Asian Journal of Mycology 1(1): 88–105 (2018) ISSN 2651-1339

www.asianjournalofmycology.org **Article**

Doi 10.5943/ajom/1/1/7

Checklist of microfungi on grasses in Thailand (excluding bambusicolous fungi)

Goonasekara ID[1,2,3], Jayawardene RS[1,2], Saichana N[3], Hyde KD[1,2,3,4]

[1] Center of Excellence in Fungal Research, Mae Fah Luang University, Chiang Rai 57100, Thailand
[2] School of Science, Mae Fah Luang University, Chiang Rai 57100, Thailand
[3] Key Laboratory for Plant Biodiversity and Biogeography of East Asia (KLPB), Kunming Institute of Botany, Chinese Academy of Science, Kunming 650201, Yunnan, China
[4] World Agroforestry Centre, East and Central Asia, 132 Lanhei Road, Kunming 650201, Yunnan, China

Goonasekara ID, Jayawardene RS, Saichana N, Hyde KD 2018 – Checklist of microfungi on grasses in Thailand (excluding bambusicolous fungi). Asian Journal of Mycology 1(1), 88–105, Doi 10.5943/ajom/1/1/7

Abstract

An updated checklist of microfungi, excluding bambusicolous fungi, recorded on grasses from Thailand is provided. The host plant(s) from which the fungi were recorded in Thailand is given. Those species for which molecular data is available is indicated. In total, 172 species and 35 unidentified taxa have been recorded. They belong to the main taxonomic groups 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; and Chytridiomycota: one identified species in Physodermatales, Physodermataceae.

Key words – Ascomycota – Basidiomycota – Chytridiomycota – Poaceae – molecular data

Introduction

Grasses constitute the plant family *Poaceae* (formerly *Gramineae*), which includes over 10,000 species of herbaceous annuals, biennials or perennial flowering plants commonly known as true grains, pasture grasses, sugar cane and bamboo (Watson 1990, Kellogg 2001, Sharp & Simon 2002, Encyclopedia of Life 2018). With a worldwide distribution, except in parts of Antarctica and Greenland, grasses cover at least 20% of the earth's surface (Wheeler et al. 1990, Gibson 2009). They are known to have a Gondwanan origin evolving 80-100 million years ago, or even earlier (Prasad et al. 2011). Grasses play a crucial role in any ecological system as an undergrowth and sometimes as weeds, while natural and sown/planted grasslands are used for grazing by herbivores, the first members of the food cycle (Watson 1990, Kellogg 2001, Sharp & Simon 2002, Dai et al. 2017, Thambugala et al. 2017). Economically, *Poaceae* are the most important group of monocots, comprising a variety of plant species with great agricultural value (Encyclopedia of Life 2018, The Plant List 2018). Humans depend on grasses, especially cereal crops such as barley, maize, rice and wheat for food, and as fodder for animals. Grasses are useful in the production of alcoholic beverages, crystal sugar and paper, as an energy source or biofuel, in ornamental landscaping and various construction purposes, to name a few uses (Kellogg 2001, Gibson 2009, Thambugala et al. 2017, Encyclopedia of Life 2018).

Microfungi, or ascomycetes and their asexual morphs can occur on grasses as pathogens, endophytes, epiphytes or saprobes (Wong & Hyde 2001, Manamgoda et al. 2011, Hyde et al. 2013,

Submitted 12 October 2018, Accepted 27 November 2018, Published 11 December 2018
Corresponding Author: K.D. Hyde – e-mail – kdhyde3@gmail.com

Quaedvlieg et al. 2013, Liu et al. 2015b, Dai et al. 2017). Most commonly found microfungi are either Dothideomycetes or Sordariomycetes. In many cases the asexual morphs of these fungi cause a wide economic impact as plant pathogens (Manamgoda et al. 2012a, b, 2013, Quaedvlieg et al. 2013, Hyde et al. 2013, 2016, Phookamsak et al. 2014a, Liu et al. 2015b, Thambugala et al. 2017). The fungal pathogens on grasses have been studied by several authors, especially those associated with *Zea mays* and other cereal crops (Lamprecht et al. 2011, Manamgoda et al. 2012a, 2015, Damm et al. 2014, Bakhshi et al. 2015). Some interesting groups of fungi included in these studies are *Alternaria*, *Bipolaris*, *Curvularia*, and especially the asexual morph genera of the family *Phaeosphaeriaceae* (Manamgoda et al. 2012a, b, 2015, Phookamsak et al 2014a). The book on smut fungi of the world (Vánky 2012) includes an extensive record of the smut diseases occurring on grasses. Cercosporoid fungi occurring on *Poaceae* have been researched by Braun et al. (2015). The fungus *Pseudopithomyces chartarum* is known to cause facial eczema disease in sheep feeding on pasture lands (Brook 1963). Various studies related to fungal endophytes and their effect towards litter decomposition (Purahong & Hyde 2011), have been conducted in the past years. Fungal endophytic genera *Acremonium*, *Balansia*, *Claviceps*, *Epichloë*, *Myriogenospora* and *Neotyphodium* are known to produce alkaloid compounds within their host plant tissues causing cattle-poisoning, ergot poisoning, intoxication, "rye-grass staggers" and narcosis in grazing cattle, horses and sheep, leading to heavy economic losses (Clay 1988). However, the presence of endophytes is considered a defense mechanism against herbivory, as the grasses will be less prone to attack by insects and most cattle will avoid feeding on them (Clay 1988). In addition, these grasses show an enhanced growth, increase in plant biomass, resistance to drought, flood and disease (Clay 1988, Clay et al. 1993, Saikonnen et al. 1999).

More recent studies on the saprobic fungi occurring on various grass hosts, have attempted to introduce or resolve the classification of species belonging to the families *Apiosporaceae*, *Bambusicolaceae*, *Cainiaceae*, *Clavicipitaceae*, *Didymellaceae*, *Didymosphaeriaceae*, *Massarinaceae*, *Mycosphaerellaceae*, *Periconiaceae*, *Phaeosphaeriaceae*, *Pleosporaceae*, *Roussoellaceae* and *Sporormiaceae* (Liu et al. 2015b, Li et al. 2016, Hyde et al. 2016, Maharachchikumbura et al. 2016, Wijayawardene et al. 2016, Thambugala et al. 2017). These studies indicate that they have a great diversity, however, there is a lack of a thorough and collective inventory for Thailand or the South East Asian region. For many species, there is a lack of molecular analysis (Bhilabutra et al. 2010, Hyde et al. 2013, Thambugala et al. 2017). Therefore, there is a need for re-collection of microfungi on grasses and a reassessment of their taxonomic placements, enabled by both morphological and molecular analyses. This checklist aims to provide a complete as possible list of microfungi recorded from grasses in Thailand (excluding those recorded on bamboo), with their host plants and information as to whether molecular data are available in GenBank. It will be a useful guide for the study of microfungi and their host distribution in Thailand.

Materials & Methods

The checklist is based on published articles in journals, books, web-based resources such as reports on host plants, USDA database (Farr & Rossman 2018), The Smut fungi of Thailand and Food and Agriculture Organization of the United Nations (FAO) websites, and graduate student theses. The checklist (Table 1) includes fungal species names, families and host species names or family. The fungal classification follows Wijayawardene et al. (2018). The names are used according to Index Fungorum (2018) and Wijayawardene et al. (2018). The host name given in the original citation is sometimes changed to be consistent with current taxonomy based on The Plant List (http://www.theplantlist.org). Fungal genera and species are listed in alphabetical order. Species for which molecular data is available in GenBank are marked with an asterisk (*); it should be noted that among them some were introduced from hosts other than grasses or based only on morphology. In a few cases, neither the species nor a proper synonym was identified, therefore the species name is used as originally cited.

Results

Table 1 Checklist of microfungi on grasses (excluding bambusicolous fungi) in Thailand.

