



Ascomycetes on Para rubber (*Hevea brasiliensis*)

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Abstract

This study focuses on ascomycetes associated with Para rubber trees, collected from plantations in Thailand. We provide descriptions and phylogenies for one new genus, seven new species, two asexual-sexual morph connections, 20 new host records, and one reference specimen. Dothideomycetes are dominant among ascomycetes on Para rubber. Only three species from our collection have previously been reported from Para rubber in the Amazon Forest, where Para rubber originates. Most taxa found on rubber trees in this study have previously been recorded in Thailand, either on Para rubber or different hosts. It is apparent that the taxa jumped from unrelated hosts to colonize rubber. A checklist of fungi and fungus-like organisms associated with Para rubber is also provided. The checklist includes references for each taxon, life mode information, and distribution. The checklist comprises 785 species and 180 taxa identified only to genus from 59 countries. The taxa in the checklist belong in 67 orders, 168 families, and 513 genera.

Key words – Ascomycota – Checklist – Dothideomycetes – Euphorbiaceae – Multi-gene phylogenetics – Sordariomycetes

Table of content

The numbers of taxa in this study are organized following the Outline of Fungi and fungus-like taxa (Wijayawardene et al. 2020) and updated using recent relevant literature.

Class Dothideomycetes sensu O.E. Erikss. & Winka

Botryosphaeriales C.L. Schoch, Crous & Shoemaker

Botryosphaeriaceae Theiss. & Syd.

1. *Lasiodiplodia pseudotheobromae* A.J.L. Phillips, A. Alves & Crous, *Fungal Divers.* 28: 8 (2008)
2. *Lasiodiplodia theobromae* (Pat.) Griffon & Maubl., *Bulletin de la Société Mycologique de France* 25: 57 (1909)
3. *Sphaeropsis eucalypticola* A.J.L. Phillips, in Phillips et al., *Stud. Mycol.* 76: 158 (2013), **new host record**

Capnodiales Woron.

Mycosphaerellaceae Lindau

4. *Cercospora dioscoreae-pyrifoliae* J.M. Yen, *Bull. Trimest. Soc. Mycol. Fr.* 84: 6 (1968), **new host record**

Dyfrolomycetales K.L. Pang, K.D. Hyde & E.B.G. Jones

Pleurotremaataceae Walt. Watson (= Dyfrolomycetaceae K.D. Hyde et al.)

5. *Dyfrolomyces sinensis* Samarak., Tennakoon & K.D. Hyde, in Hyde et al., *Mycosphere* 9(2): 354 (2018), **new host record**

Hysteriales Lindau

Hysteriaceae Chevall.

6. *Gloniopsis leucaenae* Jayasiri, E.B.G. Jones & K.D. Hyde, *Mycosphere* 10 (1): 16 (2019), **new host record and sexual morph record**
7. *Rhytidhysterion neorufulum* Thambug. & K.D. Hyde, in Thambugala, Hyde, Eungwanichayapant, Romero & Liu, *Cryptog. Mycol.* 37(1): 110 (2016)
8. *Rhytidhysterion tectonae* Doilom & K.D. Hyde, in Doilom et al., *Fungal Divers.* 82: 107–182 (2016), **new host record**

Muyocopronales Mapook, Boonmee & K.D. Hyde

Muyocopronaceae K.D. Hyde

9. *Muyocopron garethjonesii* Tibpromma, Karun. & K.D. Hyde, in Tibpromma et al., *Mycosphere* 7(9): 1485 (2016), **new host record**
10. *Quadrisporella* Senwanna, Cheewangkoon & K.D. Hyde, **gen. nov.**
11. *Quadrisporella heveae* Senwanna, Cheewangkoon & K.D. Hyde, **sp. nov.**

Pleosporales Luttrell ex M.E. Barr

Corynesporascaceae Sivan.

12. *Corynespora cassiicola* (Berk. & M.A. Curtis) C.T. Wei, *Mycol. Pap.* 34: 5 (1950)

Didymosphaeriaceae Munk

13. *Montagnula thailandica* Mapook & K.D. Hyde, in Mapook et al., *Fungal Divers.* 101: 35 (2020), **new host record**
14. *Pseudopithomyces palmicola* Jun F. Li, Ariyaw. & K.D. Hyde, in Ariyawansa et al., *Fungal Divers.* 75: 27–274 (2015), **new host record**

Hermatomycetaceae Locq.

15. *Hermatomyces sphaericus* (Sacc.) S. Hughes, *Mycological Papers* 50: 100 (1953), **new host record**

Lophiostomataceae Sacc.

16. *Vaginatispora amygdali* A. Hashim., K. Hiray. & Kaz. Tanaka, in Hashimoto et al., *Stud. Mycol.* 90: 179 (2018), **new host record**

Neohendersoniaceae Giraldo & Crous

17. *Brevicollum hyalosporum* Kaz. Tanaka & Toy. Sato, in Tanaka et al., *Mycologia* 109(4): 611 (2017)

18. *Crassiparies octosporarum* Senwana, Cheewangkoon & K.D. Hyde, **sp. nov.**
19. *Crassiparies quadrisporus* M. Matsum., K. Hiray. & Kaz. Tanaka, in Li et al., Fungal Divers. 78: 63 (2016), **new host record**

Periconiaceae Nann.

20. *Periconia heveae* J.A. Stev. & Imle, Mycologia 37(5): 580 (1945), **reference specimen**

Phaeoseptaceae Boonmee, Thambug. & K.D. Hyde

21. *Pleopunctum heveae* Senwana, Cheewangkoon & K.D. Hyde, **sp. nov.**

Torulaceae Corda

22. *Torula fici* Crous, IMA Fungus 6 (1): 192 (2015), **new host record**

Venturiales Y. Zhang ter, C.L. Schoch & K.D. Hyde

Sympoventuriaceae Y. Zhang ter, C.L. Schoch & K.D. Hyde

23. *Clavatispora thailandica* Boonmee & K.D. Hyde, in Boonmee et al., Phytotaxa 176(1): 96 (2014)

24. *Verruconis heveae* Huanrluek, Senwana, Jayawardena & K.D. Hyde, in Huanraluek et al., Bhat & Hyde, Phytotaxa 403(1): 50 (2019)

25. *Verruconis phayaoensis* Senwana, Cheewangkoon & K.D. Hyde, **sp. nov.**

Class Sordariomycetes O.E. Erikss. & Winka

Diaporthales Nannf.

Coryneaceae Corda

26. *Coryneum heveanum* Senwana, Cheewangkoon & K.D. Hyde, in Senwana et al., MycoKeys 43: 81 (2018)

Cytosporaceae Fr.

27. *Cytospora diopuiensis* Q.J. Shang, J.K. Liu & K.D. Hyde, in Shang et al., Mycosphere 11(1): 202 (2020), **new host record and asexual morph record**

28. *Cytospora heveae* Senwana, Cheewangkoon & K.D. Hyde, **sp. nov.**

29. *Cytospora thailandica* Norph., T.C. Wen & K.D. Hyde, in Norphanphoun et al., MycoKeys 38: 106 (2018), **new host record**

Diaporthaceae Höhn. ex Wehm.

30. *Diaporthe heveicola* Senwana, Cheewangkoon & K.D. Hyde, **sp. nov.**

31. *Diaporthe rosae* Samarakoon & K.D. Hyde, in Wanasinghe et al., Fungal Divers. 89: 1–236 (2018), **new host record**

Hypocreales Lindau

Nectriaceae Tul. & C. Tul.

32. *Albonectria rigidiuscula* (Berk. & Broome) Rossman & Samuels, in Rossman et al., Stud. Mycol. 42: 105 (1999), **new host record**

33. *Nectria pseudotrichia* Berk. & M.A. Curtis, J. Acad. Nat. Sci. Philadelphia 2, 2: 289. 1853

Coronophorales Nannf. (= Melanosporales N. Zhang & M. Blackw.)

Nitschkiaceae (Fitzp.) Nannf.

34. *Fracchiaea heveae* Senwana, Cheewangkoon & K.D. Hyde, **sp. nov.**

Sporidesmiales Crous

Sporidesmiaceae Fr.

35. *Sporidesmium tropicale* M.B. Ellis, Mycol. Pap. 70: 58 (1958), **new host record**

Xylariales Nannf.

Diatrypaeaceae Nitschke

36. *Allocryptovalsa cryptovalsoidea* (Trouillas, W.M. Pitt & Gubler) Senwana et al., Mycosphere 8 (10): 1840 (2017), **new host record**

37. *Paraeutypella citricola* (Speg.) L.S. Dissan., Wijayaw., J.C. Kang & K.D. Hyde, in Dissanayake, Wijayawardene, Dayarathne, Samarakoon & Dai, Biodiversity Data Journal 9: e63864, 14 (2021), **new host record**

Introduction

Hevea brasiliensis Müll. Arg. (Euphorbiaceae) is commonly known as the Para rubber tree and commercially, is the only source for the natural rubber (Jayasinghe 1999b, Lieberei 2007). Natural rubber is a secondary metabolite (cis 1,4-polyisoprene) that cannot easily be replaced by commercially produced synthetic rubber (Rippel & Galembeck 2009, Souza et al. 2009, Zhu & Zhang 2009). With the high economic value, rubber plantations have expanded throughout the tropics, especially in Southeast Asia (Fox et al. 2014, Ahrends et al. 2015, Warren-Thomas et al. 2015). Many forests and traditional agricultural systems in the tropics have been converted to monocultures plantations of rubber trees (Chen et al. 2016, Meijide et al. 2018). This results in significant biodiversity loss and increase the pathogen density in the ecosystem (Vongkamheng et al. 2016, Meijide et al. 2018, Nguyen et al. 2020). Para rubber plantations also contribute to climate change (Ahrends et al. 2015, Wangpimool et al. 2017).

The Para rubber tree is an exotic forest species originating from tropical rain forests in the Amazon Basin of South America, which sustains high microbial diversity (Jayasinghe 1999b, Hyde & Soyong 2007, Orwa et al. 2009, Hytönen et al. 2019). Para rubber has highly diverse associations with microorganisms, including fungi. Several fungal pathogens (e.g., *Colletotrichum* spp., *Corynespora cassiicola*, *Phytophthora palmivora*) cause diseases in all growth stages of Para rubber (Déon et al. 2012a, Sunpapao & Pornsuriya 2014, Liu et al. 2018). However, natural rubber and some rubber-based products also show higher susceptibility towards fungi (Evueh & Ogbemor 2008, Ogbemor 2010, Gasparotto et al. 2012, Sunpapao & Pornsuriya 2014, Liu et al. 2018b, Sterling et al. 2019). Many economically important fungal pathogens are found in forests. However due to the high diversity of other micro-organisms, pathogenicity may be suppressed (Weir 1926). In Central and South America, Leaf Blight disease (SALB) is an important and serious disease caused by *Pseudocercospora ulei*, which can seriously affect Para rubber plantation yields (Rands 1924, Weir 1926, Gazis & Chaverri 2010, FAO 2011, Rocha et al. 2011). Moreover, leaf spot, leaf fall and powdery mildew disease caused by *Colletotrichum* spp., *Corynespora cassiicola*, *Erysiphe necator*, *E. quercicola*, and *Oidium heveae* are also important diseases in rubber plantations (Liyanaage and Jacob 1992, Limkaisang et al. 2005, Ogbemor 2010, Sunpapao & Pornsuriya 2014, Liyanage et al. 2016, Villarraga et al. 2017). However, the fungal infection process varies with physiological as well as geographical factors. Altogether, these factors affect the disease epidemiology (Weir 1926, Oghenekaro et al. 2014, Monkai et al. 2017). Therefore, the expansion of monoculture rubber plantations can affect the ecology of the plantation area through diseases epidemics and pathogenicity (Jayasinghe 1999a, b, Ploetz 2007, Narayanan & Mydin 2012, Monkai et al. 2017). There have been several studies of endophytes, saprobes, and pathogens on Para rubber worldwide. Nonetheless, the information of the fungi on Para rubber is relatively poor and many taxa lack molecular data. Hence, a revised taxonomic approach with multi-gene phylogenetic analysis is necessary to understand the fungal diversity associated with Para rubber and its effect on related ecosystems.

Thailand is the world's largest rubber producer and exporter since 1991 (Romyen et al. 2018). Para rubber plantations expanded from the south of Thailand to the north and northeast, leading to widespread land conversion to monoculture rubber cultivation (Pansak 2015, Tongkaemkaew & Patanothai 2015, Wangpimool et al. 2017). The fungi on Para rubber in Thailand have been relatively poorly investigated and only a few reports are available (Seephueak et al. 2011, Rodesuchit et al. 2012, Sunpapao & Pornsuriya 2014, Trakunyingcharoen et al. 2015, Srihanant & Petcharat 2015, Thaochan et al. 2020). Due to the fast distribution of Para rubber as well as climate change effects, it is important to investigate the fungal diversity of Para rubber plantations in Thailand. Para rubber is an exotic plant in Thailand and provides a platform to study fungal host interactions, lifestyle shifts and host jumping. In this study, we provide descriptions and

phylogenies of ascomycetes associated with para rubber plantations in Thailand. Multi-gene phylogeny coupled with taxonomic comparison are used to identify and confirm the current taxonomic placements of these taxa. In addition, a checklist of fungi associated with *Hevea brasiliensis* is provided.

Materials & Methods

Collections, morphological studies, and isolation

Fresh materials (symptomatic and asymptomatic of Para rubber) were collected from Para rubber plantations in Chiang Mai, Chiang Rai, Loei, Phayao, Ranong, and Sukhothai provinces in Thailand. The methods of this study follow Senwana et al. (2019) and Senayanake et al. (2020).

DNA extraction, PCR amplification and DNA sequencing

Genomic DNA was extracted from fungal mycelium grown on MEA or fungal fruiting bodies, using the Biospin Fungus Genomic DNA Extraction Kit (BioFlux®, Hangzhou, P.R. China), FavorPrep Tissue Genomic DNA Extraction Mini Kit (FAVORGEN Biotech Corp., Taiwan), and the BIOMIGA Fungus Genomic DNA Extraction Kit (Biomiga Inc., USA) and E.Z.N.A.® Genomic DNA Isolation Kits (OMEGA Bio-Tek, Georgia) respectively, according to the manufacturer's protocol. Extracted DNA was stored at -20 °C. PCR amplifications were performed for selected gene regions using given primers (Table 1) and conditions as shown described in Senwana et al. (2019).

Phylogenetic analyses

Sequences were assembled using SeqMan 5.00 and the closely related taxa for newly generated sequences were selected from GenBank® based on BLASTn searches of the NCBI nucleotide database (<http://blast.ncbi.nlm.nih.gov/>) as well as recent studies. The individual gene alignments were initially aligned by MAFFT version 7 (Kato et al. 2019, <http://mafft.cbrc.jp/alignment/server/>) and improved manually where necessary in BioEdit v.7.0.9.1 (Hall 1999) and MEGA7 (Kumar et al. 2015). The final alignments of the combined multi-gene dataset were analyzed and inferred the phylogenetic trees based on maximum likelihood (ML) and Bayesian inference (BI) analyses.

The ML analyses were performed by using the RAxML-HPC2 on XSEDE (v. 8.2.8) (Stamatakis et al. 2008, Stamatakis 2014) via the CIPRES Science Gateway platform (Miller et al. 2010). Maximum likelihood bootstrap values equal or greater than 60% are defined above each node. The BI analyses were performed by MrBayes on XSEDE, MrBayes 3.2.6 (Huelsenbeck & Ronquist 2001) via the CIPRES Science Gateway platform (Miller et al. 2010). Bayesian posterior probabilities (BYPP) (Rannala & Yang 1996, Zhaxybayeva & Gogarten 2002) were determined by Markov Chain Monte Carlo Sampling (BMCMC). Six simultaneous Markov chains were run from random trees for 1,000,000 generations or depending on individual settings for the fungal group and trees were sampled every 100th generation. The run was stopped when the standard deviation of split frequencies was reached below 0.01. The first 10% of generated trees representing the burn-in phase of the analysis were discarded and the remaining trees were used for calculating PP in the majority rule consensus tree. Bayesian posterior probabilities (BYPP) equal to or greater than 0.95 are defined above the nodes. The phylogenetic tree was visualized in FigTree v.1.4.3 (Rambaut 2016) and edited in Adobe Illustrator CC 2019 version 23.0.3.585 and Adobe Photoshop CS6 version 13.0. (Adobe Systems. USA). The newly generated sequences in this study were deposited in GenBank.

Table 1 Details of gene loci sequenced and primers used for phylogenetic analyses.

Genus (number of isolates used for sequencing)	Gene/loci ^a	PCR primers (forward/reverse)	References for primer
<i>Brevicollum</i> (2), <i>Clavatispora</i> (2), <i>Corynespora</i> (1), <i>Crassiparies</i> (4), <i>Dyfrlolomyces</i> (1), <i>Glioniopsis</i> (2), <i>Hermatomyces</i> (1), <i>Montagnula</i> (1), <i>Muyocopron</i> (1), <i>Periconia</i> (1), <i>Pleopunctum</i> (2), <i>Rhytidhysterion</i> (4), <i>Sporidesmium</i> (1), <i>Torula</i> (3), <i>Verruconis</i> (4), <i>Quadrisporella</i> (1)	LSU SSU ITS TEF1 RPB2	LR0R/LR5 NS1/NS4 ITS5/ITS4 EF1-983F/EF1-2218R fRPB2-5f/fRPB2-7cR	Vilgalys & Hester (1990) White et al. (1990) White et al. (1990) Rehner (2001) Liu et al. (1999)
<i>Cercospora</i> (2)	ITS TEF1 ACT	ITS5/ITS4 EF1-728F/EF1-986R ACT512F/ACT783R	White et al. (1990) Carbone & Kohn (1999) Carbone & Kohn (1999)
<i>Coryneum</i> (2)	ITS LSU TEF1	ITS5/ITS4 LR0R/LR5 EF1-728F/EF1-986R	White et al. (1990) Vilgalys & Hester (1990) Carbone & Kohn (1999)
<i>Cytospora</i> (5)	ITS LSU ACT TEF1	ITS5/ITS4 LR0R/LR5 ACT512F/ACT783R EF1-728F/EF2	White et al. (1990) Vilgalys & Hester (1990) Carbone & Kohn (1999) Carbone & Kohn (1999), O'Donnell et al. (1998)
<i>Diaporthe</i> (2)	ITS TEF1 TUB2	ITS5/ITS4 EF1-728F/EF2 Bt-2a/Bt-2b	White et al. (1990) Carbone & Kohn (1999), O'Donnell et al. (1998) Glass & Donaldson (1995)
Diatrypaceae: <i>Allocryptovalsa</i> (1), <i>Eutypella</i> (1)	ITS TUB2	ITS5/ITS4 T1/Bt-2b	White et al. (1990) O'Donnell & Cigelnik (1997), Glass & Donaldson (1995)
<i>Fracchiacea</i> (1)	LSU TEF1 RPB2	LR0R/LR5 EF1-526F/ EF1-1526R fRPB2-5f/fRPB2-7cR	Vilgalys & Hester (1990) Rehner (2001) Liu et al. (1999)
<i>Lasiodiplodia</i> (5)	ITS TEF1 TUB2	ITS5/ITS4 EF1-688F/EF1-986R Bt-2a/Bt-2b	White et al. (1990) Alves et al. (2008), Carbone & Kohn (1999) Glass & Donaldson (1995)
Nectriaceae: <i>Albonectria</i> (1), <i>Nectria</i> (1)	ITS LSU RPB1 TUB2	ITS5/ITS4 LR0R/LR5 RPB1-Ac/RPB1-Cr Bt-2a/Bt-2b	White et al. (1990) Vilgalys & Hester (1990) Matheny et al. (2002) Glass & Donaldson (1995)
<i>Pseudopithomyces</i> (1)	LSU ITS RPB2	LR0R/LR5 ITS5/ITS4 fRPB2-5f/fRPB2-7cR	Vilgalys & Hester (1990) White et al. (1990) Liu et al. (1999)
<i>Sphaeropsis</i> (1)	ITS TEF1 TUB2	ITS5/ITS4 EF-728F/EF2 Bt-2a/Bt-2b	White et al. (1990) Carbone & Kohn (1999), O'Donnell et al. (1998) Glass & Donaldson (1995)

^a ACT: Actin, ITS: Part of rDNA 18S (3' end), the first internal transcribed spacer (ITS1), the 5.8S rRNA gene, the second ITS region (ITS2), and part of the 28S rRNA (5' end); LSU: 28S large subunit rDNA; SSU: 18S small subunit rDNA; TEF1: translation elongation factor 1-alpha gene; RPB1: RNA polymerase II largest subunit; RPB2: RNA polymerase II second largest subunit; TUB2: β -tubulin

Results

Taxonomy

Phylum Ascomycota Caval.-Sm.

Class Dothideomycetes sensu O.E. Erikss. & Winka

Botryosphaeriales C.L. Schoch, Crous & Shoemaker

Botryosphaeriaceae Theiss. & Syd.

Botryosphaeriaceae are endophytes, pathogens, and saprobes of a wide range of hosts in temperate, tropical and subtropical regions (Burgess et al. 2006, Phillips et al. 2013, Slippers et al. 2013, Dissanayake et al. 2017a, Wu et al. 2021). Some pathogenic taxa are associated with cankers, dieback and rot diseases on ecologically and economically important plants (Phillips et al. 2013, Trakunyingcharoen et al. 2015a, b, Marin-Felix et al. 2017, Karunanayake & Adikaram 2020, Batista et al. 2021). Currently, 22 genera are listed in this family (Phillips et al. 2019, Hongsanant et al. 2020b). In this study, four collections belonging to *Lasiodiplodia pseudotheobromae* (1) and *L. theobromae* (3) were made and identified (Fig. 1). The asexual morphs of *Lasiodiplodia* are characterized by hyaline and aseptate conidia becoming brown and 1-septate when mature, with longitudinal striations on the conidial surface (Hyde et al. 2013, Phillips et al. 2013). Many species are pathogens of various hosts (Burgess et al. 2006, Phillips et al. 2013, Trakunyingcharoen et al. 2015a, Rosado et al. 2016, Karunanayake & Adikaram 2020). In addition, *Sphaeropsis eucalypticola* is newly recorded on *Hevea brasiliensis* in Thailand.

Lasiodiplodia pseudotheobromae A.J.L. Phillips, A. Alves & Crous, Fungal Divers. 28: 8 (2008)

Fig. 2

Index Fungorum number: IF510941

Saprobic on seed cover of *Hevea brasiliensis*. Sexual morph: Undetermined. Asexual morph: *Conidiomata* (170–)190–300 μm diam. (\bar{x} = 234 μm , n = 10), superficial, solitary to gregarious, globose or subglobose, dark brown to black, with a central ostiole. *Peridium* composed of cells of *textura angularis*, outer layers dark brown to black, inner layers hyaline, thin-walled. *Pseudoparaphyses* (27–)35–55(–60) μm long, 1.8–3.5 μm wide, hyaline, aseptate, cylindrical, widest at the base, tapering towards the ends. *Conidiophores* reduced to conidiogenous cells. *Conidiogenous cells* (6.8)7.5–11.2 \times (2–)3.2–4.7 μm (\bar{x} = 9 \times 4 μm , n = 20), holoblastic, hyaline, thin-walled, smooth-walled, cylindrical. *Conidia* (16.7–)22–28(–31.5) \times (9.5–)11–14.5 μm (\bar{x} = 26 \times 13 μm , n = 40), hyaline, aseptate when immature, medianly 1-euseptate, dark brown, thick-walled, ellipsoid to obovoid, base truncate or rounded, with longitudinal striations from apex to base when mature.

Culture characteristics – Conidia germinating on MEA within 24 hours at room temperature and germ tubes produced from apex. Colonies on MEA circular, velvety, moderately fluffy, white at first, becoming greyish white to black.

Material examined – Thailand, Phayao Province, Mueang District, on seed cover of *Hevea brasiliensis* (Euphorbiaceae), 3 January 2017, C. Senwana, RBPY32 (MFLU 21-0202), living culture MFLUCC 17-0349.

Host and distribution – Wide host range, widely distributed in tropical and subtropical regions.

GenBank numbers – MFLUCC 17-0349: ITS = OL782124, LSU = OL782046, TEF1 = OL944420, TUB2 = OL840994.

Notes – Phylogenetic analyses show that strain MFLUCC 17-0349 grouped within the *Lasiodiplodia pseudotheobromae* clade (Fig. 1). In the BLASTn search, the closest match to the ITS, TEF1 and TUB2 sequences with 100% similarity was *L. pseudotheobromae*. The morphology from our collection (MFLU 21-0202) is similar to the asexual morph of the holotype (Pavlic et al. 2008) and the collection from Para rubber (Trakunyingcharoen et al. 2014). We, therefore, name our collections as *L. pseudotheobromae*.

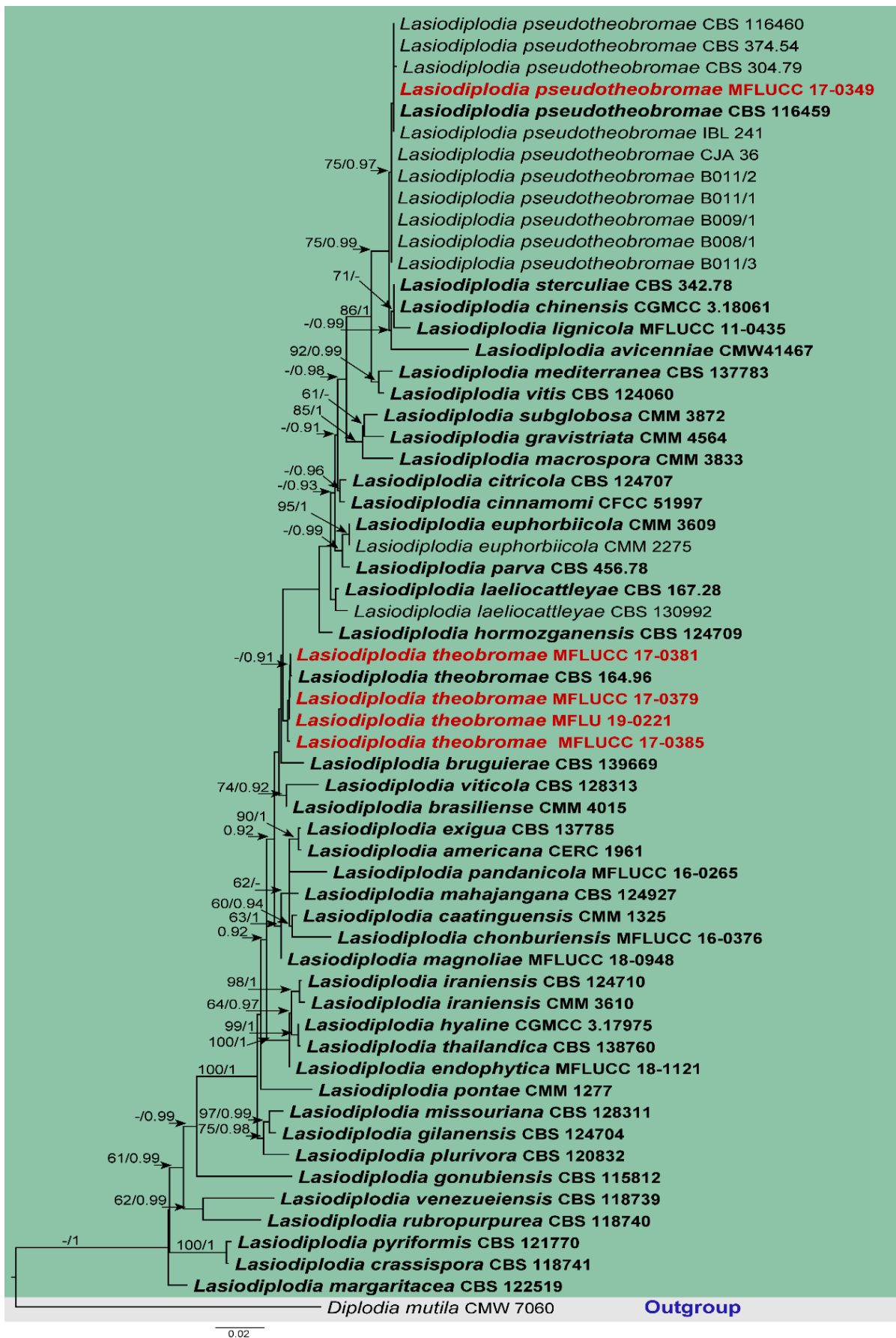


Figure 1 – RAxML tree of *Lasiodiplodia* based on analyses of a combined ITS, TEF1 and TUB2 sequence data. Sixty strains are included in the combined sequence analysis, which comprise 1272 characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring

RAxML tree with a final likelihood value of -4820.523529 is presented. The matrix had 350 distinct alignment patterns, with 18.51% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.209484, C = 0.303163, G = 0.256114, T = 0.231239; substitution rates: AC = 1.381847, AG = 3.568230, AT = 1.705303, CG = 1.053067, CT = 5.370543, GT = 1.000000; gamma distribution shape parameter $\alpha = 0.659489$. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Diplodia mutila* (CMW 7060) is used as the outgroup taxon.

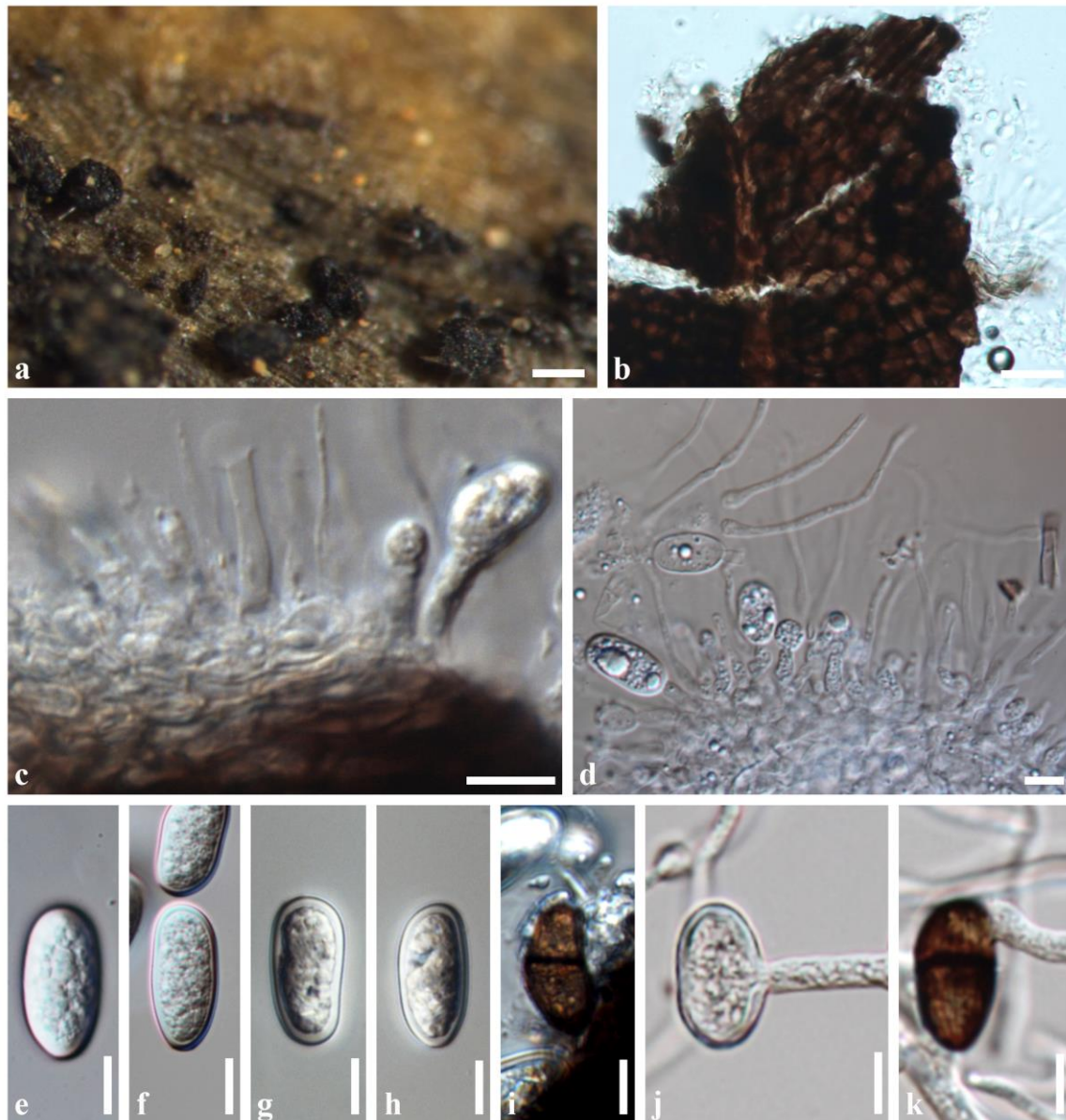


Figure 2 – *Lasiodiplodia pseudotheobromae* (MFLU 21-0202). a Conidiomata on substrate. b Squash mounts showing the peridium. c, d Paraphyses and conidiogenesis. e–i Conidia. j, k Germinated spores. Scale bar: a = 200 μm , b = 20 μm , c–k = 10 μm .

Lasiodiplodia theobromae (Pat.) Griffon & Maubl., Bulletin de la Société Mycologique de France 25: 57 (1909) Fig. 3

Index Fungorum number: IF805924

Saprobic on dried petiole, associated with dieback of twig (attached on tree) and stem of *Hevea brasiliensis*. Sexual morph: Undetermined. Asexual morph: *Conidiomata* (160–)170–

390(–405) × (155–)165–300 μm (\bar{x} = 263 × 236.5 μm, n = 19), immersed to semi-immersed, becoming raised to erumpent through the host tissue, uni- to multi-locular, solitary to gregarious, globose or subglobose, dark brown to black, with a central ostiole. *Peridium* 12–66 μm wide, cell of *textura angularis*, outer layers dark brown to black, inner layers hyaline, thin-walled. *Pseudoparaphyses* up to 29–70 μm long, 2.7–4 μm wide, hyaline, aseptate, cylindrical, occasionally branched, ends rounded. *Conidiophores* reduced to conidiogenous cells. *Conidiogenous cells* 7–15 × 2.5–6 μm (\bar{x} = 11 × 4 μm, n = 10), holoblastic, hyaline, thin-walled, smooth-walled, cylindrical. *Conidia* (18–)21–29 × 10.5–14(–17) μm (\bar{x} = 24.5 × 13 μm, n = 56), hyaline, aseptate when immature, medially 1-aseptate, dark brown, thick-walled, ellipsoid to obovoid, base truncate or rounded, with longitudinal striations from apex to base when mature.

Culture characteristics – Conidia germinating on MEA within 24 hours at room temperature and germ tubes produced from apex. Colonies on MEA circular, velvety, moderately fluffy, cultures white at first, becoming greyish white to black.

Material examined – Thailand, Chiang Mai Province, Mueang District, on dried petiole of *Hevea brasiliensis* (Euphorbiaceae), 22 September 2016, C. Senwana, RBCM02 (MFLU 19-0219), living culture MFLUCC 17-0379; *ibid.*, on stem of *Hevea brasiliensis* (Euphorbiaceae), 22 September 2016, C. Senwana, RBCM04 (MFLU 19-0221), living culture MFLUCC 17-0381; *ibid.*, on branch (attached to the tree) of *Hevea brasiliensis* (Euphorbiaceae), 22 September 2016, C. Senwana, RBCM08 (MFLU 19-0225), living culture MFLUCC 17-0385.

Host and distribution – Wide host range, widely distributed in tropical and subtropical regions.

GenBank number – MFLUCC 17-0379: ITS = OL782125, LSU = OL782047, TEF1 = OL944421, TUB2 = OL840995; MFLU 19-0221: ITS = OL782126; MFLUCC 17-0381: ITS = OL782127; MFLUCC 17-0385: ITS = OL782128, TEF1 = OL944422, TUB2 = OL840996.

Notes – In the BLASTn search, the closest matches to the ITS, TEF1 and TUB2 sequences of our strains with 100% similarity were *Lasiodiplodia theobromae*. *Lasiodiplodia theobromae* is a common opportunistic pathogen that occurs on many host plants (i.e., Myrtaceae, Pinaceae, Proteaceae, Sapotaceae) worldwide and is similar to *L. pseudotheobromae* in having hyaline, ellipsoid, aseptate conidia, becoming dark brown with a median single septum and having longitudinal striations when mature, but they differ in conidia size (Alves et al. 2008, Trakunyingcharoen et al. 2015b). The species has also been reported as saprobic and pathogenic on Para rubber (Dingley et al. 1981, Saikia 1982, Seephueak et al. 2011). In this study, the phylogenetic analysis shows that four strains MFLUCC 17-0379, MFLUCC 17-0381, MFLUCC 17-0385 and MFLU 19-022 grouped with *Lasiodiplodia theobromae* (CBS 164.96, type strain) (Fig. 1). The morphology of our strains are also similar to *L. theobromae* (Griffon & Maublanc 1909). We, therefore, name our collections as *L. theobromae*.

Sphaeropsis eucalypticola A.J.L. Phillips, in Phillips et al., Stud. Mycol. 76: 158 (2013) Fig. 5
≡ *Sphaeropsis chromolaenicola* Mapook & K.D. Hyde, in Mapook et al., Fungal Divers. 101: 113 (2020)

Index Fungorum number: IF 805924

Associated with cankers on twig (attached on tree) of *Hevea brasiliensis*. Sexual morph: Ascomata 200–245 × 170–250 μm (\bar{x} = 223 × 212.3 μm, n = 10), appearing as black to dark brown spots, solitary or scattered, convex on host tissue, initially immersed in tissue, becoming semi-immersed, globose, coriaceous, with a central ostiole. *Peridium* 31–40 μm (\bar{x} = 34.4 μm, n = 10) wide, cells of *textura angularis*, dark brown to black. *Pseudoparaphyses* 3.4–5.8 μm (\bar{x} = 4.6 μm, n = 20) wide, oblong to cylindrical, septate, constricted at the septum. *Asci* (52–)70–120(–127.5) × (12–)19–32(–41) μm (\bar{x} = 90 × 26.2 μm, n = 19), 8-spored, bitunicate, fissitunicate, cylindrical-clavate or clavate, with a short pedicel, apically rounded with an ocular chamber. *Ascospores* (21.5)24–30(–32) × 10–15.5 μm (\bar{x} = 27.5 × 13 μm, n = 38), overlapping biseriate, hyaline to yellowish brown when immature, becoming brown to dark brown when mature, ellipsoid to ovoid,

aseptate, ends rounded, with an apiculus at each end, widest at the center and tapering towards the narrow ends, with granular appearance. Asexual morph: Undetermined.

Culture characteristics – Ascospores germinating on MEA within 24 hours at room temperature and germ tubes produced from apex. Colonies on MEA circular, velvety, moderately fluffy, cultures white at first, becoming greyish white to dark olivaceous and dark in reverse.

Material examined – Thailand, Phayao Province, Muang District, on twig (attached on tree) of *Hevea brasiliensis* (Euphorbiaceae), 2 October 2016, C. Senwana, RBPY05 (MFLU 19-0236), living culture MFLUCC 17-0324 (new host record).

Host and distribution – *Bauhinia purpurea* (Thailand; Phookamsak et al. 2019), *Chromolaena odorata* (Thailand; Mapook et al. 2020), *Eucalyptus* sp. (Thailand; Liu et al. 2012), *Hevea brasiliensis* (Thailand; this study), *Tectona grandis* (Thailand; Doilom et al. 2015).

GenBank number – MFLUCC 17-0324: ITS = OL782129, LSU = OL782045, SSU = OL780518, TEF1 = OL944419, TUB2 = OL944406.

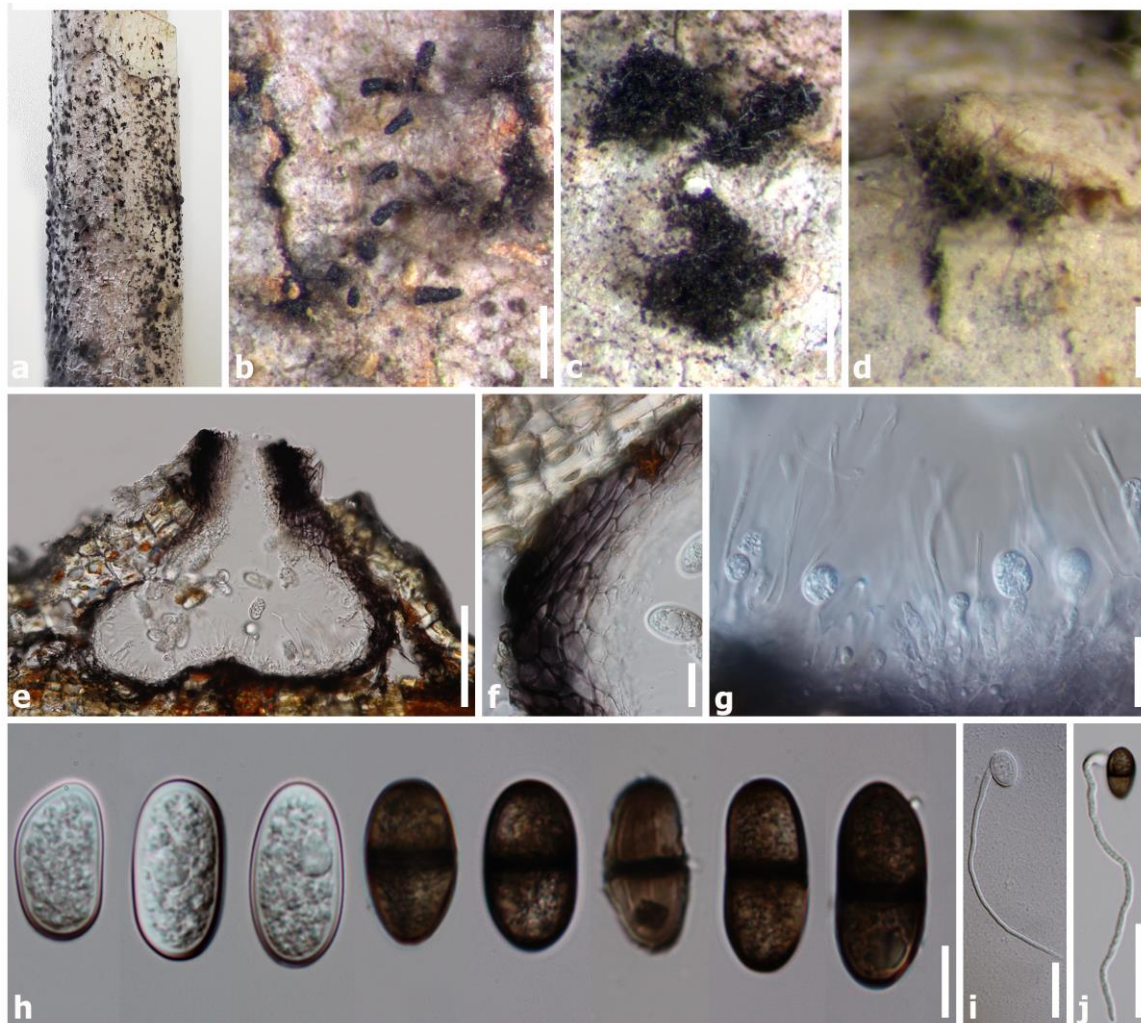


Figure 3 – *Lasiodiplodia theobromae* (MFLU 19-0225). a Substrate. b–d Conidiomata on the substrate. e Section through the conidioma. f Peridium. g Paraphyses and conidiogenesis. h Conidia. i, j Germinated spores. Scale bars: a = 500 µm, b = 50 µm, c–j = 20 µm.

Notes – *Sphaeropsis* was introduced by Saccardo (1880b) and characterized by brown, aseptate ascospores with a small apiculus at either end. In the BLASTn search, the closest match to the ITS and LSU sequences with 100% similarity (MT214366 and MT214460) were *S. chromolaenicola* (MFLUCC 17-1499) and *S. eucalypticola* (MFLUCC 12-0171; MK108956, CBS 133993; MH866075 and MFLUCC 11-0654; JX646803), while the closest match to TEF1 and

TUB2 sequences with 100% (KX646363), and 99.67% (KX671965) similarity, were *S. eucalypticola* (strain MFLUCC 13-0701). A comparison of the LSU gene region of our strain (MFLUCC 17-0324), *S. chromolaenicola* (MFLUCC 17-1499, type strain) and *S. eucalypticola* (MFLUCC 11-0579, type strain) reveals one base pair difference (0.12%) across 835 nucleotides, while a comparison of the ITS (+5.8S) gene region shows that *S. chromolaenicola* is not significantly different from *S. eucalypticola* (0/491 bp). In addition, comparison of the TEF1 and TUB2 gene regions show that our strain (MFLUCC 17-0324) is not significantly different from *S. eucalypticola*. However, we could not compare the TEF1 and TUB2 gene region of *S. chromolaenicola* (MFLUCC 17-1499) due to a lack of sequences. We, therefore, synonymized *S. chromolaenicola* as *S. eucalypticola* based on phylogenetic analyses. Our strain of *Sphaeropsis eucalypticola* (MFLUCC 17-0324) was isolated from a twig of *Hevea brasiliensis*. This is well-supported in the phylogenetic tree (Fig. 4) and in agreement with the type descriptions (Liu et al. 2012). However, the asci of our strain and that of *Chromolaena odorata* (Mapook et al. 2020) are broader than reported by Liu et al. (2012). This may be due to distribution and morphological variability within the species. *Sphaeropsis eucalypticola* has been reported from different hosts (Liu et al. 2012, Doilom et al. 2017, Phookamsak et al. 2019, Mapook et al. 2020), but this is the first report from *Hevea brasiliensis*.

