard Miguel and Mrs. Sheila Miguel, for the unconditional love, never-ending support financially and emotionally to the author.

CARLO M. MIGUEL



TABLE OF CONTENTS

	PAGE
TITLE PAGE	i
APPROVAL SHEET	ii
BIOGRAPHICAL SKETCH	iii
ACKNOWLEDGEMENT	vi
TABLE OF CONTENTS	viii
LIST OF TABLES	x
LIST OF FIGURES	xi
LIST OF APPENDICES	xiii
LIST OF APPENDIX FIGURES	xiv
ABSTRACT	xv
INTRODUCTION	1
Background of the Study	1
Objective of the Study	2
Significance of the Study	3
Scope and Limitation of the Study	4
Time and Place of the Study	4
REVIEW OF RELATED LITERATURE	5
Ifugao Province	5
Hungduan	6
Its inhabitats	8
Mayayao	9
Its inhabitats	10
Mushroom/Macrofungi	11
Bracket Mushroom	11
Diversity	13



MATERIALS AND METHODS	14
Study Site	14
Collection of Samples	14
Morphological Characterization of Collected Macrofungi	15
Species Listing	15
Preservation of Collected Samples	16
Data Gathered	16
RESULTS AND DISCUSSION	
Collection Sites	17
Species list and distribution of bracket macrofungi in the six brgy.	17
Assessment of Collected Macrofungi	33
SUMMARY, CONCLUSION AND RECOMMENDATION	
Summary	36
Conclusion	36
Recommendation	37
LITERATURE CITED	38
APPENDICES	43



LIST OF TABLE

TABLE		PAGE
1	List of the six study sites showing their abiotic factors	17
2	Number of bracket macrofungi per family in the six barangays during collection.	34
3	The frequency occurrence of bracket macrofungi in six barangays in the Municipality of Hungduan and Mayoyao, Ifugao Province.	35



LIST OF FIGURES

FIGURE		PAGE
1	Map of Ifugao Province	5
2	<i>Ganoderma applanatum</i> (Pers.) Pat.	18
3	<i>Ganoderma fornicatum</i>	19
4	<i>Ganoderma</i> sp.	19
5	<i>Chondrostereum purpureum</i> (Pers.: Fr.) Pouzar	20
6	<i>Irpex flavus</i> (Klotz.)	21
7	<i>Earliella scabrosa</i> (Pers.) Gilb. & Ryvardeen	22
8	<i>Hexagonia tenuis</i> (Hook.) Fr.	22
9	<i>Lenzites elegans</i> (Fr.) Pat.	23
10	<i>Microporus affinis</i> (Blume & Nees ex Fr.)	24
11	<i>Microporus xanthopus</i> (fr.) kunt.	25
12	<i>Polyporus</i> sp.	26
13	<i>Pycnoporus sanguineus</i> (Fr.) Murr	27
14	<i>Pycnoporus coccineus</i> (Fr.) Bond. Et Sing	28
15	<i>Trametes hirsuta</i> (Wulf.) Pilat	29



16	<i>Trametes suaveolens</i> (L.) Fries	30
17	<i>Trametes versicolor</i> (L.) Lloyd	31
18	<i>Thelephora anthocephala</i>	32
19	<i>Daldinia concentrica</i> (Bolt.) Ces & de Not	33



LIST OF APPENDICES

APPENDIX		PAGE
A	Collection Sites	44
B	Letters to the Municipal Mayor of Hungduan and Mayoyao, Ifugao Province	48
C	Photo documentation	50



