

Dissertation Title Endophytic Fungi from *Tetradium ruticarpum* and Their Ability to Produce Antimicrobial Activities

Author Lixue Mi

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Advisor Assistant Professor Prapassorn Damrongkool Eungwanichayapant, Ph. D.

Co-Advisor Adjunct Professor Kevin David Hyde, Ph. D.
Professor Dian-Ming Hu, Ph. D.

ABSTRACT

This study presents a comprehensive investigation of the endophytic fungal community associated with the traditional medicinal plant *Tetradium ruticarpum*, revealing its taxonomic diversity, ecological drivers, and bioactive potential. Through extensive sampling across multiple tissues, geographic locations, and culture media, we identified 935 fungal isolates spanning three phyla, six classes, 21 orders, 54 families, and 84 genera. The community was dominated by Ascomycota (99.5%), primarily Sordariomycetes (61.9%) and Dothideomycetes (35.4%). *Diaporthe* was the most abundant genus (26.8%), followed by *Colletotrichum* (9.9%), *Fusarium* (9.2%), and *Alternaria* (6.1%). Among the remaining 82 rare genera, all except *Hypoxylon*, *Nigrospora* were reported for the first time from this host. Recovery of endophytes was influenced by medium, tissue, and region, with PDA (429 isolates, 71 genera), leaves (408 isolates), and the Daodi production area (Jiangxi Province, 744 isolates, 63 genera), yielding the highest numbers and diversity.

A total of 12 novel fungal species were discovered exclusively from this host, including *Amphisphaeria chenzhouensis*, *A. tetradiana*, *Cyphellophora guangxiensis*, *Diaporthe hunanensis*, *D. jiangxiensis*, *D. tetradii*, *Funiliomyces jiangxiensis*, *Fusarium jiangxiensis*, *Nemania jiangxiensis*, *Pseudokeissleriella tetradii*, *Tetradium jiangxiensis*, and *Zasmidium guangxiensis*. These findings further enriched the taxonomy of endophytic fungi by leading to the establishment of a new family, Funiliomycetaceae, and a new genus, *Tetradium*. Additionally, three species, *Coryneum castaneicola*, *Exophiala pisciphila*, and *Nigrograna jinghongensis* were

documented as new host records for *T. ruticarpum*. This significant taxonomic expansion underscores *T. ruticarpum* as a valuable reservoir for fungal biodiversity and a promising source of novel fungal lineages.

Antimicrobial screening using the agar plug method identified 35 strains from 12 genera with inhibitory activity against three pathogenic bacteria (*Escherichia coli*, *Xanthomonas campestris*, and *Staphylococcus aureus*) and two pathogenic fungi (*Aspergillus niger* and *Candida albicans*). Antimicrobial screening using the agar plug method identified 35 strains from 12 genera with inhibitory activity against three pathogenic bacteria (*E. coli*, *X. campestris*, and *S. aureus*) and two pathogenic fungi (*A. niger* and *C. albicans*). Among them, *Epicoccum* sp. 2 (JAUCC 6839), *Epicoccum* sp. 2 (JAUCC 3794), and *Penicillifer* sp. 1 (JAUCC 4286) showed inhibitory activity against two pathogens. In particular, *Epicoccum* sp. 2 (JAUCC 6839) exhibited strong inhibition against *X. campestris* (32.7 mm), and two *Fusarium* strains (JAUCC 5568 and JAUCC 3841) demonstrated notable inhibition of *A. niger* (26.7 mm).

This study provides a comprehensive overview of *T. ruticarpum* endophytic fungi, revealing high taxonomic richness with several new taxa, distinct tissue- and region-specific patterns, and notable antimicrobial potential. These findings lay a foundation for exploring their roles in host physiology and their biotechnological applications in agriculture and drug discovery.

Keywords: Antimicrobial Properties, Fungal Community, Endophytes, Medicinal Plant, Multi-locus Phylogeny, Novel Taxa