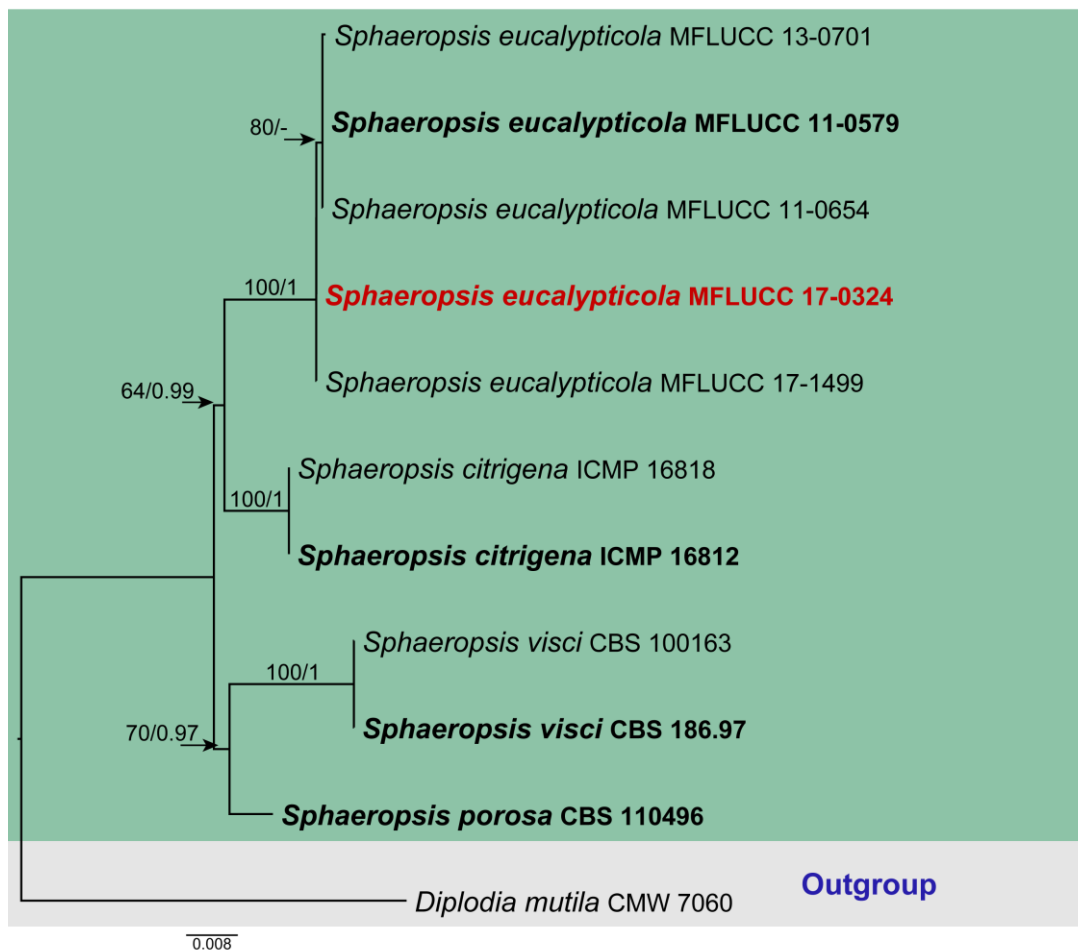


Figure 4 – RAxML tree of *Sphaeropsis* based on analyses of a combined LSU, ITS, TEF1 and TUB2 sequence data. Eleven strains are included in the combined sequence analysis, which comprise 2175 characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree with a final likelihood value of -4157.744015 is presented. The matrix had 158 distinct alignment patterns, with 8.88% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.224679, C = 0.269908, G = 0.285826, T = 0.219587; substitution rates: AC = 1.410032, AG = 2.214590, AT = 0.406236, CG = 1.511840, CT

= 5.536141, GT = 1.000000; gamma distribution shape parameter $\alpha = 2.466509$. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Diplodia mutila* (CMW 7060) is used as the outgroup taxon.

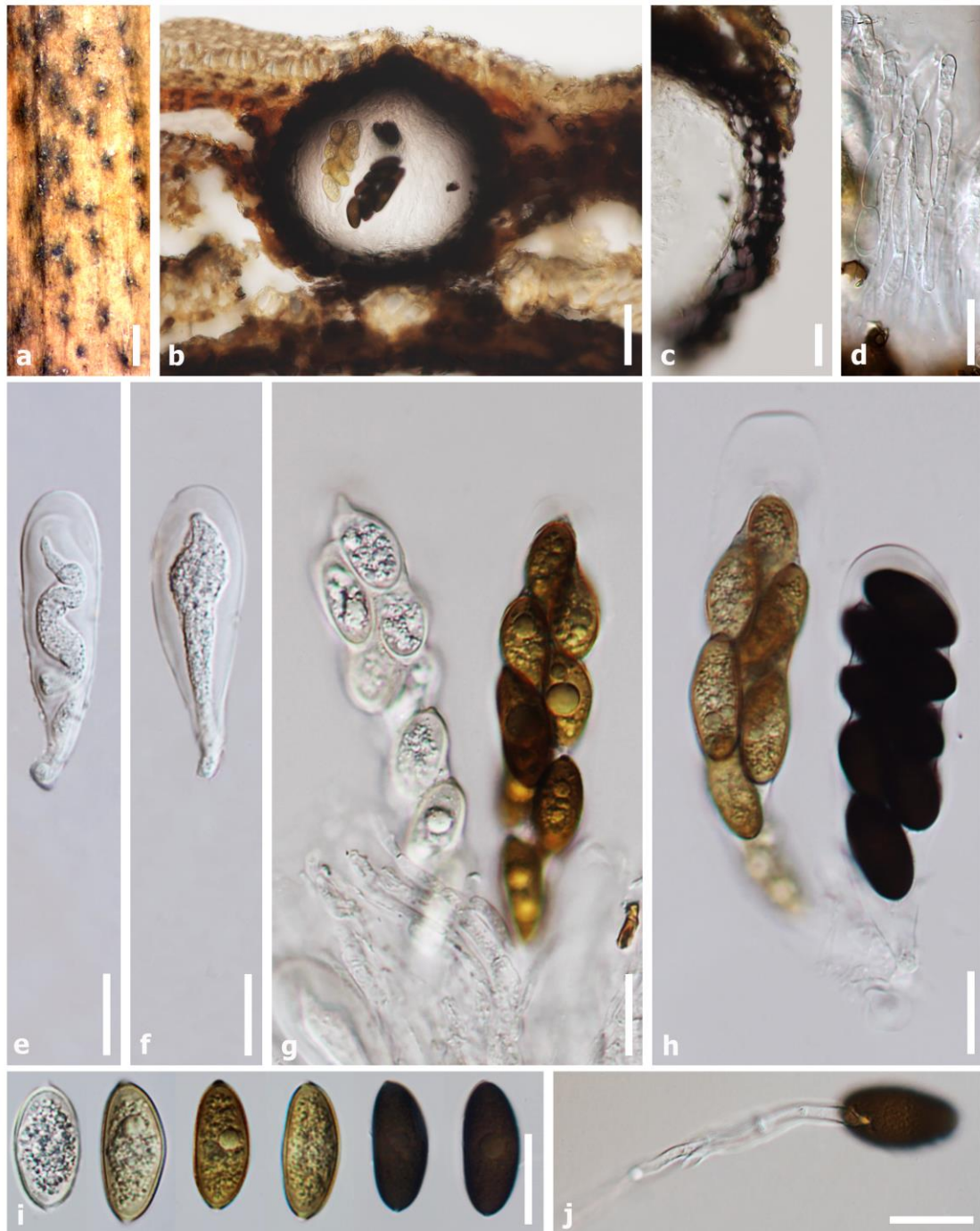


Figure 5 – *Sphaeropsis eucalypticola* (MFLU 19-0236, new host record). a Habit on substrate. b Section through the ascoma. c Peridium. d Pseudoparaphyses. e–h Asci. i Ascospores. j Germinated spore. Scale bars: a = 500 μm , b = 50 μm , c–j = 20 μm .

Capnodiales Woron.

Mycosphaerellaceae Lindau

Mycosphaerellaceae is highly diversified in morphology and lifestyles (Videira et al. 2017, 2018). Several genera are economically relevant species causing diseases on a wide range of plants,

e.g. *Pseudocercospora* spp. causing sigatoka diseases on banana worldwide, *Ps. angolensis* causing fruit and leaf spot disease of citrus, *Nothopassalora personata* causing foliar diseases of groundnut, *Cercospora apii* causing leaf spot disease of celery (Videira et al. 2017, 2018, Świdarska-Burek et al. 2020). Currently, 112 genera and 107 doubtful genera are accepted in the family (Videira et al. 2017, 2018, Hongsanan et al. 2020b). *Cercospora* is one of the most devastating genera causing diseases on various plant hosts worldwide (Videira et al. 2018, Jayawardena et al. 2020, Meswaet et al. 2021). The genus is characterized by pigmented conidiophores, thickened and darkened conidiogenous loci and conidial hila and hyaline conidia (Groenewald et al. 2013). In this study, *Cercospora dioscoreae-pyrifoliae* was collected from Para rubber.

Cercospora dioscoreae-pyrifoliae J.M. Yen, Bull. Trimest. Soc. Mycol. Fr. 84: 6 (1968) Fig. 7
Index Fungorum number: IF327742

Associated with leaf spots of leaves of *Hevea brasiliensis*, distinct, subcircular to circular, pale brown to brown on upper surface with dark brown margin, surrounded by yellowish halo, light brown on lower surface. Sexual morph: Undetermined. Asexual morph: *Caespituli* epiphyllus, scattered. *Stromata* substomatal to intraepidermal, dark brown to black, erumpent, 89–118 μm diam. giving rise to fascicle of conidiophores (fascicles up to 50 μm). *Conidiophores* (27–)57–75(–86) \times (3.5–)4–5 μm (\bar{x} = 66 \times 4.7 μm , n = 20), 2–4-septate, erumpent through the cuticle, pale to medium brown, straight, smooth, wall thin to slightly thickened, unbranched. *Conidiogenous cells* (7–)17–30(–34) \times (3.5–)4–5.5 μm (\bar{x} = 24 \times 4.6 μm , n = 15), integrated, terminal, conidiogenous loci conspicuous, 2.5–3(–3.6) μm wide, apical, darkened, thickened. *Conidia* (40–)63–164(–183) \times (3.5–)4–5 μm (\bar{x} = 114 \times 5 μm , n = 20), solitary, hyaline, subcylindrical, straight to slight curved, tapering from the middle of the conidium to an acutely rounded apex, (3–)5–7(–11)-septate, hilum truncate, 2–3 μm wide, thickened and darkened.

Culture characteristics – Conidia germinating on MEA within 24 hours at room temperature and germ tubes produced from every cell of conidium. Colonies on MEA circular, slightly raised, surface smooth with entire edge, whitish grey at the surface with white margin and dark brown from the centre of the colony in reverse with white margin.

Material examined – Thailand, Phayao Province, Muang, on leaf spot of *Hevea brasiliensis* (Euphorbiaceae), 3 January 2017, C. Senwana, RBPY24 (MFLU 19-0250), living culture MFLUCC 17-0343) (new host record).

Host and distribution – *Dioscorea bulbifera* (India; Kamal 2010), *D. esculenta* (Papua New Guinea; Groenewald et al. 2013), *D. pyrifolia* (Singapore; Braun et al. 2014), *D. tokoro* (Japan; Nakashima et al. 2011), *D. rotundata* (Papua New Guinea; Groenewald et al. 2013), *Hevea brasiliensis* (Thailand; this study).

GenBank numbers – MFLU 19-0250: ITS = OL782131, TEF1 = OL944424, ACT = OM000383; MFLUCC 17-0343: ITS = OL782130, TEF1 = OL944423, ACT = OM000382.

Notes – In a BLASTn search, the closest matches of the ITS sequences with 100% similarity were *Cercospora glycinicola* (CPC 23912; NR_147293), *C. belicola* (CBS16456; NR_121315), *C. corchori* (MUCC 585; NR_120172) and *C. fagopyri* (CBS 132623; NR_147263). The TEF1 sequences were 100% similar to *Cercospora* cf. *sigesbeckiae* (CBS 132641; JX143412), while the ACT sequences were 100% similar to was *C. pileicola* (CBS 132607; JC143147). Phylogenetic analyses show that MFLU 19-0250 and MFLUCC 17-0343 grouped with *C. dioscoreae-pyrifoliae* clade (Fig. 6). The morphology from our collection (MFLU 19-0250) is similar to *C. dioscoreae-pyrifoliae* described by Sivanesan (1985) and Braun et al. (2014). However, our collection has shorter conidiophores (27–86 \times 3.5–5 vs 60–150 \times 4–5 vs (10–)40–200 \times 3–7 μm) and number of septa of conidiophores (2–4 vs 0–3 vs 0–8 septate) and conidia ((3–)5–7(–11) vs 2–18 vs 3–18 septate). Thus, we name our collection as *C. dioscoreae-pyrifoliae* which is a new host record for *Hevea brasiliensis* in Thailand.

Dyfrulomycetales K.L. Pang, K.D. Hyde & E.B.G. Jones

Pleurotremataceae Walt. Watson (= Dyfrulomycetaceae K.D. Hyde et al.)

Pleurotremaaceae comprises three genera viz. *Dyfrolomyces*, *Pleurotrema* and *Melomastia* which have been collected from aquatic, mangrove and terrestrial habitats (Hongsanan et al. 2020a). In this study, a new host record of *Dyfrolomyces sinensis* collected from Para rubber is reported. *Dyfrolomyces* was introduced by Pang et al. (2013) to accommodate species having immersed, globose or subglobose, coriaceous, clypeate, ostiolate, papillate ascomata, bitunicate, fissitunicate, cylindrical asci and broadly fusiform, symmetrical, hyaline, septate ascospores, with or without a mucilaginous sheath.

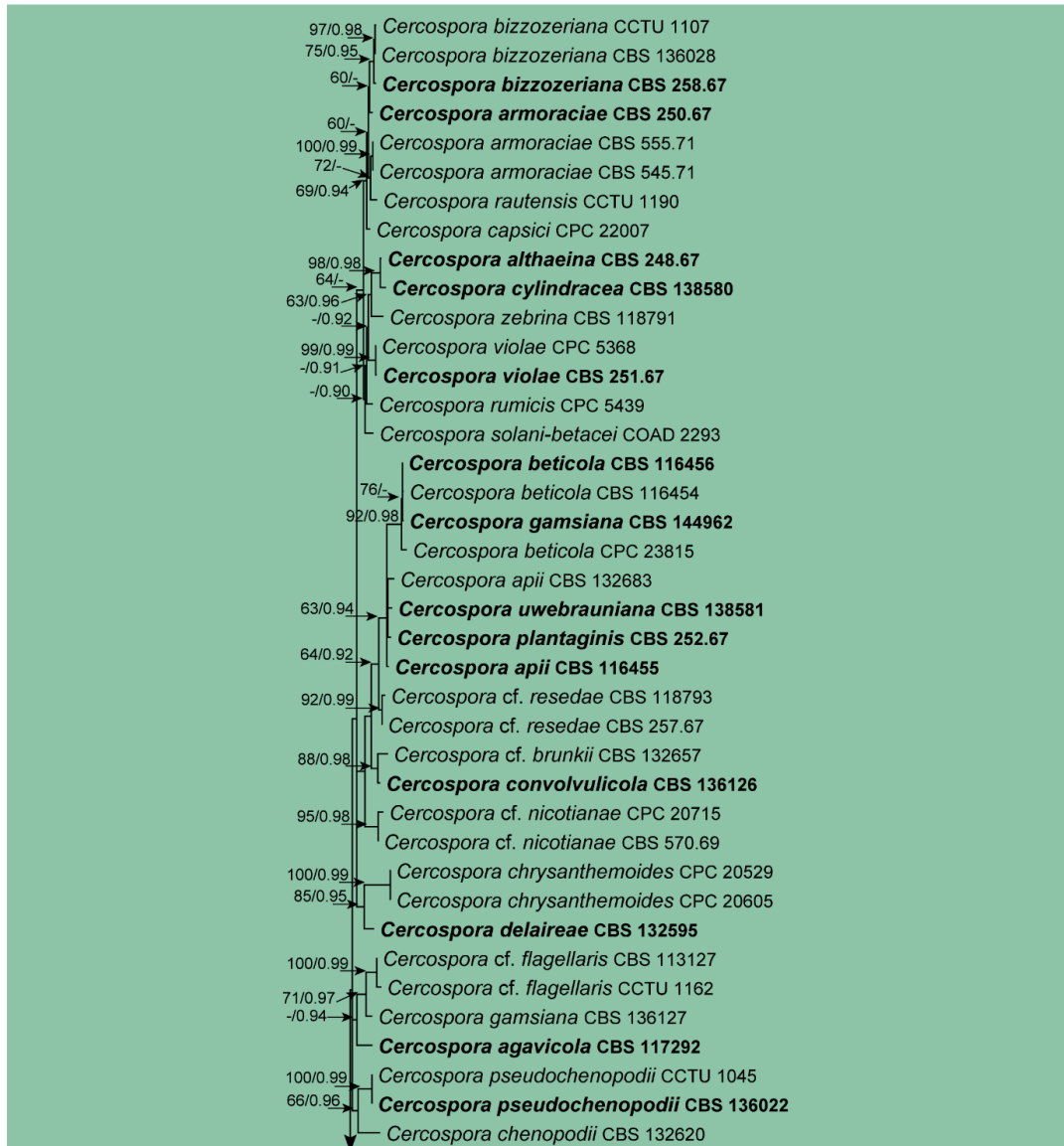


Figure 6 – RAxML tree of *Cercospora* based on analyses of a combined ITS, TEF1, ACT, CAL and His3 sequence data. Ninety-eight strains are included in the combined sequence analysis, which comprise 1764 characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree with a final likelihood value of -14889.898786 is presented. The matrix had 675 distinct alignment patterns, with 20.44% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.230414, C = 0.305071, G = 0.249835, T = 0.214680; substitution rates: AC = 1.512332, AG = 3.895838, AT = 1.275323, CG = 1.116955, CT = 5.847230, GT = 1.000000; gamma distribution shape parameter α = 0.559200. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Pseudocercospora chiangmaiensis* (AGI094.3 and CBS 123244) are used as outgroup taxa.



Figure 6 – continued.

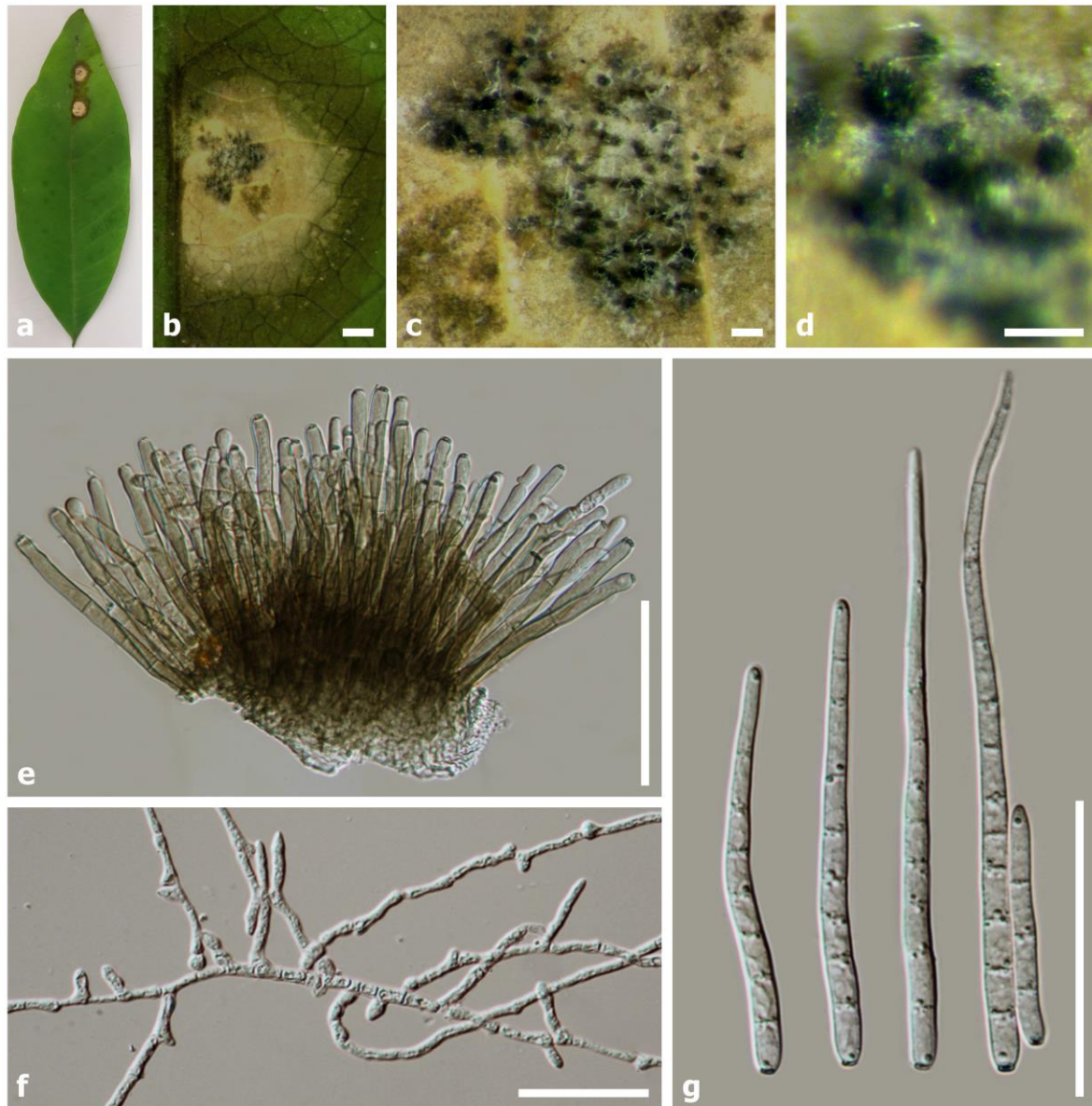


Figure 7 – *Cercospora dioscoreae-pyrifoliae* (MFLU 19-0250, new host record). a Leaf spots. b–d Close-up lesion with stromata. e Conidiophores. f Germinated spores. g Conidia. Scale bar: b, d = 100 μm , c = 500 μm , e, g = 50 μm , f = 30 μm .

Dyfronomyces sinensis Samarak., Tennakoon & K.D. Hyde, in Hyde et al., *Mycosphere* 9(2): 354 (2018) Fig. 9

Index Fungorum number: IF554110

Saprobic on branch of *Hevea brasiliensis*. Sexual morph: *Ascomata* up to 570 μm diam. \times 590 μm high, solitary, immersed, globose to subglobose, dark brown to black, ostiolate. *Peridium* 40–76 μm (\bar{x} = 55.6 μm , n = 15) wide, composed of cells of *textura angularis*, outer layers dark brown to black, thick-walled, inner layers thin-walled. *Pseudoparaphyses* 2.2–5 μm (\bar{x} = 3.5 μm , n = 20) wide, numerous, hyaline, septate, embedded in a gelatinous matrix. *Asci* (123–)145–214(–230) \times 6–11 μm (\bar{x} = 181.7 \times 8.6 μm , n = 30), 8-spored, bitunicate, cylindrical, short-pedicellate, with a thickened apex. *Ascospores* (15–)17–24(–27) \times 5–8 μm (\bar{x} = 21 \times 6.4 μm , n = 50), uniseriate, hyaline, ellipsoid, pointed at the ends, cylindrical, mostly 5–7-septate, with several small guttules, slightly constricted at septa when mature. Asexual morph: Undetermined.

Culture characteristics – Ascospores germinating on MEA within 24 hours at room temperature and germ tubes produced from one or both ends. Colonies on MEA circular, mycelium

slightly raised, entire, cultures white at first, becoming greyish white from the centre with dark brown margin from above, with dark brown aerial mycelium and dark brown to black in reverse with dark brown aerial mycelium.

Material examined – Thailand, Chiang Rai Province, Wiang Chiang Rung District, on branch of *Hevea brasiliensis* (Euphorbiaceae), 1 November 2016, C. Senwana, RBCR20 (MFLU 19-0232), living culture MFLUCC 17-2606 (new host record).

Host and distribution – *Camellia sinensis* (Thailand; Hyde et al. 2018), *Hevea brasiliensis* (Thailand; this study).

GenBank numbers – MFLUCC 17-2606: ITS = OL782132, LSU = OL782048, TEF1 = OL875098.

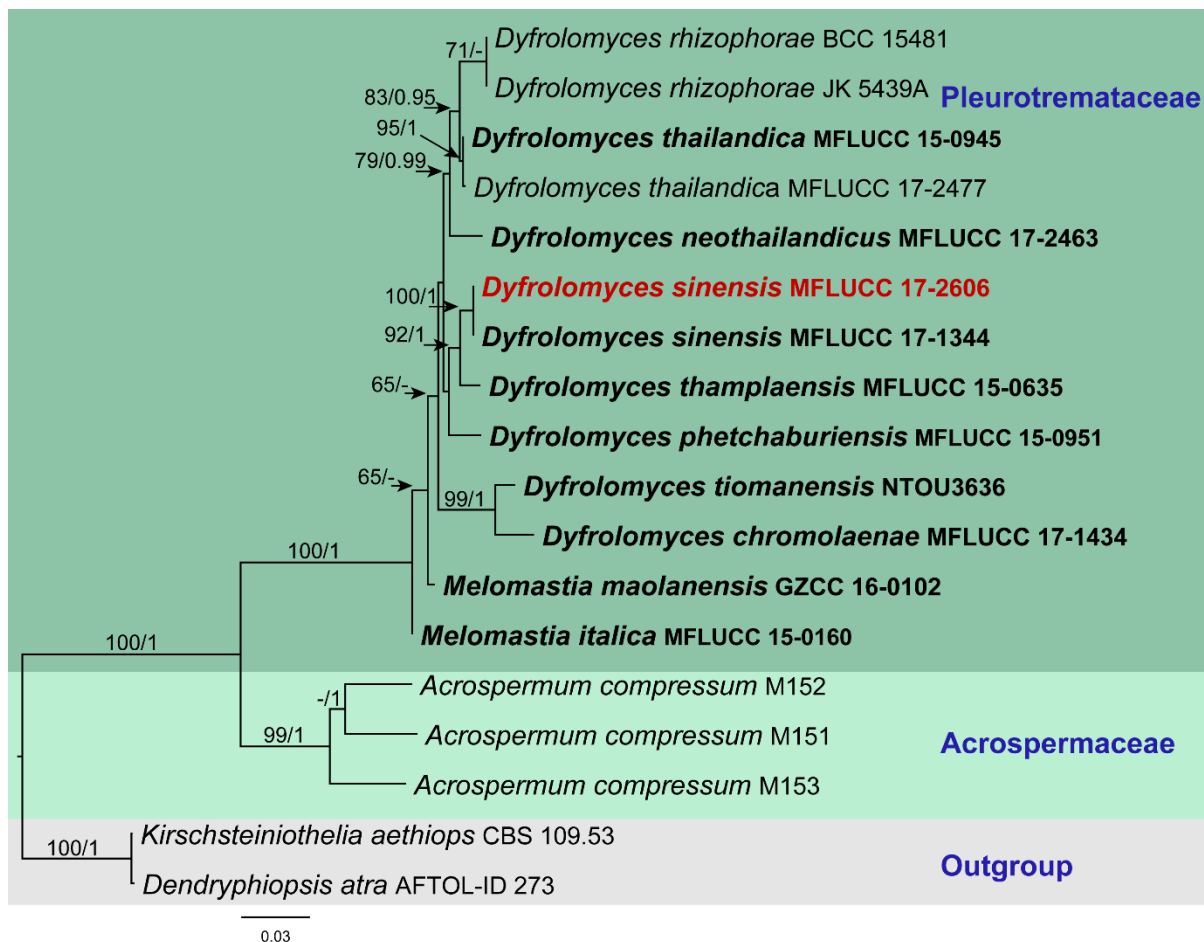


Figure 8 – RAxML tree of *Dyfrolomyces* based on analyses of a combined ITS, and SSU sequence data. Eighteen strains are included in the combined sequence analysis, which comprise 1974 characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree with a final likelihood value of -6132.007847 is presented. The matrix had 413 distinct alignment patterns, with 16.04% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.246371, C = 0.237857, G = 0.301813, T = 0.213958; substitution rates: AC = 1.102533, AG = 3.032887, AT = 0.905777, CG = 1.489388, CT = 8.402890, GT = 1.000000; gamma distribution shape parameter α = 0.971894. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Dendryphiopsis atra* (AFTOL-ID 273) and *Kirschsteiniothelis aethiops* (CBS 109.53) are used as outgroup taxa.

Notes – A phylogenetic analysis based on a combined dataset of LSU, SSU and TEF1 sequence data shows that our strain (MFLUCC 17-2606) groups with *Dyfrolomyces sinensis* with

100% ML statistical support (Fig. 8). In a BLASTn search, the closest match of LSU sequences with 97.29% similarity was *D. neothailandicus* (MFLU 17-2589; MN017857). The morphology of our collection (MFLU 19-0232) is similar to the holotype from *Camellia sinensis* (Hyde et al. 2018) in having a similar shape and size of asci (123–230 × 6–11 vs 160–220 × 8–10) and ascospores (15–27) × 5–8 μm vs 18–30 × 5–8). We report our collection as a new host record of *Dyfrolomyces sinensis* from *Hevea brasiliensis*.

Hysteriales Lindau

Hysteriaceae Chevall.

Hongsanan et al. (2020b) accepted *Actidiographium*, *Gloniella*, *Gloniopsis*, *Hysterium*, *Hystero brevium*, *Hystero carina*, *Hystero difractum*, *Hystero glonium*, *Oedohysterium*, *Ostreichnion*, *Pseudoscypha*, *Psilogonium* and *Rhytidhysterion* in Hysteriaceae. In the present study, *Gloniopsis leucaenae*, *Rhytidhysterion neorufulum* and *Rhytidhysterion tectonae* is documented with a description and illustrations (Fig. 10).

Gloniopsis leucaenae Jayasiri, E.B.G. Jones & K.D. Hyde, Mycosphere 10 (1): 16 (2019) Fig. 11

Index Fungorum number: IF555527

Saprobic on branches of *Hevea brasiliensis*. Sexual morph: *Hysterothecia* 740–2140 μm × 115–184 μm × 152–176 μm (\bar{x} = 1283 × 147 × 168 μm, n = 10), navicular, black, with tapered ends, semi-immersed to superficial, scattered, straight or irregularly curved, with a prominent longitudinal slit. *Peridium* 20–37 μm, (\bar{x} = 27, n = 10) wide, composed of cells of *textura angularis*, outer dark brown to black, thick-walled, inner layer hyaline, thin-walled. *Pseudoparaphyses* 1.2–2.8 μm (\bar{x} = 1.85, n = 15) wide, hyaline, dense, septate, branched, filiform. *Asci* (56–) 60–76 (–117) × 13–17(–19) μm (\bar{x} = 71.5 × 16.3 μm, n = 13), 8-spored, bitunicate, subcylindrical to cylindrical, with a short pedicel, apically rounded, sometimes without a distinct ocular chamber. *Ascospores* 17–22(–26) × (5–)7–19 μm (\bar{x} = 20 × 7.5 μm, n = 30), biseriate to crowded, hyaline, subglobose and 1-septate when immature, becoming pale brown to dark brown, 7–11 transverse and 1–2 vertical septa, dictyospore, constricted at the central septa, slightly asymmetric in outline, smooth-walled when mature. Asexual morph: Undetermined.

Culture characteristics – Ascospores germinating on MEA within 24 hours at room temperature and germ tubes produced from end of ascospores. Colonies on MEA circular, mycelium slightly raised, fluffy, entire, cultures whitish grey to grey at the surface from the center of the colony at the surface with white margin, dark brown from the center of the colony in reverse with white margin.

Material examined – Thailand, Phayao Province, Muang District, on branch of *Hevea brasiliensis* (Euphorbiaceae), 3 January 2017, C. Senwanna, RBPY31 (MFLU 21-0201), living culture MFLUCC 17-0348 (new host record and sexual morph record).

Host and distribution – *Leucaena* sp. (Fabaceae) (Thailand; Jayasiri et al. 2019), *Hevea brasiliensis* (Thailand; this study).

GenBank numbers – MFLUCC 17-0348: ITS = OL782133, LSU = OL782049, SSU = OL780519, TEF1 = OL875099; MFLU 21-0201: ITS = OL782134, LSU = OL782050, SSU = OL780520, TEF1 = OL875100.

Notes – In a BLASTn search of NCBI GenBank, the closest match to the LSU and TEF1 sequences with 99.88% (KX646363), and 98.42% (KX671965) similarity were *G. calami*, while the closest match of the ITS sequences with 100% (MK347750) was *G. leucaenae*. In the present phylogenetic analysis, our strains (MFLUCC 17-0348 and MFLU 21-0201) clustered with *G. leucaenae* (MFLUCC 17-2425) with 100% ML/1 PP support (Fig. 10). However, we could not compare the morphological characteristics of our strains with those of *G. leucaenae*, which is only known as an asexual morph species with isolates from *Leucaena* sp. (Jayasiri et al. 2019), while our strain is found as a sexual morph in nature, and we could not obtain its asexual morph in culture. *Gloniopsis* was introduced by Boehm et al. (2009) and is characterized by dictyospores, hyaline to yellow ascospores, multi-septate, with one or more longitudinal septa. The morphology of our

collection (MFLU 21-0201, Fig 11) is similar to the description by Boehm et al. (2009) in having dictyospores, hyaline to yellow ascospores, multi-septate, with one or more longitudinal septa. We, therefore, name our collection as *G. leucaenae* and this is the first report of the sexual morph of *G. leucaenae*.

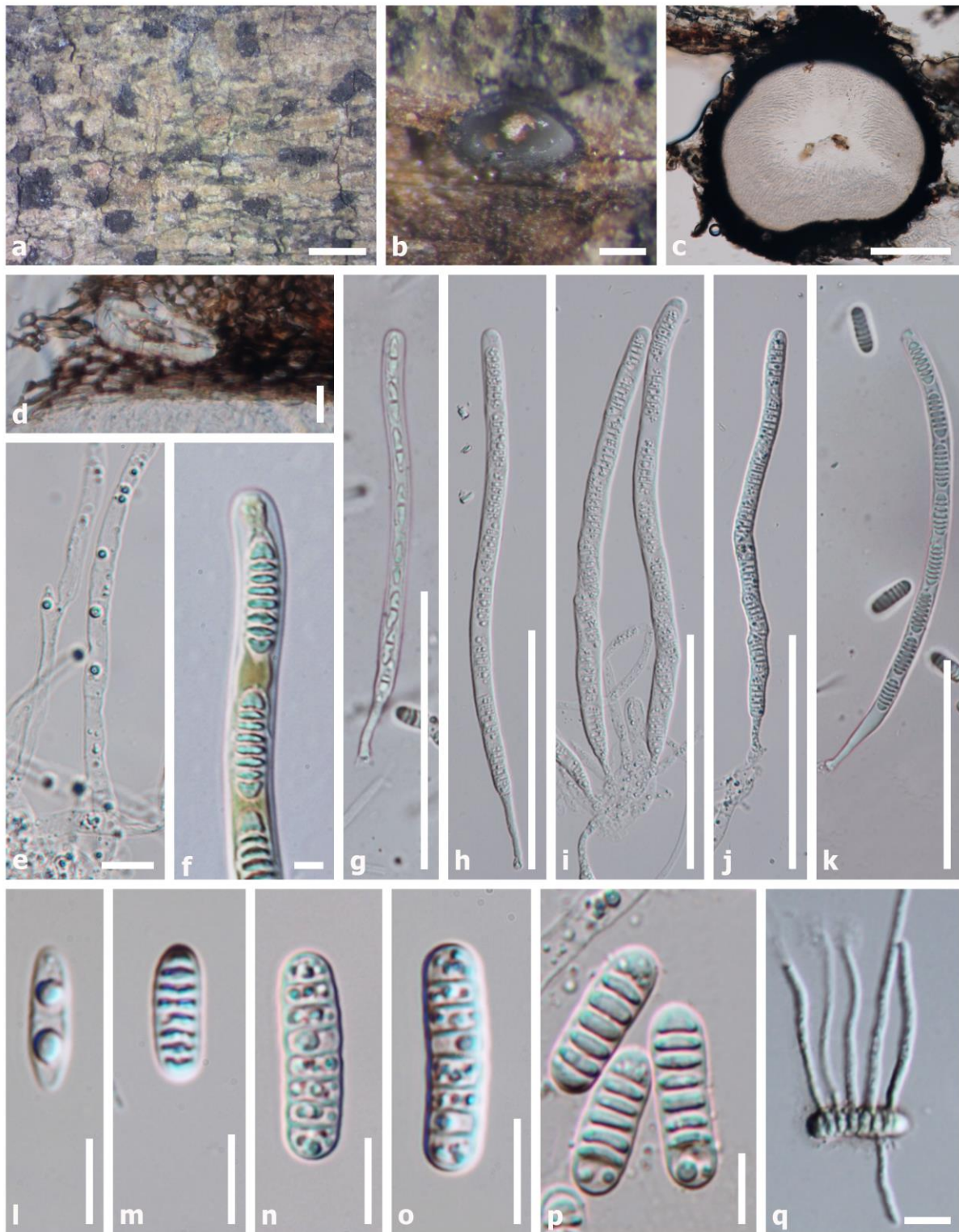


Figure 9 – *Dyfrolomyces sinensis* (MFLU 19-0232, new host record). a, b Ascomata on the host surface. c Vertical section through ascoma. d Peridium. e Pseudoparaphyses. f Apex of an ascus (mounted in Melzer’s reagent). g–k Asci. l–p Ascospores. q Germinating ascospore. Scale bars a = 1000 μ m, b–c = 500 μ m, d–f, l–q = 10 μ m, g–k 10 μ m.

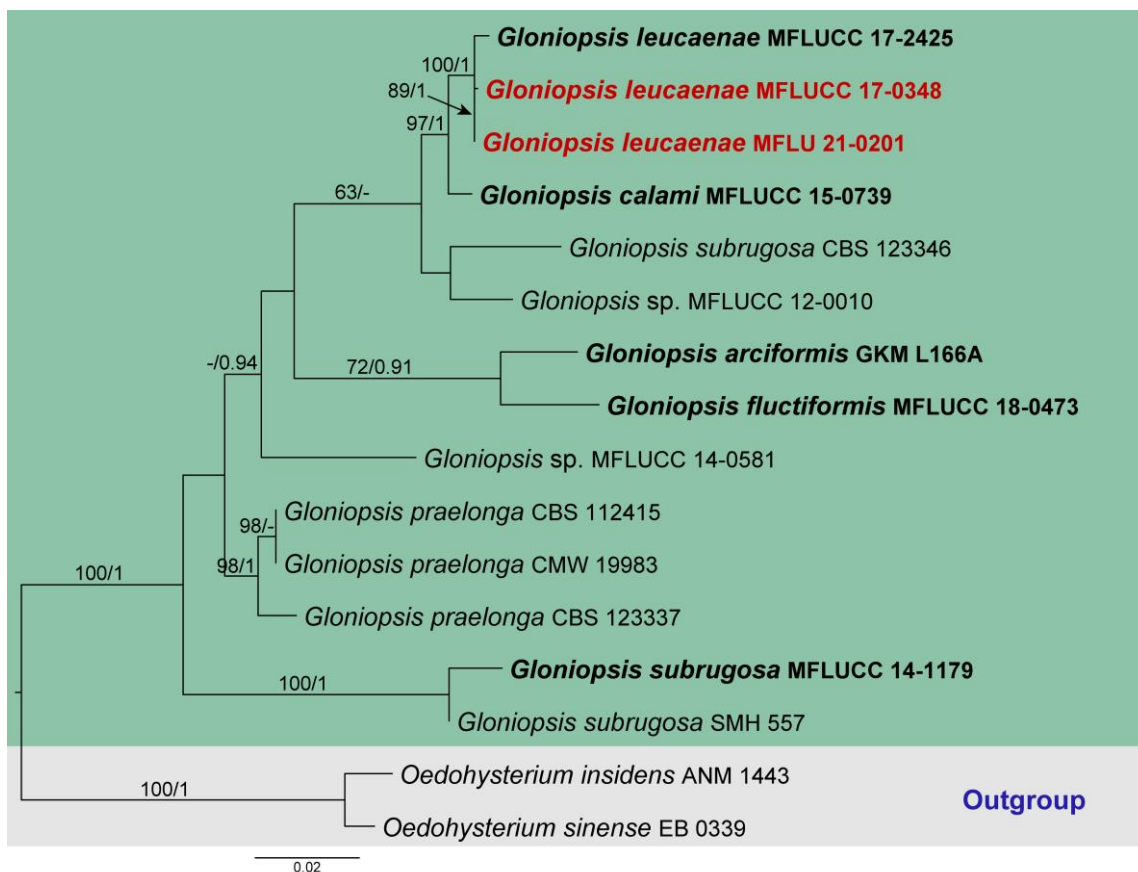


Figure 10 – RAxML tree of *Gloniopsis* based on analyses of a combined LSU, SSU, ITS and TEF1 sequence data. Sixteen strains are included in the combined sequence analysis, which comprise 3676 characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree with a final likelihood value of -8764.622064 is presented. The matrix had 455 distinct alignment patterns, with 31.40% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.243241, C = 0.240094, G = 0.279186, T = 0.237479; substitution rates: AC = 1.224503, AG = 2.349991, AT = 0.958589, CG = 0.597298, CT = 8.026386, GT = 1.000000; gamma distribution shape parameter α = 0.661483. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Oedohysterium insidens* (ANM 1443) and *O. sinense* (EB 0339) are used as outgroup taxa.

Rhytidhysterion neurufulum Thambug. & K.D. Hyde, in Thambugala, Hyde, Eungwanichayapant, Romero & Liu, Cryptog. Mycol. 37(1): 110 (2016) Fig. 13

Index Fungorum number: IF551865

Saprobic on branches and stems of *Hevea brasiliensis*. Sexual morph: *Hysterothecia* 1470–2786 × 480–715 × 414–724 μm (\bar{x} = 2113 × 592 × 561 μm , n = 15), navicular, black, with tapered ends, solitary to aggregated, semi-immersed to superficial, straight or irregularly curved, with a prominent longitudinal slit. *Exciple* 46–94 μm , (\bar{x} = 70.5, n = 18), composed of cells of *textura angularis*, outer brown to dark brown, thick-walled, inner layer hyaline, thin-walled. *Pseudoparaphyses* 1.5–2.7 μm (\bar{x} = 2, n = 16) wide, dense, hyaline, septate, filiform, forming light brown to yellow epithecium above the asci and enclosed in a gelatinous matrix. *Asci* (154.5–)163–209(–215) × 9–14(–16) μm (\bar{x} = 190 × 13 μm , n = 20), 8-spored, bitunicate, subcylindrical to cylindrical, pedicellate, apically rounded, sometimes without a distinct ocular chamber. *Ascospores* (21–)24–31 × 8–12 μm (\bar{x} = 27.3 × 10.1 μm , n = 42), uni-seriate, slightly overlapping, hyaline to pale brown, subglobose, 1-septate when immature, pale brown to dark brown, ellipsoidal to

fusiform, 2–3-septate, slightly rounded or pointed at both ends, constricted at the central septum, smooth-walled when mature. Asexual morph: Undetermined.

Culture characteristics – Ascospores germinating on MEA within 24 hours at room temperature and germ tubes produced from end of ascospores. Colonies on MEA circular, mycelium slightly raised, fluffy, entire, cultures white at the surface and creamy-white from the centre of the colony in reverse with white margin.



Figure 11 – *Gloniopsis leucaenae* (MFLU 21-0201, new host record and sexual morph record). a Substrate. b–d Ascomata on the host surface. e Section through the ascoma. f Peridium. g Pseudoparaphyses. h–l Asci. m Ascospores. n Germinated ascospore. Scale bars: b = 1000 μm , c–d = 500 μm , e = 100 μm , f = 20 μm , g, m, n = 10 μm , h–l = 10 μm .

Material examined – Thailand, Phayao Province, Muang District, on stem of *Hevea brasiliensis* (Euphorbiaceae), 2 October 2016, C. Senwana, RBPY01 (MFLU 19-0233), living culture MFLUCC 17-0321), RBPY02 (MFLU 19-0234); *ibid*, Chiang Rai Province, Wiang Chiang Rung District, on branches of *Hevea brasiliensis* (Euphorbiaceae), 1 November 2016, C. Senwana, RBCR04 (MFLU 19-0226), living culture MFLUCC 17-0370.

Host and distribution – undetermined hosts (Brazil; Almeida et al. 2014, Europe, Ghana; Boehm et al. (2009), undetermined dead stem (Thailand; Thambugala et al. 2016), *Hevea brasiliensis* (Thailand; Huanraluek et al. 2020, this study).

GenBank numbers – MFLUCC 17-0321: ITS = OL782135, LSU = OL782051, SSU = OL780521; MFLU 19-0234: ITS = OL782136, LSU = OL782052; MFLUCC 17-0370: ITS = OL782137, LSU = OL782053, SSU = OL780522.