LIST OF APPENDIX FIGURES

APPENDIX FIGURE		PAGE
1	Hungduan Municipal Hall	44
2	Brgy. Poblacion, Hungduan, Ifugao Province	44
3	Brgy. Hapao, Hungduan Ifugao Province	45
4	Brgy. Bokiawan, Hungduan, Ifugao Province	45
5	Mayoyao Municipal Hall	46
6	Brgy. Chaya, Mayoyao, Ifugao Province	46
7	Brgy. Chumang, Mayoyao, Ifugao Province	47
8	Brgy. Mapawoy, Mayoyao, Ifugao Province	47
9	Letter to the Municipal Mayor of Hungduan, Ifugao Province	48
10	Letter to the Municipal Mayor of Mayoyao, Ifugao Province	49
11	Measuring the abiotic factors	50
12	Collection of samples	50
13	Morphological Identification	51
14	Preservation of collected samples	51



ABSTRACT

MIGUEL, CARLO MINIADO, Bachelor of Science in Biology, Department of Biological Sciences, College of Arts and Sciences, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines, June 2017. **SPECIES LISTING OF BRACKET MACROFUNGI FOUND IN HUNGDUAN AND MAYOYAO, IFUGAO PROVINCE**

Manuscript No.: BIO-M-2ND17-005

Adviser: Angeles M. De Leon, PhD

Bracket fungi, also known as shelf fungi, play an active role in wood decomposition, thereby contributing to nutrient recycling in forest ecosystem. However, in spite of their important ecological role, little is known about the biodiversity of bracket fungi in the Philippines. In this study, a total of 46 bracket fungi were identified in Hungduan and Mayoyao in Ifugao Province and identified as belonging to 5 families and 12 genera and 18 species. The bracket fungi included *Chondrostereum purpureum* (Pers.: Fr.) Pouzar., *Daldinia concentrica* (Bolt.) Ces & de Not., *Earliella scabrosa* (Pers.) Gilb. & Ryvardeen., *Ganoderma applanatum* (Pers.) Pat., *Ganoderma fornicatum*, *Ganoderma* sp., *Hexagonia tenuis* (Hook.) Fr., *Irpex flavus* (Klotz.), *Lenzites elegans* (Fr.) Pat.), *Microporus affinis* (Blume & Nees ex Fr.), *Microporus xanthopus* (fr.) kunt., *Polyporus* sp., *Pycnoporus coccineus* (Fr.) Bond. Et Sing., *Pycnoporus sanguineus* (Fr.) Murr., *Thelephora anthocephala* Fr. Fig. 11 (f. g.), 18-20., *Trametes hirsuta* (Wulf.) Pilat, *Trametes suaveolens* (L.) Fries and *Trametes versicolor* (L.) Lloyd. The present study is the first report on the bracket macrofungi in Hungduan and Mayoyao, Ifugao Province.



LITERATURE CITED

- BANGO, J. (2007).** Ifugao, home to a bountiful heritage, baguio midland Courier.
http://www.baguio.midlandcourier.com.ph/supplement_article6.asp.
- BATES, S.T. (2006).** A Preliminary Checklist of Arizona macrofungi *Canotia*, 2(2):47-78.
- BERNICCHIA, A.P. (2007).** Aphylophoraceous Wood Inhabiting Fungi of Lanaitu Valley. *Sardinia Mycotaxon*, 77: 15-2.
- BIADNES G.C.Q. and N.G., TANGONAN. (2003).** Assessment of the biodiversity of basidiomycetous fungi, insects and orchids in midmontane forest of Mt. Apo, Mindanao, *PSSN Nature News*, 2,59.
- BIRGORNIA, M. (2012).** The Ifugao People, University of the Philippines, Diliman
<http://www.ethnicgroupsphilippines.com/2012/04/22/the-ifugao-people/>.
- BROWN, N., BHAGWAT, S. and S.WATKINSON. (2006).** Ltd. Macrofungal diversity in fragmented and disturbed forests of the Western Ghats of India. *Journal of Applied Ecology*, 43, 11-17.
- BOA, E. (2004).** Wild edible fungi: a global overview of their use and importance to people. *Nonwood Forest Products*, No. 17, FAO, Forestry Department, Rome, Italy.
- BUTLER, R. (2011).** Rainforest wildlife. 1st ed. rainforests. USA: Mongabay.
<http://rainforests.mongabay.com/0811.htm>.
- BOLHASSAN, M.H., ABDULLAH, N., SABARATNAM, V., TSUTOMU, H., ABDULAH, S., MOHD, N., RASHID, N., and Y. MUSA. (2012).** Diversity and distribution of Polyporales in Peninsular Malaysia. *Sains Malaysiana*, 41, 155-161.
- CHANG, S. T. and P. G. MILES. (2004).** *Mushrooms: Cultivation, Nutritional Value, Medicinal Effect and Environmental impacts* at CRC Press United States of America. Book, Crc press, Second Edition.
- COSTE, T., FERRARI, SELENE. and P. VANDEPUTTE. (2012).** "Antifungal Resistance and New Strategies to Control Fungal Infections: review article," *International Journal of Microbiology*.
- CORDILLERA ALMANAC, DEPARTMENT OF TOURISM CORDILLERA ADMINISTRATIVE REGION. (2012).** Ifugao Province.
http://www.nscb.gov.ph/rucar/fnf_ifugao.htm.



