

Dissertation Title Microfungi on Medicinal Plants in Southern China and Northern Thailand

Author Yaru Sun

Degree Doctor of Philosophy (Biological Science)

Advisor Mahamarakkalage Mary Ruvishika Shehali Jayawardena, Ph. D.

Co-Advisor Adjunct Prof. Kevin David Hyde, Ph. D.

Co-Advisor Prof. Yong Wang, Ph. D.

ABSTRACT

Medicinal plants have been integral to human culture and medicine since prehistoric times, with over 70% of the global population relying on them. The international trade of medicinal plants is projected to reach USD 5 trillion by 2050. Fungi, a diverse group of organisms, are significantly associated with medicinal plants, forming important ecological relationships. Fungi can pose threats to medicinal plants, causing severe diseases and economic losses. But they play crucial roles in drug development, green pesticides, disease prevention and control and nutrient recycling.

Despite the critical role fungi play, research gaps persist in our understanding of their relationships with medicinal plants. Many fungi associated with medicinal plants lack detailed morphological or molecular data, hindering our ability to fully exploit their potential benefits. Therefore, fungi associated with medicinal plants need further discovery and research. In this study, 158 specimens were collected from around 60 different medicinal plants in southern China and northern Thailand. Based on morphological characteristics and phylogenetic analyses, 135 species are identified and distributed across three classes (Dothideomycetes, Leotiomycetes and Sordariomycetes), 17 orders, 39 families and 81 genera. We introduce one new order, Oncopodiellales, four new families,

Catenuliconidiaceae, Diplocladiellaceae, Oncopodiellaceae and Vamsapriyaceae, two new genera, *Biascospora* and *Pleocatenata*, and 72 new species: *Achroiostachys brunnea*, *A. catenate*, *A. fusiformispora*, *Acrocalymma xishuiense*, *Amphisphaeria hibiscicola*, *Apiculospora thailandensis*, *Apiospora tropica*, *Arecophila maolanensis*, *A. yunnanensis*, *Bambusicola nanensis*, *Barriopsis caryotae*, *Biascospora chishuiensis*, *Brunneofusispora mahoniae*, *Conioscypha synnemata*, *Diaporthe ervatamiae*, *D. kunmingensis*, *D. litseae*, *D. tuchungicola*, *D. xishuiensis*, *Diplocladiella hainanensis*, *Distoseptispora bambusae*, *D. gelatinosa*, *D. olivaceoviridis*, *Gregatothecium difflugossae*, *Helicosporium multiseptatum*, *Helminthosporium thailandicum*, *Kalmusia tetrastigmae*, *Keissleriella yunnanensis*, *Kirschsteiniothelia thailandica*, *Lasiodiplodia houttuyniae*, *L. poacearum*, *Leptospora houttuyniae*, *Lophiotrema asexuale*, *L. guizhouense*, *Melanopsamma tongrenensis*, *Memnoniella Chiangmaiensis*, *Montagnula aquatica*, *M. guiyangensis*, *Murichromolaenicola dendrobii*, *Neoheliospora brunnea*, *Neohelicascus guizhouensis*, *Neohelicomyces sexualis*, *Neohendersonia tongrenensis*, *Neomassaria fibraureae*, *Neococcitibambusa fusispora*, *Neopestalotiopsis amomi*, *N. hyperici*, *N. photiniae*, *N. suphanburiensis*, *Neoscytalidium dendrobii*, *Parabahusutrabeeja hyalina*, *Paramyrothecium xishuiense*, *Pestalotiopsis Chiangmaiensis*, *P. loeiana*, *P. smilacicola*, *Phaeosphaeria boehmeriae*, *P. guiyangensis*, *Phaeosphaeriopsis oblongispora*, *Pleocatenata Chiangraiensis*, *Porodiplodia guizhouensis*, *Psiloglonium bambusicola*, *P. brunneum*, *P. guizhouense*, *Roussoella panzhouensis*, *R. wudangensis*, *Seriascoma guizhouense*, *Sphaeropsis guiyangensis*, *Striaticonidium olivaceobrunneum*, *Tamhinispora obpyriformis*, *Vamsapriya Chiangmaiensis*, *V. Chiangraiensis* and *Virgatospora thailandica*, with illustrations, discussions of their taxonomic placement, and comparisons with morphologically similar taxa. Eleven new combinations are introduced: *Conioscypha obovoidea* (\equiv *Vanakripa obovoidea*), *C. Chiangmaiense* (\equiv *Vanakripa Chiangmaiense*) and *C. minutiellipsoidea* (\equiv *Vanakripa minutiellipsoidea*), *Keissleriella acacia* (\equiv *Pleurophoma acaciae*), *K. italicum* (\equiv *Pleurophoma italica*), *K. ossicola* (\equiv *Pleurophoma ossicola*), *K. pleurospora* (\equiv *Phoma pleurospora*), *Phaeosphaeria*

brachylaenae (\equiv *Didymocyrtis brachylaenae*), *P. pini* (\equiv *Didymocyrtis pini*), *P. septata* (\equiv *Didymocyrtis septata*) and *Torula sundara* (\equiv *Dwayabeeja sundara* = *Pseudotorula sundara*). Additionally, we report 40 new host records from medicinal plants and ten new geographical records for China and Thailand. We also resolved inter-generic synonymy for three species. Reference specimen is provided for *Diplocladiella taurina*.

The study reveals a rich diversity of microfungi associated with medicinal plants in southern China and northern Thailand, which not only enhances our understanding of microbial diversity in these regions but also provides new insights into the conservation and utilization of these medicinal plants. Future research will continue to explore the impact of these fungi on medicinal plants and their potential chemical functions, aiming to provide scientific evidence for the sustainable development and utilization of medicinal plant resources and the pharmaceutical industry.

Keywords: 72 new species, 4 new families, 1 new order, 158 new collections, 11 new combinations, Catenuliconidiaceae, Diplocladiellaceae, Oncopodiellales, Oncopodiellaceae, Phylogeny, Taxonomy, Vamsapriyaceae