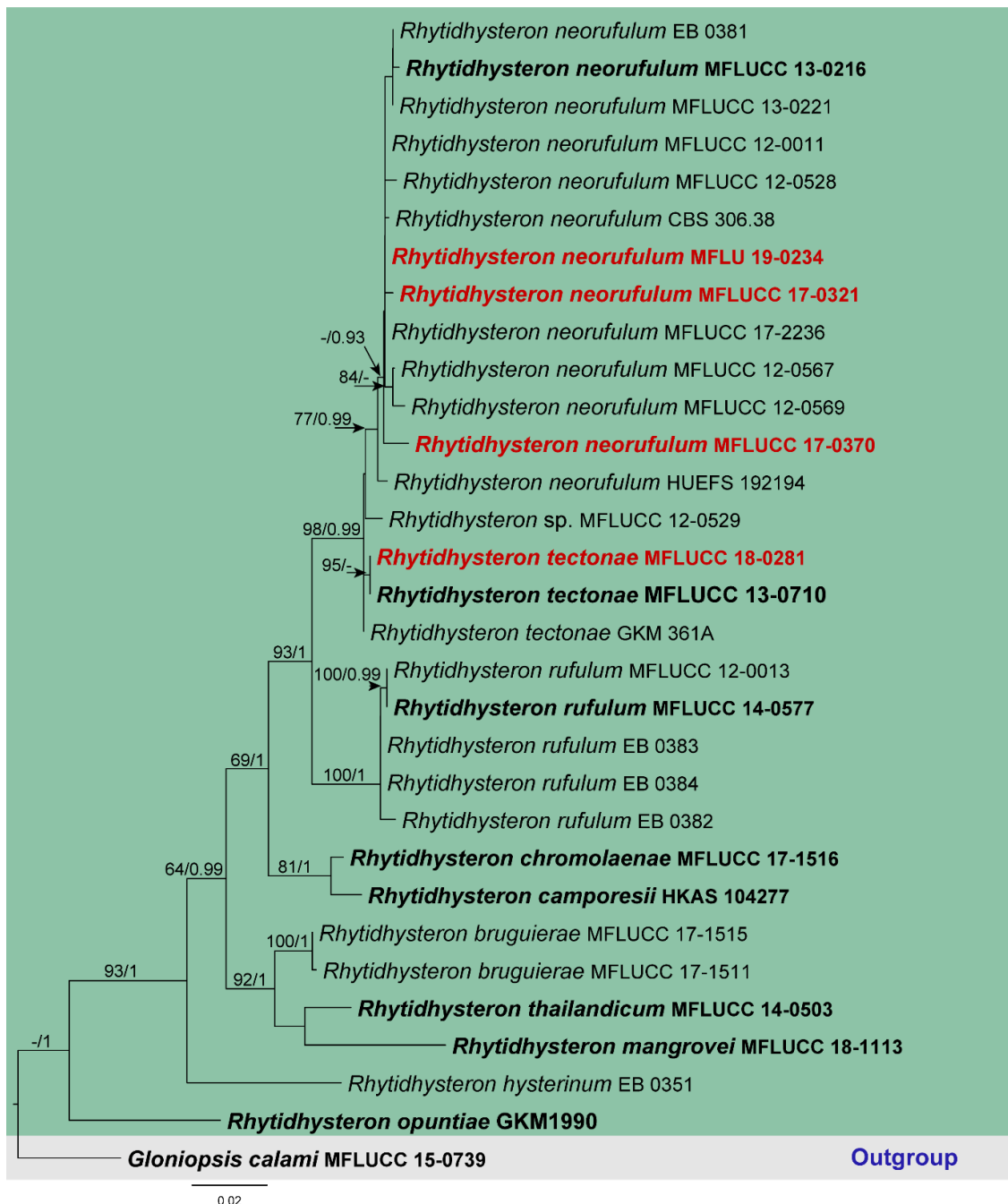


Figure 12 – RAxML tree of *Rhytidhysterion* based on analyses of a combined LSU, SSU, ITS and TEF1 sequence data. Thirty-one strains are included in the combined sequence analysis, which comprise 3558 characters with gaps. Tree topology of the ML analysis was similar to the BYPP.

The best scoring RAxML tree with a final likelihood value of -8867.131361 is presented. The matrix had 599 distinct alignment patterns, with 36.56 % of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.243152, C = 0.241115, G = 0.281797, T = 0.233935; substitution rates: AC = 1.671070, AG = 2.409632, AT = 1.117689, CG = 0.930433, CT = 7.216656, GT = 1.000000; gamma distribution shape parameter α = 0.492267. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Gloniopsis calami* (MFLUCC 15-0739) is used as the outgroup taxon.



Figure 13 – *Rhytidhysterium neorufulum* (MFLU 19-0233). a–b Ascomata on the host surface. c Section through ascoma. d–e Pseudoparaphyses. f Exciple. g–m Asci. n Ascospores. o Germinated ascospore. Scale bars: b = 500 μ m, c = 100 μ m, d, g–m = 50 μ m, e–f, n–o = 20 μ m.

Notes – Strains MFLUCC 17-0321, MFLU 19-0234, MFLUCC 18-0281 and MFLUCC 17-0370 are phylogenetically related to *Rhytidhysterion neorufulum*. In a BLASTn search, the ITS and LSU sequence of our four strains were *R. neorufulum* (MFLUCC 13-0216; KU377561 and KU377566) with 99% and 100% similarity. When comparing our strain with the type specimen of *R. neorufulum* (MFLUCC 13-0216), they are similar in morphology in having hysterothecia, and ellipsoidal to fusiform ascospores with 2–3-septate. However, our strain has larger hysterothecia, shorter exciple (46–94 vs 60–160 µm), wider asci (154.5–215 × 9–16 vs 185–220 × 9.5–13 µm) and larger ascospores (21–31 × 8–12 vs 27–34 × 6.5–10.6 µm) compared to the type strain (Thambugala et al. 2016).

Rhytidhysterion tectonae Doilom & K.D. Hyde, in Doilom et al., Fungal Divers. 82: 107–182 (2016) Fig. 14

Index Fungorum number: IF551964

Saprobic on branches of *Hevea brasiliensis*. Sexual morph: *Hysterothecia* (395–)700–2055(–2920) × (540–)690–1210(–1250) × (280–)630–1310(–1330) µm (\bar{x} = 1156 × 995 × 983 µm, n = 16), navicular, black, with tapered ends, solitary to aggregated, semi-immersed to superficial, carbonaceous, straight or irregularly curved, with a prominent longitudinal slit. Exciple 65–156 µm, (\bar{x} = 89, n = 20), composed of cells of *textura angularis*, outer layers brown to dark brown, thick-walled, inner layer hyaline, thin-walled. *Pseudoparaphyses* 1.3–2.6 µm (\bar{x} = 1.99, n = 25) wide, hyaline, dense, septate, filiform, forming light brown to yellow epithecium above the asci and enclosed in a gelatinous matrix. Asci (153–)170–207(–208) × 8–13(–15.5) µm (\bar{x} = 187 × 11.4 µm, n = 20), 8-spored, bitunicate, subcylindrical to cylindrical, with a pedicel, apically rounded. Ascospores (24–)26–30(–32) × (7–)9–11(–12) µm (\bar{x} = 28 × 9.8 µm, n = 45), uni-seriate, slightly overlapping, hyaline to pale brown or golden brown, subglobose, 1-septate when immature, becoming brown to dark brown, ellipsoidal to fusiform, mostly 3-septa, slightly rounded or pointed at both ends, constricted at the central septum, smooth-walled when immature. Asexual morph: Undetermined.

Culture characteristics – Ascospores germinating on MEA within 24 hours at room temperature and germ tubes produced from end or each cell of ascospores. Colonies on MEA circular, mycelium slightly raised, fluffy, entire, cultures white or light brown at the surface and dark brown to black from the center of the colony in reverse and white at the margin.

Material examined – Thailand, Phayao Province, Chiang Kam District, on branches of *Hevea brasiliensis* (Euphorbiaceae), 26 July 2017, C. Senwanna, RBPY53 (MFLU 21-0195), living culture MFLUCC 18-0281 (new host record).

Host and distribution – *Tectona grandis* - Thailand (Doilom et al. 2017), *Hevea brasiliensis* (Thailand; this study).

GenBank numbers – MFLUCC 18-0281: ITS = OL782138, LSU = OL782054.

Notes – In a BLASTn search, the closest match of the LSU and ITS sequences with 99% and 97.62% similarity were *Rhytidhysterion neorufulum* (MFLUCC 13-0216), while the closest match of the TEF1 sequences with 95% was *R. mangrovei* (strain MFLUCC 18-1103). In the phylogenetic analysis, our strain (MFLUCC 18-0281) clusters with *R. tectonae* (MFLUCC 13-0710) with 95% ML bootstrap support (Fig. 12). The morphology of our collection (MFLU 21-0195, Fig. 14) is similar to *R. tectonae* from *Tectona grandis* as described by Doilom et al. (2017). We, therefore, name our collection as *R. tectonae* and this is the first report of this species on *Hevea brasiliensis*.

Muyocopronales Mapook, Boonmee & K.D. Hyde

Muyocopronaceae K.D. Hyde

Muyocopronaceae was introduced by Luttrell (1951) to accommodate species having black, superficial, coriaceous to carbonaceous, ostiolate ascomata, without mycelium and bitunicate, ovoid to obclavate asci, containing subglobose to ellipsoidal, hyaline ascospores. Currently, Muyocopronaceae comprises *Axiella*, *Leptodiscella*, *Mycoleptodiscus*, *Muyocopron*, *Neocochlearomyces*, *Neomycoleptodiscus*, *Paramycoleptodiscus*, *Setoapiospora* and

Pseudopalawania (Hongsanan et al. 2020a, Mapook et al. 2020). In this study, *Quadrisporella* is introduced as a new genus with its type species, *Quadrisporella heveae* from Thailand. This is based on evidence from morphology and molecular data (Figs 15, 17). In addition, a new host and geographical records for *Muyocopron Garethjonesii* is reported (Figs 15, 16).

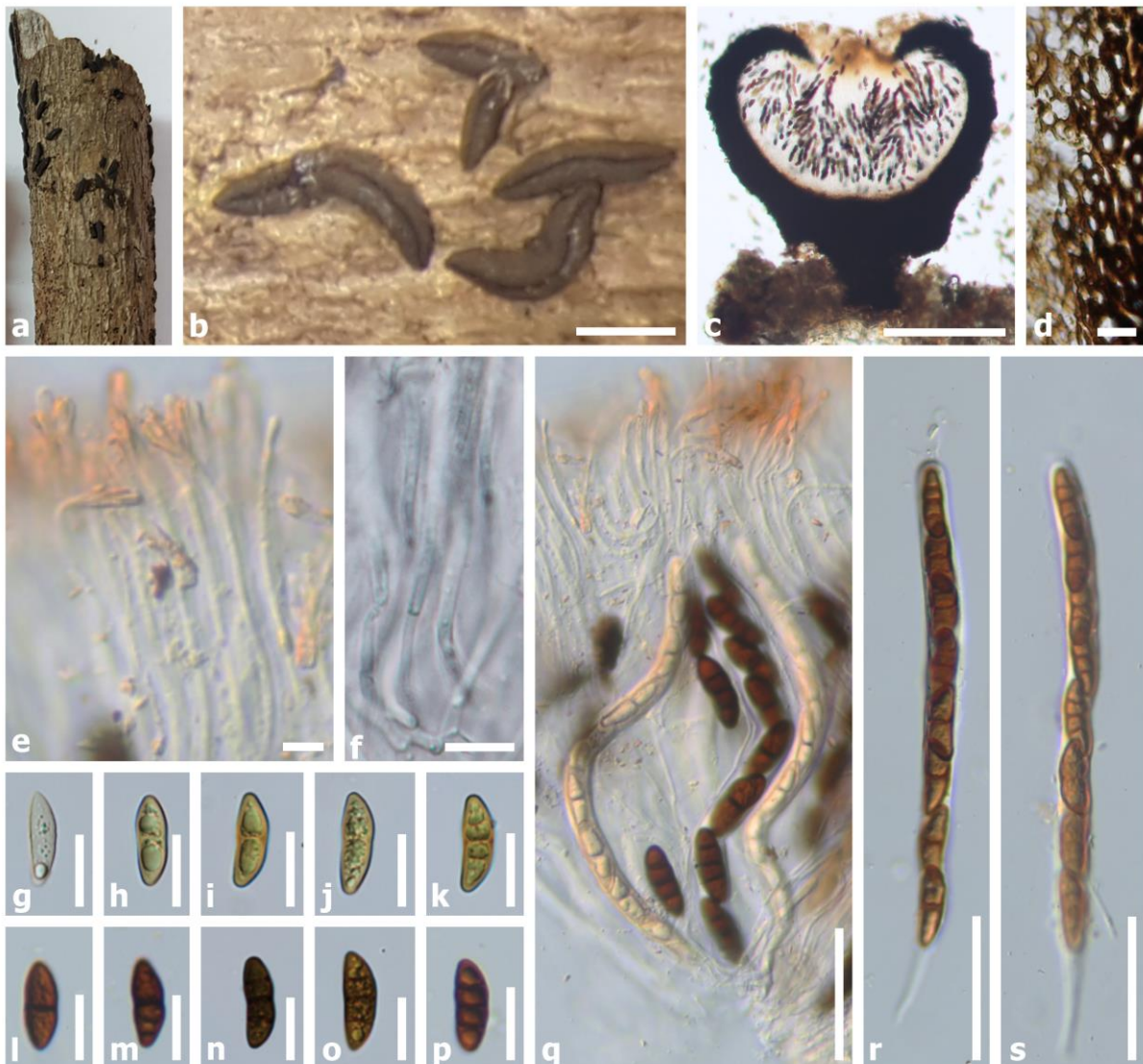


Figure 14 – *Rhytidhysteron tectonae* (MFLU 21-0195, new host record). a–b Ascomata on host surface. c Section through the ascoma. d Exciple. e–f Pseudoparaphyses. g–p Ascospores. q–s Asci. Scale bars: b = 1000 μ m, c = 300 μ m, d–f = 10 μ m, g–p = 20 μ m, q–s = 50 μ m.

Muyocopron Garethjonesii Tibpromma, Karun. & K.D. Hyde, in Tibpromma et al., *Mycosphere* 7(9): 1485 (2016) Fig. 16

Index Fungorum number: IF552529

Saprobe on dried twig (attached on tree) of *Hevea brasiliensis*. Sexual morph: Colonies dry, black, circular, raised to umbonate on the host surface, without a subiculum, easily removed from the host, clustered, gregarious, ostiolate. Ascomata (21–)44–65(–89) high \times 170–405(–480) μ m diam. (\bar{x} = 55.4 \times 322, n = 12), superficial, raised, dimidiate to conical, black, rough-walled, glabrous, black, with a central irregular ostiole. Peridium (12–)14–20(–37) μ m thick (\bar{x} = 18.8, n = 22), thick-walled of unequal thickness, poorly developed at the base, slightly thick at the sides towards the apex, comprising two type cell layers; an outer layer thick-walled, composed of black, brittle carbonaceous cells, an inner layer comprised dark brown pseudoparenchymatous cells of *textura angularis*. Hamathecium of numerous, 2–3 μ m wide, septate, branched, broadly cellular

pseudoparaphyses. *Asci* (20–)52–74 (–82) × (12–)21–29.5 μm (\bar{x} = 62 × 23 μm, n = 20), 8-spored, bitunicate, broadly cylindrical to ovoid, long pedicellate, apically rounded, with an ocular chamber. *Ascospores* (13–)15–20.5 × 8–11.5 μm (\bar{x} = 18 × 10 μm, n = 30), irregularly arranged, overlapping, ellipsoid to obovoid, hyaline, one-celled, with granular appearance, rough-walled.

Material examined – Thailand, Phayao Province, Chiang Kam District, on dried twig (attached on tree) of *Hevea brasiliensis* (Euphorbiaceae), 26 July 2017, C. Senwanna, RBPY60 (MFLU 21-0192) (new host record).

Host and distribution – *Pandanus* sp. (Thailand; Tibpromma et al. 2016), *Hevea brasiliensis* (Thailand; this study).

GenBank numbers – MFLU 21-0192: ITS = OL782139, LSU = OL782055, SSU = OL780523.

Notes – In a BLASTn search of GenBank, the closest match of the LSU sequence of RBPY60 is *Muyocopron Garethjonesii* (MFLU 16-2664a) with 99.88% similarity, while the closest match of the ITS sequence is *M. laterale* (ATCC: 200213) with 94.93% similarity. A comparison of the LSU gene region of *Muyocopron Garethjonesii* (MFLU 16-2664a) and our collection reveals 1 base pair difference (1/844). Based on the multi-gene analyses, *Muyocopron Garethjonesii* (MFLU 21-0192) has a close phylogenetic relationship and similar morphological characters with *M. Garethjonesii* in having broadly cylindrical to ovoid asci with a long pedicel and ellipsoidal ascospores (Tibpromma et al. 2016) (Fig. 16). However, our collection has shorter asci (20–82 × 12–29.5 vs 60–120 × 19–35 μm) and ascospores (13–20.5 × 8–11.5 vs 9–25 × 11–13) than the type species. We, therefore, name our collection as *M. Garethjonesii* and this is the first report on *Hevea brasiliensis* to obovoid.

***Quadrisporella* Senwanna, Cheewangkoon & K.D. Hyde, gen. nov.**

Index Fungorum number: IF559357

Etymology – The generic epithet reflects the 4-spored asci

Saprobic on *Hevea brasiliensis*. Sexual morph: *Ascomata* black, raised to umbonate on the host surface, without a subiculum, easily removed from the host, superficial to semi-immersed, solitary or scattered, carbonaceous, appearing as dark brown to black spots. Ostiole central. *Peridium* thick-walled of unequal thickness, poorly developed at the base, slightly thick at the sides towards the apex, comprising two type cell layers; an outer thick-walled layer, composed of black, brittle carbonaceous cells, an inner hyaline layer comprised pseudoparenchymatous cells of *textura angularis*. *Hamathecium* with cylindrical to filiform, septate, pseudoparaphyses. *Asci* 4-spored, bitunicate, cylindrical, pedicellate, straight or slightly curved, with an ocular chamber. *Ascospores* overlapping, irregularly, oblong to broadly fusiform, hyaline, 1-septate, constricted at the septum, guttulate, smooth-walled. Asexual morph: Undetermined.

Type species – *Quadrisporella heveae* Senwanna, Cheewangkoon & K.D. Hyde

Notes – In a BLASTn search, the closest match of the LSU and ITS sequences with 95.82% and 82.32% similarity was *Setoapiospora thailandica* (MFLUCC 17-1426). The closest match of the TEF1 sequences with 87.96% similarity was *Muyocopron laterale* (FMR 13797). In the phylogenetic analysis, *Quadrisporella heveae* (MFLUCC 18-0308) is closely related to *Setoapiospora thailandica* (MFLUCC 17-1426) with 100% ML and 1 BYPP bootstrap support (Fig. 15). *Quadrisporella* shares several similarities with *Setoapiospora* in having superficial to semi-immersed, carbonaceous ascomata which appear as dark brown to black spots on the host surface and hyaline ascospores. However, our new genus differs by ascomata without external setae, 4-spored asci and oblong to broadly fusiform, hyaline ascospores which are 1-septate at the middle (Hyde et al. 2020a). We, therefore, introduce *Quadrisporella* as a new genus to accommodate a new species *Quadrisporella heveae* based on morphology and phylogenetic evidence.

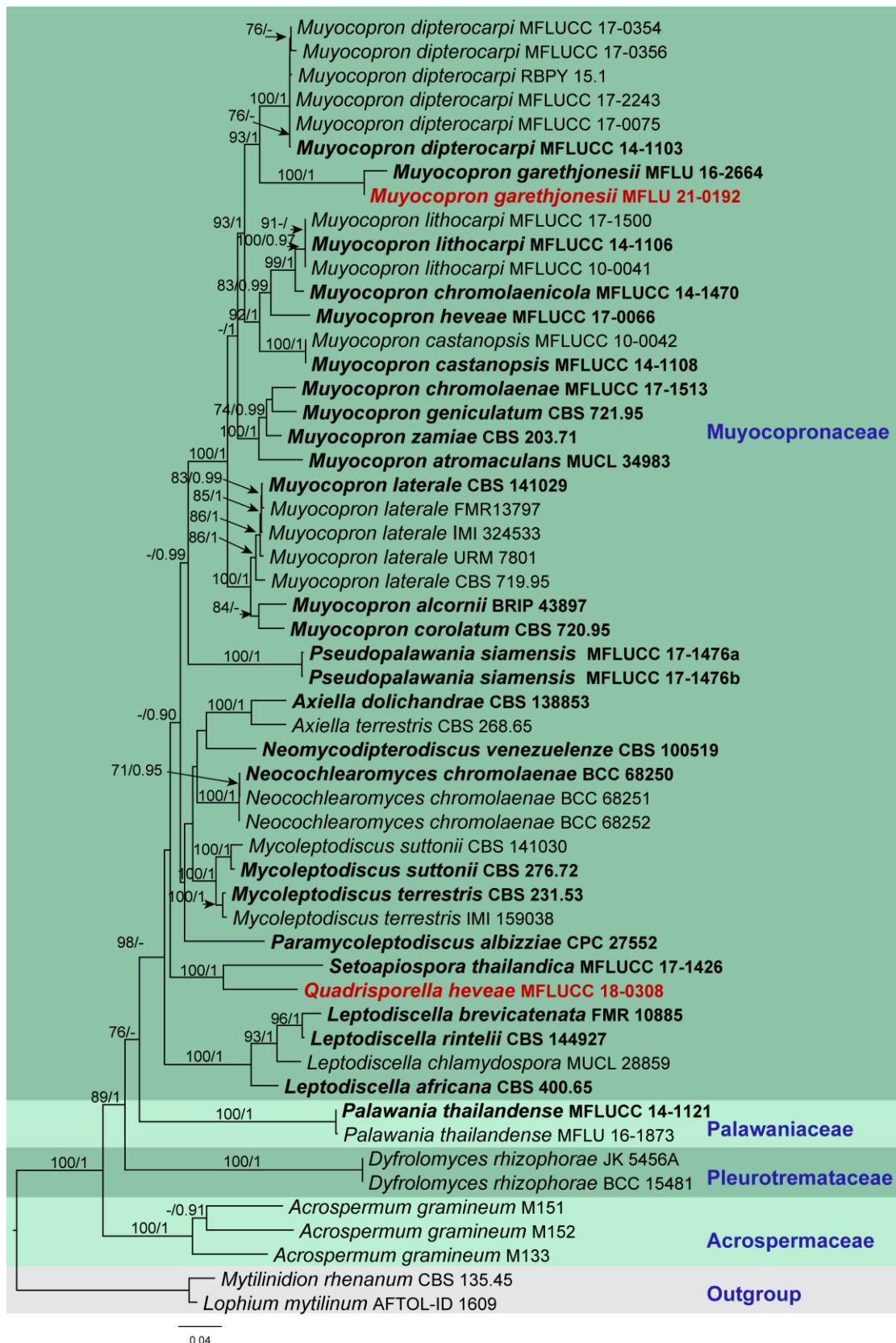


Figure 15 – RAxML tree of Mycyocopronaceae based on analyses of a combined LSU, SSU, ITS and TEF1 sequence data. Fifty-four strains are included in the combined sequence analysis, which comprise 4426 characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree with a final likelihood value of -23433.134290 is presented. The matrix had 1534 distinct alignment patterns, with 50.72% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.240134, C = 0.243034, G = 0.294580, T =

0.222252; substitution rates: AC = 1.270158, AG = 2.748820, AT = 1.647779, CG = 1.110155, CT = 6.389605, GT = 1.000000; gamma distribution shape parameter α = 0.486598. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Lophium mytilinum* (AFTOL-ID 1609) and *Mytilinidion rhenanum* (CBS 135.45) are used as outgroup taxa.

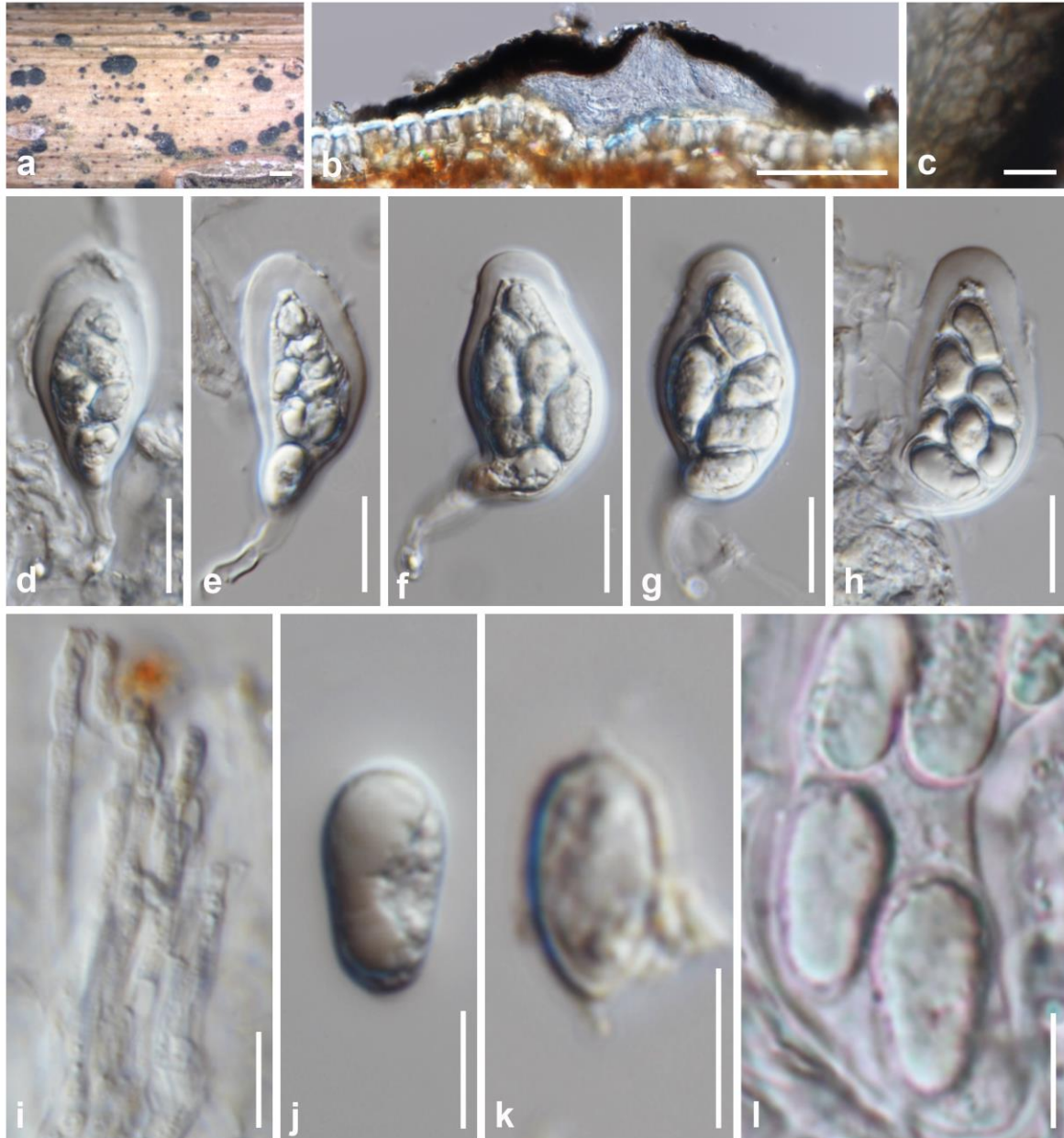


Figure 16 – *Muyocopron garethjonesii* (MFLU 21-0192, new host record). a Ascomata on host substrate. b Section through the ascoma. c Peridium. d–h Ascospores. i Pseudoparaphyses. j–l Asci. Scale bars: a = 500 μ m, b = 100 μ m, c, i–l = 10 μ m, d–h = 20 μ m.

Quadrisporella heveae Senwanna, Cheewangkoon & K.D. Hyde, sp. nov.

Fig. 17

Index Fungorum number: IF559358

Etymology – Name reflects the host genus *Hevea*, from which the species was collected.

Saprobe on dried twig (attached on tree) of *Hevea brasiliensis*. Sexual morph: Ascomata (350–)430–625(–650) μ m diam. \times (185–)205–365 μ m diam. (\bar{x} = 510 \times 268 μ m, n = 11), dry, black, raised to umbonate on the host surface, without a subiculum, easily removed from the host,

superficial to semi-immersed, solitary or scattered, carbonaceous, appearing as dark brown to black spots. *Ostiole* central. *Peridium* thick-walled of unequal thickness, poorly developed at the base, 21–29 μm thick (\bar{x} = 26, n = 7), slightly thick at the sides towards the apex, 57–65(–72) μm thick (\bar{x} = 63, n = 7), comprising two type cell layers; an outer thick-walled layer, composed of black, brittle carbonaceous cells, an inner hyaline layer comprised pseudoparenchymatous cells of *textura angularis*. *Hamathecium* comprising 1.5–3.5 μm wide, cylindrical to filiform, septate, pseudoparaphyses. *Asci* (90–)100–135 (–138) \times (21–)34–39 μm (\bar{x} = 120.6 \times 29.2 μm , n = 23), 4-spored, bitunicate, cylindrical, pedicellate, straight or slightly curved, with an ocular chamber. *Ascospores* (32–)36–44(–47) \times (12–)14–20 μm (\bar{x} = 41.5 \times 17.3 μm , n = 40), irregularly overlapping, oblong to broadly fusiform, hyaline, 1-septate, constricted at the septum, guttulate, smooth-walled.

Material examined – Thailand, Ranong Province, La-un District, on branch (attached on tree) of *Hevea brasiliensis* (Euphorbiaceae), 1 October 2017, C. Senwana, RBRN01 (MFLU 21-0194, holotype), ex-type living culture MFLUCC 18-0308 = MFLUCC 18-0309.

GenBank numbers – MFLUCC 18-0308: ITS = OL782140, LSU = OL782057, TEF1 = OL875101, RPB2 = OL828755.

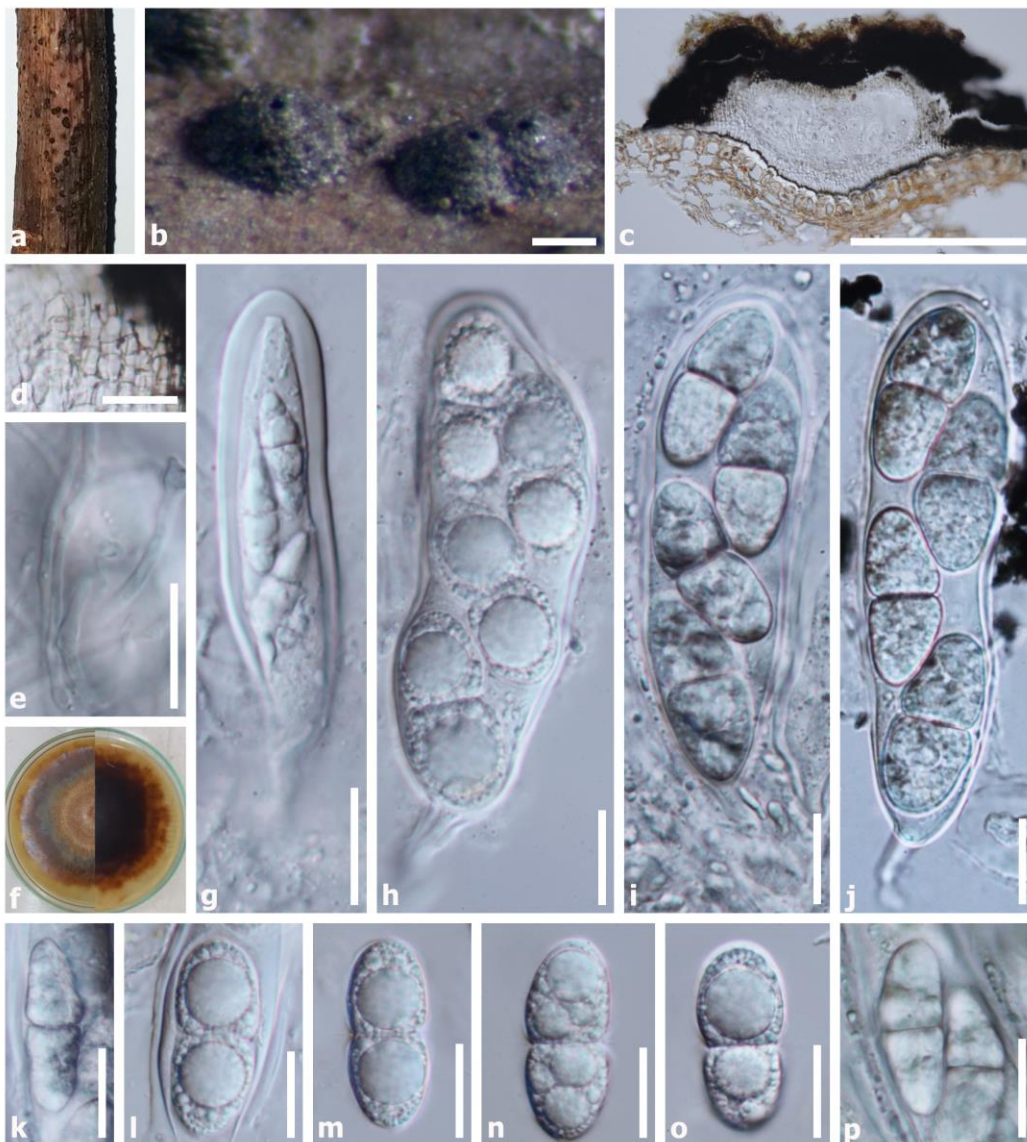


Figure 17 – *Quadrisporella heveae* (MFLU 21-0194, holotype). a–b Ascomata on host surface. c Section through the ascoma. d Peridium. e Pseudoparaphyses. f Culture on PDA for 30 days. g–j Asci. k–p Ascospores. Scale bars: b–c = 200 μm , d–p = 20 μm .

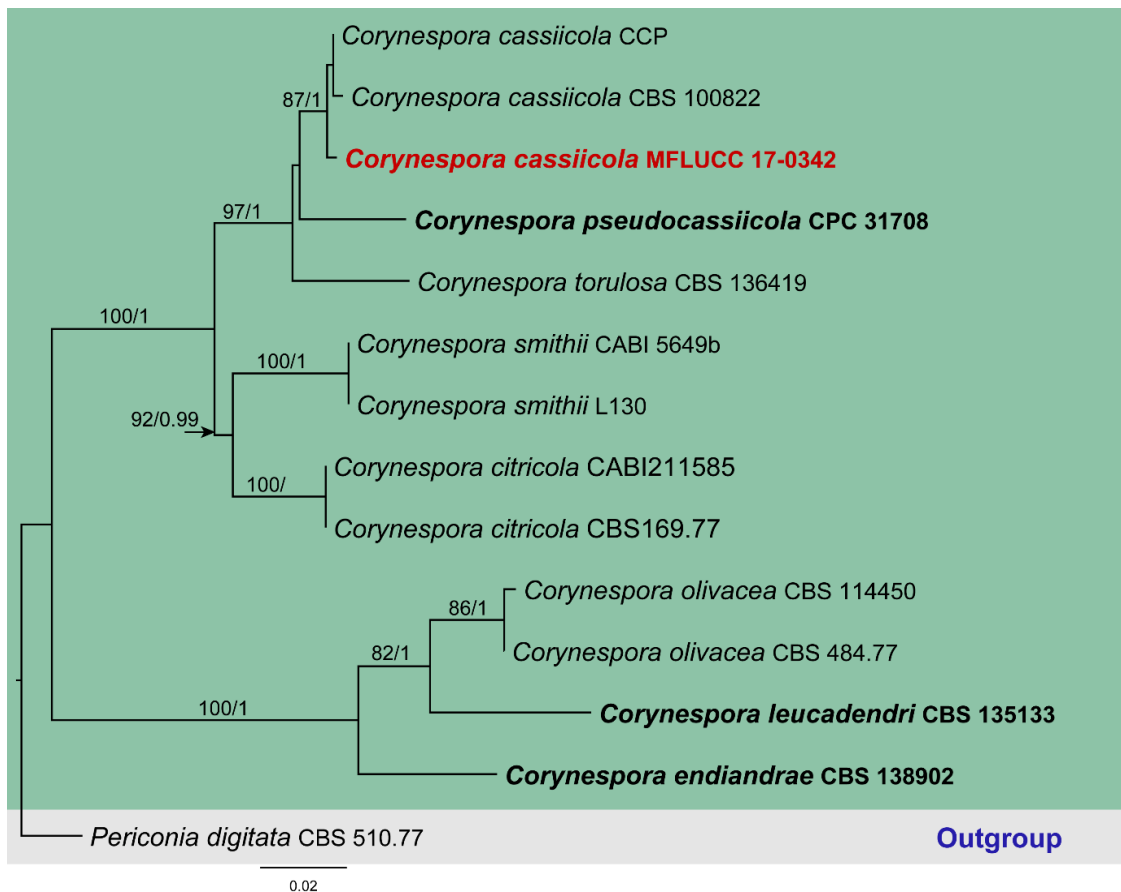


Figure 18 – RAxML tree of *Corynespora* based on a combined LSU, ITS, SSU, TEF1 and RPB2 sequence dataset. Fourteen strains are included in the combined sequence analysis, which comprise 4458 characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree with a final likelihood value of -9638.498558 is presented. The matrix had 445 distinct alignment patterns, with 56.67% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.242462, C = 0.255781, G = 0.275101, T = 0.226655; substitution rates: AC = 1.889016, AG = 2.161405, AT = 1.233890, CG = 1.20144, CT = 8.355785, GT = 1.000000; gamma distribution shape parameter α = 4.537830. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Periconia digitata* (CBS510.77) is used as the outgroup taxon.

Pleosporales Luttrell ex M.E. Barr

Corynesporascaceae Sivan.

The member of Corynesporascaceae cause foliar diseases in many plants in the tropics and subtropics (Hyde et al. 2013, Kumar et al. 2016). *Corynespora cassiicola* is an important pathogenic with high genetic diversity that causes leaf spot, target spot and leaf fall of economic plants such as cotton, cucumber, rubber, soybean, tomato, worldwide (Silva et al. 2003, Cai et al. 2006, Lopez et al. 2018, MacKenzie et al. 2018, Sumabat et al. 2018, Rondon & Lawrence 2021). In addition to being a plant pathogen, the species can infect animal and humans as well as play a role as endophytes and saprobes (Déon et al. 2012a, b, 2014, Sumabat et al. 2018, Lopez et al. 2018). Hongsanan et al. (2020a) accepted *Corynespora* Güssow and *Corynesporasca* Sivan. in Corynesporascaceae.

Corynespora cassiicola (Berk. & M.A. Curtis) C.T. Wei, Mycol. Pap. 34: 5 (1950)
Index Fungorum number: IF296024

Fig. 19

Associated with spots on leaves of *Hevea basiliensis* seedlings. *Leaf spots* subcircular to circular, pale brown to brown on upper surface with dark brown margin surrounded by yellowish halo, light brown on lower surface. Sexual morph: Undetermined. Asexual morph: *Colonies* effuse, grey to dark brown, hairy. *Conidiophores* solitary to small group, erect, straight, subcylindrical, unbranched, brown, base bulbous, 9–15.5 μm diam. (\bar{x} = 11.5 μm , n = 15), stipe (94–)118–192(–223) \times 5–12 μm (\bar{x} = 166 \times 10 μm , n = 15), 3–7-septate. *Conidiogenous cells* integrated, terminal, proliferating percurrently. *Conidia* (81–)102–222(–313) \times (4–)6–10(–13) μm (\bar{x} = 166 \times 8 μm , n = 26), cylindrical, obclavate, straight to slightly curved with a rounded apex and base truncate, 3–12-pseudoseptate, pale brown, hilum darkened, thickened, 2–6 μm wide.

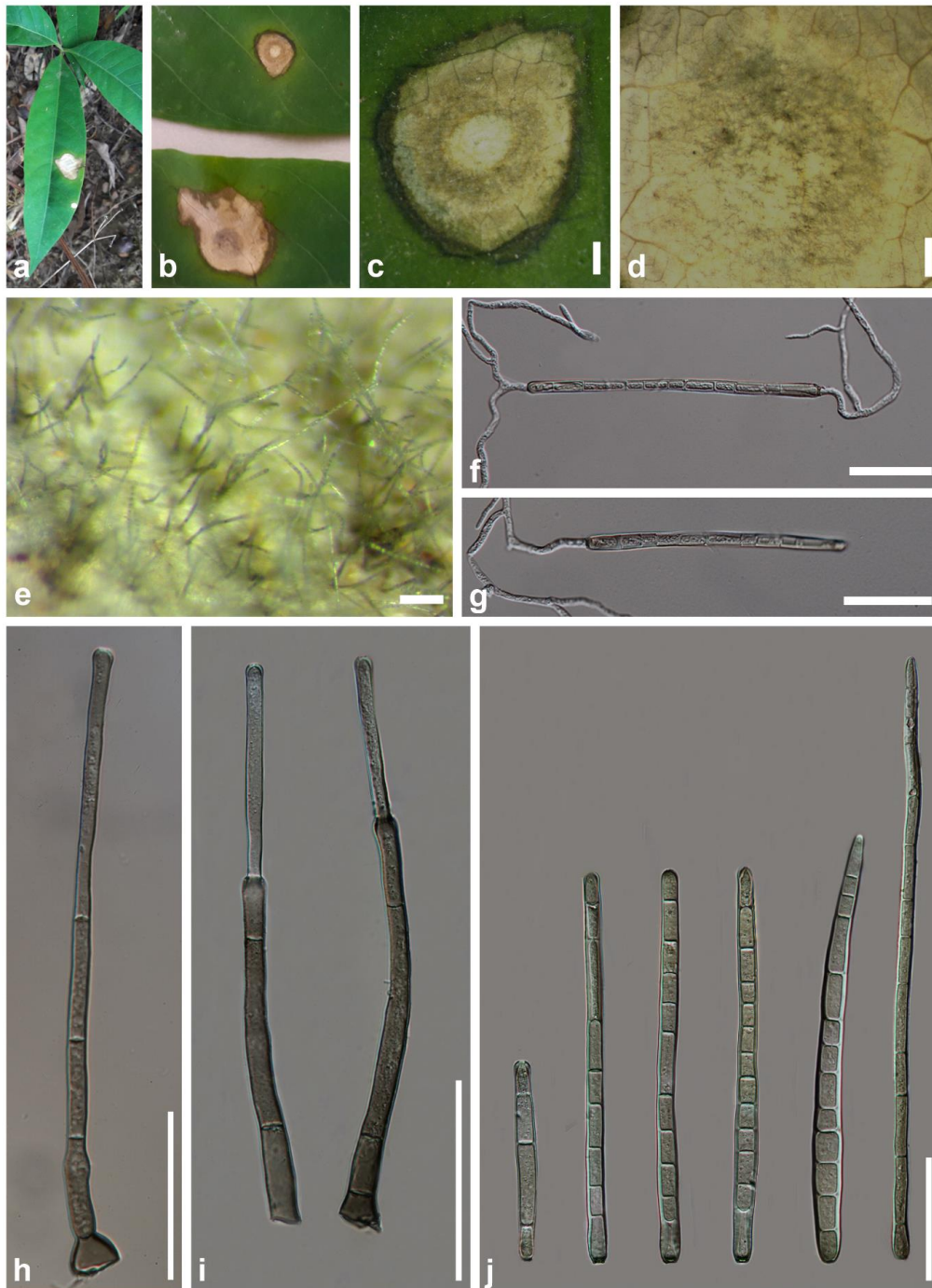


Figure 19 – *Corynespora cassiicola* (MFLU 19-0249). a–b Leaf spots on seedling. c–e Close-up of lesion. f–g Germinated spores. h–i Conidiophores. j Conidia. Scale bars: c–d = 500 μm , e = 100 μm . f–g = 50 μm .

Culture characteristics – Conidia germinating on MEA within 24 hours at room temperature and germ tubes produced from one or both ends. Colonies on MEA circular, mycelium slightly raised, entire, cultures greyish white at the surface and white at the margin and light brown from the centre of the colony in reverse and creamy-white at the margin.

Material examined – Thailand, Phayao Province, Muang, leaf spots on seedling leaves of *Hevea brasiliensis* (Euphorbiaceae), 3 January 2017, C. Senwana, RBPY23 (MFLU 19-0249), living culture MFLUCC 17-0342.

Host and distribution – Wide host range, widely distributed in tropical and subtropical regions.

GenBank numbers – MFLUCC 17-0342: ITS = OL782141, LSU = OL782058, SSU = OL780524, RPB2 = OL828752.

Notes – In Para rubber *Corynespora cassiicola* causes Corynespora leaf fall (CLF) disease, which affects rubber production in Asia and Africa and Latin America (Manju et al. 2001, Déon et al. 2014, Florence & Fashoranti 2018, Lopez et al. 2018). In this study, our strain MFLUCC 17-0342 grouped with *C. cassiicola* with 87% ML and 1 BYPP bootstrap support (Fig. 18). When comparing our strain with the description of Wei (1950), they are similar in morphology. We, therefore, name our collection as *C. cassiicola*.

Didymosphaeriaceae Munk

Currently, 32 genera are accepted in Didymosphaeriaceae (Hongsanan et al. 2020a). The family are saprobes, endophytes and pathogens on various substrates in terrestrial and aquatic habitats (Hyde et al. 2013, Ariyawansa et al. 2014, Hongsanan et al. 2020a). In the present study, new host records of *Montagnula thailandica* and *Pseudopithomyces palmicola* from Para rubber are reported.

Montagnula thailandica Mapook & K.D. Hyde, in Mapook et al., Fungal Divers. 101: 35 (2020)

Fig. 21

Index Fungorum number: IF557299

Saprobic on dried twigs of *Hevea brasiliensis*. Sexual morph: *Ascomata* 160–350 µm high × 130–330 µm diam., solitary, scattered to clustered, immersed to semi-immersed, visible as slightly raised, ostiole central. *Peridium* 18–27 µm wide, slightly thin at the base, composed of thick-walled, dark brown to black cells of *textura angularis*. *Pseudoparaphyses* 1.5–2.5 µm wide (\bar{x} = 2.07, n = 35), hyaline, dense, filiform. *Asci* (63–)69–90(–94) × 10–13(–14) µm (\bar{x} = 79 × 12.2 µm, n = 25), 8-spored, bitunicate, fissitunicate, clavate, long pedicellate, apically rounded, sometimes without a distinct ocular chamber. *Ascospores* (12–)14–16(–17.5) × 4.5–7 µm (\bar{x} = 15.5 × 5.5 µm, n = 40), overlapping 1–2-seriate, initially hyaline to pale brown, becoming brown to dark brown at maturity, ellipsoidal to fusiform, slightly rounded or pointed at both ends, 1-septate, constricted at the septa, smooth-walled, with guttules. Asexual morph: Undetermined.

Culture characteristics – Ascospores germinating on MEA within 24 hours at room temperature and germ tubes produced from end of ascospores. Colonies on MEA irregular, mycelium slightly raised, cultures dark brown to black from the centre of the colony and white at the margin.