Species	Family	Host	Reference
ASCOMYCOTA			
Alfaria terrestris L. Lombard & Crous	Stachybotryaceae	on grass litter	Hyde et al. (2018)
**Alternaria alternata* (Fr.) Keissl.	Pleosporaceae	*Zea mays*	Giatgong (1980) as *Alternaria tenuis*
**Alternaria padwickii* (Ganguly) M.B. Ellis	Pleosporaceae	*Oryza sativa*	Giatgong (1980) as *Trichoconis padwickii*, Richardson (1990) as *Trichoconiella padwickii*
**Ascochyta sorghi* Sacc.	Didymellaceae	*Sorghum* sp.	Richardson (1990)
Aspergillus sp.	Aspergillaceae	*Sorghum vulgare*	Giatgong (1980)
Astrosphaeriella exorrhiza Boise	Astrosphaeriellaceae	*Thysanolaena maxima*	Phookamsak et al. (2015), Phookamsak (2017)
Astrosphaeriella thysanolaenae Phook. & K.D. Hyde	Astrosphaeriellaceae	*Thysanolaena maxima*	Phookamsak et al. (2015), Phookamsak (2017)
Balansia sp.	Clavicipitaceae	*Panicum trigonum*	Giatgong (1980), Lenne (1990)
Bipolaris brachiariae Y. Marín, Senwanna & Crous	Pleosporaceae	*Brachiaria mutica*	Marin-Felix et al. (2017)
**Bipolaris coffeana* Sivan.	Pleosporaceae	*Digitaria* sp.	Manamgoda et al. (2014)
**Bipolaris maydis* (Y. Nisik. & C. Miyake) Shoemaker	Pleosporaceae	*Zea mays*	Giatgong (1980) as *Helminthosporium maydis*, Richardson (1990) as *Cochliobolus heterostrophus*, Marin-Felix et al. (2017)
**Bipolaris oryzae* (Breda de Haan) Shoemaker	Pleosporaceae	*Oryza sativa*	Giatgong (1980) as *Cochliobolus miyabeanus*, Giatgong (1980) as *Helminthosporium oryzae*, Richardson (1990) as *C. miyabeanus*, Manamgoda et al. (2012a, 2014), Jeon et al. (2015), Xiao et al. (2015), Khemmuk et al. (2016), Tan et al. (2016), Zhang et al. (2017), Marin-Felix et al. (2017)
**Bipolaris sacchari* (E.J. Butler) Shoemaker	Pleosporaceae	*Saccharum officinale*, *Saccharum officinarum*	Giatgong (1980) as *Helminthosporium sacchari*
**Bipolaris sorokiniana* Shoemaker	Pleosporaceae	*Hordeum vulgare*	Richardson (1990) as *Cochliobolus sativus*
		Triticum aestivum	Marin-Felix et al. (2017)
		Triticum vulgare	Giatgong (1980) as *Helminthosporium sativum*
Bipolaris sp.	Pleosporaceae	*Oryza sativa*	Manamgoda et al. (2012a)
Bipolaris stenospila (Drechsler) Shoemaker	Pleosporaceae	*Saccharum officinarum*	Giatgong 1980 as *Cochliobolus stenospilus*
Blumeria sp.	Erysiphaceae	*Triticum vulgare*	Giatgong (1980) as *Oidium* sp.
Botryosphaeria sp.	Botryosphaeriaceae	*Sorghum halepense*	Giatgong (1980)

Table 1 Continued.

Species	Family	Host	Reference
Brachysporium sp.	Trichosphaeriaceae	*Oryza sativa*	Giatgong (1980)
Capnodium sp.	Capnodiaceae	*Saccharum officinarum*	Giatgong (1980)
**Catenulocercospora fusimaculans* (G.F. Atk.) C. Nakash., Videira & Crous	Mycosphaerellaceae	*Agrostis* sp.	Phengsintham et al. (2012), Phengsintham et al. (2013) as *Passalora fusimaculans*
		Beckeropsis sp., *Brachiaria* sp., *Chasmopodium* sp., *Digitaria* sp., *Echinochloa* sp., *Eleusine* sp., *Entolasia* sp., *Ichnanthus* sp., *Leptoloma* sp., *Oplismenus* sp., *Panicum* sp., *Paspalidium* sp., *Rottboellia* sp., *Sorghum* sp., *Stenotaphrum* sp., *Urochloa* sp., *Zea* sp.	Phengsintham et al. (2012)
		Panicum maximum	Lenne (1990) as *Cercospora fusimaculans*
**Ceratocystis paradoxa* (Dade) C. Moreau	Ceratocystidaceae	*Saccharum officinarum*	Giatgong (1980) as *Thielaviopsis paradoxa*
Cercospora barretoana (U. Braun & Crous) U. Braun & Crous	Mycosphaerellaceae	*Echinochloa esculenta*	Phengsintham et al. (2013) as *Passalora barretoana*
Cercospora longipes E.J. Butler	Mycosphaerellaceae	*Saccharum officinarum*	Giatgong (1980)
**Cercospora sorghi* Ellis & Everh.	Mycosphaerellaceae	*Sorghum vulgare*	Giatgong (1980)
Cercospora sp.	Mycosphaerellaceae	*Saccharum officinarum*	Giatgong (1980)
Cladosporium sp.	Cladosporiaceae	*Digitaria* sp.	Giatgong (1980)
		Paspalum dilatatum	Giatgong (1980), Lenne (1990)
**Claviceps africana* Freder., Mantle & De Milliano	Clavicipitaceae	*Sorghum bicolor*	Bandyopadhyay et al. (1998), Pazoutova et al. (2004), Pazoutova & Frederickson (2005)
Colletotrichum endophyticum Manamgoda, Udayanga, L. Cai & K.D. Hyde	Glomerellaceae	*Pennisetum purpureum*	Manamgoda et al. (2013), Sharma & Shenoy (2014), Liu et al. (2015a), Diao et al. (2017)
**Colletotrichum falcatum* Went	Glomerellaceae	*Saccharum officinarum*	Giatgong (1980), Giatgong (1980) as *Physalospora tucumanensis*, Crouch (2014)
**Colletotrichum graminicola* (Ces.) G.W. Wilson	Glomerellaceae	*Rottboellia cochinchinensis*	Sherriff et al. (1995)

Table 1 Continued.

Species	Family	Host	Reference
		Sorghum sudanense, *Sorghum vulgare*, *Zea mays*	Giatgong (1980)
**Colletotrichum siamense* Prihast., L. Cai & K.D. Hyde	Glomerellaceae	*Cymbopogon citratus*	Munir et al. (2016)
Colletotrichum sp.	Glomerellaceae	*Digitaria* sp., *Sorghum vulgare*	Giatgong (1980)
****Coniothyrium chiangmaiense*** Goonas., Thambug. & K.D. Hyde	Coniothyriaceae	on grass litter	Thambugala et al. (2017)
****Curvularia alcornii*** Manamgoda, L. Cai & K.D. Hyde	Pleosporaceae	*Panicum* sp.	Manamgoda et al. (2012a, b)
		Pennisetum clandestinum	Manamgoda et al. (2012a)
		Zea mays	Manamgoda et al. (2012a, b), Khemmuk et al. (2016)
		Zea sp.	Manamgoda et al. (2015)
****Curvularia asiatica*** Manamgoda, L. Cai & K.D. Hyde	Pleosporaceae	*Oryza sativa*, *Saccharum officinarum*	Manamgoda et al. (2012a, b, 2015)
		Panicum sp.	Manamgoda et al. (2012a, b, 2015), Jeon et al. (2015), Khemmuk et al. (2016), Zhang et al. (2018)
****Curvularia chiangmaiensis*** Y. Marín, Senwanna & Crous	Pleosporaceae	*Zea mays*	Marin-Felix et al. (2017)
****Curvularia dactyloctenicola*** Y. Marín, Senwanna & Crous	Pleosporaceae	*Dactyloctenium aegyptium*	Marin-Felix et al. (2017)
****Curvularia hawaiiensis*** (Bugnic. ex M.B. Ellis) Manamgoda, L. Cai & K.D. Hyde	Pleosporaceae	*Panicum* sp.	Manamgoda et al. (2012a, 2015)
**Curvularia hominis* K.C. Cunha, Madrid, Gené & Cano	Pleosporaceae	*Echinochloa* sp., *Oryza sativa*	Manamgoda et al. (2015)
**Curvularia lunata* (Wakker) Boedijn	Pleosporaceae	*Oryza sativa*	Giatgong (1980), Richardson (1990) as *Cochliobolus lunatus*, Manamgoda et al. (2012a), Xiao et al.(2015)
		Panicum sp.	Manamgoda et al. (2012)
		Sorghum vulgare	Giatgong (1980)
		Zea mays	Giatgong (1980), Ariyawansa et al. (2015a), Manamgoda et al. (2015)
****Curvularia nodosa*** Y. Marín, Cheew. & Crous	Pleosporaceae	*Brachiaria reptans*	Marin-Felix et al. (2017)
		Chloris barbata	Marin-Felix et al. (2017)
		Digitaria ciliaris	Marin-Felix et al. (2017)
**Curvularia pallescens* Boedijn	Pleosporaceae	*Oryza sativa*	Sivanesan (1987) as *Cochliobolus pallescens*
****Curvularia pseudobrachyspora*** Y. Marín, Cheew. & Crous	Pleosporaceae	*Eleusine indica*	Marin-Felix et al. (2017)

Table 1 Continued.

