

Dissertation Title Taxonomy and Phylogeny of Microfungi on Grasses

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ABSTRACT

Grasses are agriculturally, economically and ecologically dominant among plants. Their fungal diversity is fascinating but has been relatively poorly studied or restricted to a few important hosts or pathogens. Especially in tropical regions such as Thailand, there is a lack of updated compilations on fungal groups associated with grasses. Therefore, numerous grass inhabiting fungal species are awaiting discovery or re-study based on morphology and molecular phylogeny. As a basis for this study, a review and checklist with names of all microfungi occurring on grasses (excluding the bambusicolous fungi) in Thailand was compiled and published. The host plant(s) for each record and the availability of molecular data for the fungal species was given. In total, 172 species and 35 unidentified taxa were reported as follows: *Ascomycota*: 98 species and 28 unidentified, in 15 orders, 37 families and 68 genera; *Basidiomycota*: 73 species and 7 unidentified, in 8 orders, 8 families and 18 genera; *Chytridiomycota*: one identified species in *Physodermataceae* (*Physodermatales*). *Puccinia*, *Sporisorium*, *Tilletia* and *Ustilago* of the rusts and smuts, followed by *Bipolaris/ Cochliobolus*, *Curvularia*, *Cercospora*, *Colletotrichum* and *Fusarium* were the most commonly recorded genera. In this study, the collection, morpho-molecular identification and classification of saprobic microfungi from four selected grass hosts *Axonopus compressus*, *Imperata cylindrica*,

Thysanolaena latifolia and *Zea mays* was conducted. Over 350 samples were collected during January 2016–March 2021, mostly from northern Thailand (Chiang Mai, Chiang Rai, Lampang, Nan and Phayao provinces), as well as from several central and southern parts of the country. Mostly, the culms, leaves and sheaths of the grasses were observed. From the collections, taxa were recorded on 176 samples. Following the isolation, morphology study and molecular data analysis three new species were discovered. They are *Paraphaeosphaeria thysanolaenae* sp. nov. (*Didymosphaeriaceae*) isolated from *T. latifolia*, *Pestalotiopsis compressa* sp. nov. (*Sporocadaceae*) from *A. compressus* and *Clonostachys Chiangmaiensis* sp. nov. (*Bionectriaceae*) from *Z. mays*. Nine new host records were identified based on their morphology and phylogeny. Descriptions, illustrations and molecular data are provided for these species. *Cladosporium* was the most commonly occurring genus and was found on all hosts. More asexual morph species/ genera than sexual morphs were found. In *I. cylindrica* and *Z. mays* species were mostly found associated with leaves and sheaths rather than the culms, while in *T. latifolia* fungi almost always occurred on culms and occasionally on the inflorescence stalk. In *Axonopus compressus*, fungi were commonly found from all its parts, the leaves, sheaths and culms.

Decaying grasses serve as an ideal substrate for fungi. Among the collections of grass litter from northern Thailand, several new records and species were discovered. *Dinemasporium pseudostrigosum* (*Chaetosphaeriaceae*) and *Robillarda africana* (*Sporocadaceae*) were collected for the first time in Thailand. It is also the first record of *R. africana* from grasses. *Coniothyrium Chiangmaiense* (*Coniothyriaceae*), *Epicoccum thailandicum* (*Didymellaceae*), *Neosetphoma poaceicola* and *Setophoma poaceicola* (*Phaeosphaeriaceae*) are described as new species. *Neosetphoma poaceicola* is the first sexual morph introduced in the genus, while *S. poaceicola* is the first *Setophoma* species discovered from Thailand. The first asexual morph of *Ophiosphaerella agrostidis* (*Phaeosphaeriaceae*) is described.

Phaeosphaeriaceae and *Pleosporaceae* are two families widely known to inhabit grasses and cereal crops as endophytes, saprobes and especially pathogens. *Parastagonospora* is an important genus in *Phaeosphaeriaceae* that includes pathogens causing leaf and glume blotch on cereal crops. In this study, a sexual morph species *P. elymi* isolated from dead stems of *Elymus repens* in Russia, and an asexual morph species *P. macrouniseptata* from dead stems of *Dactylis glomerata* in Italy is introduced. *Pyrenophora trichostoma* (*Pleosporaceae*) the causal agent of tan spot or yellow leaf spot on wheat was collected for the first time in Russia and is described. The species was recorded on two grass hosts, *Bothriochloa ischaemum* and *Bromopsis inermis*. The history of *P. trichostoma*, its distribution and impact as a pathogen, as well as its current status are discussed.

In addition to the main study of microfungi on grasses from Thailand, several fungal species of interest discovered outside this region or from non-grass hosts have been presented. These include the new taxa *Distoseptispora thysanolaenae* (*Distoseptisporaceae*), *Parabambusicola thysanolaenae* (*Parabambusicolaceae*), *Pseudocercospora tamarindi* (*Mycosphaerellaceae*), *Pseudotruncatella camporesii* (*Pseudotruncatellaceae*), *Seimatosporium quercina* (*Sporocadaceae*), and four new host and geographical records in *Sporocadaceae*.

Keywords: Checklist, Graminicolous Fungi, Poaceae, Saprobes, Thailand, Tropical Fungi