Material examined – Thailand, Phayao Province, Muang District, on dried twigs of *Hevea brasiliensis* (Euphorbiaceae), 2 March 2017, C. Senwana, RBPY45 (MFLU 21-0191), living culture MFLUCC 17-0363 (new host record).

Host and distribution – *Chromolaena odorata* (Thailand; Mapook et al. 2020), *Hevea brasiliensis* (Thailand; this study), dead stems of undetermined hosts (Thailand; Boonmee et al. 2021).

GenBank numbers – MFLUCC 17-0363: ITS = OL782142, LSU = OL782059, SSU = OL780525, TEF1 = OL875102, RPB2 = OL828754.

Notes – In a BLASTn search, the closest match of the ITS, SSU and TEF1 sequences of the strain with 100%, 99.81% and 99.43% similarity, respectively, was *Montagnula thailandica*

(MFLUCC 17-1508), while the closest match to the LSU sequences with 100% similarity, was *M. chromolaenicola* (MFLUCC 17-1469). *Montagnula* species are saprobic in terrestrial habitats and characterized by globose to subglobose, immersed ascomata, claviform asci, fusoid or ellipsoid, phragmosporous or muriform ascospores (Barr 1990, Ariyawansa et al. 2014). In the present phylogenetic analysis, MFLUCC 17-0363 clustered with *M. thailandica* (MFLUCC 17-1508) (Fig. 20). The morphology of our strain is similar to *M. thailandica* described by Mapook et al. (2020). We, therefore, name our collection as *M. thailandica* which is a new host record for *Hevea brasiliensis* in Thailand.

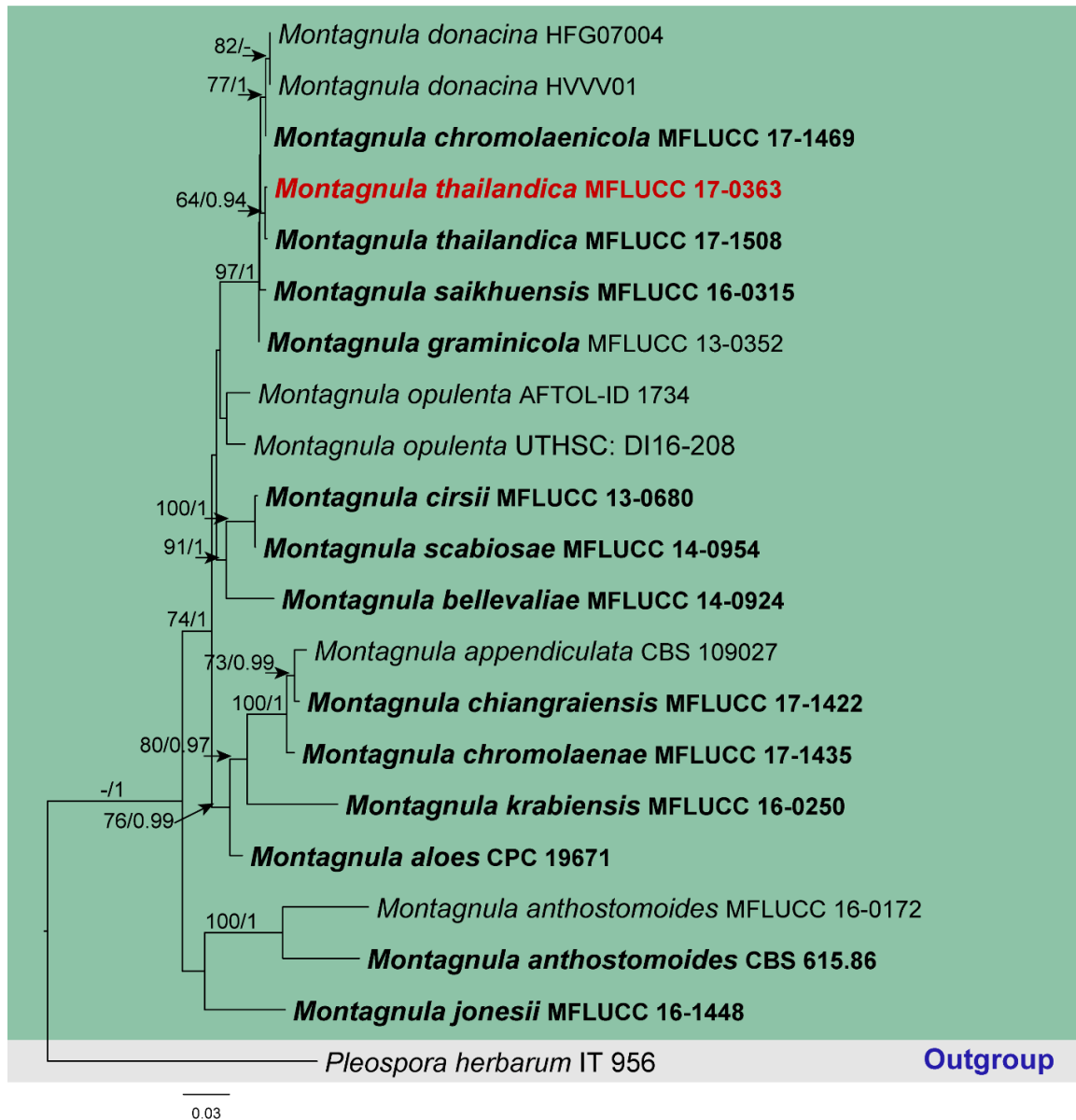


Figure 20 – RAxML tree of *Montagnula* based on a combined LSU, ITS, SSU and TEF1 sequence dataset. Twenty-one strains are included in the combined sequence analysis, which comprise 2802 characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree with a final likelihood value of -12629.744665 is presented. The matrix had 924 distinct alignment patterns, with 34.10% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.244441, C = 0.248269, G = 0.272059, T = 0.235231; substitution rates: AC = 1.311889, AG = 2.257389, AT = 1.482806, CG = 1.080343, CT = 5.534655, GT = 1.000000; gamma distribution shape parameter α = 0.725183. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as

ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Pleospora herbarum* (IT 956) is used as the outgroup taxon.

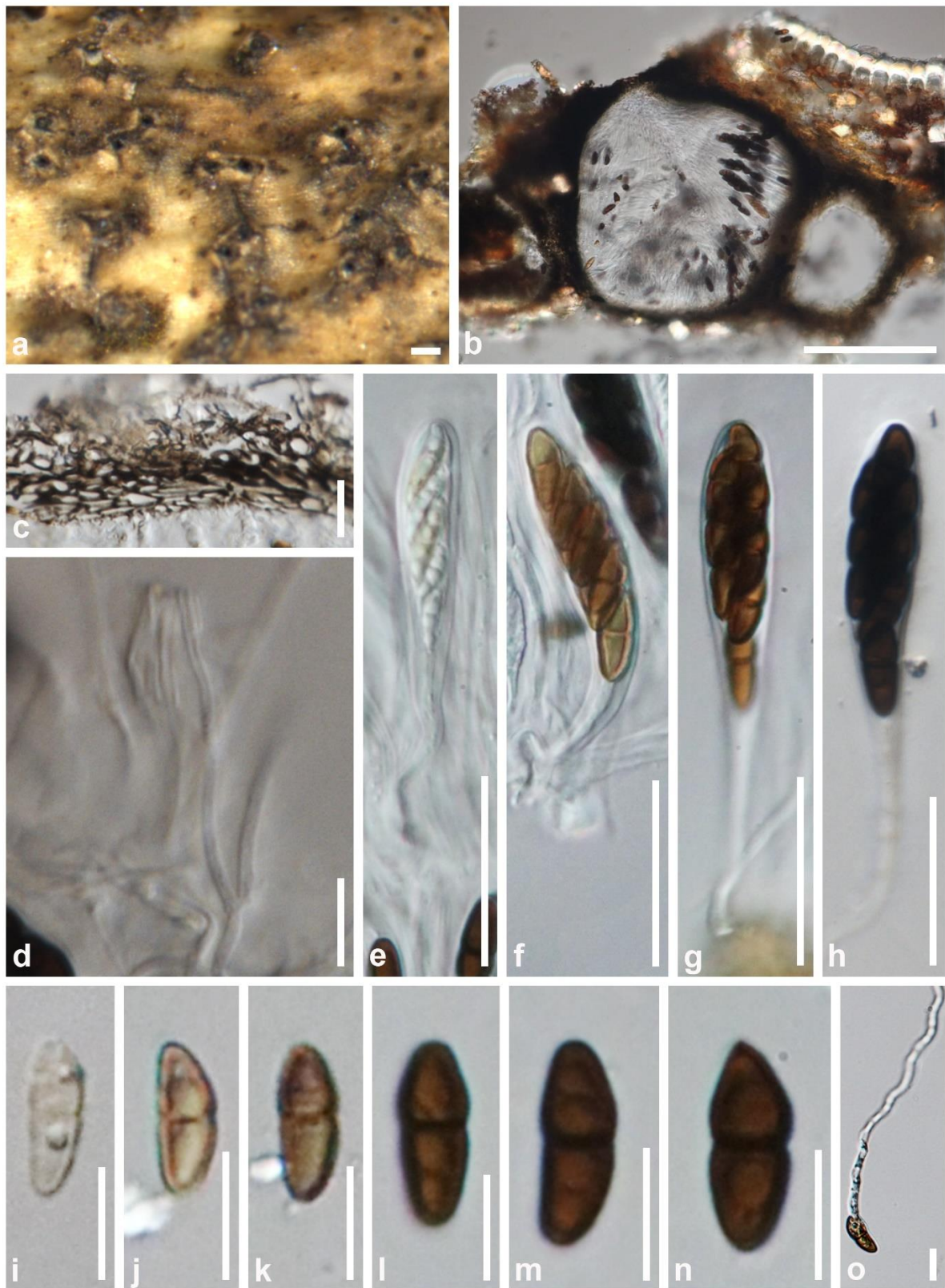


Figure 21 – *Montagnula thailandica* (MFLU 21-0191, new host record). a Habit of ascomata on substrate. b Vertical section through the ascoma. c Peridium. d. Pseudoparaphyses. e–h Asci. i–n Ascospores. o Germinated spores. Scale bars: a = 200 μm , b = 100 μm , c, d, i–o = 10 μm , f–h = 30 μm .

Pseudopithomyces palmicola Jun F. Li, Ariyaw. & K.D. Hyde, in Ariyawansa et al., Fungal Divers. 75: 27–274 (2015) Fig. 23

Index Fungorum number: IF551394

Saprobic on dried leaf of *Hevea brasiliensis*. Sexual morph: Undetermined. Asexual morph: Colonies effuse, dark brown to black. Mycelium superficial or partly immersed on the substrate, composed of septate, smooth, thin-walled, pale to brown hyphae. Conidiophores 6–12(–15) × 2–4 μm (\bar{x} = 10.1 × 3.2 μm, n = 10), micronematous, mononemous, closely packed, hyaline, thin-walled, aseptate, smooth, branched. Conidiogenous cells 4.5–10.8 × 2.2–4 μm (\bar{x} = 6.8 × 3.1 μm, n = 10), holoblastic, terminal, hyaline. Conidia (9–)12–24(–26) × 6–14(–16) μm (\bar{x} = 18.5 × 11 μm, n = 30), ellipsoidal to obclavate, muriform, brown to dark brown, round at ends, mostly 3 transverse septate, longitudinally 1–3-septate, slightly constricted at the septa, verrucose to echinulate. Appressoria solitary, hyaline, globose to sub globose, thick-walled.

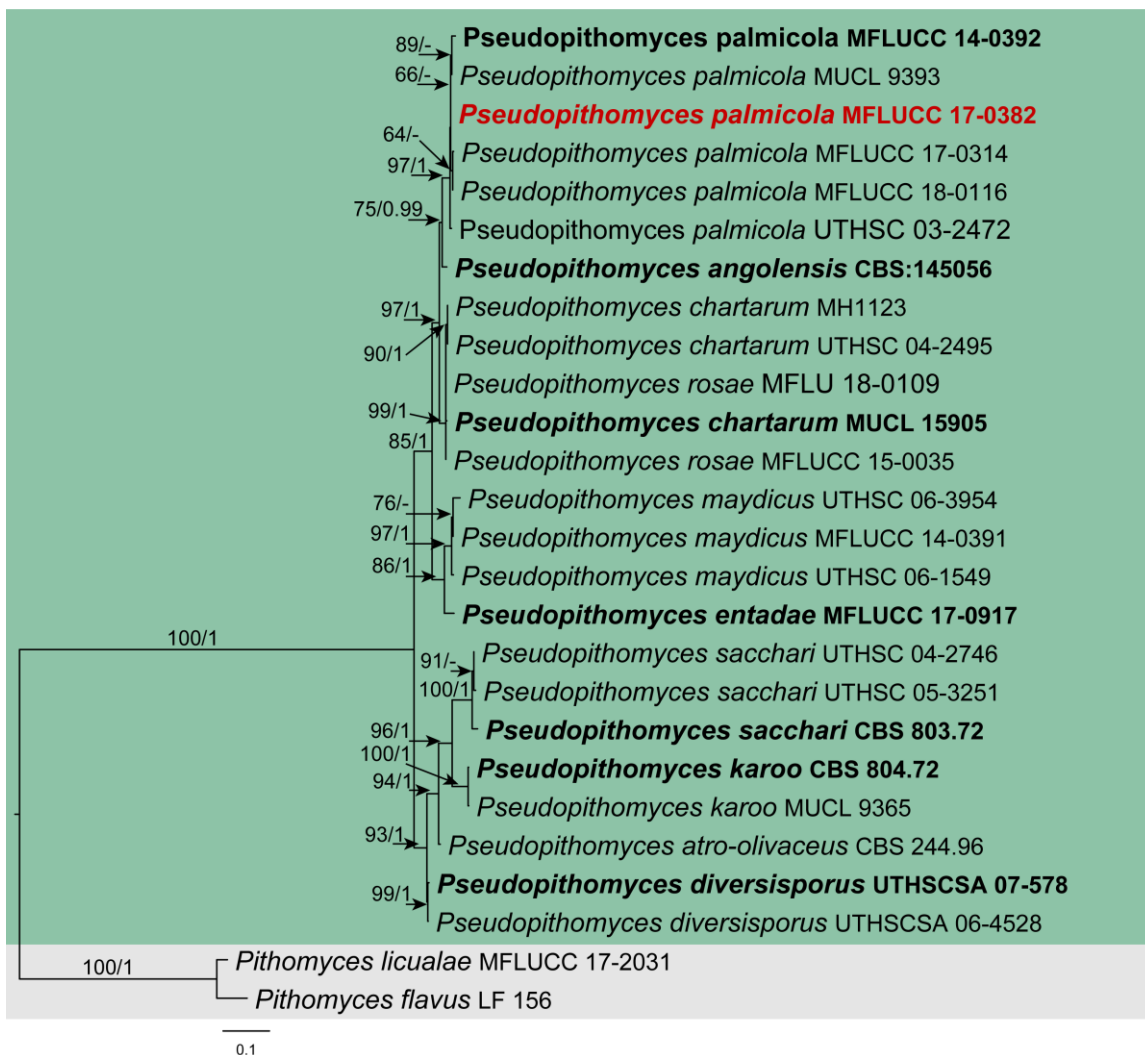


Figure 22 – RAxML tree of *Pseudopithomyces* based on a combined LSU, ITS, RPB2 and GPD sequence dataset. Twenty-six strains are included in the combined sequence analysis, which comprise 3145 characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree with a final likelihood value of -11022.299869 is presented. The matrix had 804 distinct alignment patterns, with 33.48% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.240009, C = 0.264477, G = 0.272648, T = 0.222866; substitution rates: AC = 1.431352, AG = 3.802855, AT = 1.142783, CG = 1.135958, CT = 9.493994, GT = 1.000000; gamma distribution shape parameter α = 0.406456. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as

ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Pithomyces flavus* (LF-156) and *P. licualae* (MFLUCC 17-2031) are used as outgroup taxa.

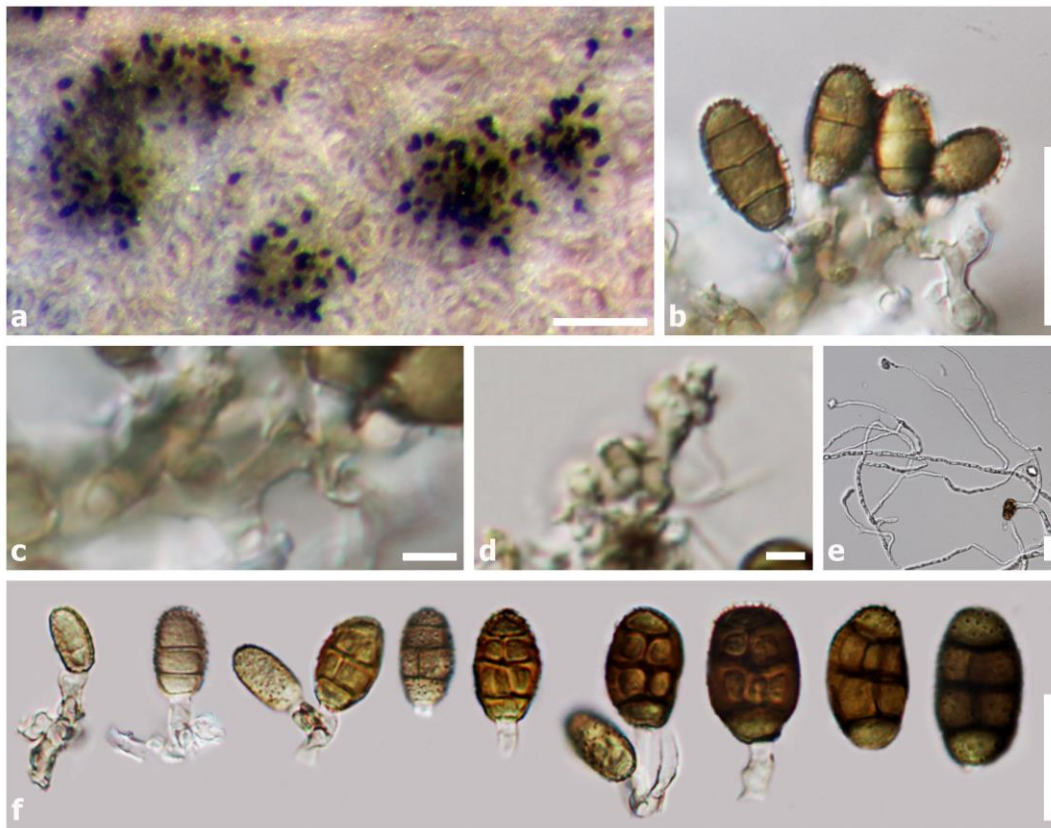


Figure 23 – *Pseudopithomyces palmicola* (MFLU 19-0222, new host record). a Colonies on host substrate. b, f Conidia attach to conidiogenous cells. c–d Dematiaceous hyphae. e Germinated spore. f Conidia. Scale bars: a = 100 μ m, b, f = 20 μ m. c–d = 5 μ m.

Culture characteristics – Conidia germinating on MEA within 24 hours at room temperature and germ tubes produced from every cell of conidium with developing appressoria. Colonies on MEA circular, mycelium slightly raised, effuse, cultures white at first, becoming creamy white from the centre and white at the margin from above, and creamy white in reverse.

Material examined – Thailand, Chiang Mai Province, Muang District, Mae Hia Agricultural Research, Demonstrative and Training Center, on dried leaf of *Hevea brasiliensis* (Euphorbiaceae), 22 September 2016, C. Senwana, RBCM05 (MFLU 19-0222), living culture MFLUCC 17-0382 (new host record).

Host and distribution – *Acoelorrhaphe wrightii* (Thailand; Ariyawansa et al. 2015), unidentified grass (China; Hyde et al. 2017), *Fragaria* sp., *Phaseolus vulgaris*, *Poa annua* and *Vitis vinifera* (Italy; Liu et al. 2018a), *Pandanus amaryllifolius* (Thailand; Tibpromma et al. 2018), *Chromolaena odorata* (Thailand; Mapook et al. 2020), *Hevea brasiliensis* (Thailand; this study).

GenBank numbers – MFLUCC 17-0382: ITS = OL782143, LSU = OL782060.

Notes – In a BLASTn search, the closest match of the ITS and LSU sequences with 99.45% (MH388364) and 100% (MH376738) similarity, respectively was *Pseudopithomyces pandanicola*. *Pseudopithomyces* was introduced by Ariyawansa et al. (2015) with *P. chartarum* (type species). The genus is characterized by brown to black colonies on the host and fusiform, verruculose dark conidia (Ariyawansa et al. 2015). In our phylogenetic analyses, MFLUCC 17-0382 strain clusters with *P. palmicola* (Fig. 22). The collection is similar to *P. palmicola* (Ariyawansa et al. 2015) (Table 2). We, therefore, name our collection as *P. palmicola* and this is the first report of this species on *Hevea brasiliensis*.

Table 2 Synopsis of recorded *Pseudopithomyces* species.

<i>Pseudopithomyces</i> species	Size (μm)			Reference
	Conidiophore	Conidiogenous cell	Conidia	
<i>P. angolensis</i>	10–25 \times 2–3.5	7–15 \times 2–3.5	(28–)30–34(–37) \times (7–)8(–9); brown appendage; 3 transverse septa	Crous et al. 2018a
<i>P. atro-olivaceus</i>	–	–	14–35 \times 7–10; 3–6 transverse septa	Ellis 1971
<i>P. chartarum</i>	2–5 \times 1.5–2.5	–	18–29 \times 10–17; 3–4 transverse septa	Ariyawansa et al. 2015
<i>P. diversisporus</i>	2–4.5 \times 2–2.5	–	20–38 \times 7–11; (1–)2–3(–5) transverse septa	Crous et al. 2016
<i>P. entadae</i>	–	–	10–14 \times 6–9; 1–2 transverse septa and 1 longitudinal septum	Jayasiri et al. 2019
<i>P. karoo</i>	–	–	17–30 \times 8–18; 2 transverse septa and 1 longitudinal septum	Ellis 1976
<i>P. maydicus</i>	–	–	12–20 \times 6–12; mostly 2 transverse septa	Ellis 1971
<i>P. palmicola</i>	3.6–6 \times 3.2–3.5	3.5–5.5 \times 2.5–3.5	21.5–30.5 \times 10–16.5; mostly 3 transverse septa	Ariyawansa et al. 2015
<i>P. palmicola</i>	6–12(–15) \times 2–4	4.5–10.8 \times 2.2–4	(9–)12–24(–26) \times 6–14(–16); mostly 3 transverse septa and 1–3 longitudinal septa	This study
<i>P. rosae</i>	7–9 \times 4–7	3–5 \times 2–4	13–30 \times 9–20; with 3 transverse septa and 1 longitudinal septum	Wanasinghe et al. 2018
<i>P. sacchari</i>	–	–	12–25 \times 5–15; 1–2 transverse septa	Ellis 1971

Hermatomycetaceae Locq.

Hermatosphaeriaceae was established to accommodate the single genus *Hermatomyces* which has been commonly reported as saprobic on plants in terrestrial habitats (Hashimoto et al. 2017, Hongsanan et al. 2020a). The genus is characterized by sporodochia conidiomata, lenticular to cylindrical, muriform conidia and lack a known sexual morph (Doilom et al. 2017, Hashimoto et al. 2017). In this study, we follow the updated classification by Koukol et al. (2018), Phukamsakda et al. (2020) and Ren et al. (2021).

Hermatomyces sphaericus (Sacc.) S. Hughes, Mycological Papers 50: 100 (1953)

Fig. 25

Index Fungorum number: IF298410

Saprobic on dried branch of *Hevea brasiliensis*. Sexual morph: Undetermined. Asexual morph: Colonies on natural substrate dry, blackish brown, velvety, circular or oval, doughnut-shaped, dull, consisting of a sterile mycelial outer zone and a round, glistening, abundantly sporulating center. Mycelium 2–3 μm wide, superficial, composed of a network of branched, septate, brown, thick-walled, smooth hyphae. Conidiophores 9–53 \times 2.5–3 (\bar{x} = 27 \times 3 μm , n = 13), micronematous, straight or flexuous, pale to dark brown, smooth, unbranched, arising from prostrate hyphae at the center of circular colony. Conidiogenous cells holoblastic, monoblastic, integrated, terminal, cylindrical, subhyaline. Conidia (16–)18–27(–29.2) μm high, (12–)16–26 μm wide (\bar{x} = 23.7 \times 20.2 μm , n = 31), broadly ellipsoidal, lenticular in front view, fattened and disk-shaped in lateral view, with subhyaline peripheral cells surrounding central with blackish-brown cells, thick-walled, smooth.

Culture characteristics – Conidia germinating on MEA within 24 hours at room temperature and germ tubes produced from every cell of the conidium. Colonies on MEA circular, slightly

raised, surface smooth with entire edge, whitish grey to grey at the surface with white margin and light brown from the centre of the colony in reverse with creamy-white margin.

Material examined – Thailand, Chiang Rai Province, Wiang Chiang Rung District, on dried branch of *Hevea brasiliensis* (Euphorbiaceae), 1 November 2016, C. Senwana, RBCR07 (MFLU 19-0228), living culture MFLUCC 17-0373 (new host record).

Host and distribution – Wide host range, widely distributed in tropical and subtropical regions.

GenBank numbers – MFLUCC 17-0373: ITS = OL782144, LSU = OL782061, SSU = OL780526, TEF1 = OL875103, RPB2 = OL828753.

Notes – In a BLASTn search of NCBI GenBank, the closest match of the ITS, LSU, SSU, TEF1 and RPB2 sequence of our strain with 99.4%, 100%, 99.9%, 100% and 99.9% similarity, respectively, was *Hermatomyces sphaericus*. In the present phylogenetic analysis, MFLUCC 17-0373 cluster with *H. sphaericus* (Fig. 24). Our collection is similar to *H. sphaericus* described by Hughes (1953) and Koukol et al. (2018). We, therefore, name our collection as *H. sphaericus* which is a new host record for *Hevea brasiliensis* in Thailand. It should be noted that *H. sphaericus* is a poorly supported group and is likely to represent a species complex. Thus, further work is needed on this group with more collections or more informative genes.

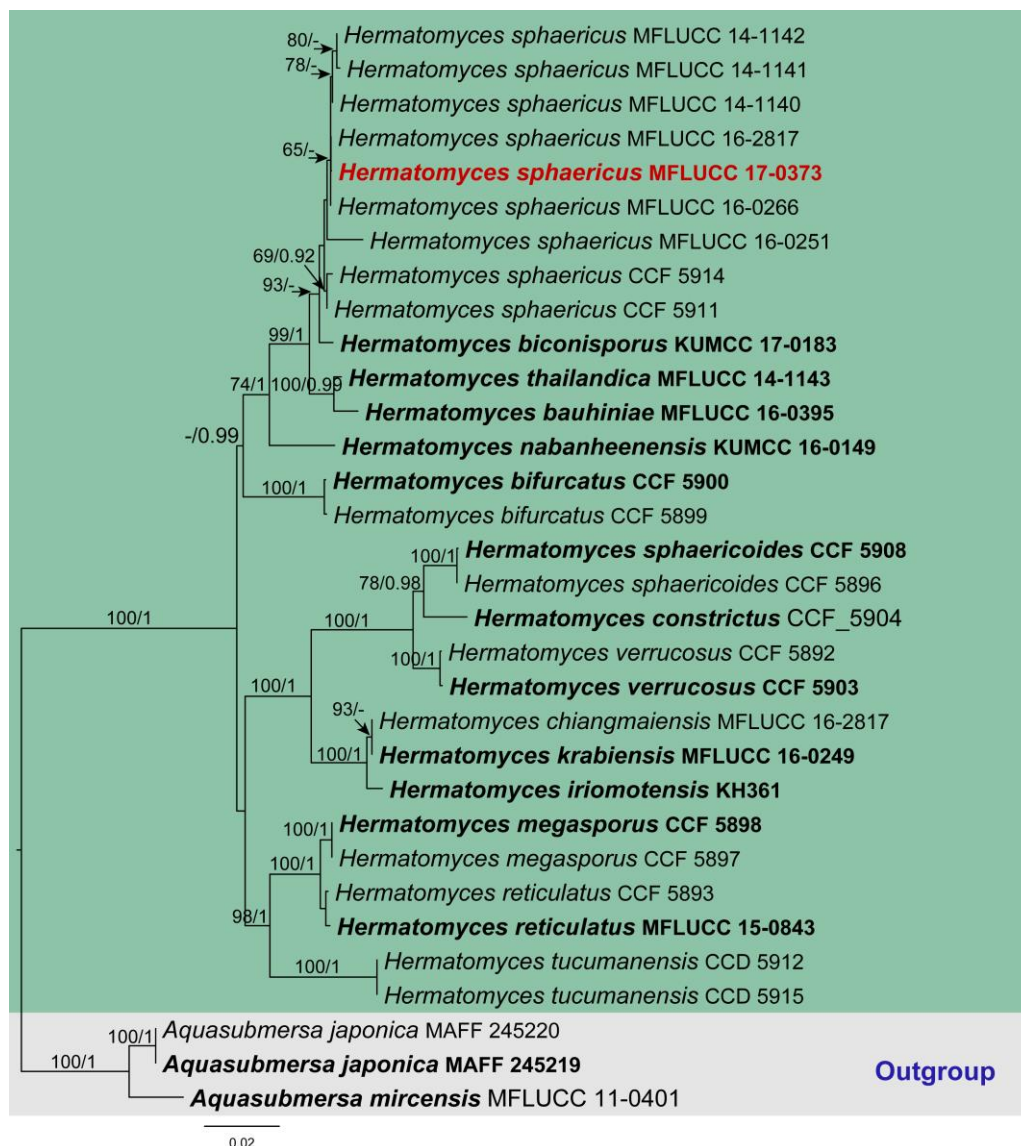


Figure 24 – RAxML tree of *Hermatomyces* based on a combined LSU, SSU, ITS, TEF1 and RPB2 sequence dataset. Thirty strains are included in the combined sequence analysis, which comprise

4417 characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree with a final likelihood value of -11357.352145 is presented. The matrix had 765 distinct alignment patterns, with 33.26% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.248169, C = 0.254390, G = 0.261434, T = 0.236007; substitution rates: AC = 1.423292, AG = 5.030421, AT = 1.604814, CG = 0.958622, CT = 14.391543, GT = 1.000000; gamma distribution shape parameter $\alpha = 0.797709$. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Aquasubmersa japonica* (MAFF 245219 and MAFF 245220) and *A. mircensis* (MFLUCC 11-0401) are used as outgroup taxa.

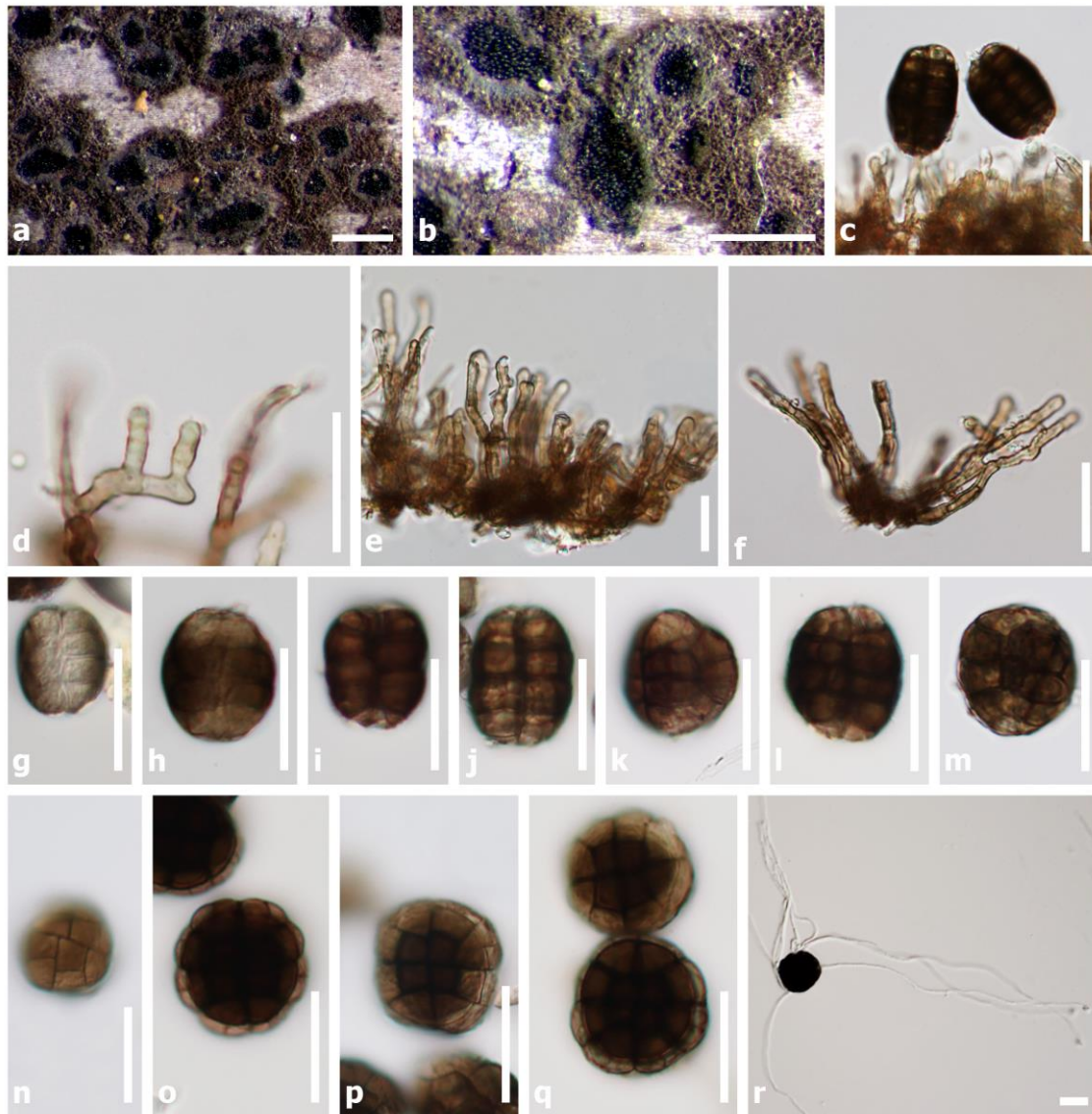


Figure 25 – *Hermatomyces sphaericus* (MFLU 19-0228, new host record). a–b Habit on substrate. c Conidia and conidiophores. d–f Conidiophores. g–q Conidia. r Germinated spore. Scale bars: a–b = 500 μ m, c–r = 20 μ m.

Lophiostomataceae Sacc.

There are 28 genera listed in Lophiostomataceae which are saprobes on herbaceous and woody plants in terrestrial and aquatic habitats (Thambugala et al. 2015, Hashimoto et al. 2017, Jayasiri et al. 2019, Hongsanan et al. 2020b, Mapook et al. 2020). In this study, a new host record for *Vaginatispora amygdali* is reported together with descriptions and illustrations.

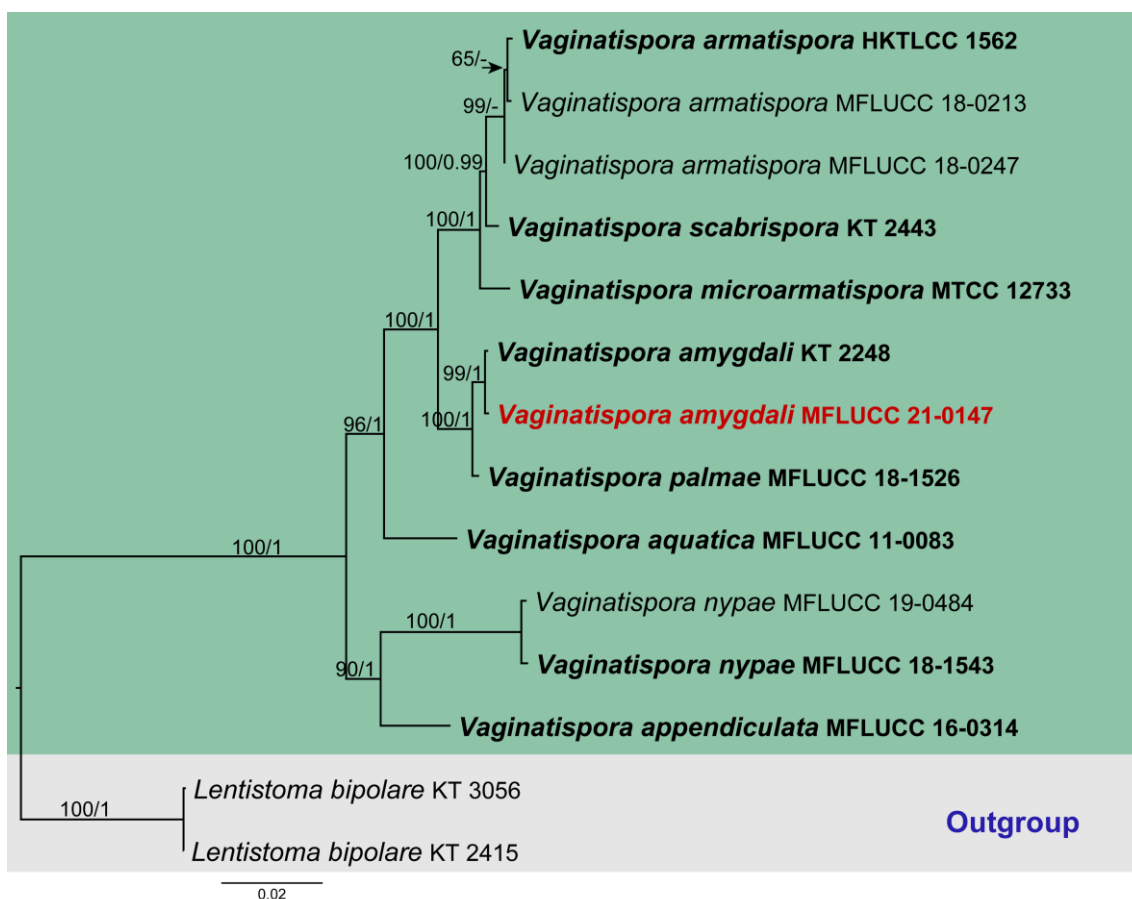


Figure 26 – RAxML tree of *Vaginatispora* based on a combined LSU, SSU, ITS, TEF1 and RPB2 sequence dataset. Fourteen strains are included in the combined sequence analysis, which comprise 4627 characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree with a final likelihood value of -9807.737828 is presented. The matrix had 474 distinct alignment patterns, with 25.73% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.246544, C = 0.249060, G = 0.270437, T = 0.233959; substitution rates: AC = 1.365166, AG = 2.333774, AT = 0.793336, CG = 1.076903, CT = 7.127814, GT = 1.000000; gamma distribution shape parameter $\alpha = 0.621507$. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Lentistoma bipolare* (KT 2415 and KT 3056) are used as outgroup taxa.

Vaginatispora amygdali A. Hashim., K. Hiray. & Kaz. Tanaka, in Hashimoto et al., Stud. Mycol. 90: 179 (2018) Fig. 27

Index Fungorum number: IF 823145

Saprobe on twig (attached on tree) of *Hevea brasiliensis*. Sexual morph: *Ascomata* 260–610 \times 270–640 μm , scattered, immersed, globose to subglobose. Ostiolar crest-like, black, central. *Peridium* 12–42 μm ($\bar{x} = 27 \mu\text{m}$, $n = 30$) wide, composed of cells of *textura angularis* at the sides, outer layers dark brown to black, inner layers hyaline, thin-walled. *Pseudoparaphyses* 1.2–3.8 μm ($\bar{x} = 2.7 \mu\text{m}$, $n = 20$) wide, hyaline, dense, septate, branched, filamentous. *Asci* (67–)70–105(–111) \times 12–18(–20) μm ($\bar{x} = 91 \times 16 \mu\text{m}$, $n = 12$), 8-spored, bitunicate, fissionate, cylindrical-clavate, short pedicellate, apically rounded. *Ascospores* 23–35(–39) \times (4–)6–8.5(–10) μm ($\bar{x} = 25 \times 7 \mu\text{m}$, $n = 80$), overlapping biseriate, hyaline, fusiform with obtuse ends, 1-septate, constricted at septum, smooth-walled, guttulate, surrounded by a narrow mucilaginous sheath and drawn out towards each end to form tapering appendages, (3–)5.5–9 μm ($\bar{x} = 6.9 \mu\text{m}$, $n = 80$) long, with an internal chamber at both ends. Asexual morph: Undetermined.

Culture characteristics – Ascospores germinating on MEA within 24 hours at room temperature and germ tubes produced from both ends. Colonies on PDA circular, mycelium slightly raised, effuse, cultures dark brown and light brown aerial mycelium at the margin.

Material examined – Thailand, Loei Province, Mueang District, on branch (attached on tree) of *Hevea brasiliensis* (Euphorbiaceae), 23 July 2019, C. Senwanna, RBLOEI07 (MFLU 21-0197), living culture MFLUCC 21-0147.

Host and distribution – *Amygdalus persica* (Japan; Hashimoto et al. 2017), *Hevea brasiliensis* (Thailand; this study).

GenBank numbers – MFLUCC 21-0147: ITS = OL782145, LSU = OL782062, TEF1 = OL875104.

Notes – Phylogenetic analyses show that the strain MFLUCC 21-0147 grouped with the type strain of *Vaginatispora amygdali* (KT 2248) with high bootstrap support (Fig. 26). In a BLASTn search, the closest match of the LSU sequence of our strains with 100% similarity was *V. amygdali* (KT 2248, LC312553) and *V. appendiculata* (MFLUCC 13-0835, KY264745), while the closest match to the ITS and TEF1 sequence with 100% similarity was *V. amygdali* (KT 2248, LC312582). Our collection is similar to the type strain, which was described from endocarp of *Amygdalus persica* in Japan (Hashimoto et al. 2017). We, therefore, name our collection as *V. amygdali*, which is a new record for *Hevea brasiliensis* in Thailand.

Neohendersoniaceae Giraldo & Crous

Neohendersoniaceae was established by Giraldo et al. (2017) to accommodate *Neohendersonia*. According to Hongsanan et al. (2020b), there are five genera listed in this family viz. *Brevicollum*, *Crassiparies*, *Medicopsis*, *Neohendersonia* and *Neomedicopsis*. Members of the Neohendersoniaceae are saprobic in terrestrial habitats (Li et al. 2016, Giraldo et al. 2017, Tanaka et al. 2017, Hyde et al. 2018, Crous et al. 2019).

Brevicollum hyalosporum Kaz. Tanaka & Toy. Sato, in Tanaka et al., *Mycologia* 109(4): 611 (2017) Fig. 29

Index Fungorum number: IF821756

Descriptions and illustrations – See Hyde et al. (2018)

Material examined – Thailand, Chiang Mai Province, Mueang District, on twig (attached on tree) of *Hevea brasiliensis* (Euphorbiaceae), 1 July 2017, C. Senwanna, RBCM22 (MFLU 21-0185), living culture MFLUCC 18-0305, *ibid.*, Chiang Mai Province, Mueang District, on twig (attached on tree) of *Hevea brasiliensis* (Euphorbiaceae), 1 July 2017, C. Senwanna, RBCM24 (MFLU 21-0186), living culture MFLUCC 18-0306.

Host and distribution – *Syzygium samarangense* (Japan; Tanaka et al. 2017), *Hevea brasiliensis* (Thailand; Hyde et al. 2018, this study).

GenBank numbers – MFLUCC 18-0305: LSU = OL782063; MFLUCC 18-0306: ITS = OL782146, LSU = OL782064.

Notes – *Brevicollum* was established to accommodate *B. hyalosporum* and *B. versicolor* (Tanaka et al. 2017). The genus is characterized by immersed, globose to depressed globose ascospores. In the present phylogenetic analysis, MFLUCC 18-0305 and MFLUCC 18-0306 cluster with *B. hyalosporum* (MAFF 243400, type species) and MFLUCC 14-0071 (collection from *Hevea brasiliensis*) with high bootstrap support (Fig. 28). We, therefore, name our collection as *B. hyalosporum*.

Crassiparies octosporarum Senwanna, Cheewangkoon & K.D. Hyde, sp. nov. Fig. 30

Index Fungorum number: IF559359

Etymology – The epithet “*octosporarum*” refers to the 8-spored asci.

Saprobe on twig (attached on tree) of *Hevea brasiliensis*. Sexual morph: *Ascomata* 180–400 µm high, 180–355 µm diam., scattered, sometimes in groups of 2–3, immersed globose to subglobose, with a central ostiole. *Peridium* 11–22 µm (\bar{x} = 15 µm, n = 20) wide, composed of cell

of *textura angularis*, thick at the sides, thin at base, outer layers dark brown to black, inner layers hyaline, thin-walled. *Pseudoparaphyses* 1.3–3 μm (\bar{x} = 2 μm , n = 20) wide, dense, hyaline, septate, branched, filamentous. *Asci* (55–)83–129(–134) \times (13–)17.5–26(–28) μm (\bar{x} = 111 \times 22 μm , n = 25), 8-spored, bitunicate, fissitunicate, cylindrical-clavate or clavate, short pedicellate, apically rounded. *Ascospores* (23–)28–35(–40) \times 8–12(–14) μm (\bar{x} = 31 \times 10 μm , n = 50), overlapping biserial, hyaline, broadly fusiform, thick-walled, with a septum mostly submedian, 1-septate, constricted at septum, smooth-walled, guttulate, without a mucilaginous sheath. Asexual morph: Undetermined.



Figure 27 – *Vaginatispora amygdali* (MFLU 21-0197, new host record). a Habit of ascoma. b Transverse sections through ascomata. c Vertical section through ascoma. d Section through ascoma. e Peridium. f Pseudoparaphyses. g–j asci. k–q Ascospores. r Arrowheads indicate an

internal chamber at both ends of ascospore. s Germinated ascospore. t, u Culture characteristic on PDA after 3 months. Scale bars: a–d = 200 μ m, e–j = 20 μ m, k–s = 20 μ m.