Species	Family	Host	Reference
Curvularia sp.	Pleosporaceae	*Oryza sativa*	Manamgoda et al. (2012a, 2015)
		Oryza sp., *Sorghum* sp.	Richardson (1990)
		Sorghum vulgare, *Zea mays*	Giatgong (1980)
****Curvularia variabilis*** Y. Marín, Senwanna & Crous	Pleosporaceae	*Chloris barbata*	Marin-Felix et al. (2017)
		Digitaria ciliaris	Marin-Felix et al. (2017)
		Imperata cylindrica	Marin-Felix et al. (2017)
**Curvularia verruculosa* Tandon & Bilgrami ex M.B. Ellis	Pleosporaceae	*Cynodon dactylon*	Marin-Felix et al. (2017)
		Eleusine indica	Marin-Felix et al. (2017)
		Oryza sativa, *Zea* sp.	Manamgoda et al. (2015)
**Cytospora sacchari* E.J. Butler	Cytosporaceae	*Saccharum officinarum*	Giatgong (1980)
Diaporthe oryzae-sativae Punith.	Diaporthaceae	*Oryza sativa*	Punithalingam & Sharma (1979) as *Ascochyta oryzae*, Giatgong (1980) as *A. oryzae*, Udayanga et al. 2011 as *A. oryzae*
Diaporthe sorghicola Punith.	Diaporthaceae	*Sorghum vulgare*	Punithalingam (1975) as *Phomopsis sorghicola*
****Didymella poaceicola*** Thambug. & K.D. Hyde	Didymellaceae	Poaceae	Thambugala et al. (2017)
Diplocarpon sp.	Drepanopezizaceae	*Saccharum officinarum*	Giatgong (1980) as *Gloeosporium* sp.
Diplodia sp.	Botryosphaeriaceae	*Zea mays*	Giatgong (1980), Richardson (1990) as *Botryodiplodia* sp.
****Epicoccum poaceicola*** Thambug. & K.D. Hyde	Didymellaceae	Poaceae	Thambugala et al. (2017)
**Epicoccum sorghinum* (Sacc.) Aveskamp, Gruyter & Verkley	Leptosphaeriaceae	*Saccharum officinale*	Giatgong (1980) as *Leptosphaeria sacchari*
****Epicoccum thailandicum*** Goonas., Thambug. & K.D. Hyde	Didymellaceae	on grass litter	Thambugala et al. (2017)
**Exserohilum rostratum* (Drechsler) K.J. Leonard & Suggs	Pleosporaceae	*Zea mays*	Richardson (1990) as *Drechslera halodes*
**Exserohilum turcicum* (Pass.) K.J. Leonard & Suggs	Pleosporaceae	*Sorghum vulgare*, *Zea mays*	Giatgong (1980) as *Helminthosporium turcicum*
Fumago sp.	Pezizomycotina, *Incertae sedis*	*Saccharum officinarum*	Giatgong (1980)
**Fusarium fujikuroi* Nirenberg	Nectriaceae	*Hordeum vulgare*	Richardson (1990) as *Fusarium moniliforme*
		Oryza sativa	Ou (1985) as *Gibberella fujikuroi*, Giatgong (1980) as *G. fujikuroi*
		Saccharum officinarum	Giatgong (1980) as *F. moniliforme*, *G. fujikuroi*
		Zea mays	Giatgong (1980) as *F. moniliforme*
**Fusarium incarnatum* (Desm.) Sacc.	Nectriaceae	*Oryza sativa*	Giatgong (1980) as *Fusarium semitectum*

Table 1 Continued.

Species	Family	Host	Reference
**Fusarium oxysporum* Schltdl.	Nectriaceae	*Zea mays*	Giatgong (1980) as *Fusarium aurantiacum*
**Fusarium pallidoroseum* (Cooke) Sacc.	Nectriaceae	*Hordeum vulgare*	Richardson (1990)
**Fusarium solani* (Mart.) Sacc.	Nectriaceae	*Hordeum vulgare*	Richardson (1990)
Fusarium sp.	Nectriaceae	*Oryza sativa*	Giatgong (1980), Richardson (1990)
		Sorghum sp.	Richardson (1990)
		Sorghum vulgare	Giatgong (1980)
		Zea mays	Giatgong (1980), Giatgong (1980) as *Gibberella* sp.
Gloeocercospora sp.	Xylariales, *Incertae sedis*	*Sorghum vulgare*	Giatgong (1980)
**Graminopassalora graminis* (Fuckel) U. Braun, C. Nakash., Videira & Crous	Mycosphaerellaceae	*Agropyron* sp., *Agrostis* sp., *Alopecurus* sp., *Ammophila* sp., *Anthoxanthum* sp., *Arctagrostis* sp., *Arrhenatherum* sp., *Arundinaria* sp., *Avena* sp., *Beckmannia* sp., *Bromus* sp., *Calamagrostis* sp., *Cinna* sp., *Cynodon* sp., *Cynosurus* sp., *Dactylis* sp., *Danthonia* sp., *Deschampsia* sp., *Digitaria* sp., *Elymus* sp., *Elytrigia* sp., *Festuca* sp., *Glyceria* sp., *Hierochloe* sp., *Hordeum* sp., *Hystrix* sp., *Koeleria* sp., *Leersia* sp., *Leucopoa* sp., *Lolium* sp., *Melica* sp., *Milium* sp., *Miscanthus* sp., *Muhlenbergia* sp., *Oryzopsis*. sp., *Panicum* sp.,	Phengsintham et al. (2012) as *Passalora graminis*

Table 1 Continued.

Species	Family	Host	Reference
		Pennisetum sp., *Phleum* sp., *Phragmites* sp., *Poa* sp., *Puccinellia* sp., *Roegneria* sp., *Secale* sp., *Sitanion* sp., *Stenotaphrum* sp., *Stipa* sp., *Trisetum* sp., *Zea* sp.	
Helminthosporium sp.	Massarinaceae	*Setaria italic* *Zea mays*	Lenne (1990) Giatgong (1980)
****Leptosphaerulina saccharicola*** Phook., Jian K. Liu & K.D. Hyde	Didymellaceae	*Saccharum officinarum*	Phookamsak (2017)
**Macrophomina phaseolina* (Tassi) Goid.	Botryosphaeriaceae	*Sorghum vulgare*	Giatgong (1980) as *Botryodiplodia phaseoli*
**Microdochium albescens* (Thüm.) Hern.-Restr. & Crous	Microdochiaceae	*Oryza sativa*	Giatgong (1980) as *Rhynchosporium oryzae*
****Multiseptospora thailandica*** Phookamsak & K.D. Hyde	Parabambusicolaceae	*Thysanolaena maxima*	Liu et al. (2015b)
**Nakataea oryzae* (Catt.) J. Luo & N. Zhang	Magnaporthaceae	*Oryza sativa*	Giatgong (1980) as *Leptosphaeria salvinii*
****Neosetophoma poaceicola*** Goonas., Thambug. & K.D. Hyde	Phaeosphaeriaceae	on grass litter	Thambugala et al. (2017)
****Neosphaerellopsis thailandica*** Crous & Trakun.	Phaeosphaeriaceae	*Bothriochloa bladhii*	Trakunyingcharoen et al. (2014)
**Nigrocornus scleroticus* (Pat.) Ryley	Clavicipitaceae	*Cymbopogon nardus*	Ryley (2006) as *Balansia sclerotica*
**Nigrospora oryzae* (Berk. & Broome) Petch	Sordariomycetes, *incertae sedis*	*Zea mays*	Richardson (1990) as *Khuskia oryzae*
**Ophiosphaerella agrostidis* Dern., M.P.S. Câmara, N.R. O'Neill, Berkum & M.E. Palm	Phaeosphaeriaceae	on grass litter, *Thysanolaena maxima*	Phookamsak et al. (2014b), Thambugala et al. (2017)
Ophiosphaerella-like	Pleosporales, *Incertae sedis*	*Imperata cylindrica*	Phookamsak (2017)
****Paraconiothyrium thysanolaenae*** Phookamsak, Chethana & K.D. Hyde	Didymosphaeriaceae	*Thysanolaena maxima*	Liu et al. (2015b)
****Paraphaeosphaeria graminicola*** Thambug. & K.D. Hyde	Didymosphaeriaceae	Poaceae	Thambugala et al. (2017)
Passalora agrostidicola Phengs. & U. Braun	Mycosphaerellaceae	*Agrostis* sp.	Braun et al. (2015)
Passalora koepkei (W. Krüger) U. Braun & Crous	Mycosphaerellaceae	*Saccharum officinarum*	Giatgong (1980) as *Cercospora koepkei*
**Passalora vaginae* (W. Krüger) U. Braun & Crous	Mycosphaerellaceae	*Saccharum officinarum*	Giatgong (1980) as *Cercospora vaginae*
Pestalotia andropogonis Rostr.	Sporocadaceae	*Andropogon sorghum*	Nag Raj (1993)
Pestalotia sp.	Sporocadaceae	*Sorghum vulgare*	Giatgong (1980)
****Periconia cortaderiae*** Thambug. & K.D. Hyde	Periconiaceae	*Cortaderia* sp.	Thambugala et al. (2017)

Table 1 Continued.