- DUYFF, R. (2006).** American Dietetic Association's Complete Food and Nutrition Guide. Third Addition. Wiley & Sons. NJ.
- DE LEON, A.M., REYES RG., and T.E.E DELA CRUZ. (2012).** An ethnomycological survey of macrofungi utilized by Aeta communities in Central Luzon, Philippines. Mycosphere Doi 10.5943/mycosphere/3/2/9.
- DILG - CAR. (1999).** Cordillera administrative region/ hungduan.. <http://www.dilgcar.com/index.php/2015-07-10-09-25-49/municipalityofhungduan>.
- DILG - CAR, (1999).** Municipality of Mayoyao The DILG CAR. <http://www.dilgcar.com/index.php/2015-07-10-09-25-49/municipalityofmayoyao>.
- DEPARTMENT OF TOURISM. (2007).** The Ultimate Travel Guide for Tourist/ Ifugao .<http://www.visitmyphilippines.com/index.php?title=Ifugao&Page=1&pid=116>
- DONGSHENG , W., HOUTMAN, C., KAPICH, A., HUNT, C., CULLEN, D. and K. HAMMEL. (2010).** Laccase and its role in production of extracellular reactive oxygen species during wood decay by the brown rot Basidiomycete *Postia placenta*. Applied and Environmental Microbiology ,76,2091-2097.
- DTI, CORDILLERA. (2012).** <http://dti-cordillera.com/the-cordillera-administrative-region/ifugao/>.
- DULAY, R. M R., KALAW, S. P., REYES R. G., CABRERA, E. C. and N.F. ALFONSO. (2012).** Optimization of culture condition for Mycelial growth and Basidiocarp Production of *Lentinus Tigris* (Bull)Fr., A new record of domestic wild edible mushroom in the Philippines. Agric Scientist, 3:278:285.
- FAO. (2004).** Wild edible fungi, A global overview of their use and Importance to People. Non Wood Forest Products 17. Food And Agriculture Organization Of The United Nations, Rome, Italy.
- FOGEL, R. (2006).** Shelf fungi, Fun facts about fungi. <http://herbarium.usu.edu/fungi/funfacts/shelffungi.htm>.
- GUIA, J. (2012).** Celebrating the Bountiful Rice Culture of Ifugao. [http://vigattintourism.com/tourism/articles/Celebrating the Bountiful Rice Culture of Ifugao](http://vigattintourism.com/tourism/articles/Celebrating%20the%20Bountiful%20Rice%20Culture%20of%20Ifugao).
- GILBERTSON, R.L. and L. RYVARDEN. (1986).** North American polypores, *Abortiporus Lindtneria*. Fungiflora, Oslo, 1, 1-433.