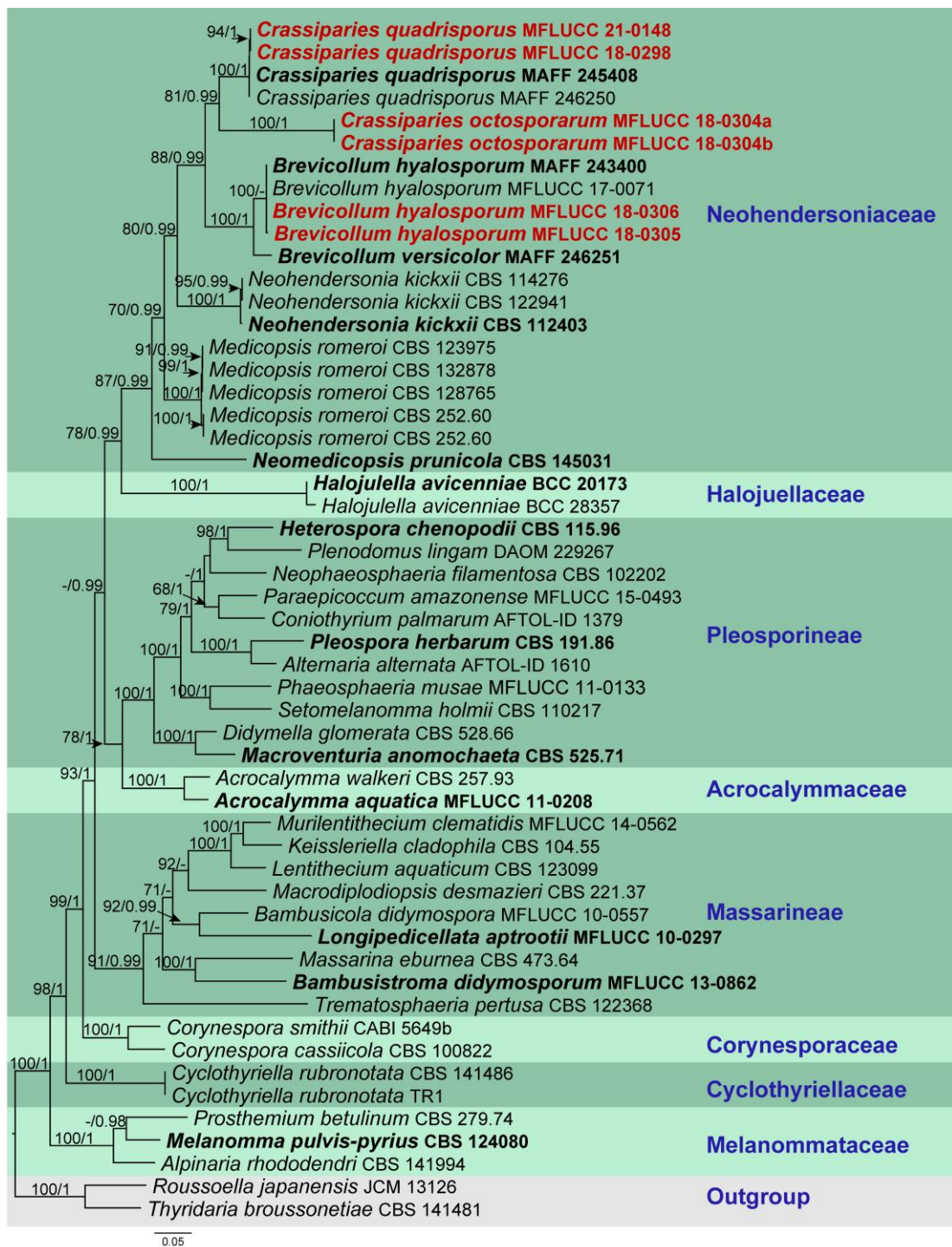


Figure 28 – RAxML tree of Neohendersoniaceae based on a combined LSU, SSU, ITS, TEF1 and RPB2 sequence dataset. Fifty-three strains are included in the combined sequence analysis, which comprise 5029 characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree with a final likelihood value of -42571.938944 is presented. The matrix had 2169 distinct alignment patterns, with 33.08% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.244632, C = 0.248770, G = 0.268959, T = 0.237639; substitution rates: AC = 1.476624, AG = 3.617383, AT = 1.621981, CG = 1.194981, CT = 7.377308, GT = 1.000000; gamma distribution shape parameter α = 0.664131. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are

defined as ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Rousoella japonensis* (JCM 13126) and *Thyridaria broussonetiae* (CBS 141481) are used as outgroup taxa.

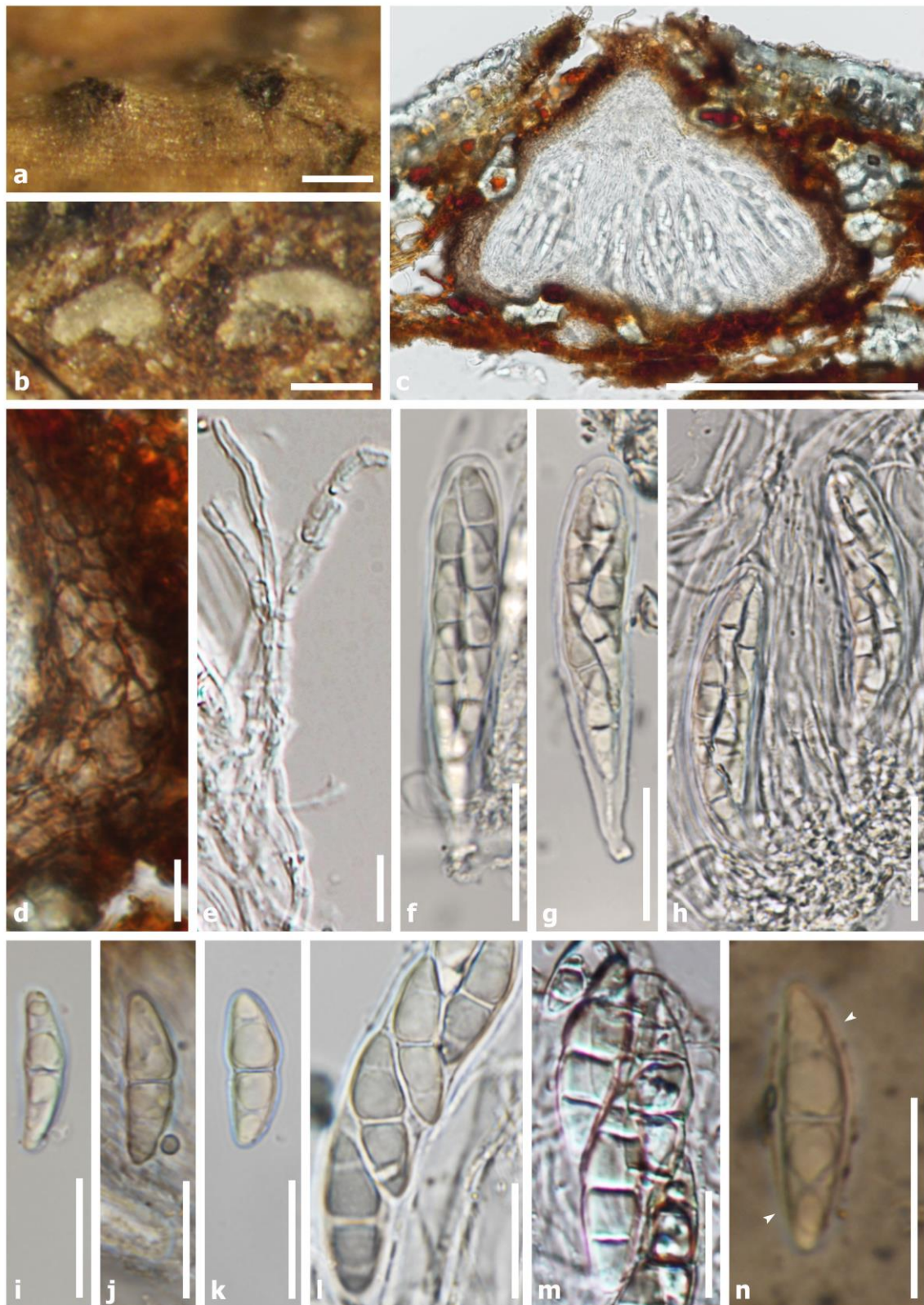


Figure 29 – *Brevicollum hyalosporum* (MFLU 21-0185). a Habit of ascoma. b, c Transverse sections through ascomata. d Peridium. e Pseudoparaphyses. f–h asci. i–m Ascospores (mounted in

double-distilled water). n Arrowheads indicate gelatinous sheath surrounding ascospores after treating with India ink. Scale bars: a–c = 200 μm , d–e = 10 μm , f–h = 30 μm , i–n = 20 μm .

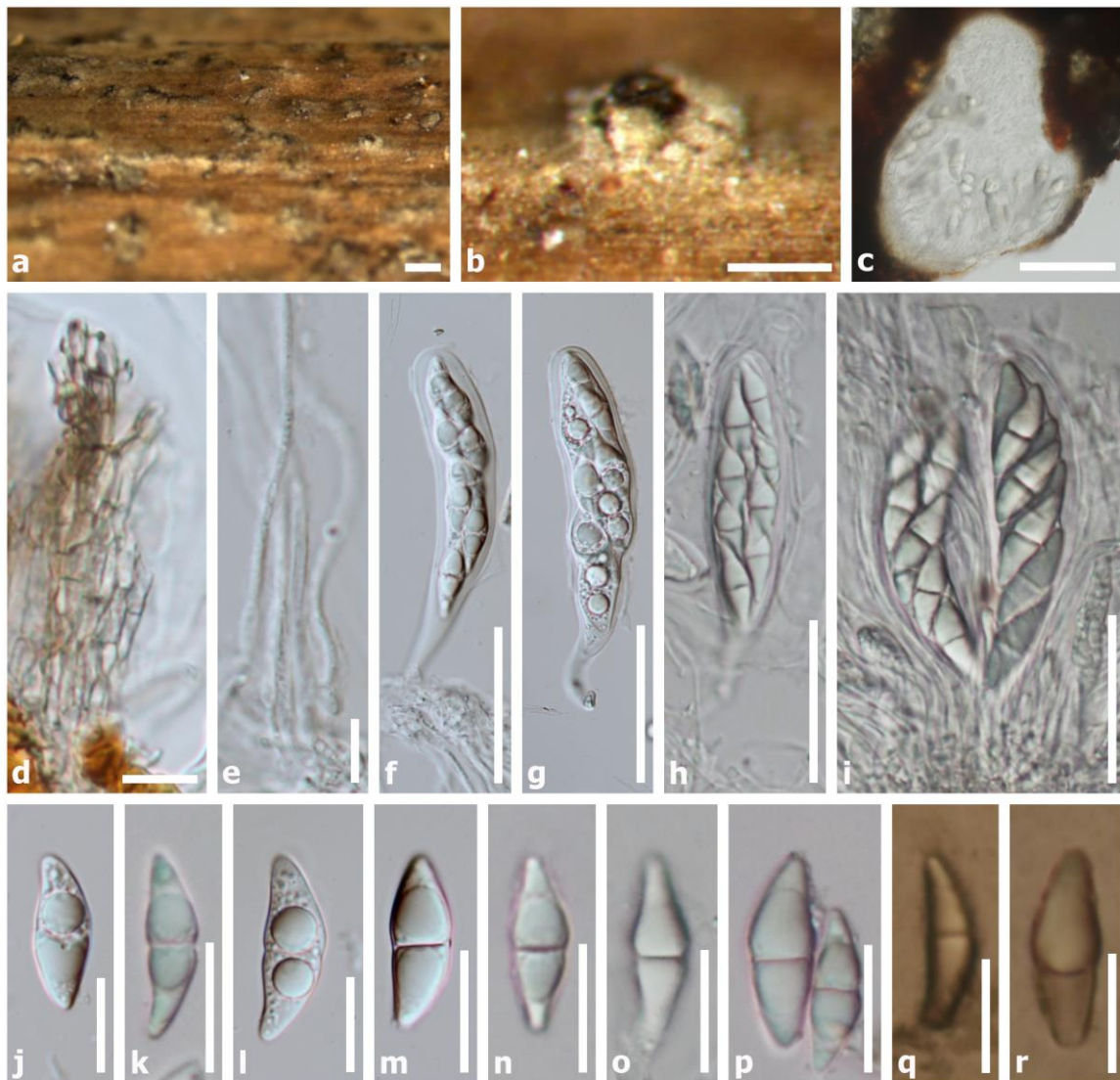


Figure 30 – *Crassiparies octosporarum* (MFLU 21-0188, holotype). a, b Habit of ascoma. c transverse sections through ascomata. d Peridium. e Pseudoparaphyses. f–i Asci. j–p Ascospores (mounted in double-distilled water). q, r Ascospores (stained in Indian ink). Scale bars: a = 500 μm , b = 200 μm , c = 100 μm , d–e = 10 μm , f–i = 50 μm , j–r = 20 μm .

Culture characteristics – Ascospores germinating on MEA within 24 hours at room temperature and germ tubes produced from both ends. Colonies on MEA circular, slightly raised, with entire edge, grey at the surface with white margin and dark brown from the centre of the colony in reverse with brown aerial mycelium at the margin.

Material examined – Thailand, Chiang Mai Province, Mueang District, on twig (attached on tree) of *Hevea brasiliensis* (Euphorbiaceae), 1 July 2017, C. Senwana, RBCM21 (MFLU 21-0188, holotype), ex-type living culture MFLUCC 18-0304a = MFLUCC 18-0304b.

Host and distribution – *Hevea brasiliensis* (Thailand; this study).

GenBank numbers – MFLUCC 18-0304a: ITS = OL782147, LSU = OL782065, TEF1 = OL875105; MFLUCC 18-0304b: LSU = OL782066.

Notes – In a BLASTn search, the closest match of the LSU and TEF1 sequence of *Crassiparies octosporarum* (MFLUCC 18-0304) was *C. quadrisporus* with 98.31% and 94.28% similarity to the strain MAFF 246250 (LC271241) and MAFF 245408 (LC271247) respectively.

Crassiparies was introduced by Li et al. (2016) with *C. quadrisporus* as the type species based on molecular analyses. In our analysis, *Crassiparies octosporarum* forms a separate branch and clusters to *C. quadrisporus* (Fig. 28). Our collection fits well within the species concept of *Crassiparies*. *Crassiparies octosporarum* is introduced here as a new species and morphologically clearly differs from *C. quadrisporus* in having longer asci with 8 spores, while *C. quadrisporus* has 2–4-spored asci (Li et al. 2016, Tanaka et al. 2017).

Crassiparies quadrisporus M. Matsum., K. Hiray. & Kaz. Tanaka, in Li et al., Fungal Divers. 78: 63 (2016) Fig. 31

Index Fungorum number: IF815295

Saprobe on twig (attached on tree) of *Hevea brasiliensis*. Sexual morph: *Ascomata* 140–295 µm high, 150–400 µm diam., scattered, sometimes in groups of 2–4, immersed to semi-immersed, globose to subglobose, with a central ostiole. *Peridium* 7–19(–23) µm wide (\bar{x} = 13.6 µm, n = 25), thick at the sides, thin at base, outer layers dark brown to black, inner layers thin-walled, hyaline, composed of cells of *textura angularis*. *Hamathecium* comprising 1.2–3 µm wide (\bar{x} = 1.8 µm, n = 25), dense, hyaline, septate, branched, filamentous pseudoparaphyses. *Asci* (71–)75–112(–118) × (13–)15–19(–20) µm (\bar{x} = 97 × 17 µm, n = 35), 4-spored, bitunicate, fissitunicate, cylindric-clavate or clavate, short pedicellate, apically rounded. *Ascospores* (10–)22–30(–32) × 6–11(–12) µm (\bar{x} = 26.5 × 9.2 µm, n = 50), overlapping biseriate, hyaline, broadly fusiform, ends rounded, thick-walled, with a septum mostly submedian, 1-septate, minutely echinulate, guttulate, without mucilaginous sheath. Asexual morph: Undetermined.

Culture characteristics – Conidia germinating on MEA within 24 hours at room temperature and germ tubes produced from every cell of the conidium. Colonies on MEA irregular, with undulate edge, greenish brown to dark brown at the surface with white margin and brown from the centre of the colony in reverse with white margin.

Material examined – Thailand, Chiang Mai Province, Mueang District, twig (attached on tree) of *Hevea brasiliensis* (Euphorbiaceae), 22 September 2016, C. Senwanna, RBCM18 (MFLU 21-0189), living culture MFLUCC 18-0298; *ibid*, Mukdahan Province, Dong Luang District, Tambon Phang Dang, on twig (attached on tree) of *Hevea brasiliensis* (Euphorbiaceae), 24 July 2019, C. Senwanna, RBMUK02 (MFLU 21-0190), living culture MFLUCC 21-0148 (new host record).

Host and distribution – *Acer* sp. (Japan; Li et al. 2016), *Machilus japonica* (Japan; Tanaka et al. 2017), *Hevea brasiliensis* (Thailand; this study).

GenBank numbers – MFLUCC 18-0298: ITS = OL782148, LSU = OL782067, SSU = OL780527, TEF1 = OL875106; MFLUCC 21-0148: ITS = OL780489, LSU = OL782068, TEF1 = OL875107.

Notes – Phylogenetic analyses show that the strain MFLUCC 18-0298 and MFLUCC 21-0148 grouped within the *Crassiparies quadrisporus* clade (Fig. 28). In a BLASTn search, the closest match of the LSU, ITS, SSU and TEF1 sequences with 100% similarity was *C. quadrisporus* (MAFF 245408). Our collection (MFLU 21-0189) is similar to the holotype of *C. quadrisporus* (Li et al. 2016, Tanaka et al. 2017). We, therefore, identify our isolate as *Crassiparies quadrisporus*.

Periconiaceae Nann.

The sexual morph of Periconiaceae is characterized by scattered, immersed to erumpent, globose ascomata, oblong to cylindrical asci and broadly fusiform with 1-septate, hyaline ascospores, while the asexual morph is characterized by macronematous, mononematous conidiomata, forming spherical conidial heads, monoblastic to polyblastic, discrete and branched conidiogenous cells and globose to ellipsoidal, aseptate, catenate, brown, verruculose to echinulate conidia (Tanaka et al. 2015). Four genera are listed in this family, i.e., *Bambusistroma*, *Flavomyces*, *Noosia* and *Periconia*, which can be found as endophytes, saprobes, and plant pathogens (Crous et al. 2011, Adamčík et al. 2015, Tanaka et al. 2015, Hongsanan et al. 2020b).

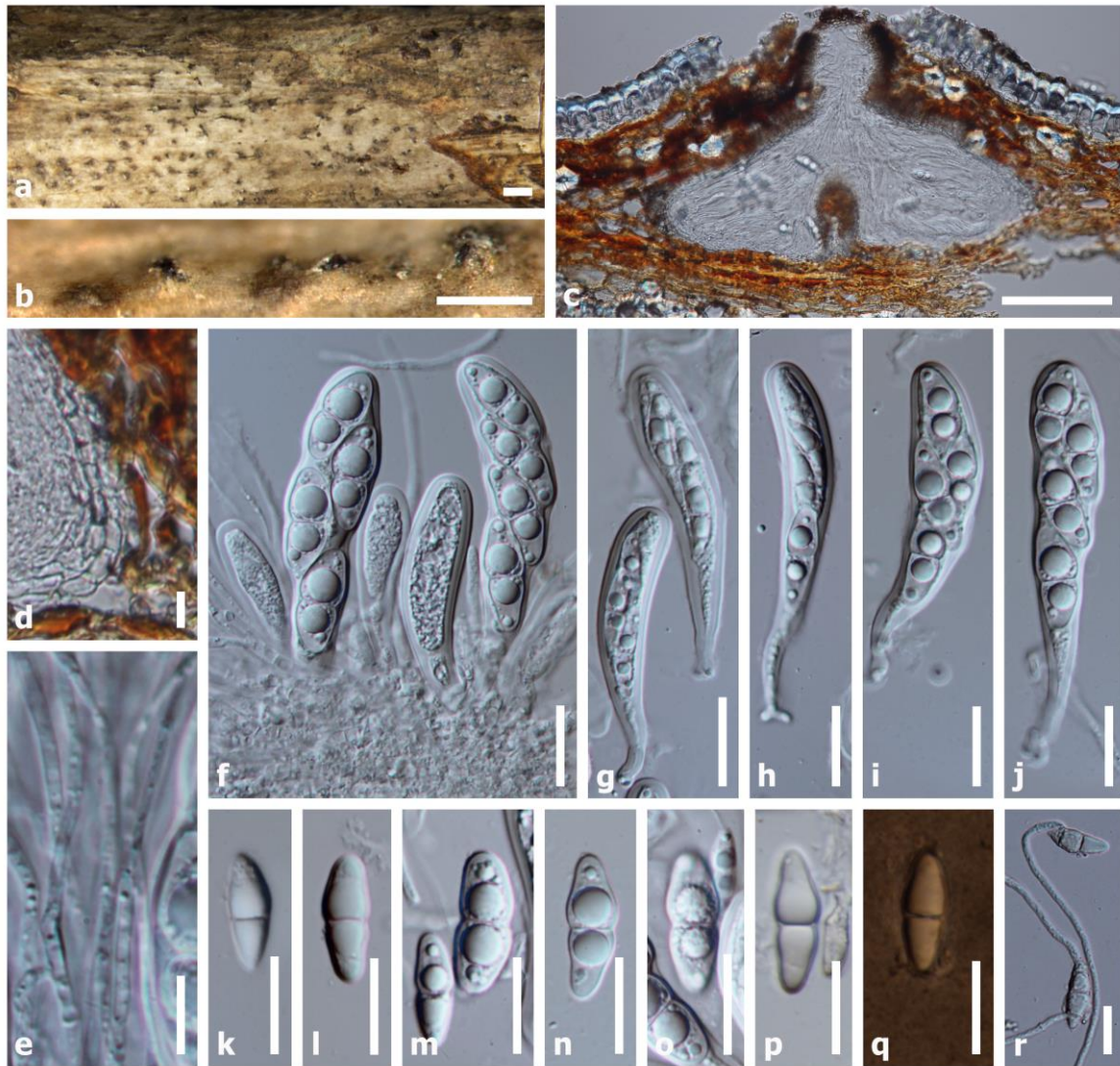


Figure 31 – *Crassiparies quadrisporus* (MFLU 21-0189, new host record): a, b Habit of ascoma. c Transverse section through ascoma. d Peridium. e Pseudoparaphyses. f–j asci. k–p Ascospores (mounted in double-distilled water). q Ascospores (stained in Indian ink). r Germinated ascospore. Scale bars: a–b = 1000 μm , c = 100 μm , d–e = 10 μm , f–r = 20 μm .

Periconia heveae J.A. Stev. & Imle, Mycologia 37(5): 580 (1945)

Fig. 33

Index Fungorum number: IF 289148

Associated with spots on leaves of *Hevea basiliensis*. *Leaf spots* subcircular to circular, pale brown to brown on upper surface with dark brown margin surrounded by yellowish halo, light brown on lower surface. Sexual morph: Undetermined. Asexual morph: *Conidiophores* (251–) 263–320 (–450) \times (16–) 18–23 (–25) μm (\bar{x} = 298 \times 21 μm , n = 13), mononematous, unbranched, erect, stout, straight or slightly flexuous, forming spherical heads at the apex, single, grayish brown to dark brown, mostly 2-septate, smooth to minutely verruculose, thick-walled. *Conidiogenous cells* 8–15 μm diam., monoblastic, discrete, terminal, globose to subglobose, brown, smooth or minute echinulate. *Conidia* (16–)22–37(–41) μm diam. (\bar{x} = 30.4 μm , n = 45), solitary, in acropetal chains, globose, aseptate, light brown to dark brown, verrucose.

Culture characteristics – Conidia germinated on MEA within 12 hours and germ tube produced from the conidia. Colony circular, dense, slightly raised, surface smooth with undulate edge, velvety to woolly, slightly radiating; colony from above white to white greyish; from below: white to white greyish at the margin, light brown at the middle, and brown at the center; not producing pigmentation in agar.

Material examined – Thailand, Phayao Province, Muang, leaf spots of *Hevea brasiliensis* (Euphorbiaceae), 3 January 2017, C. Senwana, RBPY22 (MFLU 19-0248, reference specimen designated here), living culture MFLUCC 17-0341.

Host and distribution – *Hevea benthamiana* (Costa Rica; Spaulding 1961), *H. brasiliensis* (Brazil; Spaulding 1961, China; Zhuang 2001, Costa Rica; Spaulding 1961, Mexico; McGuire & Crandall 1967, Thailand; this study), *H. guianensis* (Costa Rica; Spaulding 1961), *H. spruceana* (Costa Rica; Spaulding 1961).

GenBank numbers – MFLUCC 17-0341: ITS = OL780490, LSU = OL782069, SSU = OL780528, TEF1 = OL875108.

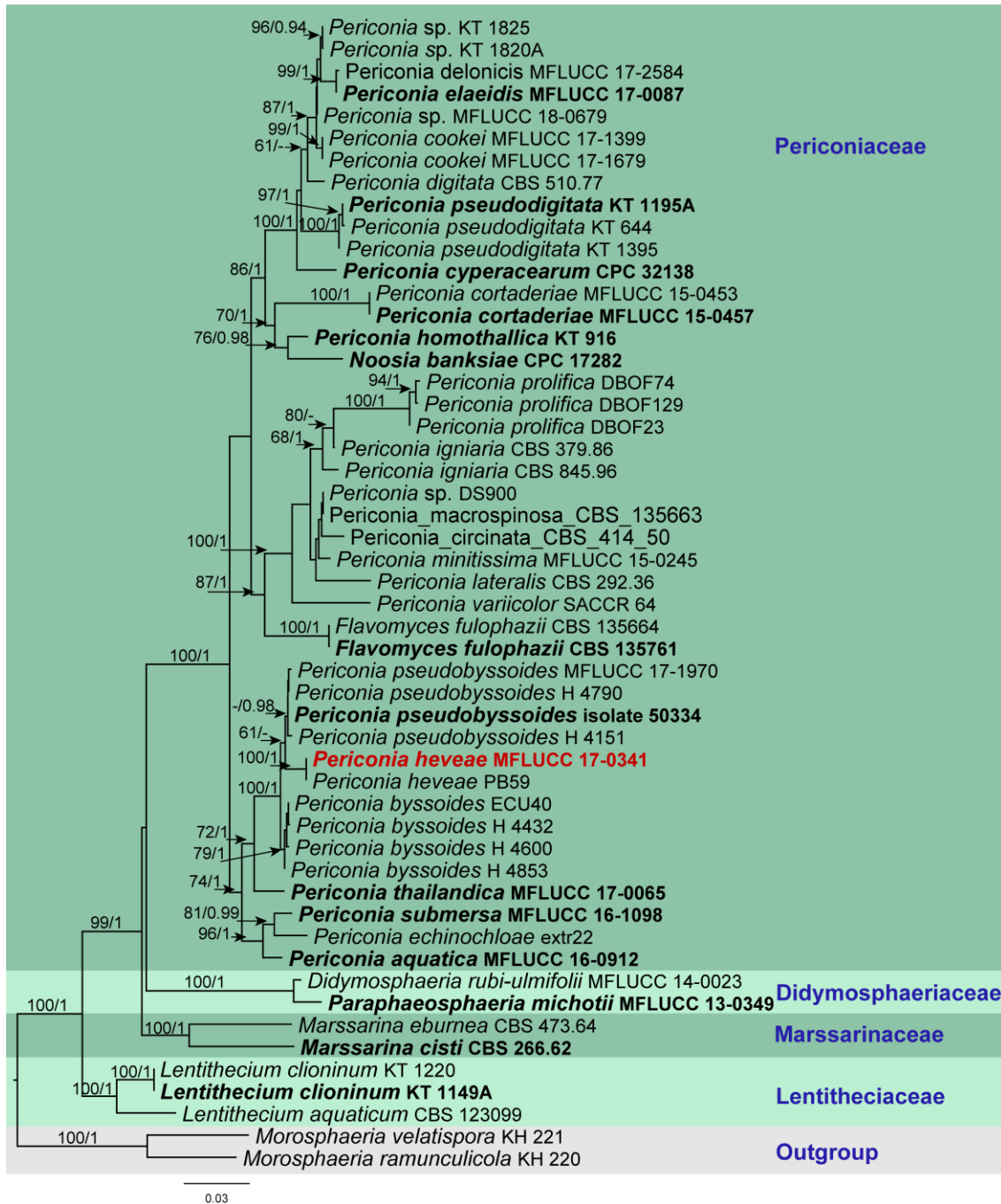


Figure 32 – RAxML tree of *Periconia* based on a combined LSU, ITS, SSU and TEF1 sequence dataset. Fifteen strains are included in the combined sequence analysis, which comprise 4458 characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree with a final likelihood value of -14077.406498 is presented. The matrix had 889

distinct alignment patterns, with 44.35% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.239377, C = 0.250332, G = 0.269372, T = 0.240920; substitution rates: AC = 1.525550, AG = 2.537508, AT = 1.407167, CG = 1.273121, CT = 9.595137, GT = 1.000000; gamma distribution shape parameter $\alpha = 0.500868$. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Morosphaeria ramuculicola* (KH 220) and *M. velatispora* (KH 221) are used as outgroup taxa.

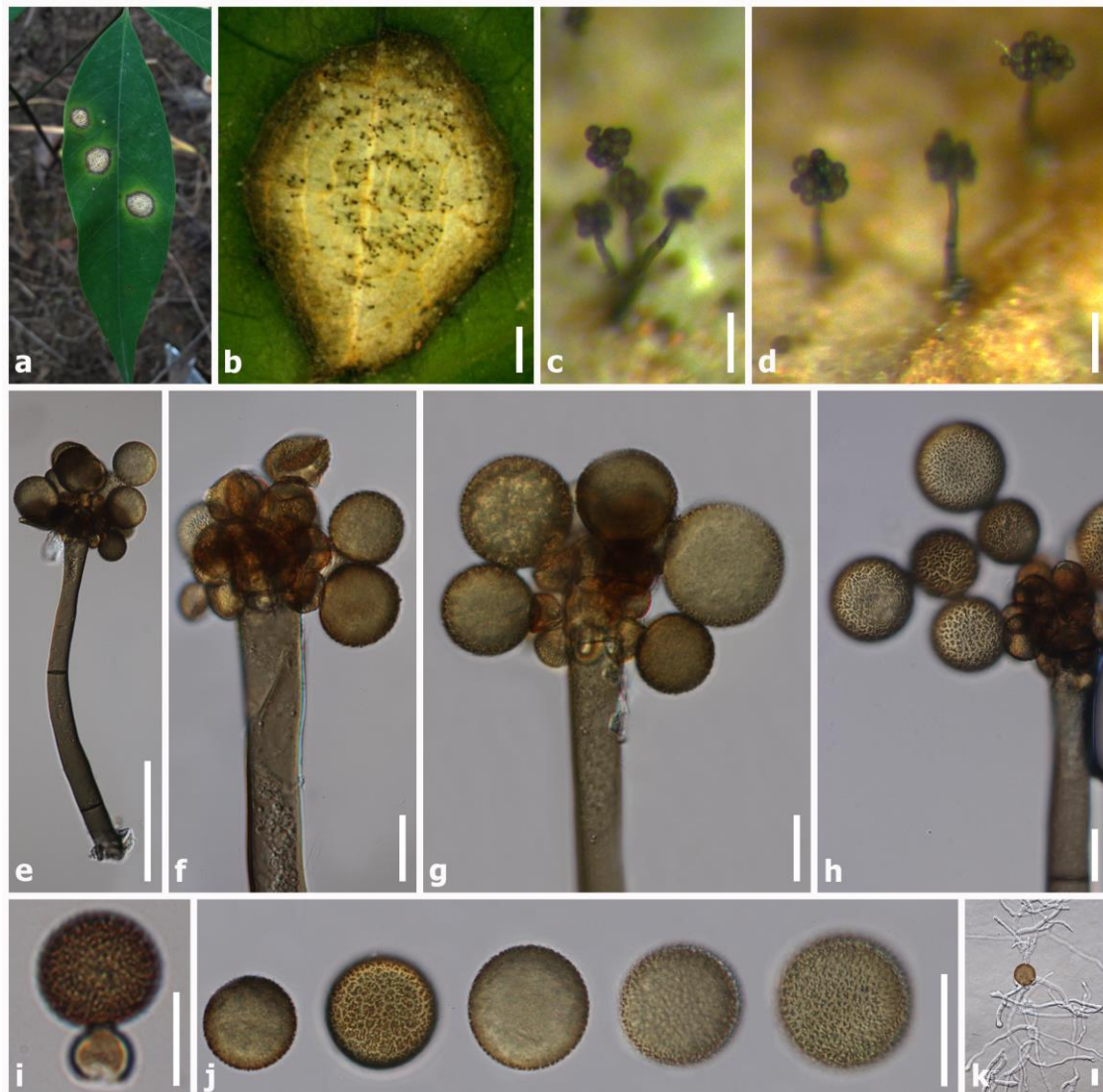


Figure 33 – *Periconia heveae* (MFLU 19-0248, reference specimen). a–b Leaf spots. b Close-up of lesion. c–d Conidiophores and conidia on leaf spot. e Conidiophores with conidia. f–g Conidiophores with conidiogenous cells and conidia. h Conidiophores with conidia in chains. i Conidiogenous cells and conidia. j Conidia. k Germinated spore. Scale bars: b = 500 μ m, c–d = 100 μ m, e = 100 μ m, f–i = 20 μ m, j–k = 30 μ m.

Notes – *Periconia* species have a cosmopolitan distribution occurring as pathogens, saprobes or endophytes on various substrates worldwide in terrestrial and marine habitats (Tanaka et al. 2015, Liu et al. 2017, Crous et al. 2018a, Hyde et al. 2018, Dayarathne et al. 2020, Phukamsakda et al. 2020). *Periconia heveae* was introduced by Stevenson & Imle (1945) on *Hevea* spp. and morphology of our collection fits well with the description of this taxa. In the NCBI BLASTn search of ITS sequences, *Periconia heveae* most closely matches *Periconia aquatica* strain

(MFLUCC 16-0912) with 93.41% similarity. However, the sequence of *Periconia heveae* is not available in GenBank. Phylogenetic analyses of LSU, ITS, SSU and TEF1 sequence dataset show that *Periconia heveae* (MFLUCC 17-0341) forms a distinct lineage sister to *P. pseudobyssoides* (Fig. 32). They are different in conidial dimension ((16–)22–37(–41) μm diam. vs (12–)15–17(–20) μm diam., respectively) (Markovskaja & Kačergius 2013). A comparison of ITS nucleotides shows that *Periconia heveae* differs from *P. pseudobyssoides* (BILAS 50334) in 20/576 bp (3.47%). *Periconia heveae* was only reported from *Hevea* spp. and this probably specific on *Hevea* (Stevenson & Imle 1945). We, therefore, name our collection as *P. heveae* and designate our strain as a reference specimen. In phylogenetic analysis (Fig. 32), *Periconia heveae* clusters with *P. byssoides* (PB59) was collected from *Hevea brasiliensis* in China. However, we could not compare the morphology with our strain. A comparison of ITS nucleotides shows that *Periconia byssoides* (PB59) 100% similarity to *Periconia heveae* strain MFLUCC 17-0341. We, hence, name *Periconia byssoides* (strain PB59) as *P. heveae*.

Phaeoseptaceae Boonmee, Thambug. & K.D. Hyde

Phaeoseptaceae was introduced by Hyde et al. (2018) to accommodate *Phaeoseptum*, *Lignosphaeria* and *Neolophiostoma*. Pem et al. (2019) treated treated *Lignosphaeria* in Dothideomycetes, genera incertae sedis based on molecular analyses. According to Hongsanan et al. (2020b), *Phaeoseptum* and *Pleopunctum* were accepted in Phaeoseptaceae. The members of this family are saprobes in terrestrial and aquatic habitats (Hyde et al. 2018, Liu et al. 2019, Dayarathne et al. 2020, Hongsanan et al. 2020b, Phukamsakda et al. 2020). In this study, we follow the updated classification by Boonmee et al. (2021) and *Pleopunctum heveae* is introduced based on morphological characters and molecular analyses.

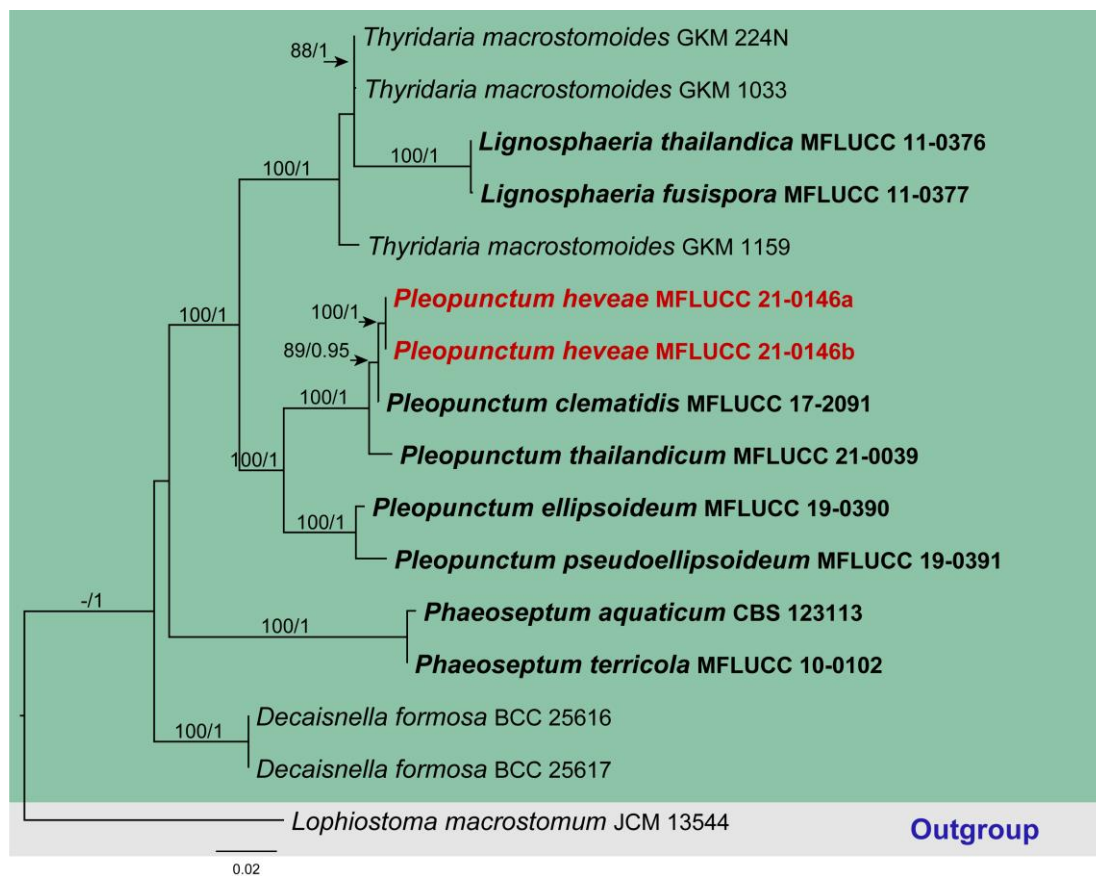


Figure 34 – RAxML tree of *Pleopunctum* based on a combined LSU, SSU, ITS and TEF1 sequence dataset. Sixteen strains are included in the combined sequence analysis, which comprise 3420 characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree with a final likelihood value of -9029.635817 is presented. The matrix had

529 distinct alignment patterns, with 43.57% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.237935, C = 0.258248, G = 0.279468, T = 0.224349; substitution rates: AC = 1.281320, AG = 2.481340, AT = 1.270661, CG = 1.248672, CT = 8.669740, GT = 1.000000; gamma distribution shape parameter $\alpha = 1.014728$. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Lophiostoma macrostomum* (JCM 13544) is used as the outgroup taxon.

Pleopunctum heveae Senwanna, Cheewangkoon & K.D. Hyde, sp. nov.

Fig. 35

Index Fungorum number: IF559360

Etymology – Named after the host on which it occurs, *Hevea brasiliensis*

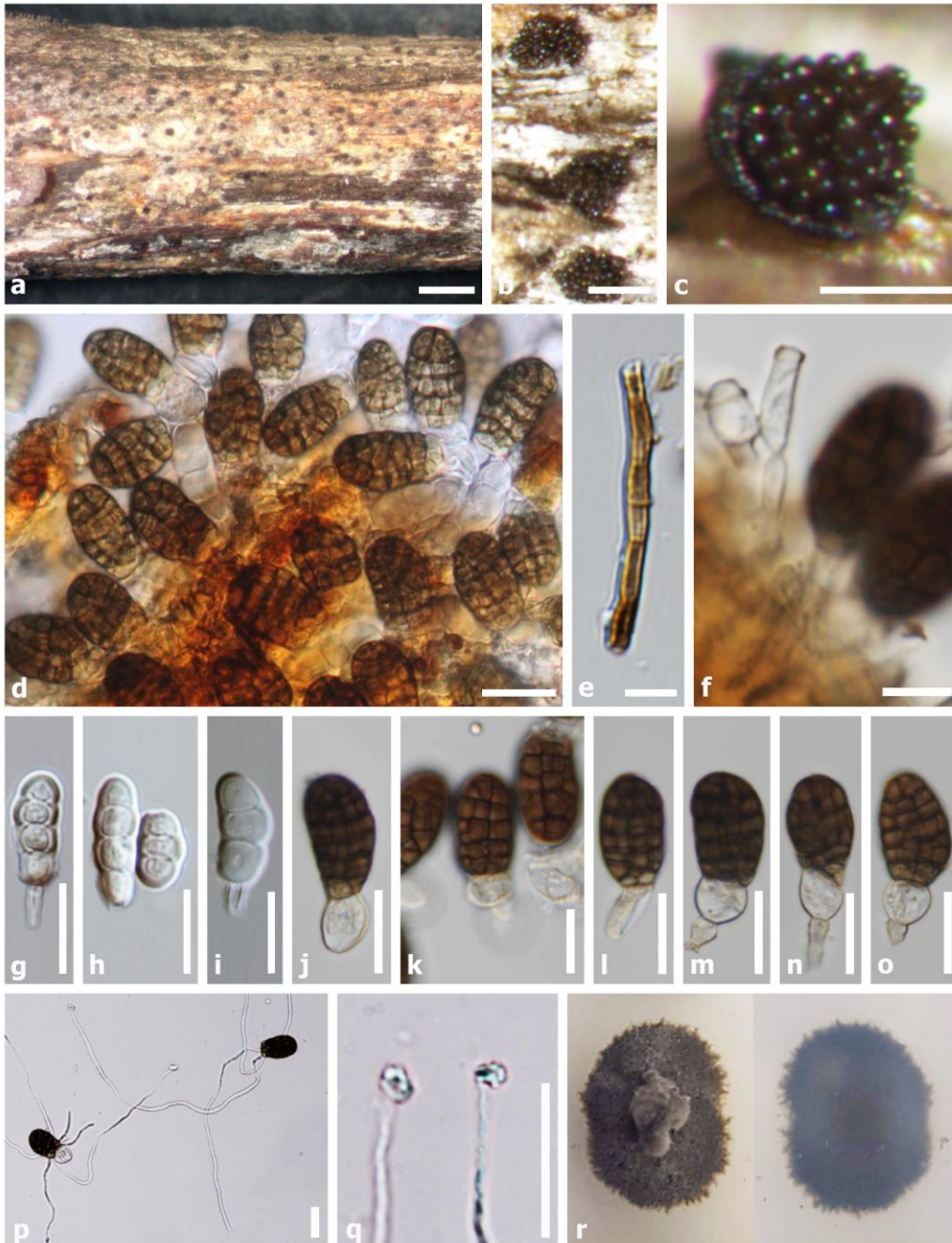


Figure 35 – *Pleopunctum heveae* (MFLU 21-0193, holotype). a–c Colonies on substrate. d Conidia on substrate. e Mycelium. f Conidiophores. g–i. Immature conidia. j–o Mature conidia.

p Germinated spores. q Appressoria. r Culture on PDA. Scale bars: a = 1000 µm, b = 200 µm, c = 100 µm, d, g–o = 20 µm, e, f = 10 µm.

Saprobic on dried twig of *Hevea brasiliensis*. Sexual morph: Undetermined. Asexual morph: Colonies on natural substrate sporodochial, superficial, dark brown, scattered, gregarious, punctiform. Mycelium 3.5–6 µm wide (\bar{x} = 4.8 µm, n = 10), immersed in the substratum, septate, subhyaline to light brown hyphae. Conidiophores 1.5–3.5 µm wide (\bar{x} = 2.5 µm, n = 15), macronematous, mononematous, cylindrical, branched, septate, hyaline. Conidiogenous cells (6–)8.5–12(–15) × 3–5 µm wide (\bar{x} = 10 × 4 µm, n = 15), monoblastic, terminal, integrated, hyaline. Conidia dimorphic, solitary, smooth-walled; cylindrical conidia (8.5–)11–30(–33) × (7.5–)9–12.5(–15) µm wide (\bar{x} = 22 × 10.7 µm, n = 35), cylindrical to ellipsoidal, hyaline, rounded at apex, truncate at base, 2–3-transversely septate, constricted at the septa; lenticular conidia (28–)34.5–43.5(–45.5) × 13–18(–23) µm (\bar{x} = 38.5 × 16.3 µm, n = 40), acrogenous, muriform, constricted at septa, oval to ellipsoidal, pale brown when immature, round at apex, truncate at base, often with a hyaline, elliptical to globose basal cell, (4.5–)8–13.5(–15) µm high × (5–)8–13.5 µm wide (\bar{x} = 11 × 11 µm, n = 40). Appressoria solitary, hyaline, globose to subglobose, thick-walled.