Species	Family	Host	Reference
**Phaeocytostroma sacchari* (Ellis & Everh.) B. Sutton	Diaporthaceae	*Saccharum officinarum*	Giatgong (1980) as *Melanconium sacchari*
****Phaeosphaeria chiangraina*** Phookamsak & K.D. Hyde	Phaeosphaeriaceae	*Oryza sativa*	Phookamsak et al. (2014b)
****Phaeosphaeria thysanolaenicola*** Phookamsak & K.D. Hyde	Phaeosphaeriaceae	*Thysanolaena maxima*	Phookamsak et al. (2014b)
**Phoma insidiosa* Tassi	Didymellaceae	*Sorghum vulgare*	Giatgong (1980)
Phoma sp.	Didymellaceae	*Hordeum vulgare*	Richardson (1990)
****Phyllachora chrysopogonicola*** Tamakaew, Cheew. & K.D. Hyde	Phyllachoraceae	*Phyllachora chrysopogonicola*	Tamakaew et al. (2017)
Phyllachora cynodontis Niessl	Phyllachoraceae	*Cynodon* sp.	Lenne (1990)
Phyllachora sacchari Henn.	Phyllachoraceae	*Sorghum vulgare*	Giatgong (1980) as *Phyllachora sorghi*
Phyllachora sp.	Phyllachoraceae	*Cynodon dactylon*	Lenne (1990)
****Phyllachora thysanolaenae*** Tamakaew, Maharachch., K.D. Hyde & Cheew.	Phyllachoraceae	*Thysanolaena maxima*	Tamakaew et al. (2017)
**Phyllosticta capitalensis* Henn.	Phyllostictaceae	*Saccharum officinarum*	Wikee et al (2013a, b)
Phyllosticta sp.	Phyllostictaceae	*Oryza sativa*	Giatgong (1980)
****Poaceascoma helicoides*** Phook. & K.D. Hyde	Lentitheciaceae	*Digitaria sanguinalis*	Phookamsak (2017)
Pseudoacrodictys dimorphospora Somrith. & E.B.G. Jones	Ascomycota, *incertae sedis*	*Arundinaria pusilla*	Somrithipol & Jones (2003)
**Pseudopyricularia bothriochloae* (Crous & Cheew.) Y. Marín & Crous	Pyriculariaceae	*Bothriochloa bladhii*	Crous et al. (2013) as *Pyricularia bothriochloae*
**Pseudotrichia rubriostiolata* (Phook. & K.D. Hyde) Q. Tian & K.D. Hyde	Pleomassariaceae	*Thysanolaena maxima*	Liu et al. (2015b)
**Pseudotrichia thailandica* (Phook. & K.D. Hyde) Q. Tian & K.D. Hyde	Pleomassariaceae	*Thysanolaena maxima*	Liu et al. (2015b)
		on grass litter	Phookamsak (2017)
**Psiloglonium colihuae* (Lorenzo & Messuti) E. Boehm	Hysteriaceae	*Thysanolaena maxima*	Liu et al. (2015b)
****Psiloglonium multiseptatum*** Phookamsak & K.D. Hyde	Hysteriaceae	*Thysanolaena maxima*	Liu et al. (2015b)
Pyrenophora sp.	Pleosporaceae	*Ophiuros exaltatus*	Lenne (1990) as *Drechslera* sp.
		Oryza sativa, *Sorghum* sp.	Richardson (1990) as *Drechslera* sp.
**Pyrenophora tritici-repentis* (Died.) Drechsler	Pleosporaceae	*Triticum vulgare*	Giatgong (1980) as *Helminthosporium tritici-vulgaris*
**Pyricularia oryzae* Cavara	Pyriculariaceae	*Oryza sativa*	Giatgong (1980)
Pyricularia sp.	Pyriculariaceae	*Brachiaria mutica*, *Digitaria* sp., *Echinochloa colonum*	Giatgong (1980), Lenne (1990)

Table 1 Continued.

Species	Family	Host	Reference
		Eragrostis sp.	Lenne (1990)
		Ischaemum rugosum, *Leersia hexandra*	Giatgong (1980)
		Panicum repens	Giatgong (1980), Lenne (1990)
		Triticum vulgare	Giatgong (1980)
		Zoysia matrella	Giatgong (1980)
**Sarocladium oryzae* (Sawada) W. Gams & D. Hawksw.	Hypocreales, *Incertae sedis*	*Oryza sativa*	Giatgong (1980) as *Acrocylindrium oryzae*, Richardson (1990)
**Sarocladium strictum* (W. Gams) Summerb.	Hypocreales, *Incertae sedis*	*Sorghum vulgare*, *Zea mays*	Giatgong (1980) as *Cephalosporium acremonium*
Sclerotium sp.	Sclerotiniaceae	*Saccharum officinarum*	Giatgong (1980)
Setophoma poaceicola Goonas., Thambug. & K.D. Hyde	Phaeosphaeriaceae	on grass litter	Thambugala et al. (2017)
**Setophoma sacchari* (Bitanc.) Gruyter, Aveskamp & Verkley	Phaeosphaeriaceae	*Saccharum officinarum*	Phookamsak et al. (2014a), Phookamsak (2017)
Spegazzinia neosundara Thambug. & K.D. Hyde	Apiosporaceae	*Cortaderia* sp.	Thambugala et al. (2017)
**Sphaerulina oryzina* Hara	Mycosphaerellaceae	*Oryza sativa*	Richardson (1990) as *Cercospora oryzae*
Stagonospora imperaticola Phukhams., Thambug. & K.D. Hyde	Massarinaceae	*Imperata cylindrica*	Thambugala et al. (2017)
Stagonospora multiseptata Thambug. & K.D. Hyde	Massarinaceae	leaves and stems of grasses	Thambugala et al. (2017)
**Stenocarpella maydis* (Berk.) B. Sutton	Diaporthaceae	*Zea mays*	Giatgong (1980) as *Diplodia zeae*
Sulcosporium thailandicum Phookamsak & K.D. Hyde	Halotthiaceae	*Axonopus compressus*	Ariyawansa et al. (2015b)
**Tetraploa yakushimensis* (Kaz. Tanaka, K. Hiray. & Hosoya) Kaz. Tanaka & K. Hiray.	Tetraplosphaeriaceae	*Imperata cylindrica*	Phookamsak (2017)
**Ustilaginoidea virens* (Cooke) Takah.	Clavicipitaceae	*Oryza sativa*	Giatgong (1980)
BASIDIOMYCOTA			
Anthracocystis andropogonis-aciculati (Petch) McTaggart & R.G. Shivas	Ustilaginaceae	*Chrysopogon aciculatus*	Shivas et al. (2007) as *Sporisorium andropogonis-aciculati*
**Anthracocystis anthistiriae* (Cobb) McTaggart & R.G. Shivas	Ustilaginaceae	*Themeda triandra*	Shivas et al. (2007) as *Sporisorium anthistiriae*
Anthracocystis berndtii (Vánky) McTaggart & R.G. Shivas	Ustilaginaceae	*Schizachyrium sanguineum*	Shivas et al. (2008) as *Sporisorium berndtii*, McTaggart et al. (2012)
Anthracocystis holstii (Henn.) McTaggart & R.G. Shivas	Ustilaginaceae	*Themeda triandra*	Shivas et al. (2007) as *Sporisorium holstii*, McTaggart et al. (2012)

Table 1 Continued.

