### TAXONOMY AND PHYLOGENY OF FUNGI ON Eucalyptus

RATCHADAWAN CHEEWANGKOON

DOCTOR OF PHILOSOPHY
IN PLANT PATHOLOGY

# ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่ Copyright<sup>©</sup> by Chiang Mai University All rights reserved

THE GRADUATE SCHOOL
CHIANG MAI UNIVERSITY
4 OCTOBER 2010

## TAXONOMY AND PHYLOGENY OF FUNGI ON Eucalyptus

RATCHADAWAN CHEEWANGKOON

A THESIS SUBMITTED TO THE GRADUATE SCHOOL IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY
IN PLANT PATHOLOGY

ลิขสิทธิมหาวิทยาลัยเชียงใหม Copyright<sup>©</sup> by Chiang Mai University All rights reserved

THE GRADUATE SCHOOL
CHIANG MAI UNIVERSITY
4 OCTOBER 2010

### TAXONOMY AND PHYLOGENY OF FUNGI ON EUCALYPTUS

### RATCHADAWAN CHEEWANGKOON

THIS THESIS HAS BEEN APPROVED TO BE A PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN PLANT PATHOLOGY

EXAMINING COMMITTEE .	
Kasomseytong	CHAIRPERSON
Assoc. Prof. Dr. Kasem Soytong	
thernal to:	MEMBER
Assoc. Prof. Dr. Chaiwat To-anun	
Pwcos	MEMBER
Prof. Dr. Pedro W. Crous	S
dol	MEMBER
Prof. Dr. Kevin D. Hyde	
Machine Tonglackhar	MEMBER
Assoc. Prof. Dr. Nuchnart Jonglaekha	10 ICIO LU OUTIN
A. Akarapisan.	MEMBER at University
Asst Prof Dr Angsana Akaranisarn	

4 OCTOBER 2010 © Copyright by Chiang Mai University

#### **ACKNOWLEDGEMENTS**

The works presented in this book would never been successfully completed without the help and support of many people. I would like to express my sincere gratitude to Ass. Prof. Dr.Chaiwat To-anun, Prof. Dr. Kevin D. Hyde and Prof. Dr. Pedro W. Crous for their invaluable guidance, supervision, and encouragement throughout the study. Although they have very busy schedules, they always allowed me to discuss every issue regarding my PhD.

I am grateful to my advisor Ass. Prof. Dr.Chaiwat To-anun for accepting me as his student in Plant Pathology Department, Chiang Mai University and providing me the kind help, patience and encouragement. His office always opens for me to discuss both scientific and personal issues.

I would like to thank Prof. Dr. Kevin D. Hyde for giving me opportunity to do my PhD and research-funding support at Mushroom Research Centre as well as at The University of Hong Kong. Dr. Hyde, you are a great teacher who always has kind hearted help, excellent guidance and grateful support during my study, I deeply impress.

I would like to express my warmest thanks to Prof. Dr. Pedro W. Crous, who funded me during the research in the Centraalbureau voor Schimmelcultures (CBS), the Netherlands, for a part of the thesis. Pedro, your enthusiasm, motivating ideas, constructive suggestions and great guidance were a great help and allowed me to produce the data presented here. Although you have a very busy schedule, you always made time to review all draft of my manuscripts as quickly as possible or to discuss important issues. You provided an inspiring and encouraging atmosphere when I was working in CBS and my inbox email, I will never forget.

I would like to acknowledge Dr. Ewald Groenewald, who helped me during my research in CBS. I really appreciated working with you, thank you so much for your kingly teaching, your patience and everything. I will never be able to get this work done without you.

The department of Ecology and Biodiversity, The University of Hong Kong (Hong Kong) is thanked for laboratory facilities during my research in HKU. Thanks are also extended to Helen Leung and Heidi Kong for technical assistance in HKU. All the staffs at CBS have been very helpful and kind to me, I would like to thank you all for your great support and help during my staying in Netherlands.

My special thanks go to Dr.Rampai Kodsuab, Dr. Sutheera Thongkantha, and Dr.Montarop Sudhadham for their kind helps encouragement and suggestions for my study and personal issues. Dr.Lau Chen Pong is thanked for his great supports in many ways, logistic and scientific thinking, warm encouragement and suggestions.

Thanks to all my friends in Mushroom Research Centre (Thailand) for their friendship, encouragement and patiently helping me. They are always there whenever I need help which provide me pleasant stay in MRC, thank you so much. My lab mates and friends in Hong Kong University are thanked for their sincere friendships and support, thanks for making my stay abroad so wonderful and memorable.

Most importantly, I would like to thank my family for their support. Thank for every telephone call, words of encouragement and thinking of me. Mom, Dad and my beloved sister Jam, thank for all your love and being there for me during the ups and downs of my life.

Ratchadawan Cheewngkoon

## ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่ Copyright<sup>©</sup> by Chiang Mai University All rights reserved