Material examined – Thailand, Chiang Mai Province, Muang District, Mae Hia Agricultural Research, Demonstrative and Training Center, on dried twig of *Hevea brasiliensis* (Euphorbiaceae), 1 July 2017, C. Senwana, RBCM12 (MFLU 21-0193, holotype), ex-type living culture MFLUCC 21-0146.

Host and distribution – *Hevea brasiliensis* (Thailand; this study).

GenBank numbers – MFLUCC 21-0146a: ITS = OL780491, LSU = OL782070, MFLUCC 21-0146b: ITS = OL780492, LSU = OL782071.

Table 3 Synopsis of *Pleopunctum* species.

Species	Conidia	Conidiogenous cell	Conidiophore	Mycelium
<i>P. clematidis</i> (Phukamsakda et al. 2020)	<i>Lenticular conidia</i> : 16–33 × 15–23 µm <i>Cylindrical conidia</i> : 15–35 × 6–11, 2–3-septate <i>Hyaline basal cell</i> : –	3–8 × 4–9 µm	6.5–15.5 × 2–5 µm	3.5–4.5 µm wide
<i>P. heveae</i> (This study)	<i>Lenticular conidia</i> : (28–)34.5–43.5(–45.5) × 13– 18(–23) µm <i>Cylindrical conidia</i> : 8(8.5–)11–30(–33) × (7.5–)9– 12.5(–15) µm, 2–3-septate <i>Hyaline basal cell</i> : (4.5–)8– 13.5(–15) µm × (5–)8–13.5 µm	1.5–3.5 µm wide	(6–)8.5–12(–15) × 3–5 µm	3.5–6 µm wide
<i>P. ellipsoideum</i> (Liu et al. 2019)	<i>Lenticular conidia</i> : 39–51 × 17–24 µm <i>Cylindrical conidia</i> : – <i>Hyaline basal cell</i> : 8–20 × 8.5–18.5 µm	-	1.5–3.5 µm wid	-
<i>P. pseudoellipsoideum</i> (Liu et al. 2019)	<i>Lenticular conidia</i> : 39–59 × 19–28 µm <i>Cylindrical conidia</i> : – <i>Hyaline basal cell</i> : 6.5–13.5 × 11–15.5 µm	-	1.5– 4.5 µm wide	-
<i>P. thailandicum</i> (Boonmee et al. 2021)	<i>Lenticular conidia</i> : 29–38 × 19–25 µm <i>Cylindrical conidia</i> : – <i>Hyaline basal cell</i> : 8–20 × 8.5–18.5 µm	-	2.5–5 µm wide	-

Notes – *Pleopunctum* is listed as the first hyphomycetous genus in Phaeoseptaceae and its sexual morph is still undetermined (Liu et al. 2019). In a BLASTn search on NCBI GenBank, the closest matches of LSU sequence of MFLUCC 21-0146a and MFLUCC 21-0146b is *Lignosphaeria fusispora* (MFLUCC 11-0377; KP 888646) with 93.74% similarity, while the closest matches with the ITS sequence is 85.61% similar to *Lignosphaeria fusispora* (MFLUCC 11-0377; KP899140). Phylogenetically, *Pleopunctum heveae* clustered in the same clade with *P. clematidis*, *P. ellipsoideum*, *P. pseudoellipsoideum* and *P. thailandicum* with high statistical support and formed a sister clade to *P. clematidis* (Fig. 34). *Pleopunctum heveae* is similar to other species in the morphological characters of having sporodochial conidiomata, monoblastic conidiogenous cells and muriform conidia with a hyaline, elliptical to globose basal cell (Liu et al. 2019). However, *P. clematidis* and *P. heveae* differ from *P. ellipsoideum*, *P. pseudoellipsoideum* and *P. thailandicum* as they have dimorphic conidia on the natural substrate (Phukamsakda et al. 2020). *Pleopunctum heveae* differs from *P. clematidis* in its conidia size (Table 3).

Torulaceae Corda

Members of Torulaceae are saprobic in terrestrial and freshwater habitats (Su et al. 2018, Hongsanan et al. 2020b, Phukamsakda et al. 2020). Currently, there are six genera accepted in this family viz. *Dendryphion*, *Neotorula*, *Rostriconidium*, *Rutola*, *Sporidesmioides* and *Torula* (Hongsanan et al. 2020b).

Torula fici Crous, IMA Fungus 6 (1): 192 (2015)

Fig. 37

Index Fungorum number: IF816154

Saprobic on dried twigs of *Hevea brasiliensis*. Sexual morph: Undetermined. Asexual morph: Hyphomycetous. Colonies effuse on host, dark brown to black, powdery. Mycelium partly immersed to superficial on the host surface, comprising septate, smooth, and pale brown to brown hyphae. *Conidiophores* 19–53 × 2.5–4.5 μm (\bar{x} = 35.7 × 3.8 μm, n = 10), macronematous, mononematous, solitary, arising from hypha, erect, pale brown to brown, smooth, thick-walled, subglobose to oblong. *Conidiogenous cells* 5.8–11.5 × 3–4.5 μm (\bar{x} = 8.3 × 3.8 μm, n = 12), mono- to polyblastic, doliiiform to subglobose, dark brown to black, paler at apex, smooth, thick-walled. *Conidia* (8–)10–20 × 5–8 μm (\bar{x} = 14.2 × 6 μm, n = 45), phragmosporous, catenate, acrogenous, branched, oblong, elongated, 1–4-septate, constricted with dark bands at the septa, brown to dark brown, verrucose, rounded and mostly dark brown at the apex, straight or slightly curved.

Culture characteristics – Conidia germinating on MEA within 24 hours at room temperature and germ tubes produced from one or both ends. Colonies on MEA circular, mycelium slightly raised, entire, cultures white at the surface and light brown from the centre of the colony in reverse with creamy-white at the margin.

Material examined – Thailand, Phayao Province, Muang District, on dried twig of *Hevea brasiliensis* (Euphorbiaceae), 2 October 2016, C. Senwanna, RBPY06 (MFLU 19-0237), living culture MFLUCC 17-0325; *ibids*, RBPY15a, living culture MFLUCC 17-0336; *ibid.*, Chiang Mai province, Muang District, Mae Hia Agricultural Research, Demonstrative and Training Center, on dead twig of *Hevea brasiliensis* (Euphorbiaceae), 1 July 2017, C. Senwanna, RBCM14 (MFLU 21-0196), living culture MFLUCC 18-0686.

Host and distribution – *Chromolaena odorata* (Thailand; Li et al. 2017, Mapook et al. 2020), *Ficus religiosa* (Cuba; Crous et al. 2015a), *Hevea brasiliensis* (Thailand; this study), *Magnolia grandiflora* (China; Jayasiri et al. 2019), *Garcinia* sp. (Thailand; Jayasiri et al. 2019), *Pandanus* sp. (Thailand; Hyde et al. 2018), submerged decaying wood (China; Su et al. 2018).

GenBank numbers – MFLUCC 17-0325: ITS = OL780493, LSU = OL782072, TEF1 = OL875109; MFLUCC 17-0336: ITS = OL780494, LSU = OL782072, TEF1 = OL875110; MFLUCC 18-0686: ITS = OL780495.

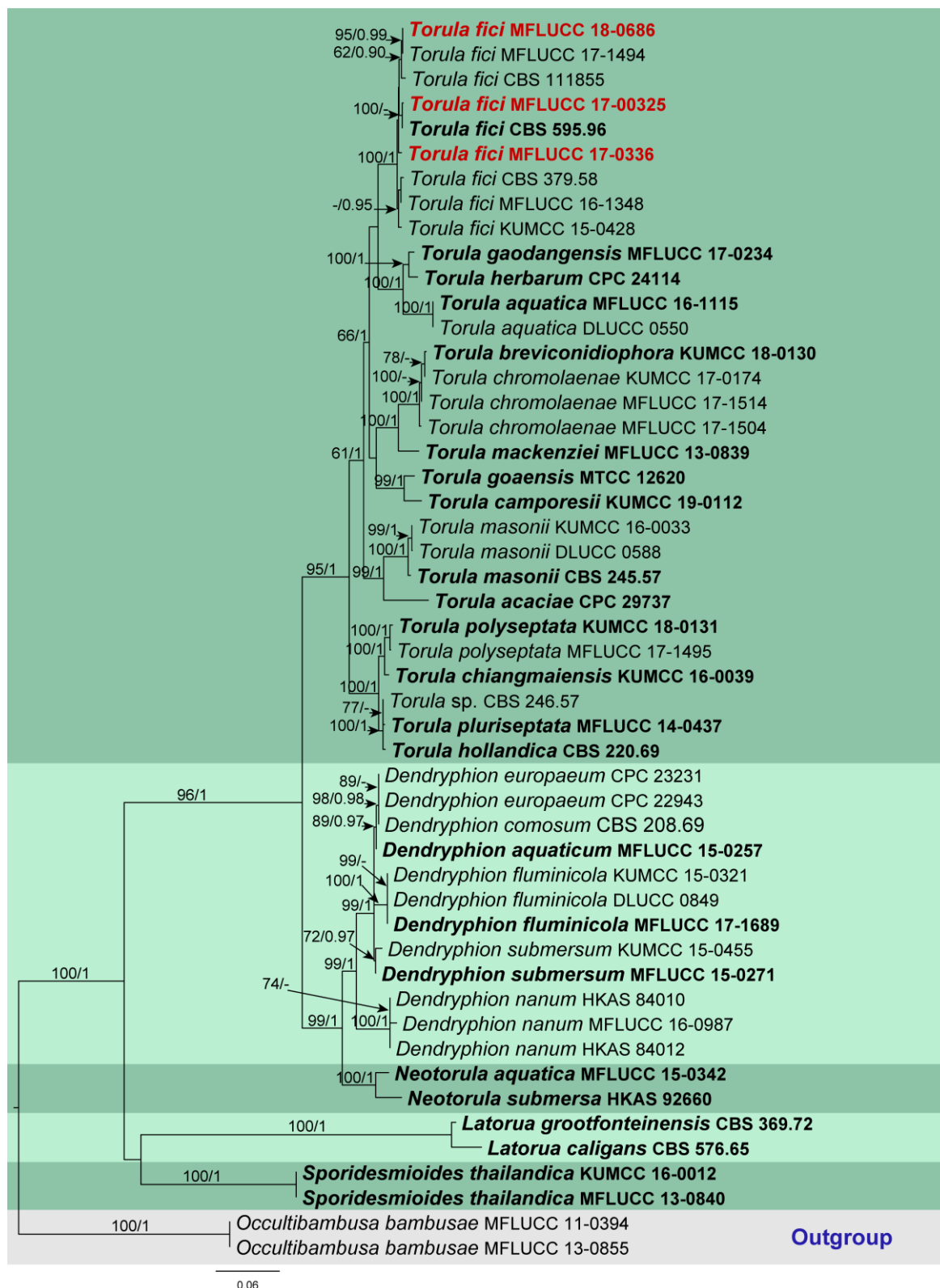


Figure 36 – RAxML tree of *Torula* based on a combined LSU, SSU, TEF1, RPB2 and ITS sequence dataset. Fifty strains are included in the combined sequence analysis, which comprise 4635 characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree with a final likelihood value of -18924.957846 is presented. The matrix had 1338 distinct alignment patterns, with 42.51% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.245644, C = 0.259294, G = 0.271689, T = 0.223374; substitution rates: AC = 2.016665, AG = 3.689714, AT = 1.530770, CG = 1.200166, CT = 9.075026, GT = 1.000000; gamma distribution shape parameter α = 0.484975. Bootstrap support

values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Occultibambusa bambusae* (MFLUCC 11-0394 and MFLUCC 13-0855) are used as outgroup taxa.

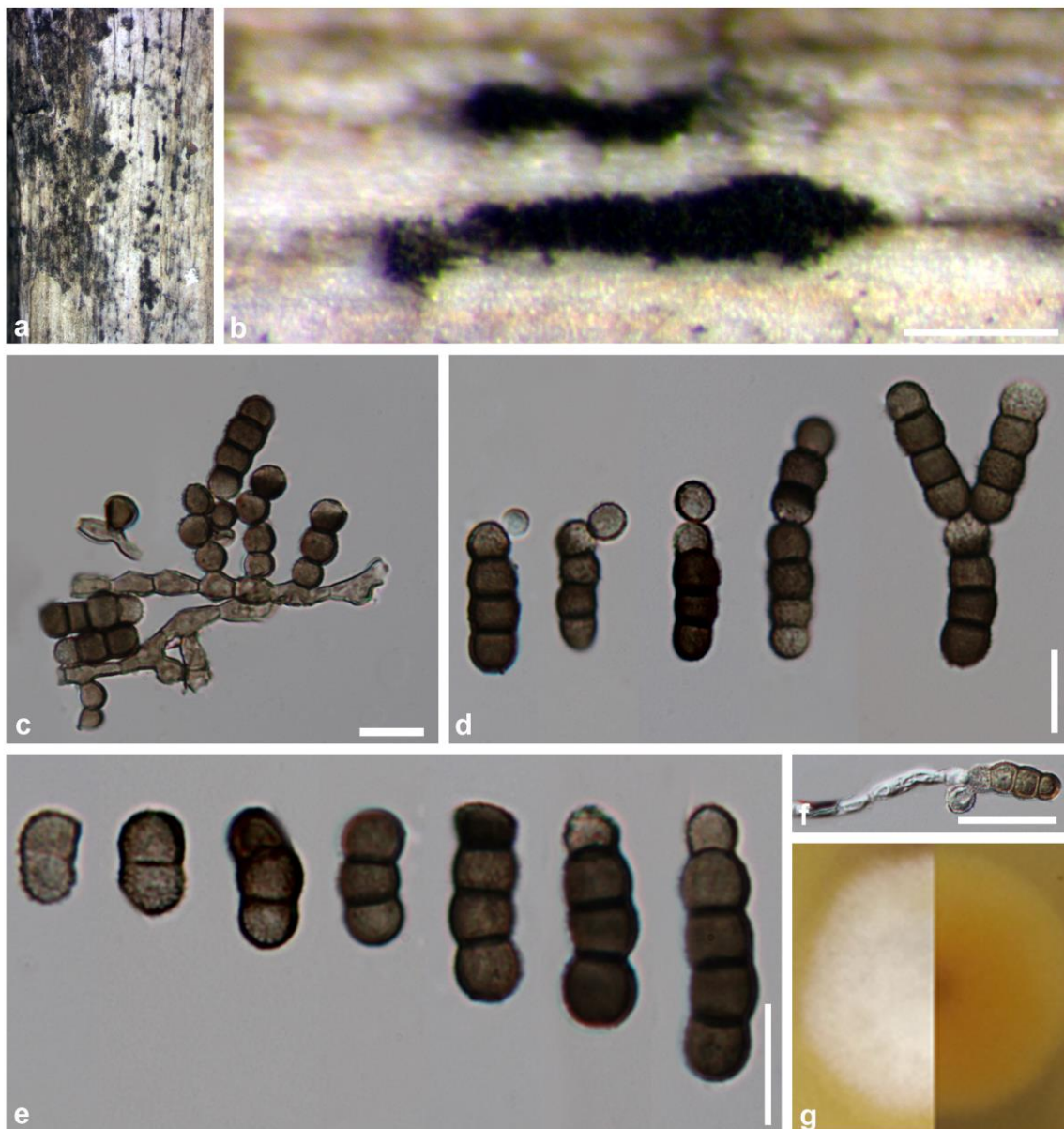


Figure 37 – *Torula fici* (MFLU 19-0237, new host record). a–b Habitat on host surface. c Conidia and conidiophores. d Catenulate conidia and the development of conidiogenous cells from the apical cell of conidium. e Conidia. f Germinated spore. Scale bars: b = 500 μm , c–e = 10 μm , f = 20 μm .

Notes – In a BLASTn search of NCBI GenBank, the closest match of the ITS, TEF1 and RPB2 sequence of our three strains with 93% (MN507400), 95.87% (MN507403) and 87.55% (MN507404) similarity, respectively, were identical to *Torula camporesii*, while the closest match of the LSU and SSU sequence with 99.27% (NG_059827) and 99.89% (NG_063641) similarity, respectively, were identical to *T. gaodangensis*. Phylogenetic analysis shows that three strains MFLUCC 17-0325, MFLUCC 17-0336 and MFLUCC 18-0686 are grouped with *Torula fici* (Fig. 36). We, therefore, name our collections as *Torula fici*. The collection is a new host record for *Hevea brasiliensis* in Thailand.

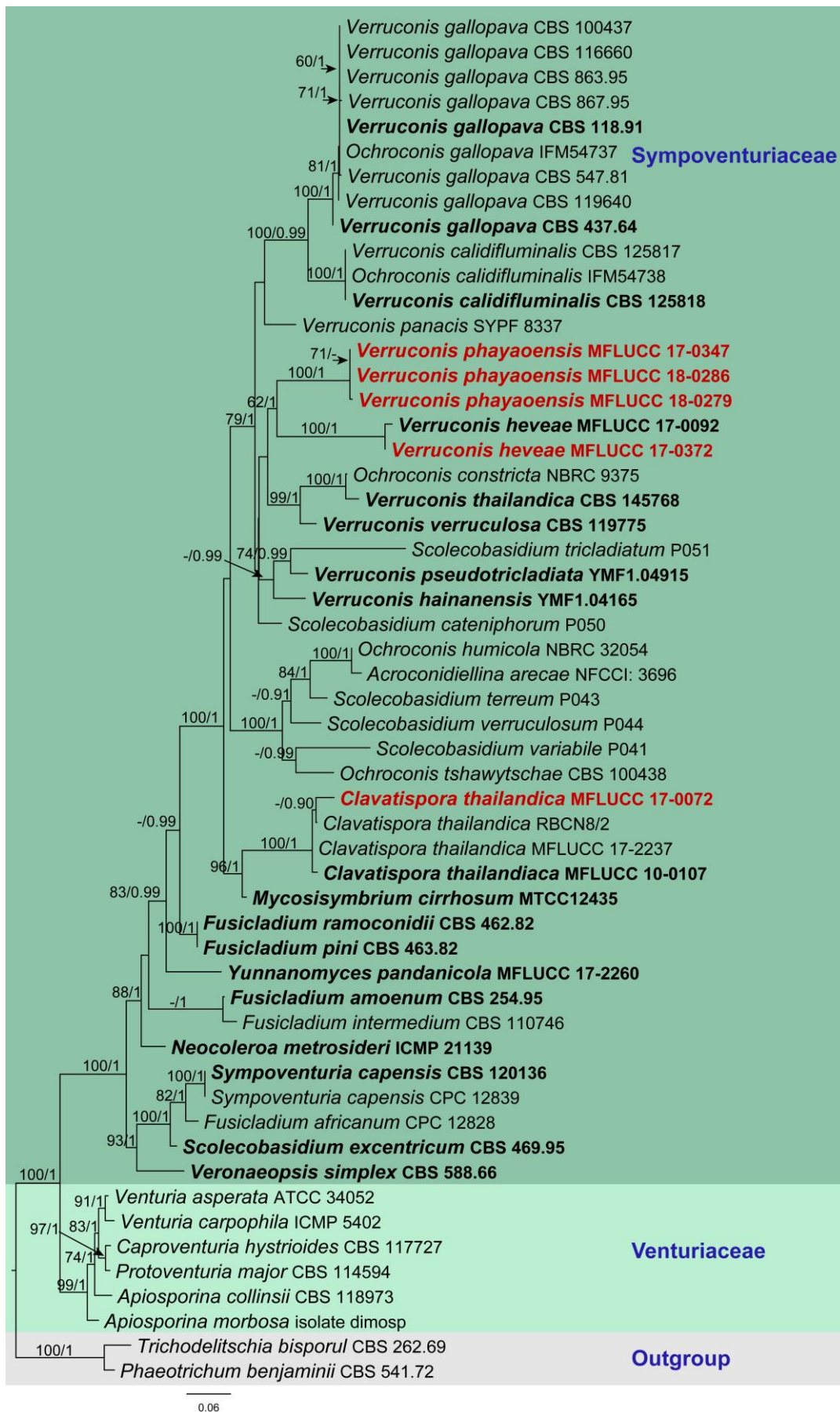


Figure 38 – RAxML tree of Symptoventuriaceae based on a combined LSU, SSU and ITS sequence dataset. Fifty-five strains are included in the combined sequence analysis, which comprise 3025

characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree with a final likelihood value of -17079.179295 is presented. The matrix had 1115 distinct alignment patterns, with 47.10% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.253338, C = 0.221785, G = 0.296212, T = 0.228665; substitution rates: AC = 0.933707, AG = 1.846509, AT = 1.253993, CG = 0.962690, CT = 4.086957, GT = 1.000000; gamma distribution shape parameter α = 0.636589. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Phaeotrichum benjaminii* (CBS 541.72) and *Trichodelitschia bisporul* (CBS 262.69) are used as outgroup taxa.

Venturiales Y. Zhang ter, C.L. Schoch & K.D. Hyde

Sympoventuriaceae Y. Zhang ter, C.L. Schoch & K.D. Hyde

There are 13 genera accepted in Sympoventuriaceae based on molecular analyses (Hongsanan et al. 2020a). Members of this family are plant pathogens, saprobes and opportunistic pathogens on animals and humans (Zhang et al. 2011, Samerpitak et al. 2014, Tibpromma et al. 2018, Huanraluek et al. 2019). In this study, we present a new species from *Hevea brasiliensis*, together with descriptions and illustrations. In addition, *Clavatispora thailandica* and *Verruconis heveae* are also reported.

Clavatispora thailandica Boonmee & K.D. Hyde, in Boonmee et al., Phytotaxa 176(1): 96 (2014)

Fig. 39

Index Fungorum number: IF 805924

Saprobic on dead branch of *Hevea brasiliensis*. Sexual morph: 64–143(–237) μm diam. \times 86–129(–170) μm high (\bar{x} = 138 \times 111 μm , n = 7), superficial, scattered, solitary to gregarious, black, rounded above, held to the host surface by mycelium, with septate setae, easily removed from the host surface, with a central irregular ostiole. *Peridium* 13–32 μm thick, composed of cells of *textura angularis*, thick-walled, dark brown to black, becoming thin-walled and hyaline towards the inner region. *Hamathecium* comprising numerous, filamentous, hyaline, septate, branched pseudoparaphyses. *Asci* 62–95(–119) \times (12–)14–20 μm (\bar{x} = 81.6 \times 16.2 μm , n = 27), 6–8-spored, bitunicate, broadly obovoid or subclavate-oblong, short pedicellate, with an ocular chamber. *Ascospores* (16–)18–29(–37) \times (5–)7–10(–13) μm (\bar{x} = 24.5 \times 8.9 μm , n = 44), biseriate, clavate, brown to dark brown, muriform, 3–5(–7)-transversely septate, longitudinally 1–3-septate, constricted at the septa, with conical and narrowly round ends, with granular appearance, smooth-walled. Asexual morph: Undetermined

Culture characteristics – Ascospores germinating on MEA within 24 hours at room temperature and germ tubes produced from spore cells. Colonies on MEA circular, mycelium slightly raised, entire, cultures creamy-white to pale yellow at the surface with greyish brown margin and olivaceous-brown from the centre of the colony in reverse with creamy-white margin.

Material examined – Thailand, Chiang Rai Province, Wiang Chiang Rung District, on branch of *Hevea brasiliensis* (Euphorbiaceae), 1 November 2016, C. Senwana, RBCR013 (MFLU 17-1979), living culture MFLUCC 17-0072; CHINA, Yunnan, Xishuangbanna, on decaying branch of *Hevea brasiliensis* (Euphorbiaceae), January 2019, Phookamsak R., RBCN08 (MFLU 21-0187).

Host and distribution – *Hevea brasiliensis* (Thailand; Huanraluek et al. 2020, this study, China; this study), unidentified herbaceous plants (Thailand; Boonmee et al. 2014).

GenBank numbers – MFLUCC 17-0072: ITS = OL780496, LSU = OL782074, SSU = OL780529, TEF1 = OL875111; MFLU 21-0187: ITS = OL780497, LSU = OL782075.

Notes – *Clavatispora thailandica* was introduced from dead stems of herbaceous plants by Boonmee et al. (2014) and is characterized by subclavate to broadly obovoid with short pedicellate asci, and clavate, muriform, brown to dark brown ascospores. In a BLASTn search of GenBank, the LSU sequence of MFLUCC 17-0072 and MFLU 21-0187 showed 99.76% and 99.40% similarity to *Clavatispora thailandica* (MFLU 10-0107; NG_058863), while the ITS sequence had 88.74% and

89.35% similarity to *Ochroconis pandanicola* (CPC 26317; NR_145399). The closest match of the SSU sequences of MFLUCC 17-0072 with 98.87% (NG_062677) similarity was *Helicoma vaccinii*. In molecular phylogenetic analysis our isolate clusters with *Clavatispora thailandica* (Fig. 38). Our collection is similar to *C. thailandica* described by Boonmee et al. (2014) and the collection from *H. brasiliensis* by Huanraluek et al. (2020). We, therefore, name our collection as *C. thailandica*.



Figure 39 – *Clavatispora thailandica* (MFLU 17-1979). a Ascomata on host substrate. b Squash mount. c Section through ascoma. d Setae. e Pseudoparaphyses. f Peridium. g Ascospores. h Germinated spore. i–p Asci. Scale bars: a–c = 200 μ m, d–h = 20 μ m, i–p = 50 μ m.

Verruconis heveae Huanraluek, Senwanna, Jayawardena & K.D. Hyde, in Huanraluek et al., Phytotaxa 403(1): 50 (2019) Fig. 40
 Index Fungorum number: IF555289

Saprobic or parasitic on the dried latex on petioles of *Hevea brasiliensis*. Sexual morph: Undetermined. Asexual morph: Hyphomycetes. *Colonies* black, hairy, velvety. *Mycelium* superficial, brown to dark brown, composed of septate, branched, brown to dark brown, smooth hyphae. *Conidiophores* (45–)62–100(–133) × 3–4.5 μm (\bar{x} = 80 × 3.7 μm, n = 15), micronematous, mononematous, in groups, develop in fascicles, erect, flexuous, brown to dark brown, septate, branched, smooth-walled. *Conidiogenous cells* holoblastic, integrated, terminal becoming intercalary, nodose, with inner wall layers of the conidiogenous cell continuous with the conidial wall. *Conidia* (3–)6–18(–20) × (2–)3–5 (\bar{x} = 11.5 × 4 μm, n = 56), solitary, ellipsoidal to oblong, pale brown to dark brown, aseptate when immature, 1–3-septate at maturity, constricted and darkened at septa, smooth-walled, basal hilum distinct.

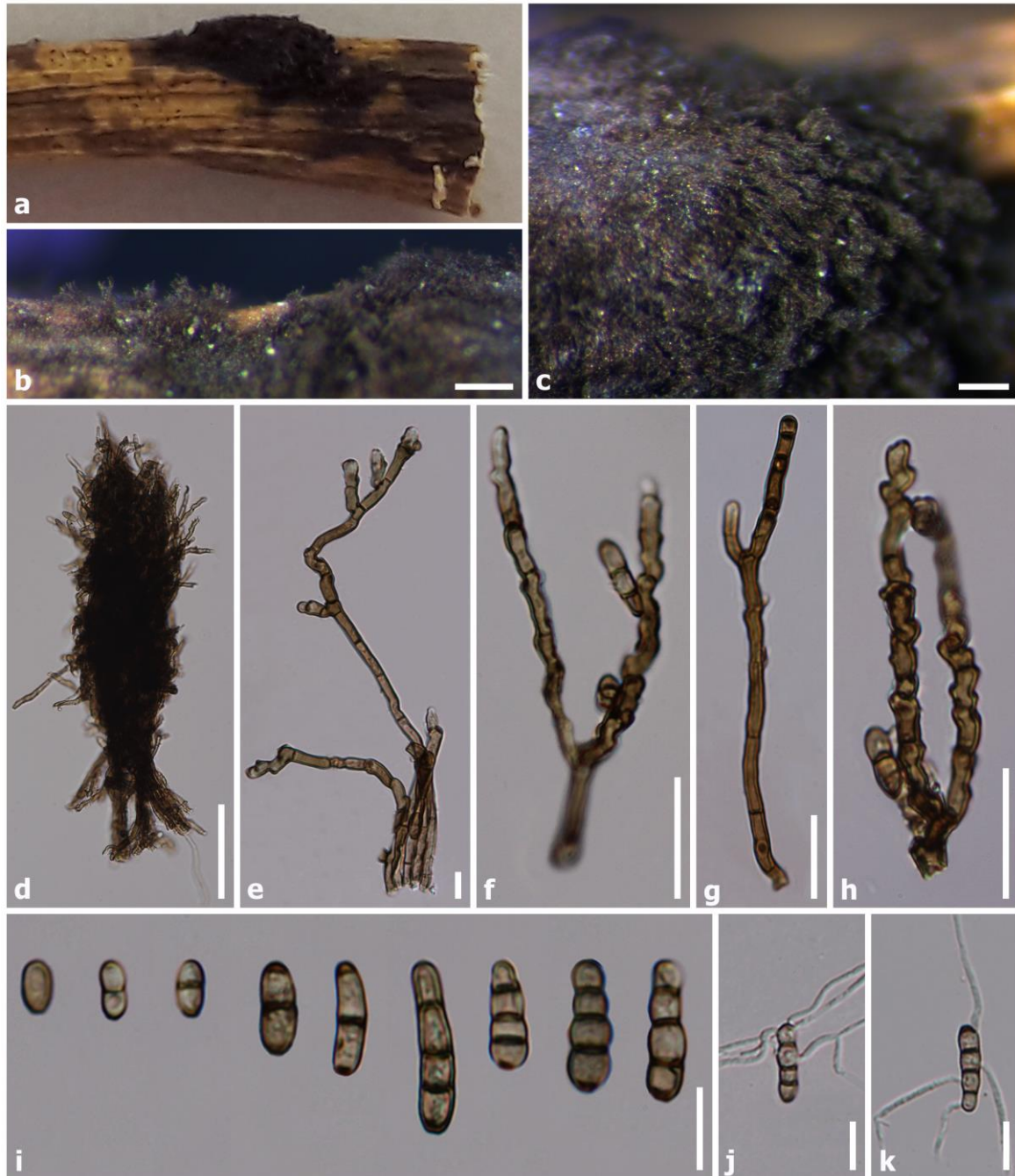


Figure 40 – *Verruconis heveae* (MFLU 19-0227). a–c Habit on substrate. d–h Conidiophores. i Conidia. j–k Germinated spores. Scale bars: b–c = 200 μm, d = 50 μm, e–h = 20 μm, i–k = 10 μm.

Culture characteristics – Conidia germinating on MEA within 24 hours at room temperature and germ tubes produced from spore cells. Colonies on MEA circular, mycelium slightly raised, slightly effuse, olivaceous-grey with dark brown to black margin and dark olivaceous-grey to black in reverse.

Material examined – Thailand, Chiang Rai Province, Wiang Chiang Rung District, on the dried latex on petioles of *Hevea brasiliensis* (Euphorbiaceae), 1 November 2016, C. Senwanna, RBCR06 (MFLU 19-0227), living culture MFLUCC 17-0372.

Host and distribution – *Hevea brasiliensis* (Thailand; Huanraluek et al. 2019, this study).

GenBank numbers – MFLUCC 17-0372: LSU = OL782076, SSU = OL780530.

Notes – *Verruconis* species are saprobes and pathogens in plants, humans, and animals (Samerpitak et al. 2014). In a BLASTn search, the closest match of the LSU sequences with 93.41% similarity was *Verruconis gallopava* (CBS 437.64; KF282656), while the closest match of the SSU sequences with 99.80% similarity was *Pseudocryptoclypeus yakushimensis* (HHUF 30503, NG_061073). Phylogenetic analyses of LSU, SSU and ITS sequence dataset show that MFLUCC 17-0372 grouped with *Verruconis heveae* (MFLUCC 17-0092) (Fig. 38). *Verruconis heveae* was introduced on *Hevea brasiliensis* by Huanraleuk et al. (2019). The morphology of our collection is similar to *Verruconis heveae* described by Huanraleuk et al. (2019), however, they are differed in size of conidia and conidiophores (Table 4).

Verruconis phayaoensis Senwanna, Cheewangkoon & K.D. Hyde, sp. nov.

Fig. 41

Index Fungorum number: IF559361

Etymology – The epithet “*phayaoensis*” refers to Phayao Province in Thailand where the fungus was found.

Saprobic or parasitic on the dried latex on petioles of *Hevea brasiliensis*. Sexual morph: Undetermined. Asexual morph: Hyphomycetes. Colonies black, hairy, velvety. Mycelium superficial, brown to dark brown, composed of septate, branched, brown to dark brown, smooth hyphae. Conidiophores (57–)63–93(–100) × 2–3.7 μm (\bar{x} = 79 × 2.7 μm, n = 14), micronematous, mononematous, in groups, developed in fascicles, erect, brown to dark brown, septate, branched, smooth-walled. Conidiogenous cells holoblastic, integrated, nodose, with inner wall layers of the conidiogenous cell continuous with the conidial wall. Conidia 6–10.5 × 3–5.5 (\bar{x} = 8.5 × 4.4 μm, n = 56), solitary, ellipoidal to oblong, pale brown to dark brown, aseptate when immature, 1–3-septate at maturity, constricted and darkened at septa, smooth-walled, basal hilum indistinct. Appressoria hyaline, globose to subglobose, thick-walled, 3.5–5 μm wide (\bar{x} = 4.4 μm, n = 5).

Culture characteristics – Conidia germinating on MEA within 24 hours at room temperature and germ tubes produced from spore cells with developing appressoria structure. Colonies on MEA circular, mycelium, raised, fluffy, olivaceous-brown and dark olivaceous-brown to black in reverse.

Material examined – Thailand, Phayao Province, Mueang District, on the dried latex on bark of *Hevea brasiliensis* (Euphorbiaceae), 3 January 2017, C. Senwanna, RBPY29 (MFLU 21-0198, holotype), ex-type living culture MFLUCC 17-0347; *ibid*, Phayao Province, Chiang Kam District, on the dried latex on bark of *Hevea brasiliensis* (Euphorbiaceae), 26 July 2017, C. Senwanna, RBPY52 (MFLU 21-0199), living culture MFLUCC 18-0279; *ibid*, Phayao Province, Chiang Kam District, on the dried latex on twig of *Hevea brasiliensis* (Euphorbiaceae), 26 July 2017, C. Senwanna, RBPY55 (MFLU 21-0205), living culture MFLUCC 18-0286.

Host and distribution – *Hevea brasiliensis* (Thailand; this study).

GenBank numbers – MFLUCC 17-0347: ITS = OL780498, LSU = OL782077, SSU = OL780531; MFLUCC 18-0279: ITS = OL780498, LSU = OL782078; MFLUCC 18-0286: LSU = OL782079.

Notes – In a BLASTn search, the closest match of the LSU sequence for MFLUCC 17-0347 and MFLUCC 18-0279 is *V. gallopava* (CBS 437.64; KF282656) with 94.26% similarity, while the closest match to the ITS sequence was with *V. calidifluminalis* (IFM 54738, NR_145332) with 98.90% similarity. The closest match of the SSU sequence for MFLUCC 17-0347 is *V. pseudotricladiata* (YMF 1.04915; NG_070120) with 95.12% and 89.25% similarity, respectively.

In our analyses, *Verruconis phayaoensis* (MFLUCC 17-0347 and MFLUCC 18-0279) forms a distinct lineage sister to *V. heveae* and is closely related to *Ochroconis constricta* (NBRC9375) and *V. verruculosa* (CBS119775) (Fig. 38). *Verruconis phayaoensis* is similar to *V. verruculosa* in conidial size but differs in size of conidiophores and number of septa (Table 4). *Verruconis heveae* and *V. phayaoensis* were collected from Para rubber. However, these species can be distinguished based on their conidiophores, conidial characters and phylogenetic analyses (Table 4, Fig. 38). Therefore, *V. phayaoensis* is introduced as a new species.

Table 4 Morphology and synopsis of recorded *Verruconis* species.

<i>Verruconis</i> species	Conidial morphology	Size (µm)		Host
		conidiophore	Conidia; septa in conidia	
<i>V. calidifluminalis</i> (Samerpitak et al. 2014)	cylindrical to clavate, pale to medium brown, with or without constrictions at the septa	–	9.5–20.5 × 2.5–5.0; 1 septate	water of a hot stream
<i>V. gallopava</i> (Samerpitak et al. 2014)	clavate, subhyaline to pale brown, apical cell wider than basal cell, constricted at the septum	–	11–18 × 2.5–4.5; 1 septate	brain abscess of <i>Meleagris gallopavo</i>
<i>V. hainanensis</i> (Qiao et al. 2019)	fusiform, rostrate at the apical cell, dark at the septa, slightly constricted at the median septum, bicolored, with brown middle cells, and subhyaline end cells, with an inconspicuous basal frill.	25 µm long	23–30.2 × 3.6–5.7; 3 septate	submerged leaves in a stream
<i>V. heveae</i> (Huanraluek et al. 2019)	ellipsoidal to oblong, pale brown to dark brown, rounded at apex, sub-acute at base, constricted and darkened at septa, basal hilum indistinct	21–92 × 1–4	6–14 × 3–6; 1-septate when immature, 2–3-septate at maturity	on dried latex of <i>Hevea brasiliensis</i>
<i>V. heveae</i> (This study)	ellipsoidal to oblong, pale brown to dark brown, constricted and darkened at septa, smooth-walled, basal hilum distinct	(45–)62–100(–133) × 3–4.5	(3–)6–18(–20) × (2–)3–5; 1-septate when immature, 1–3-septate at maturity	on dried latex of <i>Hevea brasiliensis</i>
<i>V. phayaoensis</i> (This study)	ellipsoidal to oblong, pale brown to dark brown, constricted and darkened at septa, smooth-walled, basal hilum distinct	(57–)63–93(–100) × 2–3.7	6–10.5 × 3–5.5; 1-septate when immature, 1–3-septate at maturity	on dried latex of <i>Hevea brasiliensis</i>
<i>V. pseudotricladiata</i> (Qiao et al. 2019)	Staurosporic, subhyaline to pale brown, smooth to verruculose, unbranched or branched: i) unbranched conidia (main axis) cylindrical-clavate, slightly constricted at the septa, ii) branched conidia staurosporic, Y-, or T-shaped, cylindrical-clavate to clavate, very pale brown	6.5–27.2 × 2.1–3.5	i) unbranched conidia: 16–20 × 3.3–4.7; 2–4 septate ii) branched conidia: 15.6–20.6 × 3.8–5.7, 1–3-septate, mostly 2-septate	submerged leaves in a stream
<i>V. thailandica</i> (Hernández-Restrepo et al. 2020)	broadly ellipsoidal with a protuberant hilum, brown, verrucose, constricted at the septum, thick-walled, sometimes with a wing-like gelatinous brown sheath, released by rhexolytic secession	(3.6–)4.1–7.1(–9) × (1.3–)2(–2.3); 0–1-septate	(5–)5.8(–7) × (2.2–)2.6(–3.1); 1 septate	soil
<i>V. verruculosa</i> (Samerpitak et al. 2014)	oblong with rounded ends, pale brown to olivaceous-brown, constricted at the septum	5–45 × 2–3	(6–)7.5(–9) × (3.5–)4(–5); 1 septate	grassland soil

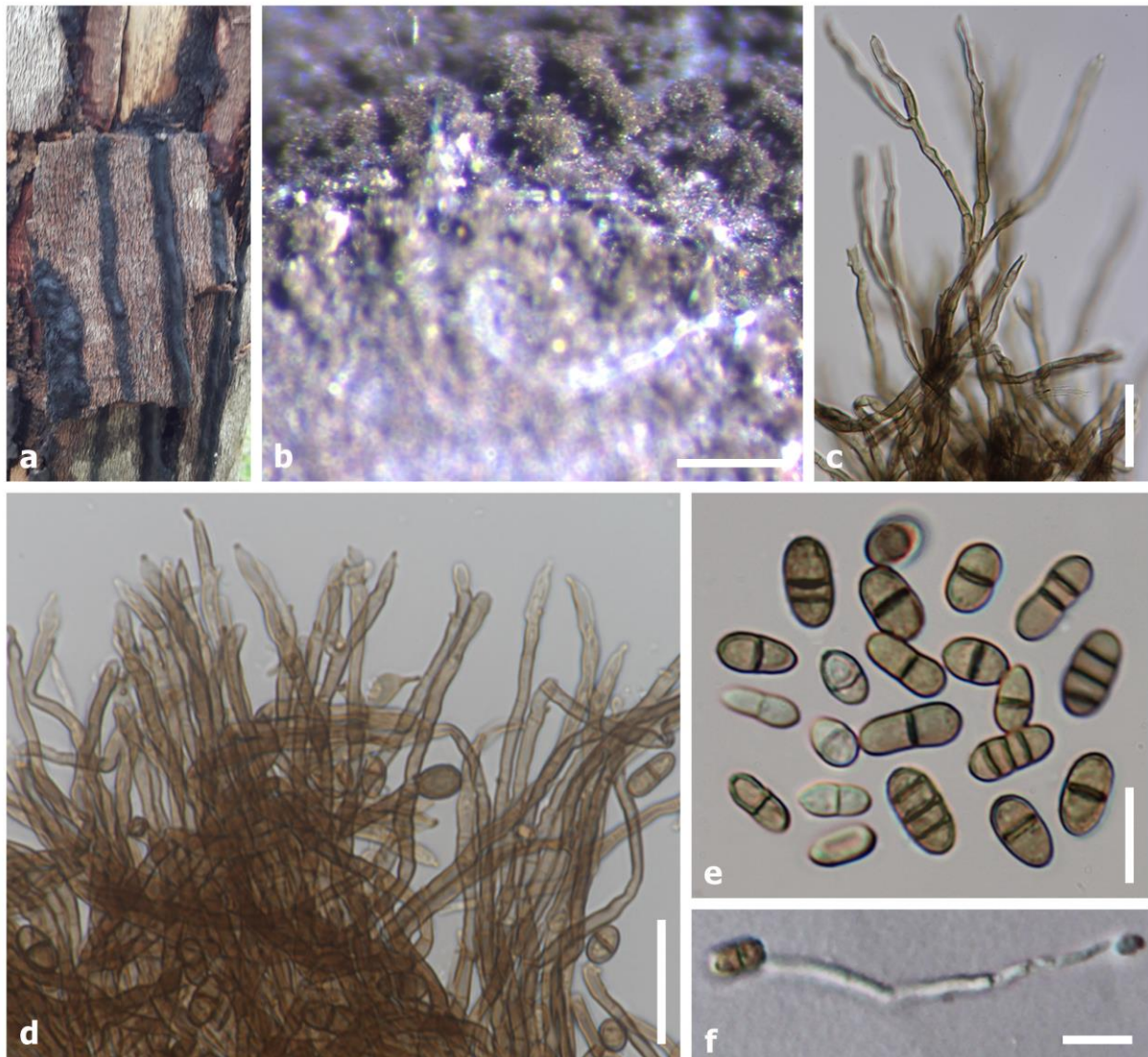


Figure 41 – *Verruconis phayaoensis* (MFLU 21-0198, holotype). a–b Habit on substrate. c–d Conidiophores. e Conidia. f Germinated spore. Scale bars: b = 200 μm , c–d = 20 μm , e–f = 10 μm .

Class Sordariomycetes O.E. Erikss. & Winka

Diaporthales Nannf.

Coryneaceae Corda

Coryneaceae is characterized by erumpent stromata, perithecial ascomata arranged in valsoid configuration and hyaline or brown, irregularly fasciculate, ellipsoid, fusoid or elongate, uni- or multiseptate ascospores (Jiang et al. 2018, Senanayake et al. 2017, 2018). The asexual morph comprises acervular conidiomata and hyaline to dark brown, curved, broadly fusiform to cylindrical or clavate with distoseptate conidia (Sutton 1980, Jiang et al. 2018, Senanayake et al. 2017, 2018, Senwanna et al. 2018a). The family comprises only single genus, *Coryneum* which are saprobes on decaying wood or plant pathogens causing Coryneum-blight, cankers and dieback in economically plant hosts as well as forest trees (Strouts 1972, Gadgil & Dick 2007, Senanayake et al. 2017, 2018, Jiang et al. 2018, Senwanna et al. 2018a, Hyde et al. 2020b).

Coryneum heveanum Senwanna, Cheewangkoon & K.D. Hyde, in Senwanna et al., MycoKeys 43: 81 (2018) Fig. 43

Index Fungorum number: IF555338

Descriptions and illustrations Senwanna et al. (2018)

Material examined – Thailand, Krabi Province, on branches (attached on tree) of *Hevea brasiliensis*, 30 August 2017, C. Senwanna, RBKB01 (MFLU 21-0204), living culture MFLUCC 18-0310, MFLUCC 18-0311.

Host and distribution – *Hevea brasiliensis* (Thailand; Senwanna et al. 2018a, this study).

GenBank numbers – MFLUCC 18-0310: ITS = OL780500, LSU = OL782080; MFLUCC 18-0311, TEF1 = OL944425: ITS = OL780501, LSU = OL782081, TEF1 = OL944426.

Notes – *Coryneum heveanum* was collected from *Hevea brasiliensis* in Chiang Rai, Thailand (Senwanna et al. 2018a). In this study, MFLUCC 18-0310 and MFLUCC 18-0311 are phylogenetically related to *C. heveanum* (MFLUCC 17-0369) with high bootstrap support (Fig. 42). The morphology of our collection (MFLU 21-0204) is similar to the holotype (Senwanna et al. 2018) in having acervular conidiomata, hyaline to dark brown, fusiform or clavate with distoseptate conidia. We, therefore, identify our strain as *C. heveanum* based on phylogenetic analyses and morphology.