Species	Family	Host	Reference
Anthracocystis likhitekarajae (R.G. Shivas, Athip. & McTaggart) McTaggart & R.G. Shivas	Ustilaginaceae	*Ischaemum* sp.	Shivas et al. (2008) as *Sporisorium likhitekarajae*, McTaggart et al. 2012
Anthracocystis paspali-thunbergii (Henn.) McTaggart & R.G. Shivas	Ustilaginaceae	*Paspalum orbiculare*	Shivas et al. (2007) as *Sporisorium paspali-thunbergii*
Anthracocystis shivasiorum (Vánky) McTaggart & R.G. Shivas	Ustilaginaceae	*Eulalia trispicata*	Vánky (2008) as *Sporisorium shivasiorum*, McTaggart et al. (2012)
****Anthracocystis trispicatae*** (R.G. Shivas, Vánky & Athip.) McTaggart & R.G. Shivas	Ustilaginaceae	*Eulalia trispicata*	Vánky et al. (2006) as *Sporisorium trispicatae*, Shivas et al. (2007) as *S. trispicatae*, McTaggart et al. (2012), Piątek et al. (2015)
**Conidiosporomyces ayresii* (Berk.) Vánky & R. Bauer	Tilletiaceae	*Panicum maximum*	Shivas et al. (2007)
**Eballistra oryzae* (Syd. & P. Syd.) R. Bauer, Begerow, A. Nagler & Oberw	Entylomataceae	*Oryza sativa*	Giatgong (1980) as *Entyloma oryzae*
**Franzpetrakia microstegii* Thirum. & Pavgi	Ustilaginaceae	*Microstegium fasciculatum*	Shivas et al. (2007), Vánky (2013)
Langdonia clandestina (R.G. Shivas, Vánky & Athip.) McTaggart & R.G. Shivas	Ustilaginaceae	*Aristida balansae* *Aristida setacea*	McTaggart et al. (2012) Vánky et al. (2006), Shivas et al. (2007) as *Sporisorium clandestinum*, McTaggart et al. (2012)
**Langdonia inopinata* (Vánky) McTaggart & R.G. Shivas	Ustilaginaceae	*Aristida* sp.	Shivas et al. (2007) as *Sporisorium inopinatum*, McTaggart et al. (2012)
**Macalpinomyces arundinellae-setosae* R.G. Shivas & Vánky	Ustilaginaceae	*Arundinella setosa*	Shivas et al. (2007)
Macalpinomyces siamensis R.G. Shivas, Vánky & Athip.	Ustilaginaceae	*Coelorachis striata*	Vánky et al. (2006), Shivas et al. (2007)
**Moesziomyces bullatus* (J. Schröt.) Vánky	Ustilaginaceae	*Leersia hexandra*, *Polytrias amaura*	Shivas et al. (2007)
**Ontotelium coronatum* Syd. as Uromyces coronatus	Pucciniaceae	*Zizania latifolia*	Lorsuwan et al. (1984) as *Uromyces coronatus*
Puccinia andropogonicola Har. & Pat.	Pucciniaceae	*Hyparrhenia bracteata*	Gjaerum (1988)
**Puccinia cynodontis* Lacroix ex Desm.	Pucciniaceae	*Cynodon dactylon* *Cynodon sp.*	Lenne (1990) Lorsuwan et al. (1984)
**Puccinia duthiei* Ellis & Tracy	Pucciniaceae	*Dichanthium annulatum*	Lorsuwan et al. (1984) as *Puccinia duthiae*
**Puccinia graminis* Pers	Pucciniaceae	*Hordeum vulgare*	Giatgong (1980) as *Puccinia graminis* subsp. *graminis*
**Puccinia graminis* f.sp. *avenae* Erikss. & Henning	Pucciniaceae	*Avena sativa*	Giatgong (1980)
**Puccinia melanocephala* Syd. & P. Syd.	Pucciniaceae	*Saccharum officinarum*	Giatgong (1980)
**Puccinia nakanishikii* Dietel	Pucciniaceae	*Cymbopogon citratus*	Lorsuwan et al. (1984)
Puccinia neyraudiae Syd. & P. Syd.	Pucciniaceae	*Neyraudia reynaudiana*	Lohsomboon et al. (1986)

Table 1 Continued.

Species	Family	Host	Reference
**Puccinia operta* Mundk. & Thirum.	Pucciniaceae	*Coix lacryma-jobi*	Lohsomboon et al. (1986)
**Puccinia polysora* Underw.	Pucciniaceae	*Brachiaria distachya*	Unartngam et al. (2011)
		Zea mays	Giatgong (1980), Unartngam et al. (2011)
**Puccinia purpurea* Cooke	Pucciniaceae	*Sorghum halepense*	Giatgong (1980)
		Sorghum vulgare	Giatgong (1980), Lorsuwan et al. (1984)
**Puccinia recondita* Roberge ex Desm.	Pucciniaceae	*Triticum aestivum*	Lorsuwan et al. (1984)
**Puccinia rubigo-vera* f.sp. *tritici* Carleton	Pucciniaceae	*Triticum vulgare*	Giatgong (1980)
**Puccinia rufipes* Dietel	Pucciniaceae	*Imperata cylindrica*	Giatgong (1980), Lorsuwan et al. (1984)
**Puccinia sorghi* Schwein.	Pucciniaceae	*Zea mays*	Giatgong (1980), Lorsuwan et al. (1984)
Puccinia sp.	Pucciniaceae	*Sorghum* sp.	Giatgong (1980)
**Puccinia striiformis* Westend	Pucciniaceae	*Triticum vulgare*	Giatgong (1980) as *Puccinia glumarum*
**Rhizoctonia solani* J.G. Kühn	Ceratobasidiaceae	*Oryza sativa*	Giatgong (1980) as *Thanatephorus cucumeris*
**Schizophyllum commune* Fr.	Schizophyllaceae	*Saccharum officinarum*	Giatgong (1980)
Sporisorium amaurae Vánky & C. Vánky	Ustilaginaceae	*Polytrias amaura*	Shivas et al. (2007)
**Sporisorium arthraxonis* (Pat.) L. Guo	Ustilaginaceae	*Arthraxon hispidus*	Shivas et al. (2007)
**Sporisorium cruentum* (J.G. Kühn) Vánky	Ustilaginaceae	*Sorghum propinquum*	Shivas et al. (2007)
Sporisorium dichanthiicola (Mundk. & Thirum.) Vánky	Ustilaginaceae	*Dichanthium caricosum*	Shivas et al. (2007) as *Sporisorium dichanthicola*
**Sporisorium doidgeae* (Zundel) Langdon & Full.	Ustilaginaceae	*Bothriochloa bladhii*	Shivas et al. (2007)
**Sporisorium exsertum* (McAlpine) L. Guo	Ustilaginaceae	*Themeda triandra*	Shivas et al. (2008)
Sporisorium ischaemicola (L. Ling) Vánky	Ustilaginaceae	*Ischaemum indicum*	Shivas et al. (2007)
**Sporisorium manilense* (Syd. & P. Syd.) Vánky	Ustilaginaceae	*Sacciolepis indica*	Shivas et al. (2007)
**Sporisorium ophiuri* (Henn.) Vánky	Ustilaginaceae	*Rottboellia cochinchinensis*	Shivas et al. (2007)
Sporisorium pseudosorghi Vánky, R.G. Shivas & Athip.	Ustilaginaceae	*Pseudosorghum fasciculare*	Vánky et al. (2006), Shivas et al. (2007)
Sporisorium sacchari (Rabenh.) Vánky	Ustilaginaceae	*Saccharum arundinaceum*	Shivas et al. (2007)
		Saccharum sp.	Shivas et al. (2007)
**Sporisorium scitamineum* (Syd.) M. Piepenbr., M. Stoll & Oberw.	Ustilaginaceae	*Saccharum officinarum*	Giatgong (1980) as *Ustilago scitaminea*, Shivas et al. (2007) as *U. scitaminea*
**Sporisorium scitamineum* (Syd.) M. Piepenbr., M. Stoll & Oberw.	Ustilaginaceae	*Saccharum officinarum*	Giatgong (1980) as *Ustilago scitaminea*,

Table 1 Continued.