- HATTORI, T., YAMASHITA, S. and S. LEE. (2012).** Diversity and conservation of wood-inhibiting polypores and other aphylloraceous fungi in malaysia. Biodiversity and conservation. 21,2375-2396. DOI: 10.1007/s10531-012-0238-x.
- HOSSAIN MS, ALAM N, AMIN SMR, BASUNIAMA and RAHMAN A. (2007).** Essential Fatty Acid Contents of *Pleurotus ostreatus*, *Ganoderma lucidum* and *Agaricus bisporus*. Bangladesh Journal of Mushroom 2007; 1(1): 1-7.
- HOU, J., TYO, K.E., LIU, Z., PETRANOVIC, D. and J. NIELSEN. (2012).** Metabolic engineering of recombinant protein secretion by *Saccharomyces cerevisiae*. FEMS yeast research, 12(5): 491-510
- LABARERE., J. and U. GEMINI. (2000).**- Collection, characterization, conservation and utilization of mushrooms germplasm resources in Africa. The Global Network on Mushrooms. FAO. 17-34.
- LAESSOE, T. (1998).** Mushrooms. Dorling Kindersley- Handbooks. ISBN 0751327174.
- LAZO, C.R.M., KALAW, S.P. and A.M. DE LEON. (2015).** Ethnomycological Survey of Macrofungi Utilized by Gaddang Communities in Nueva Vizcaya, Philippines Current Research in Environmental & Applied Mycology, 5 (3): 256-262 (2015) ISSN 2229-2225.
- LI, S., ZHU, T., LIU, G. and H. ZHU. (2011).** Diversity of macrofungal community in Bifeng Gorge.: the core giant panda habitat in china. African journal of Biotechnology. 11(8),1970-1976
- LONSDALE, D., PAUTASSO, M. and O. HOLDENRIEDER. (2008).** Wood-decaying fungi in the forest: conservation needs and management options. European Journal of Forest Research. 127,1-22. DOI:10.1007/s10342-007-0182-6.
- MANZI, P., GAMBELLI, L., MARCONI, S., VIVANTI. V. and L. PIZZOFERRATO. (1999).** Nutrients in edible mushrooms: an interspecies comparative study. Food Chemistry. 65, 477-482.
- MATINEZ- CARRERA, D., AGULAR, A., MARTINEZ, W., BONILLA, M., MORALES, P. and M. SOBAL. (2000).** Commercial Production and Marketing of edible mushroom cultivated on coffee pulp in mexico. 45:471-488.
- MUSNGI, R.B., ABELLA, E.A., LALAP, A.L. and R.G. REYES. (2005).** Four species of wild *Auricularia* in Central Luzon, Philippines as sources of cell lines for researchers and mushroom growers. Journal of Agricultural Technology ,279299.