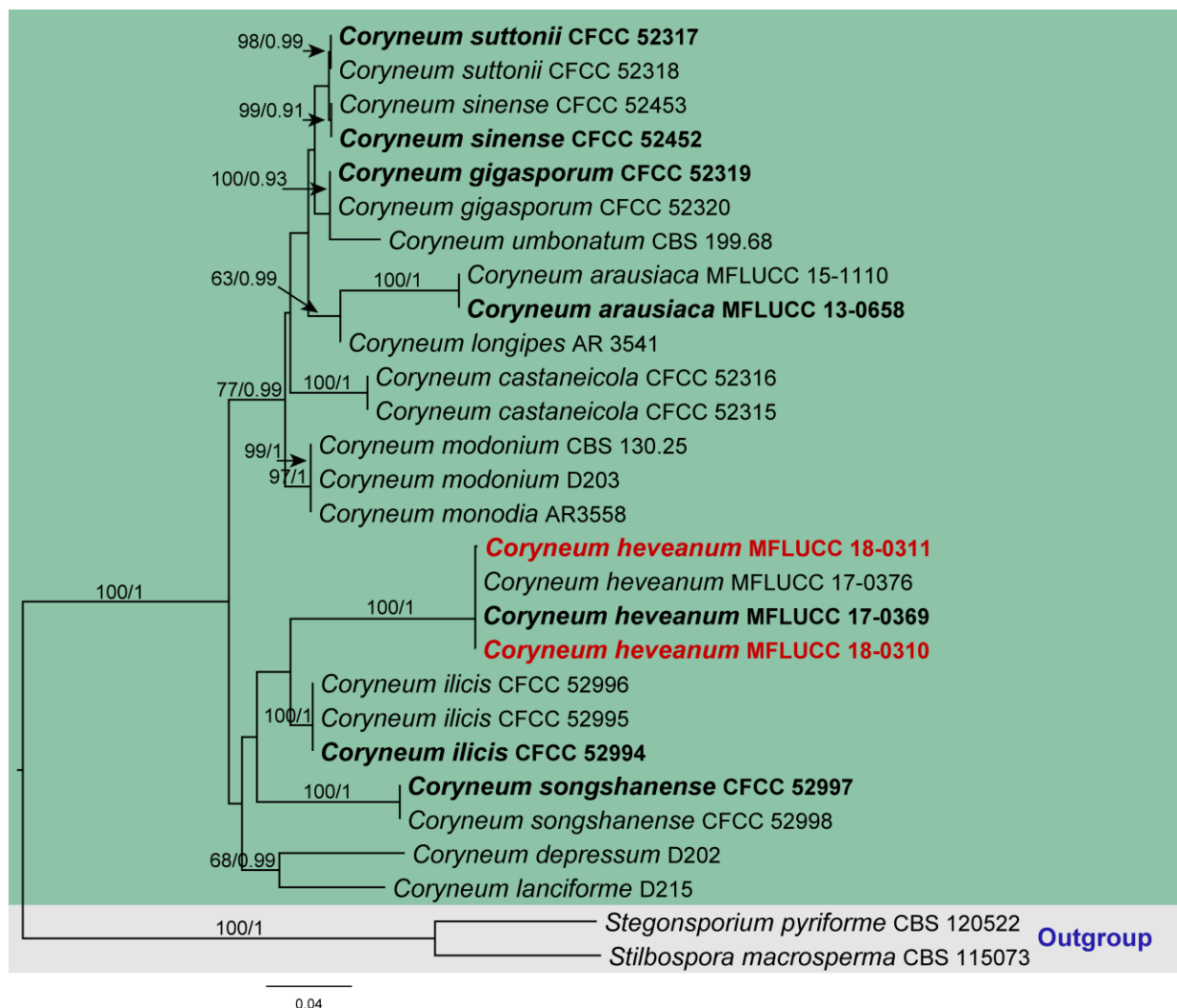


Figure 42 – RAxML tree of *Coryneum* based on a combined LSU, ITS and TEF1 sequence dataset. Twenty-eight strains are included in the combined sequence analysis, which comprise 2506 characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree with a final likelihood value of -9299.960163 is presented. The matrix had 762 distinct alignment patterns, with 24.06% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.232474, C = 0.274010, G = 0.280437, T = 0.213078; substitution rates: AC = 1.708719, AG = 1.793689, AT = 1.631050, CG = 1.135433, CT = 5.841390, GT = 1.000000; gamma distribution shape parameter α = 0.689346. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as

ML/BYPP above the nodes. Newly generated sequences are in red and type species are in bold. *Stegosporium pyriforme* (CBS 120522) and *Stilbospora macrosperma* (CBS 115073) are used as outgroup taxa.

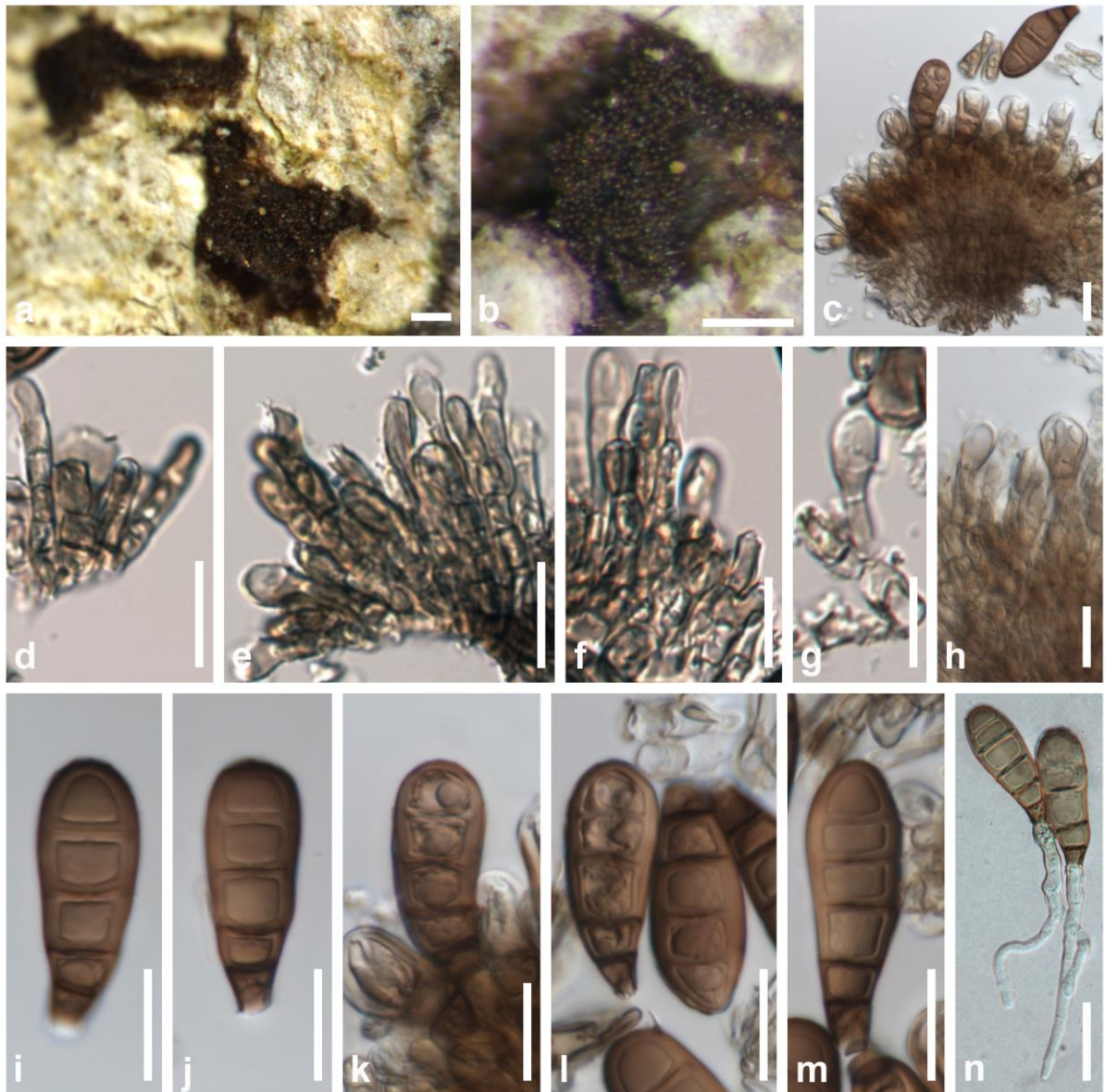


Figure 43 – *Coryneum heveanum* (MFLU 21-0204). a–b Conidiomata on host surface. c Acervulus. d–h Conidiophores and conidiogenous cells with conidia. i–m Conidia. n Germinated spores. Scale bars: a–b = 200 μ m, c–n = 20 μ m.

Cytosporaceae Fr.

Hyde et al. (2020b) listed six genera under Cytosporaceae viz. *Cryptascoma*, *Cytospora*, *Pachytrype*, *Paravalsa*, *Waydora* and *Xenotypa*. In this study, *Cytospora diopuiensis*, *C. heveae* and *C. thailandica* were reported on *Hevea brasiliensis*. Members of *Cytospora* are important plant pathogens associated with canker and dieback disease on various host plants worldwide, saprobe and endophytes (Fan et al. 2020, Jiang et al. 2020, Shang et al. 2020).

Cytospora diopuiensis Q.J. Shang, J.K. Liu & K.D. Hyde, in Shang et al., Mycosphere 11(1): 202 (2020)

Figs 45, 46

Index Fungorum number: IF 555502

Associated with twigs and dead branches of *Hevea brasiliensis*, distinct, subcircular to circular surrounded by dark brown margin on host surface. Sexual morph: *Stromata* solitary to gregarious, semi-immersed in host tissue, erumpent, with 3–8 locules arranged circularly or subcircular with dark brown to black margin, becoming raised by the ostiolar canal, with ostiolar neck. *Ascomata* (90–)140–480 μm high, 135–380 μm diam. (\bar{x} = 220 \times 229 μm , n = 23), perithecial, immersed in a stroma, dark brown to black, globose to subglobose, glabrous, individual ostiole with the neck. *Ostiole* 100–380 μm high, cylindrical, sulcate, at the same level as the disc, occasionally area below disc a lighter entostroma. *Peridium* 20–40(–47) μm wide, composed of several layers of brown to dark brown cells of *textura angularis* mixed with *textura prismatica*, becoming hyaline at the inner regions. *Paraphyses* absent. *Asci* (24.5–)26–31.5(–35) \times (4–)5–6 μm (\bar{x} = 29.2 \times 5.3 μm , n = 23), 8-spored, unitunicate, clavate, sessile, apically rounded to truncate, with a J-, refractive apical ring. *Ascospores* (4.5–)6–8(–9) \times (1.3–)1.5–2.6 μm (\bar{x} = 7.3 \times 2 μm , n = 62), overlapping 1–2-seriate, hyaline, elongate-allantoid, aseptate, smooth-walled. Asexual morph: *Conidiomata* 370–560 μm high, 170–360 μm diam., semi-immersed in host tissue, solitary, scattered, erumpent, with 7–10 locules arranged circularly or subcircular with dark brown to black margin, with ostiolar neck. *Ostioles* 120–200 μm high., at the same level as the disc surface. *Peridium* 8–12(–18) μm wide, composed of several layers of brown to dark brown, thick-walled cells of *textura angularis*, becoming hyaline, thin-walled cells of *textura angularis*. *Conidiophores* branched, reduced to conidiogenous cells. *Conidiogenous cells* (3–)4.5–8(–10) \times 1.2–1.7(–2) μm (\bar{x} = 6.7 \times 1.5 μm , n = 35), blastic, enteroblastic, phialidic, hyaline, smooth-walled. *Conidia* 3–3.7(–4) \times 1–1.8 μm (\bar{x} = 3.5 \times 1.4 μm , n = 60), elongate-allantoid, hyaline, aseptate, smooth-walled.

Culture characteristic – Ascospores germinating on MEA within 24 hours at room temperature (25–30 °C) and germ tube was produced from the ends of the ascospores. Initially aerial mycelium white, circular, after 15 days become whitish grey, velvety, raise, dense mycelium, lacking aerial mycelium. Colony from single ascospores: initially aerial mycelium white, circular, velvety with sparse aspects, after 10 days become to whitish grey from the center, white at the edge, slight raise, dense, after 20 days of incubation, colonies become iron grey, no asexual morph produced on culture.

Material examined – Thailand, Phayao Province, Muang District, on twigs of *Hevea brasiliensis* (Euphorbiaceae), 2 October 2016, C. Senwana, RBPY07 (MFLU 19-0238), living culture MFLUCC 17-0326; *ibid*, Sukhothai Province, Srisatchanalai District, on dead branch of *Hevea brasiliensis* (Euphorbiaceae), 2 January 2017, N. Huanraluek, RBSK05 (MFLU 19-0255).

Host and distribution – *Hevea brasiliensis* (Thailand; this study), undetermined wood (Thailand; Shang et al. 2020).

GenBank numbers – MFLUCC 17-0326: ITS = OL780502, LSU = OL782082, SSU = OL780532, TEF1 = OL944427; MFLU 19-0255a: ITS = OL780503, LSU = OL782083; MFLU 19-0255b: ITS = OL780504.

Notes – In a BLASTn search, the closest matches of ITS sequence of MFLUCC 17-0326, MFLU 19-0255a and MFLU 19-0255b are *Cytospora diopuiensis* with 99.80%, 100% and 99.79% similarity to strain MFLUCC 18-1419 (MK912137), while the closest match of the LSU sequence of our strains with 99.50% similarity, were identical to *C. thailandica* (MFLU 17-0709 and MFLUCC 17-0262). Phylogenetic analysis shows that strains MFLUCC 17-0326, MFLU 19-0255a and MFLU 19-0255b grouped with *C. diopuiensis* (Fig. 44). The sexual morph of *Cytospora diopuiensis* was introduced by Shang et al. (2020) for isolates from dead wood of unidentified host in Thailand. Morphological characters of our collection (MFLU 19-0238, Fig. 45) are similar to the holotype of *C. diopuiensis* (MFLU 18-0390). However, the ascospores of *C. diopulensis* in this study are narrower than those reported by Shang et al. (2020) and the paraphyses were not found. In this study, isolate of the asexual morph of *C. diopuiensis* (MFLU 19-0255) was observed directly on dead branch of *Hevea brasiliensis* (Fig. 46) and the morphology could not be compared as the current studies were reported only its sexual morph (Shang et al. 2020). Therefore, we consider the new collection as host record and new record of the asexual morph of *C. diopuiensis* based on the phylogenetic evidence.

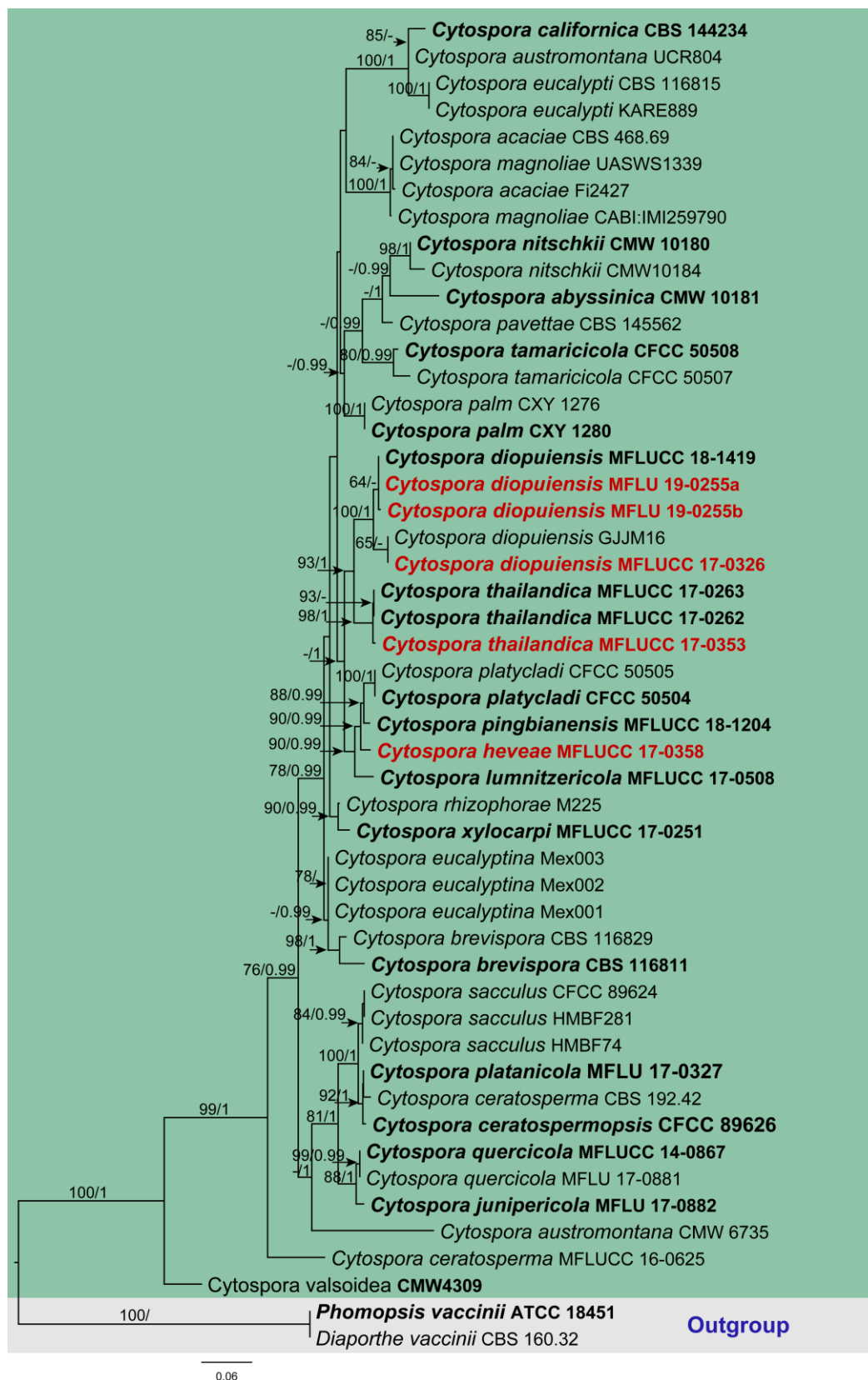


Figure 44 – RAxML tree of *Cytospora* based on a combined ITS, LSU, ACT and TEF1 sequence dataset. Fifty strains are included in the combined sequence analysis, which comprise 2323 characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree with a final likelihood value of -10048.719308 is presented. The matrix had 820 distinct alignment patterns, with 50.24% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.236415, C = 0.266617, G = 0.257777, T = 0.239191;

substitution rates: AC = 1.856562, AG = 3.049365, AT = 1.676404, CG = 1.079642, CT = 7.045005, GT = 1.000000; gamma distribution shape parameter $\alpha = 0.456988$. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Diaporthe vaccinii* (CBS 160.32) and *Phomopsis vaccinii* (ATCC 18451) are used as outgroup taxa.

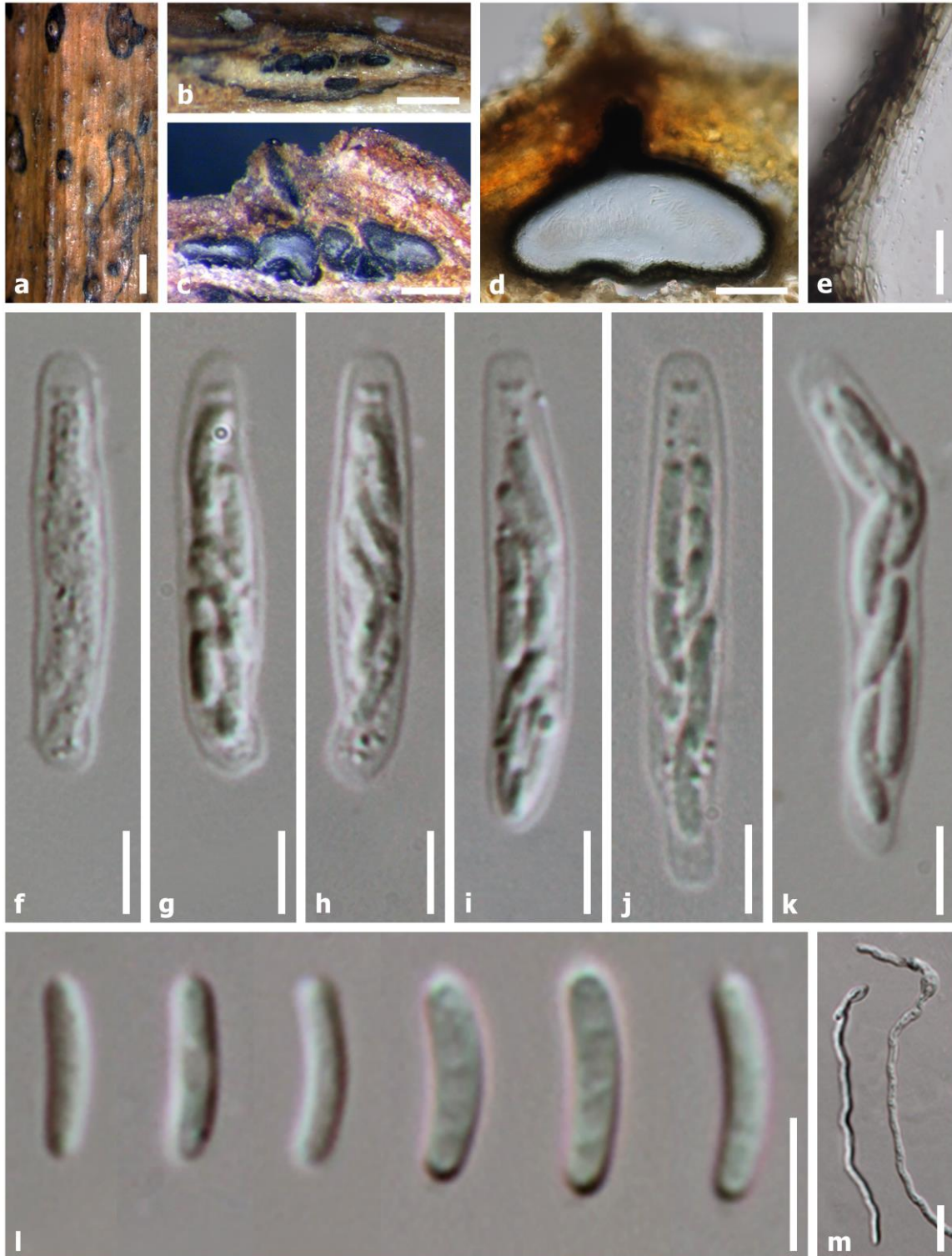


Figure 45 – Sexual morph of *Cytospora diopuiensis* (MFLU 19-0238, new host record). a Habit of ascomata in bark. b Vertical section through ascomata. c Longitudinal sections through ascomata.

d Section through the ascoma. e Peridium. f–j Asci. k. Ascospores. l Germinated spores. Scale bars: a = 1000 μm , b = 500 μm , c = 200 μm , d = 100 μm . e, m = 20 μm , f–l = 5 μm .

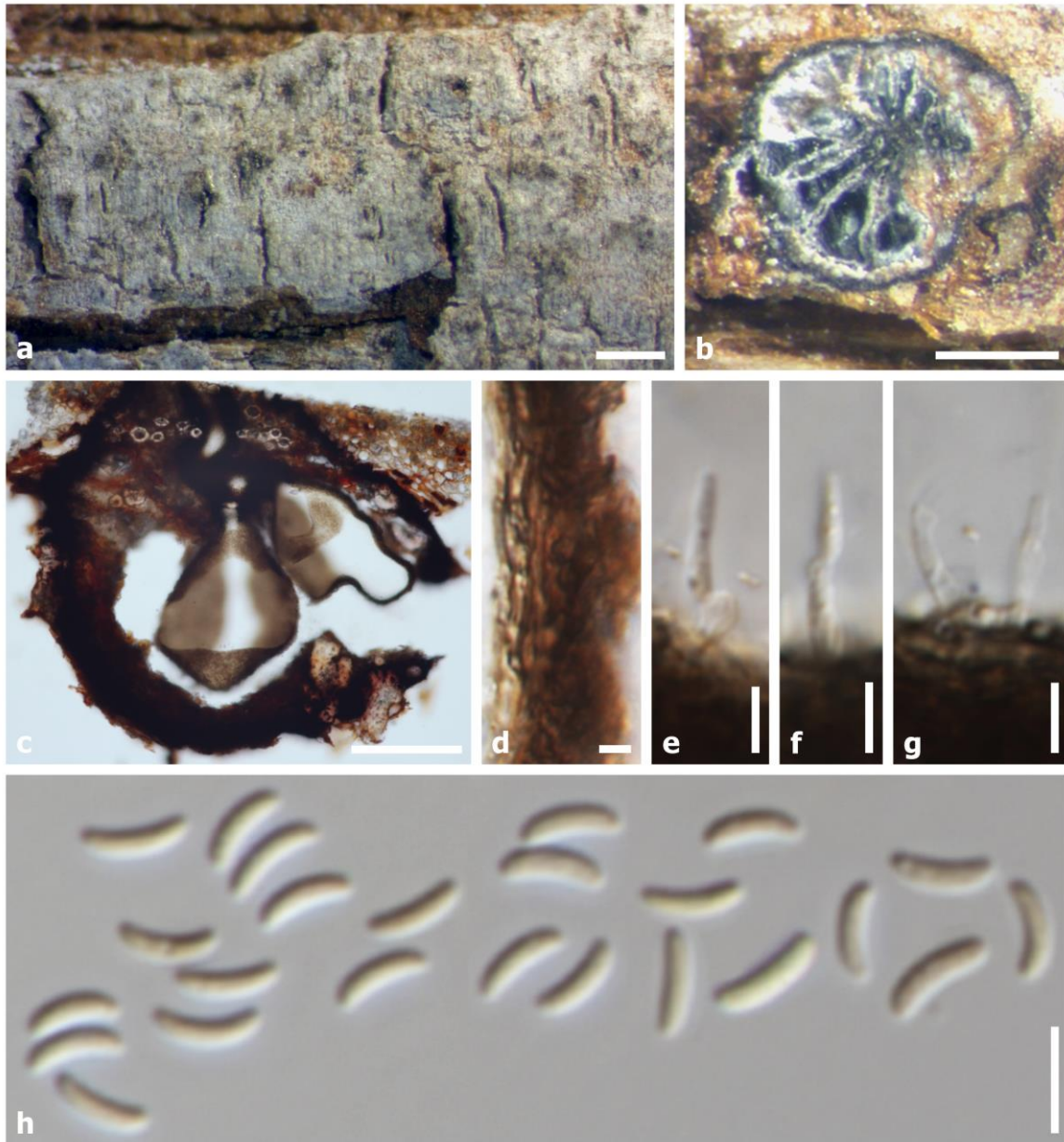


Figure 46 – Asexual morph of *Cytospora diopuiensis* (MFLU 19-0255, new host record). a Habit in bark. b Vertical section through conidiomata. c Section through the conidiomata. d Peridium. e–g conidiophores. h Conidia. Scale bars: a–b = 500 μm , c = 200 μm , d–h = 5 μm .

Cytospora heveae Senwanna, Cheewangkoon & K.D. Hyde, sp. nov.

Fig. 47

Index Fungorum number: IF559362

Etymology – named after the host genus *Hevea*, from which this species was isolated.

Associated with canker on seedling stem of *Hevea brasiliensis*. Sexual morph: Undetermined. Asexual morph: *Conidiomata* 370–1000 \times 200–480 μm diam., semi-immersed in host tissue, solitary, scattered, erumpent, with 7–10 locules arranged circularly or elliptically with independent walls, with ostiolar neck. Ostioles 75–95 μm diam., at the same level as the disc surface. *Peridium* 8–12(–18) μm wide, composed of several layers of brown to dark brown, thick-walled cells of *textura angularis*, becoming hyaline, thin-walled cells of *textura angularis*. *Conidiophores* branched, reduced to conidiogenous cells. *Conidiogenous cells* (3–)4.5–8(–10) \times 1.2–1.7(–2) μm (\bar{x}

= $6.7 \times 1.5 \mu\text{m}$, $n = 35$), blastic, enteroblastic, phialidic, hyaline, smooth-walled. *Conidia* $3\text{--}3.7(-4) \times 1\text{--}1.8 \mu\text{m}$ ($\bar{x} = 3.5 \times 1.4 \mu\text{m}$, $n = 60$), elongate-allantoid, hyaline to light yellow, aseptate, smooth-walled.

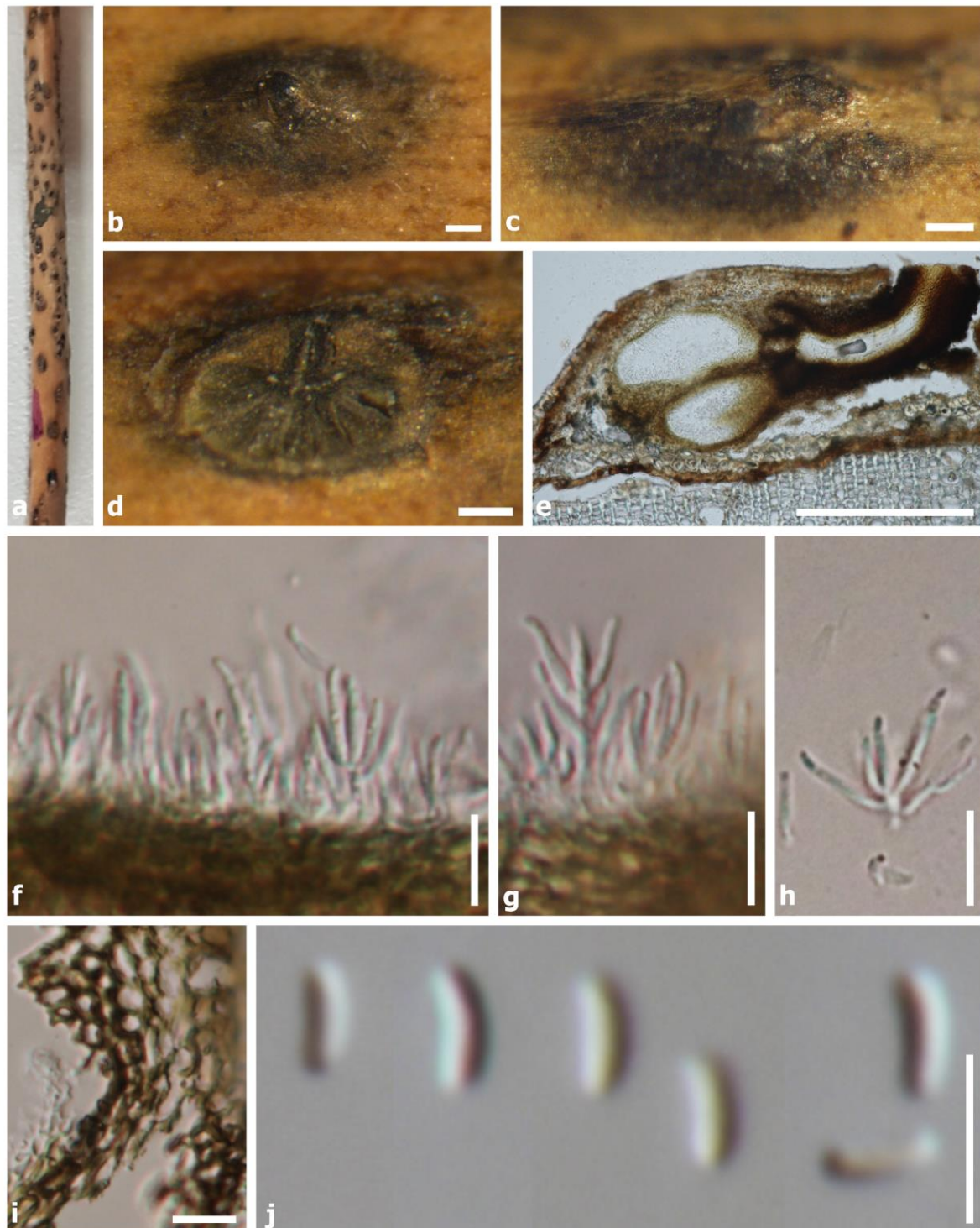


Figure 47 – *Cytospora heveae* (MFLU 21-0203, holotype). a Habit in bark. b–c Surface of ascomata. d Vertical section through conidiomata. e Longitudinal sections through conidiomata. f–h Conidiophores. i Peridium. j Conidia. Scale bars: a–e = 200 μm , f–i = 10 μm , j = 5 μm .

Culture characteristics – Conidia germinating on MEA within 24 hours at room temperature (25–30°C) and germ tubes produced from the ends of the conidia, producing dense mycelium,

margin rough, white, after 10 days become whitish grey, slightly raise, dense mycelium, lacking aerial mycelium.

Material examined – Thailand, Phayao Province, Mueang District, canker on seedling stem of *Hevea brasiliensis* (Euphorbiaceae), 29 January 2017, C. Senwanna, RBPY40 (MFLU 21-0203, holotype), ex-type living culture MFLUCC 17-0358.

Host and distribution – *Hevea brasiliensis* (Thailand; this study).

GenBank numbers – MFLUCC 17-0358: ITS = OL780505, SSU = OL780534, TEF1 = OL944428.

Notes – In the NCBI BLASTn search, *Cytospora heveae* has the closest match to *C. pingbianensis* (MFLUCC 18-1204; MK912135) with 98.72% similarity, the closest match of LSU sequence is similar to *C. thailandica* (MFLU 17-0709; MH253455 and MFLUCC 17-0262; MH253455) with 99.63% similarity, while the closest match of the ACT and TEF sequence of our strain with 97.63% (MH933552) and 94.13% (MH933516) similarity, respectively, are identical to *C. platycladi* (CFCC 50504). Phylogenetic analyses of the combined ITS, LSU, ACT and TEF1 sequence dataset show that *C. heveae* forms a distinct lineage closely related to *C. lumnitzukicola*, *C. platycladi* and *C. pingblanensis* (Fig. 44). *Cytospora heveae* differs from *C. lumnitzukicola* and *C. platycladi* in conidiogenous cells ($3\text{--}10 \times 1.2\text{--}2$ vs $5\text{--}12 \times 1\text{--}1.5$ vs $8\text{--}14 \times 0.6\text{--}1.6$ μm) and conidia ($3\text{--}4 \times 1\text{--}1.8$ vs $4\text{--}5.5 \times 1\text{--}1.5$ vs $3.7\text{--}4.5 \times 1\text{--}1.5$ μm) dimensions (Norphanphoun et al. 2018, Fan et al. 2020). However, we could not compare the morphological characteristics of our strain with *C. pingblanensis* as it is only known as sexual morph species (Shang et al. 2020). *Cytospora heveae* is introduced as a new species based on morphological characters and phylogenetic evidence.

Cytospora thailandica Norph., T.C. Wen & K.D. Hyde, in Norphanphoun et al., MycoKeys 38: 106 (2018) Fig. 48

Index Fungorum number: IF554779

Associated with canker on twigs of *Hevea brasiliensis*. Sexual morph: *Stromata* immersed in bark. *Ascomata* $350\text{--}1780 \times 430\text{--}950$ μm diam., semi-immersed in host tissue, scattered, erumpent, uni- or multi-loculate, with ostiolar neck. *Ostiole* $60\text{--}152$ μm diam., numerous, dark brown to black, at the same level as the disc, occasionally area below disc a lighter entostroma. *Peridium* $(12\text{--})16\text{--}25\text{--}(31)$ μm wide, composed of several layers of brown to dark brown, thick-walled cells of *textura angularis*, becoming hyaline, thin-walled cells of *textura angularis*. *Paraphyses* cylindrical, aseptate, hyaline. *Asci* $(20\text{--})22\text{--}30\text{--}(34.5) \times (3.6\text{--})4.2\text{--}5.4\text{--}(5.8)$ μm ($\bar{x} = 26.8 \times 4.7$ μm , $n = 35$), 8-spored, unitunicate, clavate to elongate obovoid, sessile, apically rounded to truncate, with a J-, refractive apical ring. *Ascospores* $(3.5\text{--})4\text{--}8.7\text{--}(10) \times (0.8\text{--})1\text{--}1.9\text{--}(2.4)$ μm ($\bar{x} = 6.8 \times 7.5$ μm , $n = 85$), biseriate, elongate-allantoid, aseptate, hyaline or light yellow, smooth-walled. Asexual morph: Undetermined.

Culture characteristics – Ascospores germinating on MEA within 24 hours at room temperature (25-30 °C) and germ tube produced from the ends of the ascospores. Initially aerial mycelium white, circular, after 15 days become whitish grey, velvety, raise, dense mycelium, lacking aerial mycelium.

Material examined – Thailand, Phayao Province, Mueang District, on twigs of *Hevea brasiliensis* (Euphorbiaceae), 29 January 2017, C. Senwanna, RBPY35 (MFLU 21-0200), MFLUCC 17-0353 (new host record).

Host and distribution – *Hevea brasiliensis* (Thailand; this study), *Xylocarpus moluccensis* (Thailand; Norphanphoun et al. 2018).

GenBank numbers – MFLUCC 17-0353: ITS = OL780506, LSU = OL782084, SSU = OL780533, TEF1 = OL944429.

Notes – Phylogenetic analysis show that strain MFLUCC 17-0353 grouped with *Cytospora thailandica* (Fig. 44). In a BLASTn search of NCBI GenBank, the closest match of the ITS, LSU, and ACT sequence of our strain with 99.81% (MG975776 and MG975777), 100% (MH253456 and MH253455) and 98.65% (MH253459) similarity, respectively, were identical to *Cytospora*

thailandica. However, the asci and ascospores of our strain is longer than reported by Norphanphoun et al. (2018). We, therefore, name our collection as *Cytospora thailandica*. The collection is a new host record for *Hevea brasiliensis* in Thailand.

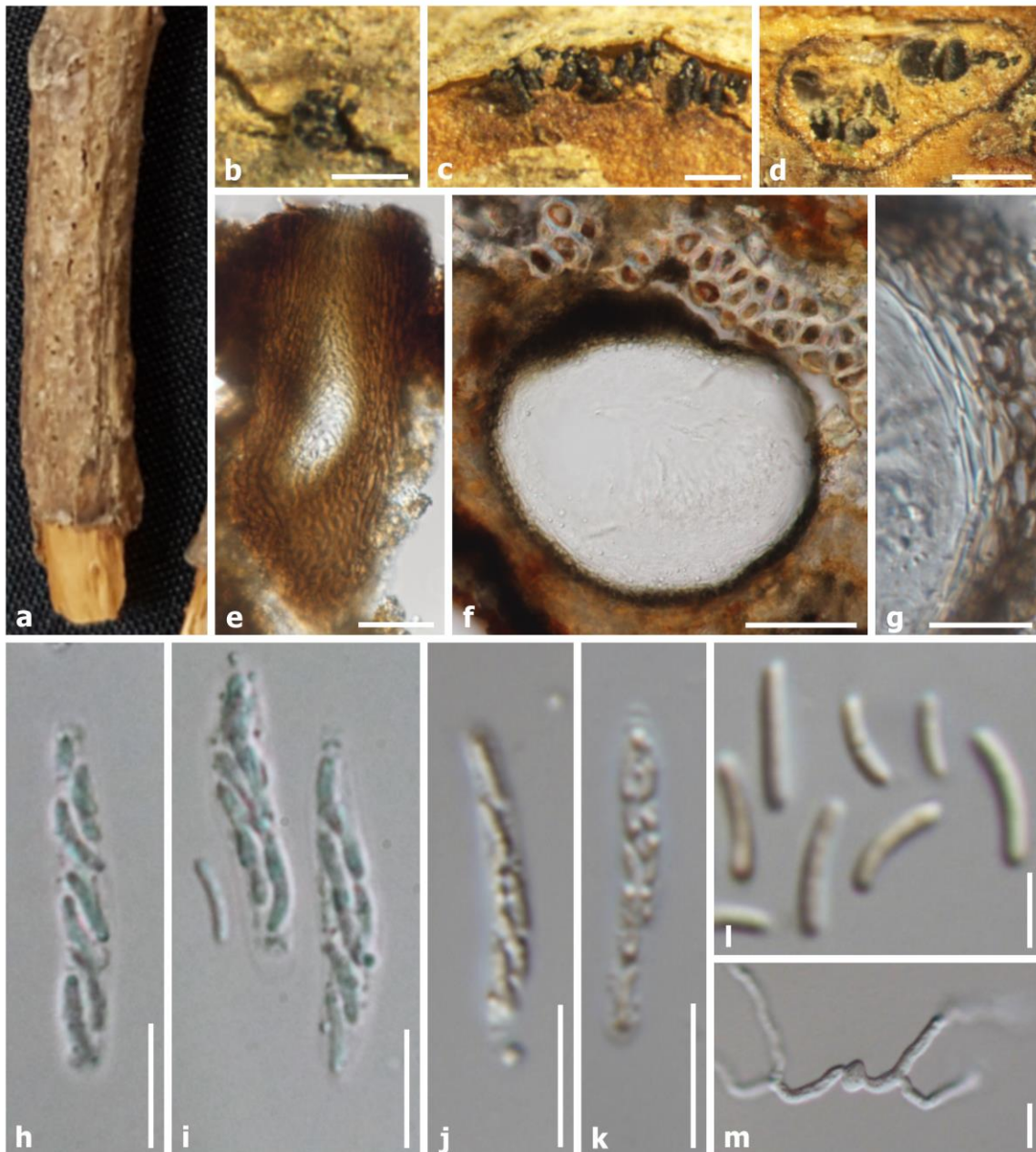


Figure 48 – *Cytospora thailandica* (MFLU 21-0200, new host record). a Habit of ascomata in bark. b–c Surface of ascomata. d Vertical section through ascomata. e Ostiolar neck. f Section through the ascoma. g Peridium. h–k Asci. l. Ascospores. m Germinated spore. Scale bars: a = 1000 μm , b–d = 500 μm , e, g = 20 μm , f = 50 μm . h–k = 10 μm , l–m = 5 μm .

Diaporthaceae Höhn. ex Wehm.

Members of Diaporthaceae are plant pathogens, saprobes, and endophytes on a broad range of plants in terrestrial and aquatic habitats worldwide (Dissanayake et al. 2017b, Senanayake et al. 2018, Dayarathne et al. 2020, Phukamsakda et al. 2020). Fifteen genera are accepted by Hyde et al. (2020b). In this study, a new species, *Diaporthe heveicola*, and a new record of *D. rosae* are introduced on *Hevea brasiliensis* based on morphology and molecular data, together with descriptions and illustrations.

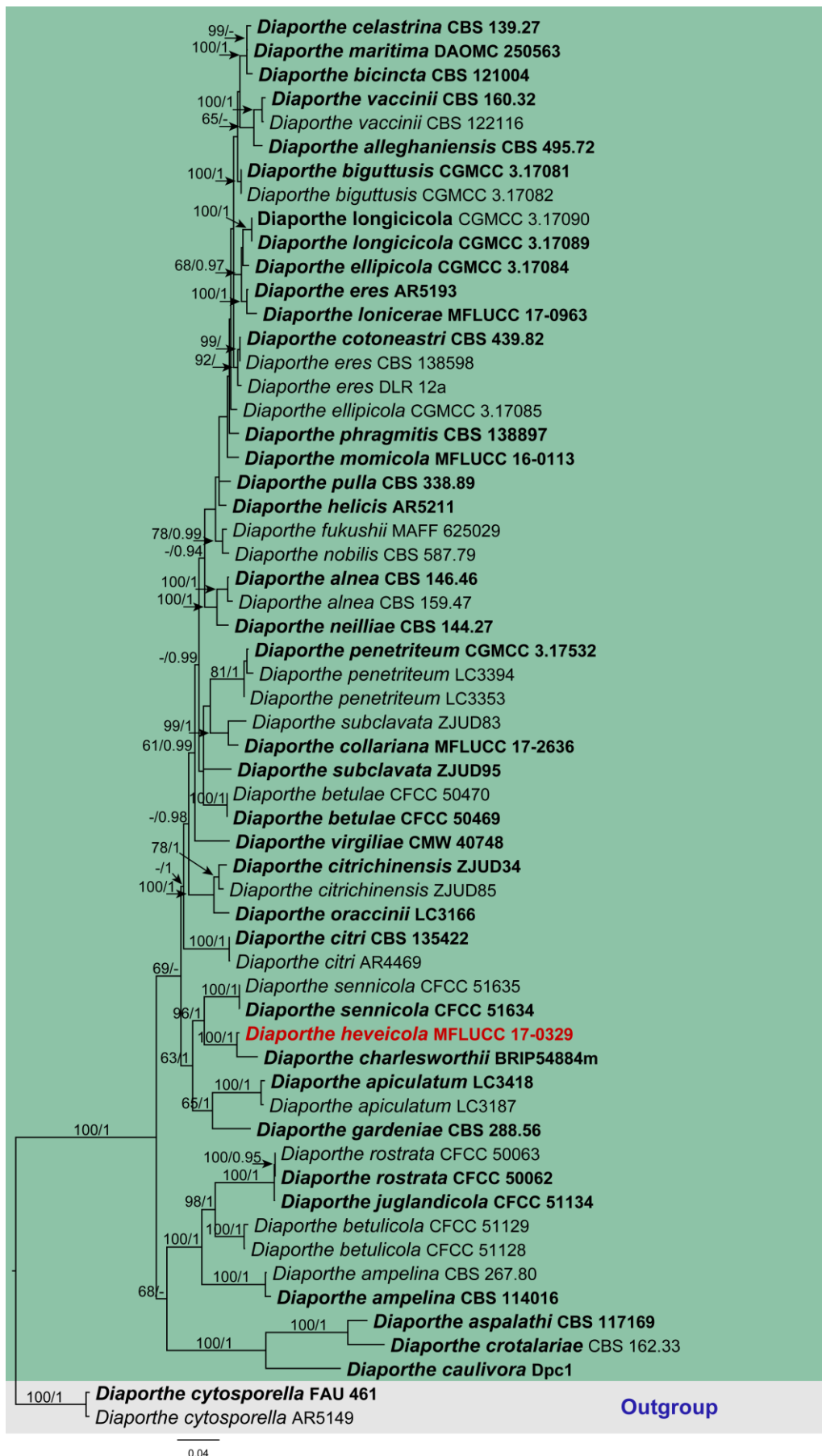


Figure 49 – RAxML tree of selected members of *Diaporthe* (I) based on a combined ITS, TEF1 and TUB2 sequence dataset. Fifty-nine strains are included in the combined sequence analysis,

which comprise 1754 characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree with a final likelihood value of -19229.929462 is presented. The matrix had 798 distinct alignment patterns, with 23.43% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.223034, C = 0.322803, G = 0.228233, T = 0.225930; substitution rates: AC = 1.555611, AG = 4.299339, AT = 1.646087, CG = 1.117010, CT = 6.414037, GT = 1.000000; gamma distribution shape parameter α = 0.862258. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Diaporthe cytospora* (AR5149 and FAU 461) are used as outgroup taxa.