Species	Family	Host	Reference
			Shivas et al. (2007) as *Ustilago scitaminea*
		Saccharum sp.	Raboin et al. (2007) as *U. scitaminea*
Sporisorium sp.	Ustilaginaceae	*Ischaemum indicum*	Shivas et al. (2007)
**Sporisorium tenue* (Syd. & P. Syd.) Vánky	Ustilaginaceae	*Bothriochloa bladhii*	Shivas et al. (2008)
**Stollia bothriochloae* (L. Ling) McTaggart & R.G. Shivas	Ustilaginaceae	*Bothriochloa bladhii*	Shivas et al. (2007) as *Macalpinomyces bothriochloae*, McTaggart et al. (2012)
		Bothriochloa pertusa	Shivas et al. (2007) as *M. bothriochloae*
**Stollia bursa* (Berk.) McTaggart & R.G. Shivas	Ustilaginaceae	*Themeda triandra*	McTaggart et al. (2012)
		Themeda villosa	Shivas et al. (2008) as *Macalpinomyces bursus*, McTaggart et al. (2012)
**Stollia ewartii* (McAlpine) McTaggart & R.G. Shivas	Ustilaginaceae	*Sorghum nitidum*	Shivas et al. (2008) as *Macalpinomyces ewartii*
Thecaphora sp.	Glomosporiaceae	*Digitaria* sp.	Giatgong (1980), Lenne (1990) as *Sorosporium* sp.
**Tilletia barclayana* (Bref.) Sacc. & P. Syd.	Tilletiaceae	*Oryza sativa*	Zundel (1953) as *Neovossia horrida*, Duran & Fischer (1961), Chandrasrikul (1962) as *Tilletia horrida*, Giatgong (1980) as *T. horrida*, Shivas et al. (2007) as *T. horrida*
Tilletia chiangmaiensis R.G. Shivas, Vánky & Athip.	Tilletiaceae	*Arundinella bengalensis*	Vánky et al. (2006), Shivas et al. (2007)
Tilletia filisora R.G. Shivas, Vánky & Athip.	Tilletiaceae	*Pennisetum setosum*	Vánky et al. (2006), Shivas et al. (2007)
Tilletia isachnicola R.G. Shivas, Athip. & McTaggart	Tilletiaceae	*Isachne globosa*	Shivas et al. (2008)
Tilletia ischaemi Vánky & N.D. Sharma	Tilletiaceae	*Ischaemum rugosum*	Shivas et al. (2007)
Tilletia lageniformis Vánky, C. Vánky, R.G. Shivas & Athip.	Tilletiaceae	*Hyparrhenia rufa*	Vánky et al. (2006), Shivas et al. (2007)
****Tilletia setariae-parviflorae*** Vánky & R.G. Shivas	Tilletiaceae	*Setaria parviflora*	Vánky (2007), Shivas et al. (2007)
Tilletia sp.	Tilletiaceae	*Sacciolepis indica*	Shivas et al. (2008)
Tilletia thailandica Vánky & R.G. Shivas	Tilletiaceae	*Eragrostis amabilis*	Vánky (2007), Shivas et al. (2007)
**Tilletia vittata* (Berk.) Mundk.	Tilletiaceae	*Oplismenus compositus*	Shivas et al. (2007)
**Uromyces setariae-italicae* Yoshino	Pucciniaceae	*Panicum purpurascens*	Giatgong (1980) as *Uromyces leptodermus*, Lenne (1990)
		Panicum sp.	Lorsuwan et al. (1984)
**Ustilago coicis* Bref.	Ustilaginaceae	*Coix lacryma-jobi*	Titatarn et al. (1983), Richardson (1990), Shivas (2007)
**Ustilago cynodontis* (Pass.) Henn.	Ustilaginaceae	*Cynodon dactylon*	Shivas et al. (2007)

Table 1 Continued.

Species	Family	Host	Reference
Ustilago egenula Syd., P. Syd. & E.J. Butler	Ustilaginaceae	*Eragrostis japonica*	Shivas et al. (2007)
**Ustilago esculenta* Henn.	Ustilaginaceae	*Zizania aquatica*	Zundel (1953)
		Zizania latifolia	Shivas et al. (2008)
Ustilago maydis (DC.) Corda	Ustilaginaceae	*Zea mays*	Giatgong (1980), Shivas et al. (2007)
**Ustilago neyraudiae* Mundk.	Ustilaginaceae	*Neyraudia reynaudiana*	Shivas et al. (2007)
**Ustilago nuda* (C.N. Jensen) Kellerm. & Swingle	Ustilaginaceae	*Triticum aestivum*	Shivas et al. (2007) as *Ustilago tritici*
		Triticum vulgare	Giatgong (1980) as *U. tritici*
***Ustilago planetella** Vánky & R.G. Shivas	Ustilaginaceae	*Eragrostis japonica*	Vánky (2007)
Ustilago sclerachnes Wakef. ex Vánky	Ustilaginaceae	*Chionachne punctata*	Shivas et al. (2007)
Ustilago sp.	Ustilaginaceae	*Brachiaria mutica*	Giatgong (1980)
		Panicum repens	Lenne (1990), Giatgong (1980)
		Zoysia japonica	Giatgong (1980)
**Ustilago trichophora* (Link) Kunze	Ustilaginaceae	*Echinochloa colonum*	Shivas et al. (2007)
**Waitea circinata* Warcup & P.H.B. Talbot	Corticiaceae	*Oryza sativa*	Giatgong (1980) as *Rhizoctonia oryzae*
CHYTRIDIOMYCOTA			
**Physoderma maydis* (Miyabe) Miyabe	Physodermataceae	*Sorghum vulgare*	Giatgong (1980)
		Zea mays	Giatgong (1980) as *Physoderma zeae-maydis*

*moledular data available in GenBank. In bold – Type/ species first recorded from this grass host in Thailand.

Conclusions

This checklist of microfungi on grasses (excluding bambusicolous fungi) found in Thailand, consists of 172 taxa distributed in 24 orders, 46 families and 89 genera. Another 35 taxa remain unidentified (to species level). The species *Stagonospora sacchari* T.T. Lo & L. Ling (Phaeosphaeriaceae) recorded on *Saccharum officinarum* (Castellani & Germano 1977, Giatgong 1980) and *Ustilago phragmitis* Hirschh. (Ustilaginaceae) on *Phragmites karka* (Shivas et al. 2007) are currently listed as invalid names in Index Fungorum and therefore are not included in this checklist. The most commonly recorded genera are *Puccinia*, *Sporisorium*, *Tilletia* and *Ustilago* (commonly known as the rusts and smuts), followed by the genera *Bipolaris*/*Cochliobolus*, *Curvularia*, *Cercospora*, *Colletotrichum* and *Fusarium*.

Acknowledgements

Ishani D. Goonasekara expresses her gratitude to the Mushroom Research Foundation, Chiang Mai, Thailand for financial assistance.

References

Ariyawansa HA, Hyde KD, Jayasiri SC, Buyck B et al. 2015a – Fungal diversity notes 111–252–taxonomic and phylogenetic contributions to fungal taxa. Fungal Diversity 75, 27–274.

Ariyawansa HA, Thambugala KM, Manamgoda DS, Jayawardena R et al. 2015b – Towards a natural classification and backbone tree for Pleosporaceae. Fungal Diversity 71, 85–139.