- NIEM, J. and M. BALDOVINO. (2015).** Initial Checklist of Macrofungi in the Karst Area of Cavinti, Laguna. *Mus. Pub. Nat. His.* 4.
- PAGOSO, E.J. (2016).** Species listing of bracket macrofungi found in Ifugao: undergraduate thesis, Biology Department, Central Luzon State University, Science City of Munoz Nueva Ecija.
- PEOPLEGROUPS. ORG. (2016).** mayoyao ifugao of philippines . peoplegroups. org. <http://www.peoplegroups.org/Explore/groupdetails.aspx?peid=7739>
- PHILLIPS, R. (2006).** Bracket Fungus, Mushrooms. Pub. McMilan, ISBN 0-330-44237-6. P. 314.
- REYES, R.G., EGUCHI, F., KALAW, S.P. and T. KIKUKAWA. (2009).** Mushroom Growing in the Tropics: A practical guide. Central Luzon State University, Philippines. ISBN: 978-971-705-252-6.
- RYVARDEN, L. (2004).** Neotropical polypores. Part 1 .Introduction, hymenochaetaceae and ganodermataceae. *Synopsis fungorum.* 19:1- 227.
- RYVARDEN, L.; JOHANSEN, I. (1980).** A preliminary polypore flora of East Africa. *Fungiflora, Oslo* :1-636.
- SHARMA, P.D. (2005).** The Fungi. Rastogi Publications. ISBN 8171337686.
- SIBOUNNAVONG, P., CYNTHIA. C.D., KALAW, S.P., REYES, R.G. and K. SOYTONG. (2008).** Some species of macrofungi at Puncan, Carranglan, Nueva Ecija in the Philippines. *Journal of Agricultural Technology* 2008, 105-115.
- SIEGEL, N. (2011).** http://mushroomobserver.org/name/show_name/27181.
- SWAPNA, S., SYED, A. and M. KRISHNAPPA. (2008).** Diversity of macrofungi in semi evergreen and moist deciduous forests of Shimoga District. Karnataka, India. *Journal of Mycology and Plant Pathology*, 38 (1), 21-26.
- TADIOSA, E. and R. BRIONES. (2013).** Fungi of Taal Volcano Protected Landscape, Southern Luzon, Philippines. *January Biodiversity.4 Asian4Journal.*
- TADIOSA, E.R., AGBAYANI, E.S., and N.T. AGUSTIN. (2011).** Preliminary study on the macrofungi of Bazal- Bubo watershed, Aurora province, Central Luzon, Philippines. *Asian Journal of Biodiversity*, 2:149-171.



- THAUNG, M.M. (2007).** A Preliminary Survey Of Macromycetes In Burma, Australasian Mycologist, 26 (1), 16-36.
- TREKNATURE.(2011).** Bracket fungi. [http:// www. treknature. com/ gallery/ photo 252969.htm](http://www.treknature.com/gallery/photo252969.htm).
- ULRICH, R., NUSKE, J., SCHEIBNER, K., SPANTZEL, J. and M. HOFRIICHTER. (2004).** Novel Haloperoxidase from agaric basidiomycete *Agrocybe aegerita* oxidizes aryl alcohols and aldehydes. *Appl. Environ. Microbiol.* 70(8):4575-4581.
- VOLK, T. (2010).** [matthewfoltzhttp://mushroomobserver.org/name/shownamedescription/](http://mushroomobserver.org/name/shownamedescription/).
- WATANABE, T. (2010)** Pictorial Atlas of Soil and Seed Fungi: Morphologies of Cultured Fungi and Key to Species, Third Edition.
- WATKINSON, S., BEBBER, D., DARRAH, P., FRICKER, M., TLALKA, M. and L. BODDY. (2006).** The role of wood decay fungi in the carbon and nitrogen dynamics of the forest floor. In Gadd G.M. *Fungi in biogeochemical cycles.* Cambridge Press, UK, 151-181.
- WEI, D., HOUTMAN, C.J., KAPICH, A.N., HUNT, C.G., CULLEN, D. and K. E. WU, .Y., CHEN, C.H., CHANG, W.H., CHUNG, K.T., LIU, Y.W., and F.J. LU. (2011).** Anti-cancer effects of protein extracts from *Calvatia lilacina*, *Pleurotus ostreatus* & *Volvariella volvacea*. *Evidence Based Complementary and Alternative Medicine.* Article ID 982368.
- WORLDHERITAGESITE. COM. (2016).** Map of ifugao, Digital Image. <http://www.world-heritage-site.com/unesco-world-heritage/rice-terraces-of-the-philippine-cordilleras-location-and-tourist-maps/>.
- YAO, Y.J., WANG, D.M. and S.H., WU. (2014).** Clarification of the Concept of *Ganoderma orbiforme* with High Morphological Plasticity Published doi: 10.1371/journal.pone.0098733.
- ZABEL, R.A. and J.J. MORRELL.(1992).** *Wood Microbiology: decay and its prevention.* Academic Press, California.