Bakhshi M, Arzanlou M, Babai-Ahari A, Groenewald JZ et al. 2015 – Application of the consolidated species concept to *Cercospora* spp. from Iran. Persoonia 34, 65–86.
Bandyopadhyay R, Frederickson DE, McLaren NW, Odvody GN et al. 1998 – Ergot: a new disease threat to sorghum in the Americas and Australia. Plant Disease 82, 356–367.
Bhilabutra W, McKenzie EHC, Hyde KD, Lumyong S. 2010 – Fungi on the grasses, *Thysanolaena latifolia* and *Saccharum spontaneum*, in northern Thailand. Mycosphere, 1(4), 301–314.
Braun U, Crous PW, Nakashima C. 2015 – Cercosporoid fungi (Mycosphaerellaceae) 3. Species on monocots (Poaceae, true grasses). IMA Fungus 6, 25–97.
Brook PJ. 1963 – Ecology of the fungus *Pithomyces chartarum* (Berk. & Curt.) MB Ellis in pasture in relation to facial eczema disease of sheep. New Zealand Journal of Agricultural Research 6, 147–228.
Castellani E, Germano G 1977 – Le Stagonosporaegraminicole. Annali Facolti di Scienze Agriculturae Universitatis Torino 10, 1–135.
Chandrasrikul A 1962 – A preliminary host list of plant diseases in Thailand. Thailand Deptarment of Agriculture, Technical Bulletin, 6, 23pp.
Clay K. 1988 – Fungal endophytes of grasses: a defensive mutualism between plants and fungi. Ecology 69, 10–16.
Clay K, Marks S, Cheplick GP. 1993 – Effects of insect herbivory and fungal endophyte infection on competitive interactions among grasses. Ecology 74, 1767–1777.
Crouch JA. 2014 – *Colletotrichum caudatum* s.l. is a species complex. IMA Fungus 5, 17–30.
Crous PW, Wingfield MJ, Guarro J, Cheewangkoon R et al. 2013 – Fungal Planet description sheets: 154-213. Persoonia 31, 188–296.
Dai DQ, Phookamsak R, Wijayawardene NN, Li WJ et al. 2017 – Bambusicolous fungi. Fungal Diversity 82, 1–105.
Damm U, O'Connell RJ, Groenewald JZ, Crous PW. 2014 – The *Colletotrichum destructivum* species complex–hemibiotrophic pathogens of forage and field crops. Studies in Mycology 79, 49–84.
Diao YZ, Zhang C, Liu F, Wang WZ et al. 2017 – *Colletotrichum* species causing anthracnose disease of chili in China. Persoonia 38, 20–37.
Duran R, Fischer GW. 1961 – The Genus *Tilletia*. Washington State University, 138 pp.
Encyclopedia of Life. 2018 – http://eol.org (last accessed on 11th July 2018)
Farr DF, Rossman AY. 2018 – Fungal Databases, U.S. National Fungus Collections, ARS, USDA. Retrieved August 5, 2018, from https://nt.ars-grin.gov/fungaldatabases/
Food and Agriculture Organization of the United Nations (FAO) – http://agris.fao.org (last accessed on 11th July 2018)
Giatgong P. 1980 – Host Index of Plant Diseases in Thailand. Second Edition. Mycology Branch, Plant Pathology and Microbiology Division, Department of Agriculture and Cooperatives, Bangkok, Thailand, 118. (44271)
Gibson DJ. 2009 – Grasses and grassland ecology. Oxford University Press.
Gjaerum HB. 1988 – Rust fungi (Uredinales) on the genus *Hyparrhenia* (Poaceae). Mycotaxon 32, 143–160.
Hyde KD, Jones EBG, Liu JK, Ariyawansa H et al. 2013 – Families of Dothideomycetes. Fungal Diversity 63, 1–313.
Hyde KD, Hongsanan S, Jeewon R, Bhat DJ et al. 2016 – Fungal diversity notes 367–491: taxonomic and phylogenetic contributions to fungal taxa. Fungal Diversity 80(1), 1–270
Hyde KD, Chaiwan N, Norphanphoun C, Boonmee S et al. 2018 – Mycosphere notes 169–224. Mycosphere 9(2), 271–430, Doi 10.5943/mycosphere/9/2/8
Index Fungorum. 2018 – http://www.indexfungorum.org/Names/Names.asp
Jeon SJ, Nguyen TT, Lee HB. 2015 – Phylogenetic status of an unrecorded species of *Curvularia*, *C. spicifera*, based on current classification system of *Curvularia* and *Bipolaris* group using multi loci. Mycobiology 43(3), 210–7.
Kellogg EA. 2001 – Evolutionary history of the grasses. Plant physiology 125, 1198–1205.

Khemmuk W, Shivas RG, Henry RJ, Geering ADW. 2016 – Fungi associated with foliar diseases of wild and cultivated rice (*Oryza* spp.) in northern Queensland. Australasian Plant Pathology 45, 297–308.
Lamprecht SC, Crous PW, Groenewald JZ, Tewoldemedhin YT, Marasas WF. 2011 – Diaporthaceae associated with root and crown rot of maize. IMA fungus 2, 13–24.
Lenne JM. 1990 – World List of Fungal Diseases of Tropical Pasture Species. Phytopathology Papers 31, 1–162.
Li GJ, Hyde KD, Zhao RN, Hongsanan S et al. 2016 – Fungal diversity notes 253–366: taxonomic and phylogenetic contributions to fungal taxa. Fungal Diversity 78, 1–237.
Liu F, Weir BS, Damm U, Crous PW et al. 2015a – Unravelling *Colletotrichum* species associated with *Camellia*: employing ApMat and GS loci to resolve species in the *C. gloeosporioides* complex. Persoonia 35, 63–86.
Liu JK, Hyde KD, Jones EBG, Ariyawansa HA et al. 2015b – Fungal diversity notes 1–110: taxonomic and phylogenetic contributions to fungal species. Fungal Diversity 72, 1–197.
Lohsomboon P, Manoch L, Visarathanonth N, Kakishima M et al. 1986 – Materials for the rust flora in Thailand II. Transactions of the Mycological Society of Japan 27, 271–281.
Lorsuwan C, Tontyaporn S, Visarathanonth N, Manoch L et al. 1984 – Materials for the rust flora in Thailand I. Transactions of the Mycological Society of Japan 25, 57–65.
Maharachchikumbura SSN, Hyde KD, Jones EBG, McKenzie EHC et al. 2016 – Families of Sordariomycetes. Fungal Diversity 79, 1–317.
Manamgoda DS, Cai L, Bahkali AH, Chukeatirote E et al. 2011 – *Cochliobolus*: an overview and current status of species. Fungal Diversity 51, 3–42.
Manamgoda DS, Cai L, McKenzie EHC, Crous PW et al. 2012a – A phylogenetic and taxonomic re-evaluation of the *Bipolaris – Cochliobolus – Curvularia* Complex. Fungal Diversity 56, 131–144.
Manamgoda DS, Cai L, McKenzie EHC, Chukeatirote E et al. 2012b – Two new *Curvularia* species from northern Thailand. Sydowia 64, 255–266.
Manamgoda DS, Udayanga D, Cai L, Chukeatirote E et al. 2013 – Endophytic *Colletotrichum* from tropical grasses with a new species *Colletotrichum endophytica*. Fungal Diversity 61, 107–115.
Manamgoda DS, Rossman AY, Castlebury LA, Crous PW et al. 2014 – The genus *Bipolaris*. Studies in Mycology 79, 221–88.
Manamgoda DS, Rossman AY, Castlebury LA, Chukeatirote E et al. 2015 – A taxonomic and phylogenetic re-appraisal of the genus *Curvularia* (Pleosporaceae): human and plant pathogens. Phytotaxa 212, 175–198.
Marin-Felix Y, Senwanna C, Cheewangkoon R, Crous PW. 2017 – New species and records of *Bipolaris* and *Curvularia* from Thailand. Mycosphere 8(9), 1556–1574.
McTaggart AR, Shivas RG, Geering ADW, Vánky K et al. 2012 – Taxonomic revision of *Ustilago*, *Sporisorium* and *Macalpinomyces*. Persoonia 29, 116–132.
Munir M, Amsden B, Dixon E, Vaillancourt L et al. 2016 – Characterization of *Colletotrichum* species causing bitter rot of apple in Kentucky orchards. Plant Disease 100(11), 2194–2203.
Nag Raj TR. 1993 – Coelomycetous anamorphs with appendage-bearing conidia. Mycologue Publications, Waterloo, Ontario, 1101pp.
Ou SH. 1985 – Rice Diseases. Second Edition. Commonwealth Mycological Institute, Kew, Surrey, England, 380 pp.
Pazoutova S, Kolarik M. Kolinska R. 2004 – Pleomorphic conidiation in *Claviceps*. Mycological Research 108, 126–135.
Pazoutova S, Frederickson DE. 2005 – Genetic diversity of *Claviceps africana* on sorghum and *Hyparrhenia*. Plant Pathology 54, 749–763.
Phengsintham P, Chukeatirote E, McKenzie EHC, Moslem MA et al. 2012 – Fourteen new records of cercosporoids from Thailand. Maejo International Journal of Science and Technology 6, 47–61.

Phengsintham P, Braun U, McKenzie EHC, Chukeatirote E et al. 2013 – Monograph of Cercosporoid fungi from Thailand. Plant Pathology & Quarantine 3, 67–138.
Phookamsak R. 2017 – Taxonomy and Phylogeny of selected Dothideomycetes on Monocots. PhD Thesis, Mae Fah Luang University, Chiang Rai, Thailand.
Phookamsak R, Liu JK, McKenzie EHC, Manamgoda DS et al. 2014a – Revision of Phaeosphaeriaceae. Fungal Diversity 68, 159–238.
Phookamsak R, Liu JK, Manamgoda DS, Chukeatirote et al. 2014b – The sexual state of *Setophoma*. Phytotaxa 176(1), 260–269.
Phookamsak R, Norphanphoun C, Tanaka K, Dai DQ et al. 2015 – Towards a natural classification of *Astrosphaeriella*-like species; introducing Astrosphaeriellaceae and Pseudoastrosphaeriellaceae fam. nov. and *Astrosphaeriellopsis*, gen. nov. Fungal Diversity 74, 143–197.
Piątek M, Lutz M, Yorou NS. 2015 – A molecular phylogenetic framework for *Anthracocystis* (Ustilaginales), including five new combinations (inter alia for the asexual *Pseudozyma flocculosa*), and description of *Anthracocystis grodzinskae* sp. nov. Mycological Progress 14(10), 88pp.
Prasad V, Strömberg CAE, Leaché AD, Samant B et al. 2011 – Late Cretaceous origin of the rice tribe provides evidence for early diversification in Poaceae. Nature Communications 2, 480.
Punithalingam E. 1975 – Some new species and combinations in *Phomopsis*. Transactions of the British Mycological Society 64, 427–435.
Punithalingam E, Sharma ND. 1979 – New microfungi from south east Asia. Nova Hedwigia 31, 881–897.
Purahong W, Hyde KD. 2011 – Effects of fungal endophytes on grass and non-grass litter decomposition rates. Fungal Diversity 47(1), 1–7.
Quaedvlieg W, Verkley GJM, Shin HD, Barreto RW et al. 2013 – Sizing up *Septoria*. Studies in Mycology 75, 307–390.
Raboin LM, Selvi A, Oliveira KM, Paulet F et al. 2007 – Evidence for the dispersal of a unique lineage from Asia to America and Africa in the sugarcane fungal pathogen *Ustilago scitaminea*. Fungal Genetics and Biology 44, 64–76.
Richardson MJ. 1990 – An Annotated List of Seed-Borne Diseases. Fourth Edition. International Seed Testing Association, Zurich.
Ryley MJ. 2006 – Notes on the type, synonyms, and other specimens of the balansioid fungus, *Nigrocornus scleroticus*. Mycotaxon 95, 97–112.
Saikkonen K, Helander M, Faeth SH, Schulthess F, Wilson D. 1999 – Endophyte-grass-herbivore interactions: the case of *Neotyphodium* endophytes in Arizona fescue populations. Oecologia 121, 411–420.
Sharma G, Shenoy BD. 2014 – *Colletotrichum fructicola* and *C. siamense* are involved in chili anthracnose in India. Archives of Phytopathology and Plant Protection 47(10), 1179–1194.
Sharp D, Simon BK. 2002 – AusGrass: Grasses of Australia. Australian Biological Resources, Canberra and Environmental Protection Agency, Queensland.
Sherriff C, Whelan MJ, Arnold GM, Bailey JA. 1995 – rDNA sequence analysis confirms the distinction between *Colletotrichum graminicola* and *C. sublineolum*. Mycological Research 99, 475–478.
Shivas RG, Athipunyakom P, Likhitekaraj S, Butranu W et al. 2007 – An annotated checklist of smut fungi (Ustilaginomycetes) from Thailand. Australasian Plant Pathology 36, 376–382.
Shivas RG, Athipunyakom P, McTaggart AR. 2008 – New records of smut fungi (Ustilaginomycetes) from Thailand, incluing two new species, *Sporisorium likhitekarahjae* and *Tilletia isachneicola*. Mycologia Balcanica 5, 103–107.
Sivanesan A.1987 – Graminicolous species of *Bipolaris*, *Curvularia*, *Drechslera*, *Exserohilum* and their teleomorphs. Mycological Papers 158, 1–261.
Smut fungi of Thailand. – http://collections.daff.qld.gov.au/web/key/thaismutfungi/Media/Html/host.html#A (last accessed 10th August 2018)

Somrithipol S, Jones EBG. 2003 – *Pseudoacrodictys dimorphospora* sp. nov., a new graminicolous hyphomycete from Thailand. Sydowia 55(6), 365–371.
Tamakaew N, Maharachchikumbura SSN, Hyde KD, Cheewangkoon R. 2017 – Tar spot fungi in Thailand. Mycosphere 8(8), 1054–1058.
Tan YP, Crous PW, Shivas RG. 2016 – Eight novel *Bipolaris* species identified from John L. Alcorn's collections at the Queensland Plant Pathology Herbarium (BRIP). Mycological Progress 15, 1203–1214.
Thambugala KM, Wanasinghe DN, Phillips AJL, Camporesi E et al. 2017 – Mycosphere notes 1–50: Grass (Poaceae) inhabiting. Mycosphere 8, 697–796, Doi 10.5943/mycosphere/8/4/13
The Plant List. 2018 – http://www.theplantlist.org (last accessed on 10th July 2018)
Titatarn S, Chiengkul A, Unchalisangkas D, Chamkrachang W et al. 1983 – Occurrence of *Ustilago coicis* on *Coix lachryma-jobi* in Thailand. Plant Disease 67, 434–435.
Trakunyingcharoen T, Lombard L, Groenewald JZ, Cheewangkoon R et al. 2014 – Mycoparasitic species of *Sphaerellopsis*, and allied lichenicolous and other genera. IMA Fungus 5(2), 391–414.
Udayanga D, Liu X, McKenzie EHC, Chukeatirote E et al. 2011 – The genus *Phomopsis*: biology, applications, species concepts and names of common phytopathogens. Fungal Diversity 50, 189–225.
Unartngam J, Janruang P, To–anan C. 2011 – Genetic diversity of *Puccinia polysora* in Thailand based on Inter Simple Sequence Repeat (ISSR) markers analysis. Journal of Agricultural Technology 7, 1125–1137.
Vánky K. 2007 – Taxonomic studies on Ustilaginomycetes - 27. Mycotaxon 99, 1–70.
Vánky K. 2008 – Taxonomic studies of Ustilaginomycetes -28. Mycotaxon 106, 133–178.
Vánky K. 2012 – Smut fungi of the world. American Phytopathological Society.
Vánky, K. 2013 – Illustrated genera of smut fungi. APS Press, St. Paul, Minnesota, 288 pp.
Vánky K, Shivas RG, Athipunyakom P. 2006 – New smut fungi (Ustilaginomycetes) from Thailand. Mycologia Balcanica 3, 107–118.
Watson L. 1990 – The grass family, Poaceae. Reproductive versatility in the grasses 1–31.
Wheeler DJ, Jacobs SW, Norton BE. 1990 – Grasses of New South Wales. University of New England.
Wijayawardene NN, Hyde KD, Wanasinghe DN, Papizadeh M et al. 2016 – Taxonomy and phylogeny of dematiaceous coelomycetes. Fungal Diversity 77, 1–316.
Wijayawardene NN, Hyde KD, Lumbsch HT, Liu JK et al. 2018 – Outline of Ascomycota: 2017. Fungal Diversity 88, 167–263.
Wikee S, Lombard L, Crous PW, Nakashima C et al. 2013a – *Phyllosticta capitalensis*, a widespread endophyte of plants. Fungal Diversity 60, 91–105.
Wikee S, Lombard L, Nakashima C, Motohashi K et al. 2013b – A phylogenetic re-evaluation of *Phyllosticta* (Botryosphaeriales). Studies in Mycology 76, 1–29.
Wong MK, Hyde KD. 2001 – Diversity of fungi on six species of Gramineae and one species of Cyperaceae in Hong Kong. Mycological Research 105, 1485–1491.
Xiao ZL, Hyde KD, Zhang JZ. 2015 – Synonymy of two species of *Bipolaris* from aquatic crops of *Poaceae*. Mycotaxon 130(1), 131–143.
Zhang W, Liu J, Huo PH, Zhang T et al. 2017 – Characterization and pathogenicity of *Bipolaris peregianensis*: the causal organism for leaf spot of hybrid bermudagrass in China. European Journal of Plant Pathology 148(3), 551–555.
Zhang W, Liu JX, Huo PH, Huang Z. 2018 – *Curvularia malina* causes a foliar disease on hybrid Bermuda grass in China. European Journal of Plant Pathology 151(2), 557–562.
Zundel GL. 1953 – The Ustilaginales of the World. Contributions from the Department of Botany Pennsylvania State College, School of Agriculture 176, 1–410.