Diaporthe heveicola Senwana, Cheewangkoon & K.D. Hyde, sp. nov.

Fig. 50

Index Fungorum number: IF559363

Etymology – Named after the host genus on which it occurs, *Hevea*.

Saprobe on branch (attached on tree) of *Hevea brasiliensis*. Sexual morph: Ascomata 190–460 μm diam., 180–480 μm high, perithecial, solitary to aggregated, immersed, obpyriform to globose, dark brown to black, papillate, ostiolate. *Peridium* 12–31 μm wide (\bar{x} = 21 μm , n = 20), composed of 2–3 layers of thin-walled cells of *textura globosa* mixed with *textura angularis*, brown to dark brown, becoming hyaline at inner regions, composed of thin-walled cells of *Textura prismatica*. *Paraphyses* 5–8 μm wide, septate, constricted at septa, broad filiform, tapering above asci. *Asci* (36–)45–59(–63) \times (6–)7–9.5(–10) μm (\bar{x} = 51.6 \times 8.4 μm , n = 29), 8-spored, unitunicate, elongate to clavate, sessile, thin-walled, with a refractive, J-, apical ring. *Ascospores* (9–)10–14 \times (2.5–)3–4.5 μm (\bar{x} = 11.5 \times 3.5 μm , n = 52), elliptical to fusiform, hyaline, uniseptate, constricted at septum, often 2–4-guttulate, with larger guttules at center and smaller ones at the ends. Asexual morph: Undetermined.

Culture characteristics – Ascospores germinating on MEA within 24 hours at room temperature (25–30°C) and germ tube was produced from the ends of the ascospores. Colonies from ascospores and conidia germinating on MEA reaching 3 cm after 2 days at room temperature, initially aerial mycelium white, circular, cottony to fluffy with sparse aspects, colony from above white to white greyish; from below: white to white greyish, slight raise, fluffy, dense, undulate.

Material examined – Thailand, Phayao Province, Muang District, on branch (attached on tree) of *Hevea brasiliensis* (Euphorbiaceae), 2 October 2016, C. Senwana, RBPY10 (MFLU 19-0240, holotype), ex-type living culture MFLUCC 17-0329.

Host and distribution – *Hevea brasiliensis* (Thailand; this study).

GenBank numbers – MFLUCC 17-0329: ITS = OL780507, TEF1 = OL944430, TUB2 = OL840999.

Note – In a BLASTn search, the closest match to the ITS sequence with 97% similarity was *Diaporthe hongkongensis* (CBS 115448), while the closest match of the TEF1 and TUB2 sequences with 98% and 99% similarity was *D. charlesworthii* (BRIP 54884m). Phylogenetic analyses of a combined ITS, TEF1 and TUB2 show that *Diaporthe heveicola* (MFLUCC 17-0329) forms a distinct lineage sister to *D. charlesworthii* (BRIP 54884m) with high support (Fig. 49). In a comparison of ITS, TEF1 and TUB2 nucleotides, *D. heveicola* differs from *D. charlesworthii* in 28/576 bp, 4/461 bp and 3/510 bp, respectively. However, we could not compare the morphological characteristics of those species; *D. heveicola* (MFLUCC 17-0329) is found as sexual morph in nature and we could not obtain its asexual morph in culture, while *D. charlesworthii* was found as asexual morphs in culture (Thompson et al. 2015). *Diaporthe heveae* have been reported on *Hevea brasiliensis*; however, our collection differs from *D. heveae* in size of asci (36–63 \times 6–10 vs 40–45 \times 6–8 μm) and ascospores (9–14 \times 2.5–4.5 vs 10–15 \times 4 μm) (Saccardo 1913). Therefore, *D. heveicola* is described here as a new species based on phylogeny.

Diaporthe rosae Samarakoon & K.D. Hyde, in Wanasinghe et al., Fungal Divers. 89: 1–236 (2018)

Fig. 52

Index Fungorum number: IF554072

Saprobe on dead branch (attached on tree) of *Hevea brasiliensis*. Sexual morph: Undetermined. Asexual morph: *Conidiomata* 45–160 μm diam., 30–120 μm high, pycnidial, globose to subglobose, immersed, dense, with a single locule. *Conidiomata* wall 13–25 μm wide (\bar{x} = 20 μm , n = 10), composed of thick-walled cells of *textura angularis*, brown to dark brown, becoming hyaline at inner regions, composed of thin-walled cells of *textura angularis*. *Conidiophores* arising all around the cavity of the conidioma, reduced to conidiogenous cells. *Conidiogenous cells* (5–)6–10(–15) \times (1.5–)2–3.5(–3.7) μm (\bar{x} = 8 \times 3.1 μm , n = 33) aseptate, ampulliform or cylindrical, straight, densely aggregated, hyaline. *Alpha conidia* (4–)5.5–7.5(–8) \times (2–)2.3–3(–3.2) μm (\bar{x} = 6.5 \times 2.7 μm , n = 90), oval to fusiform, hyaline, aseptate, conspicuously biguttulate. *Beta conidia* not found.

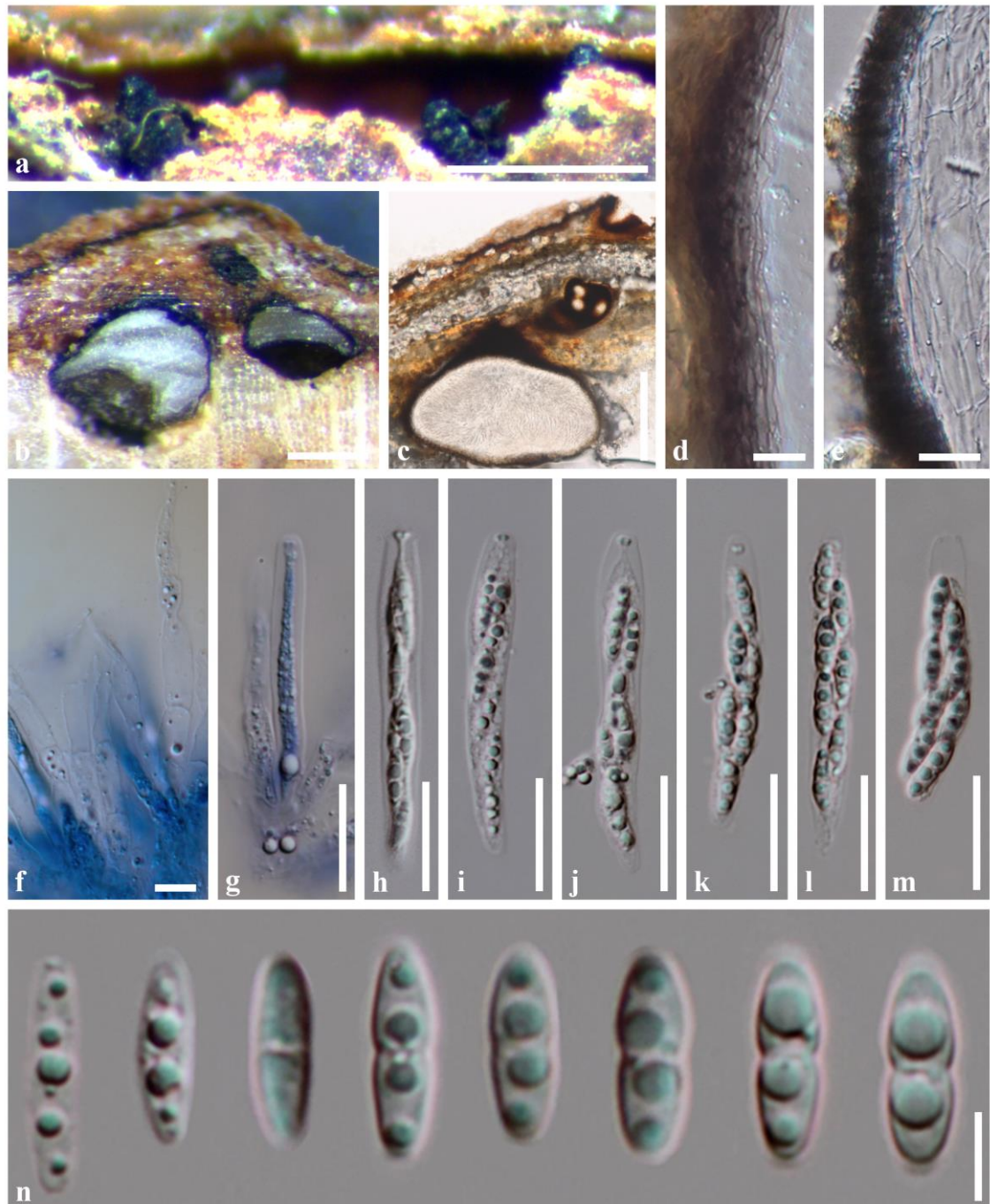


Figure 50 – *Diaporthe heveicola* (MFLU 19-0240, holotype). a–b Habitat on host surface. b Longitudinal sections through ascomata. c Section through the ascoma. d–e Peridium. f Paraphyses (mounted in Lactophenol cotton blue). g–m Asci; g, asci mounted in Lactophenol

cotton blue, h asci mounted in Melzer's reagent, i-m. asci mounted in ddH₂O. n Ascospore. Scale bars: a = 500 μm, b-c = 200 μm, d, e, h-m = 20 μm, f = 10 μm, n = 5 μm.

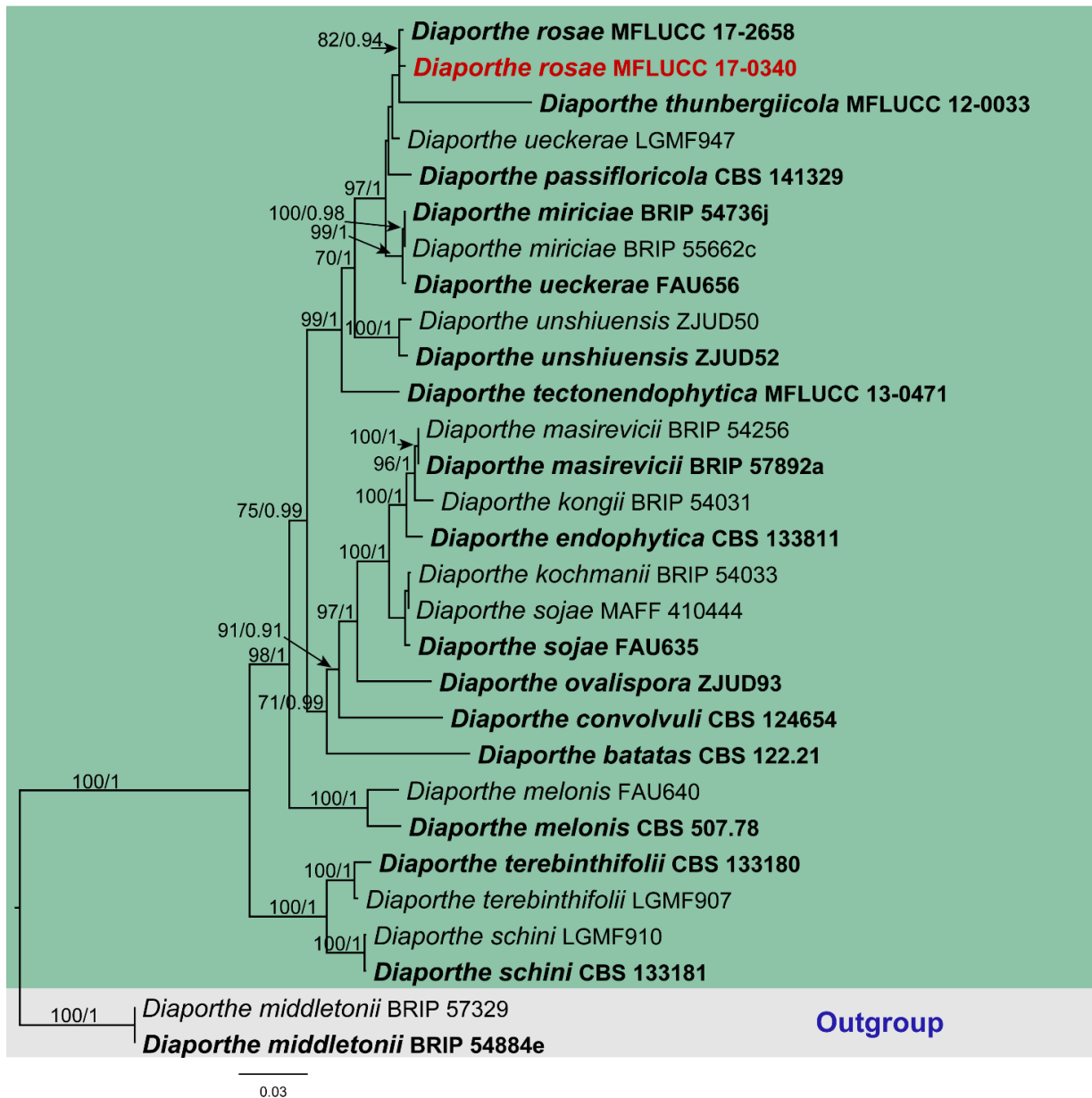


Figure 51 – RAxML tree of selected members of *Diaporthe* (II) based on a combined ITS, TEF1 and BT sequence dataset. Twenty-nine strains are included in the combined sequence analysis, which comprise 1688 characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree with a final likelihood value of -6627.827469 is presented. The matrix had 564 distinct alignment patterns, with 18.47% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.220652, C = 0.314490, G = 0.236062, T = 0.228796; substitution rates: AC = 1.749158, AG = 5.679014, AT = 1.685358, CG = 1.424435, CT = 6.823319, GT = 1.000000; gamma distribution shape parameter α = 0.787298. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Diaporthe middletonii* (BRIP 54884e and BRIP 57329) are used as outgroup taxa.

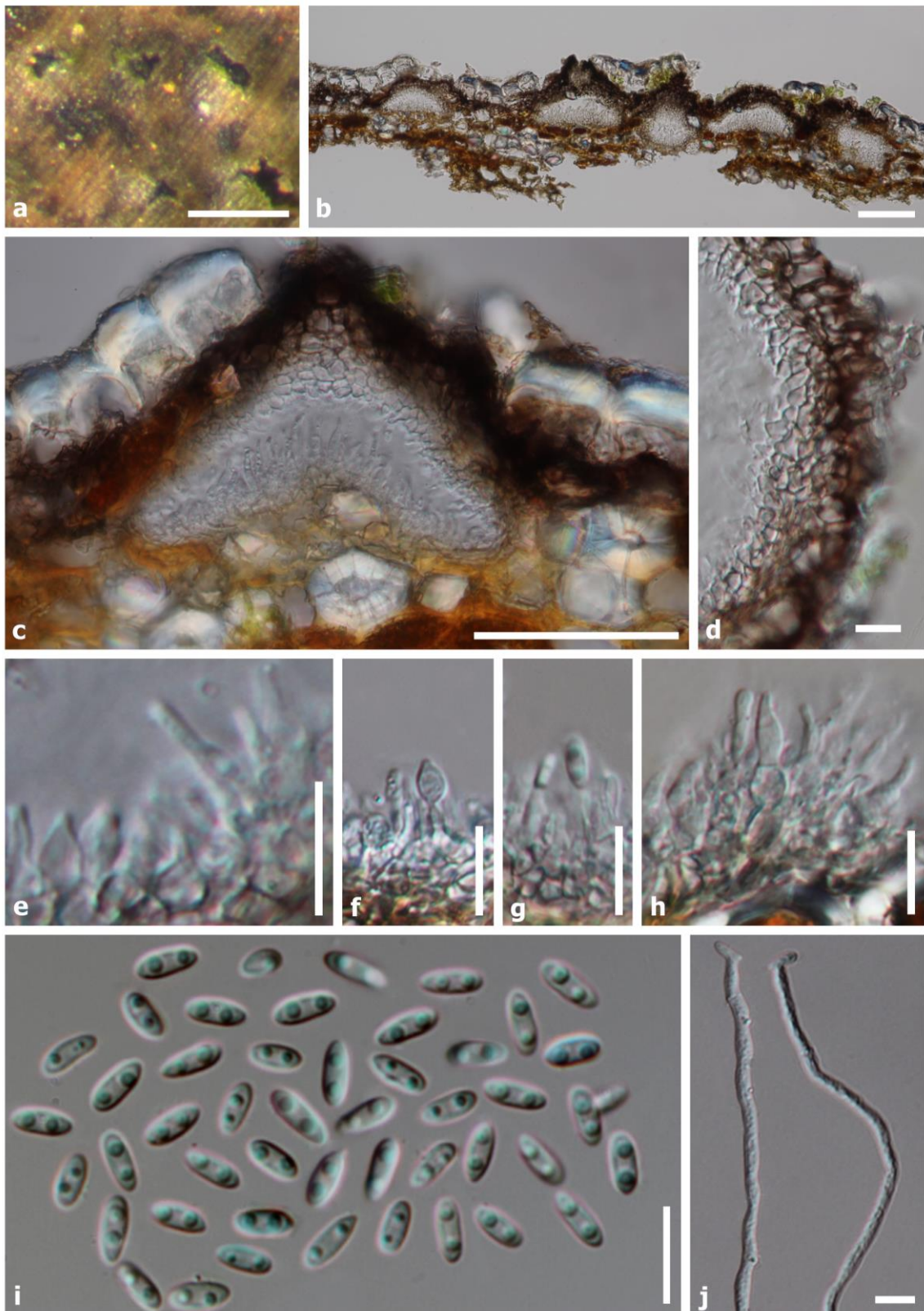


Figure 52 – *Diaporthe rosae* (MFLU 19-0247, new host record). a Habit on host substrate. b–c Section through the conidiomata. d Peridium. e–h Conidiophores and conidiogenous cells. i Conidia. j Germinated spores. Scale bars: a = 200 μm , b–c = 100 μm , d–j = 10 μm .

Culture characteristics – Ascospores germinating on MEA within 24 hours at room temperature (25–30°C) and germ tubes produced from the ends of the ascospores. Colonies initially

aerial mycelium white, circular, cottony to fluffy with sparse aspects, colony from above white to white greyish; from below: white to white greyish, slight raise, fluffy, dense, undulate.

Material examined – Thailand, Phayao Province, Mueang District, on dead branch (attached on tree) of *Hevea brasiliensis* (Euphorbiaceae), 5 December 2016, C. Senwanna, RBPY021 (MFLU 19-0247), living culture MFLUCC 17-0340 (new host record).

Host and distribution – *Rosa* sp. (California; French 1989, Thailand; Perera et al. 2018, Wanasinghe et al. 2018), *Magnolia champaca* (Thailand; Perera et al. 2018), *Senna siamea* - Thailand (Perera et al. 2018), *Hevea brasiliensis* (Thailand; this study).

GenBank numbers – MFLUCC 17-0340: ITS = OL780508.

Notes – A phylogenetic analysis shows that the strain MFLUCC 17-0340 clusters to *Diaporthe rosae* (MFLUCC 17-2658) and *D. thunbergiicola* (MFLUCC 12-0033) (Fig. 51). In a BLASTn search, the closest match of the ITS sequence of strain MFLUCC 18-0304 was *Diaporthe rosae* with 99.65% similarity to the strain MFLUCC 17-2658 (MG828894). Morphological characters of conidiophores, conidiogenous cells and conidial dimensions from our collection (MFLU 19-0247) are similar to the holotype of *Diaporthe rosae* which was collected from dead pedicel of *Rosa* sp. in Thailand (Wanasinghe et al. 2018). We, therefore, name our collection as *Diaporthe rosae* which is a new host record for *Hevea brasiliensis* in Thailand.

Hypocreales Lindau

Nectriaceae Tul. & C. Tul.

Nectriaceae comprises numerous plant and human pathogens (Lombard et al. 2015). The family is characterized by lightly to brightly coloured, uniloculate ascomata, and synnematous, sporodochial or pycnidial conidiomata with phialidic conidiogenesis (Lombard et al. 2015). The two collections in this study are considered to be *Albonectria rigidiuscula* and *Nectria pseudotrichia* based on phylogeny and morphological comparison.

Albonectria rigidiuscula (Berk. & Broome) Rossman & Samuels, in Rossman et al., Stud. Mycol. 42: 105 (1999) Fig. 54

Index Fungorum number: IF 460215

Saprobic on branches of *Hevea brasiliensis*. Sexual morph: *Ascomata* 275–640 µm diam., 250–590 µm high, solitary or gregarious, superficial, globose to subglobose, pale yellow, with or without a small, pointed papilla, ascomata surface with concolorous wart. *Peridium* 43–89 µm thick (\bar{x} = 64 µm, n = 15), comprising several layers, hyaline to pale yellow cells of *textura angularis*. *Paraphyses* 109–117 × 16–19 µm, hyaline, septate, constricted at septum. *Asci* (47–)55–114(–118.5) × (8.5–)10–18 µm (\bar{x} = 81.5 × 13 µm, n = 33), 4-spored, unitunicate, hyaline, clavate to cylindrical, with a short pedicellate, apical ring. *Ascospores* (16–)18–25(–28) × (4–)5–9(–12) µm (\bar{x} = 21.5 × 7.4 µm, n = 42), fusiform to narrowly ellipsoidal-ovoid with rounded ends, straight to rarely curved, hyaline, 3–4-septate, smooth-walled. Asexual morph: Undetermined.

Culture characteristics – Ascospores germinating on MEA within 24 hours and germ tube produced from one or both ends of the ascospores. Colonies on PDA reaching 2–3 cm diam. after 5 days at 25–30 °C, colonies circular, mycelium slightly raised, effuse, cultures white at first, becoming creamy white from the centre with white margin from above and creamy white in reverse.

Material examined – Thailand, Phayao Province, Mae Ka Subdistrict, Mueang District, on branch of *Hevea brasiliensis* (Euphorbiaceae), 2 October 2016, C. Senwanna, RBPY09 (MFLU 18-1383), living culture MFLUCC 17-0328 (new host record).

Host and distribution – Wide host range, widely distributed in tropical and subtropical regions.

GenBank numbers – MFLUCC 17-0328: ITS = OL780509, LSU = OL782090, TUB2 = OL840997.

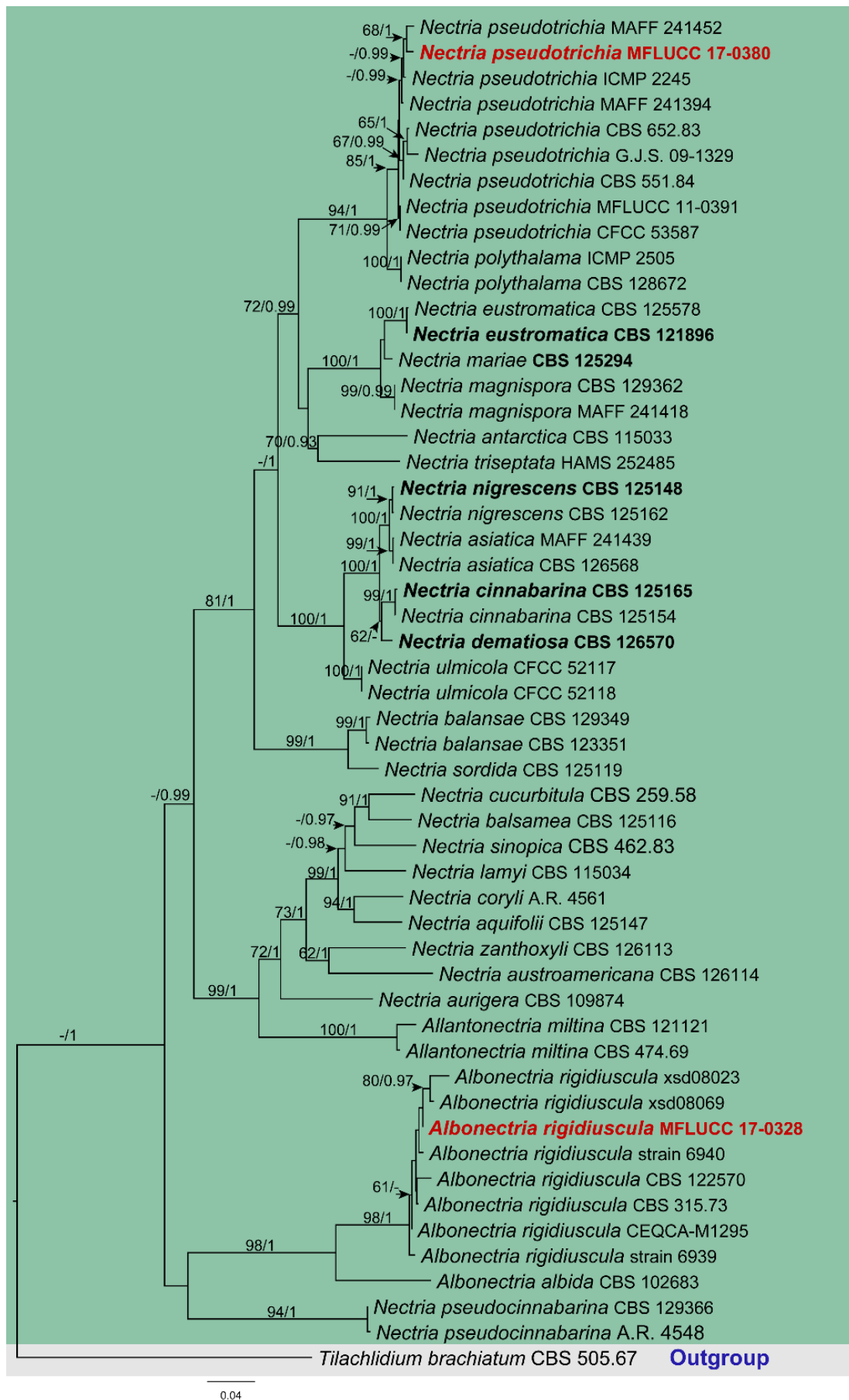


Figure 53 – RAxML tree of *Nectria* based on a combined ITS, LSU, RPB1 and TUB1 sequence dataset. Twenty-nine strains are included in the combined sequence analysis, which comprise 1720

characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree with a final likelihood value of -19229.929462 is presented. The matrix had 1060 distinct alignment patterns, with 23.91% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.236620, C = 0.257172, G = 0.275135, T = 0.231073; substitution rates: AC = 1.133952, AG = 3.018968, AT = 1.454018, CG = 0.937166, CT = 6.245900, GT = 1.000000; gamma distribution shape parameter $\alpha = 0.859225$. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Tilachlidium brachiatum* (CBS 505.67) is used as the outgroup taxon.

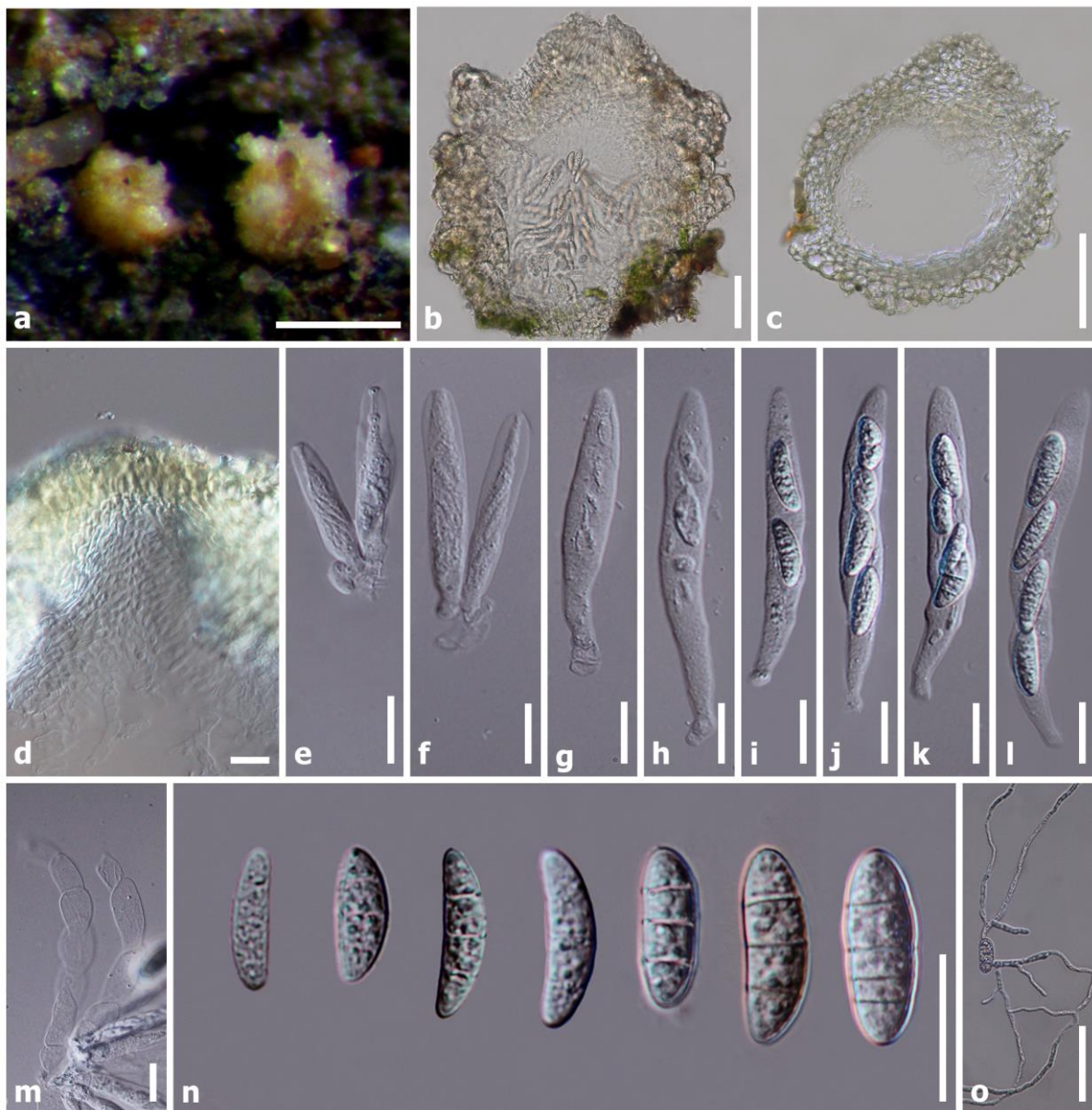


Figure 54 – *Albonectria rigidiuscula* (MFLU 18-1383, new host record). a–b Ascomata on host substrate. c Section through the ascoma. c Peridium. d Ostiole in section with periphyses. e–l Asci. m Paraphyses. n Ascospores. o Germinated spore. Scale bars: a–b = 200 μm , c = 50 μm , d–l = 20 μm , m = 10 μm , n = 30 μm .

Notes – In a BLASTn search, the closest match of the ITS sequence is *Fusarium continuum* (NRRL 66286; NR_159818) and *F. babinda* (CBS 397.96; MH862578) with 90% similarity, while the closest match to the LSU sequence was with *F. sublunatum* (CBS 189.34; MH866966) with

97.66% similarity. In the present study, phylogenetic analysis shows that our strain MFLUCC 17-0328 grouped within *Albonectria rigidiuscula* (Fig. 53). *Albonectria* was introduced by Rossman et al. (1999) to accommodate species with white to pale yellow ascomata. Moreover, *Albonectria* was listed as sexual morphs connected with *Fusarium* (Wijayawardene et al. 2012). Our collection is similar to *A. rigidiuscula* described in Rossman et al. (1999) and Guu et al. (2007). We, therefore, name our collection as *A. rigidiuscula* which is a new host record for *Hevea brasiliensis* in Thailand.

Nectria pseudotrichia Berk. & M.A. Curtis, J. Acad. Nat. Sci. Philadelphia 2, 2: 289. 1853

Fig. 55

Index Fungorum number: IF 460215

Saprobic on dead branches of *Hevea brasiliensis*. Sexual morph: Undetermined. Asexual morph: Colonies effuse. Mycelium partly immersed on the substrate, composed of septate, branched, brown, hyphae. Conidiophores macronematous, synnematosus, orange, septate, branched. Synnemata scattered, superficial, solitary, rarely gregarious, humate or coniform, erect or nodding, rigid, orange or reddish brown, branched in top half, hyaline at the tip, velvety, smooth, composed of compactly arranged conidiophores, 1.5–2.5 mm long, 135–220 μm wide at the base, 50–140 μm wide in the middle, 40–70 μm wide at the tip, fertile only apically. Conidiogenous cells (11–)13–19(–28) \times (1.5–)2–3.5 μm (\bar{x} = 15.8 \times 2.4 μm , n = 21), enteroblastic, phialidic, integrated or discrete, cylindrical, hyaline, smooth. Conidial mass globose or slightly tapering toward tip, light orange or creamy-white in color. Conidia (3.5–)4–6(–8) \times 2–3(–3.5) μm (\bar{x} = 5.1 \times 2.8 μm , n = 54) μm , cylindrical, straight, aseptate, hyaline, smooth-walled.

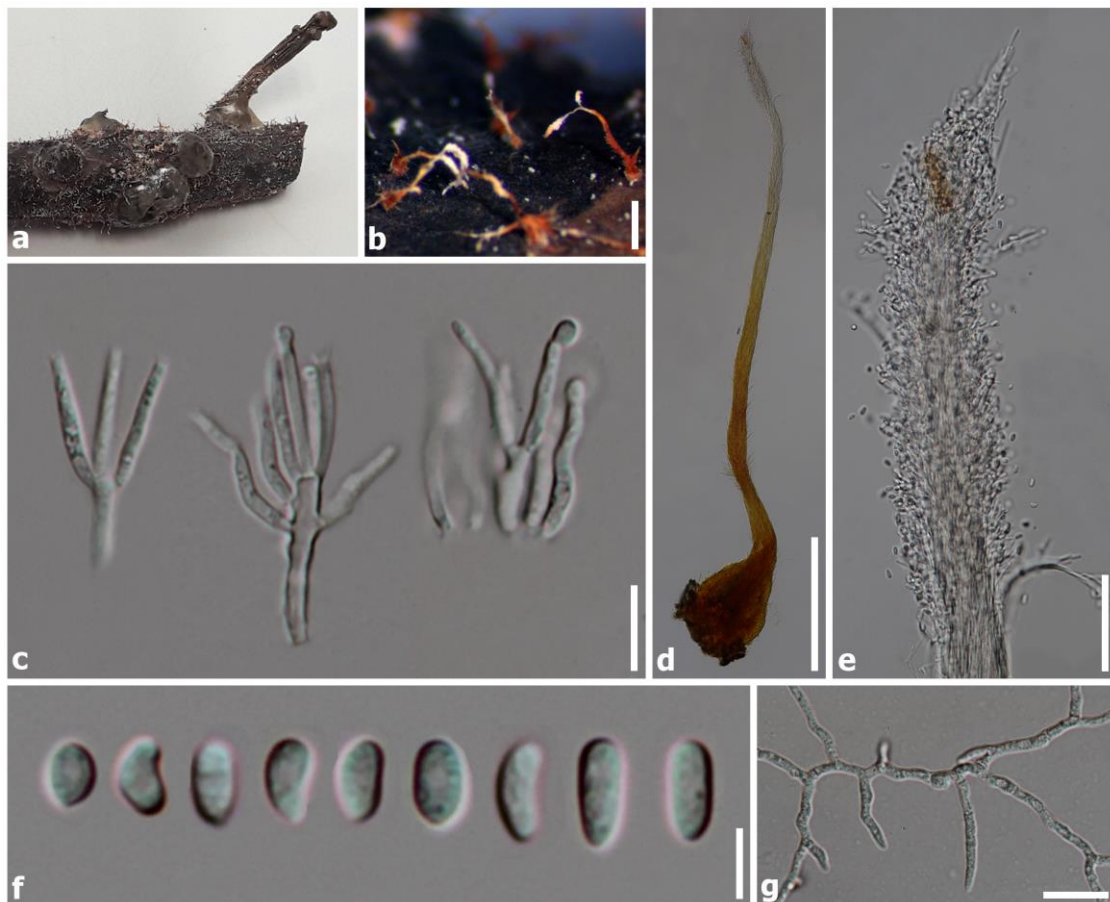


Figure 55 – *Nectria pseudotrichia* (MFLUCC 19-0220). a–b Synnemata on host surface. c Conidiogenous cells and conidiophores. d Synnemata. e Apex of synnemata. f Conidia. g Hyaline hyphae.

g Germinated spore. Scale bars: b = 500 µm, c = 10 µm, d = 500 µm, e = 50 µm, f = 5 µm, g = 15 µm.

Culture characteristics – Conidia germinating on MEA within 24 hours and germ tube produced from both ends. Colonies on MEA, colonies circular, mycelium slightly raised, effuse, cultures white at first, becoming creamy white from the center, and creamy white in reverse.

Host and distribution – Wide host range and widely distributed in tropical and subtropical regions.

Material examined – Thailand, Chiang Mai Province, Mueang District, on dead branch of *Hevea brasiliensis* (Euphorbiaceae), 22 September 2016, C. Senwana, RBCM03 (MFLU 19-0220), living culture MFLUCC 17-0380.

GenBank numbers – MFLUCC 17-0380: ITS = OL780510, LSU = OL782089, TUB2 = OL840998, RPB1 = OL944405.

Notes – In a BLASTn search, the closest match to the LSU sequences with 97.90% similarity was *Nectria dematiosa* (CBS 126570; MH875619), while the closest match to the ITS sequence was *N. polythalama* (CBS 129240; NR_160251) with 98.16% similarity. A phylogenetic analysis based on combined dataset of ITS, LSU, RPB1 and TUB sequence data show that strain MFLUCC 17-0380 groups with *Nectria pseudotrichia* (Fig. 53). *Nectria pseudotrichia* is common tropical species with a synnematus anamorph (Hirooka et al. 2012).

Coronophorales Nannf. (= Melanosporales N. Zhang & M. Blackw.)

Nitschkiaceae (Fitzp.) Nannf.

Nitschkiaceae is characterized by erumpent, black, carbonaceous or coriaceous to membranaceous, rough, tuberculate, smooth or with short spines ascomata and 4- to multi-spored, clavate asci with hyaline, fusiform or allantoid ascospores (Fitzpatrick 1923, Mugambi & Huhndorf 2010, Hyde et al. 2020b, Huang et al. 2021). Members of this family are saprobes on decaying bark and wood in terrestrial and aquatic habitats with worldwide distribution (Mugambi & Huhndorf 2010, Vasilyeva et al. 2010).

Fracchiæa heveae Senwana, Cheewangkoon & K.D. Hyde, sp. nov.

Fig. 57

Index Fungorum number: IF559364

Etymology – named after the host genus *Hevea*, from which this species was isolated.

Saprobe on branch of *Hevea brasiliensis*. Sexual morph: *Ascomata* 115–350 µm high, 120–385 µm diam., superficial or erumpent through bark of host, single or clusters of 2–20 *ascomata*, globose, black, coriaceous, ornamented with pointed spines 18–25 µm long. *Ostioles* scarcely prominent, hyaline periphysate. *Peridium* 25–79 µm wide, outer layers dark brown to black, inner layers thin-walled, hyaline, composed of cells of *textura angularis*. *Paraphyses* not seen. *Asci* (60–)65–130(–137) × (9–)14–22(–27) µm (\bar{x} = 100 × 19 µm, n = 27), with numerous ascospores, unitunicate, thin-walled, clavate to cylindrical, short pedicellate, apically rounded. *Ascospores* (9–)12–19(–21) × 2–4 µm (\bar{x} = 15.7 × 3.3 µm, n = 75), crowded, hyaline, lunate or cylindrical with acute ends, slightly curved, aseptate, smooth-walled, mostly with small guttules. Asexual morph: Undetermined.

Host and distribution – *Hevea brasiliensis* (Thailand; this study)

Material examined – Thailand, Chiang Rai Province, Wiang Chiang Rung District, on branch of *Hevea brasiliensis* (Euphorbiaceae), 1 November 2016, C. Senwana, RBCR15 (MFLU 17-0214, holotype).

GenBank numbers – MFLU 17-0214a: ITS = OL780511, LSU = OL782086, SSU = OL780535; MFLU 17-0214b: ITS = OL780512, LSU = OL782086, SSU = OL780536.

Notes – In a BLASTn search of GenBank, the closest match of the LSU sequence of MFLU 17-0214 is *Coronophora myricoides* (IFRD 9201; KX856174) with 85.27% similarity. The present study using morphology and phylogenetic analyses, places *Fracchiæa heveae* in Nitschkiaceae. *Fracchiæa* is typified by *Fracchiæa heterogenea* and there are 33 epithets in Index Fungorum

(2021). The genus is characterized by perithecia, coriaceous-carbonaceous, turbinate, superficial ascomata, clavate and polysporous asci with allantoid, slightly curve ascospores (Fitzpatrick 1924, Mugambi & Huhndorf 2010, Vasilyeva et al. 2010). Phylogenetic analyses of LSU, TEF and RPB2 sequence data (Fig. 56), indicate that *Fracchiaea heveae* can be distinguished from other species within the genus *Fracchiaea* and is close to *F. broomeiana* and *F. lunata*. However, *Fracchiaea heveae* differs from those species in the shape of ascospores and ascospores dimensions (Petch 1917, Talde 1970, Vasilyeva et al. 2010).

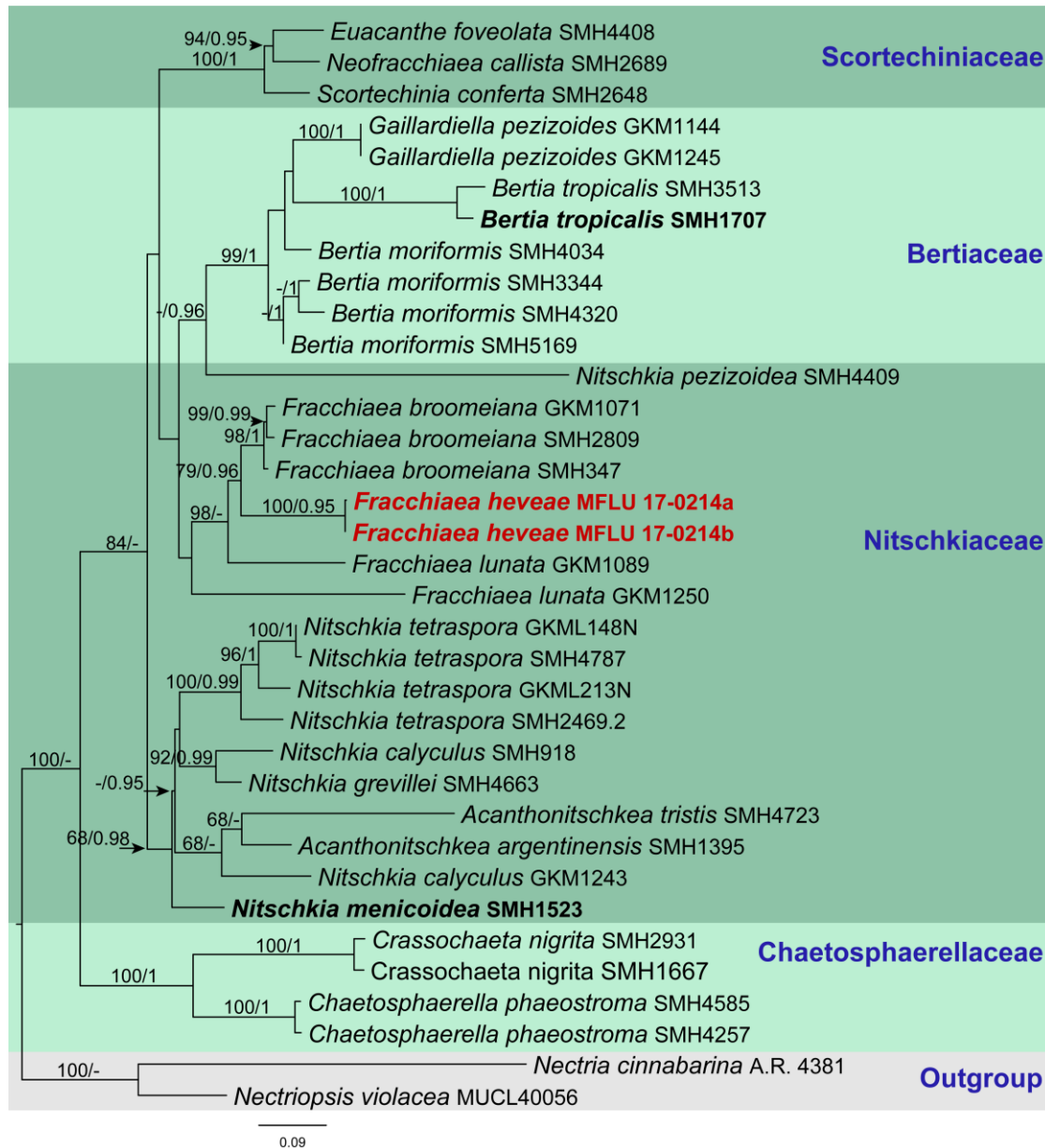


Figure 56 – RAxML tree of *Fracchiaea* based on a combined LSU, TEF and RPB2 sequence dataset. Thirty-five strains are included in the combined sequence analysis, which comprise 2945 characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree with a final likelihood value of -20484.619200 is presented. The matrix had 1380 distinct alignment patterns, with 52.38% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.224476, C = 0.286277, G = 0.309625, T = 0.179622; substitution rates: AC = 1.188678, AG = 2.970846, AT = 1.415215, CG = 1.431534, CT = 7.251219, GT = 1.000000; gamma distribution shape parameter α = 0.806399. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in

bold. *Nectria cinnabarina* (A.R. 4381) and *Nectriopsis violacea* (MUCL 40056) are used as outgroup taxa.

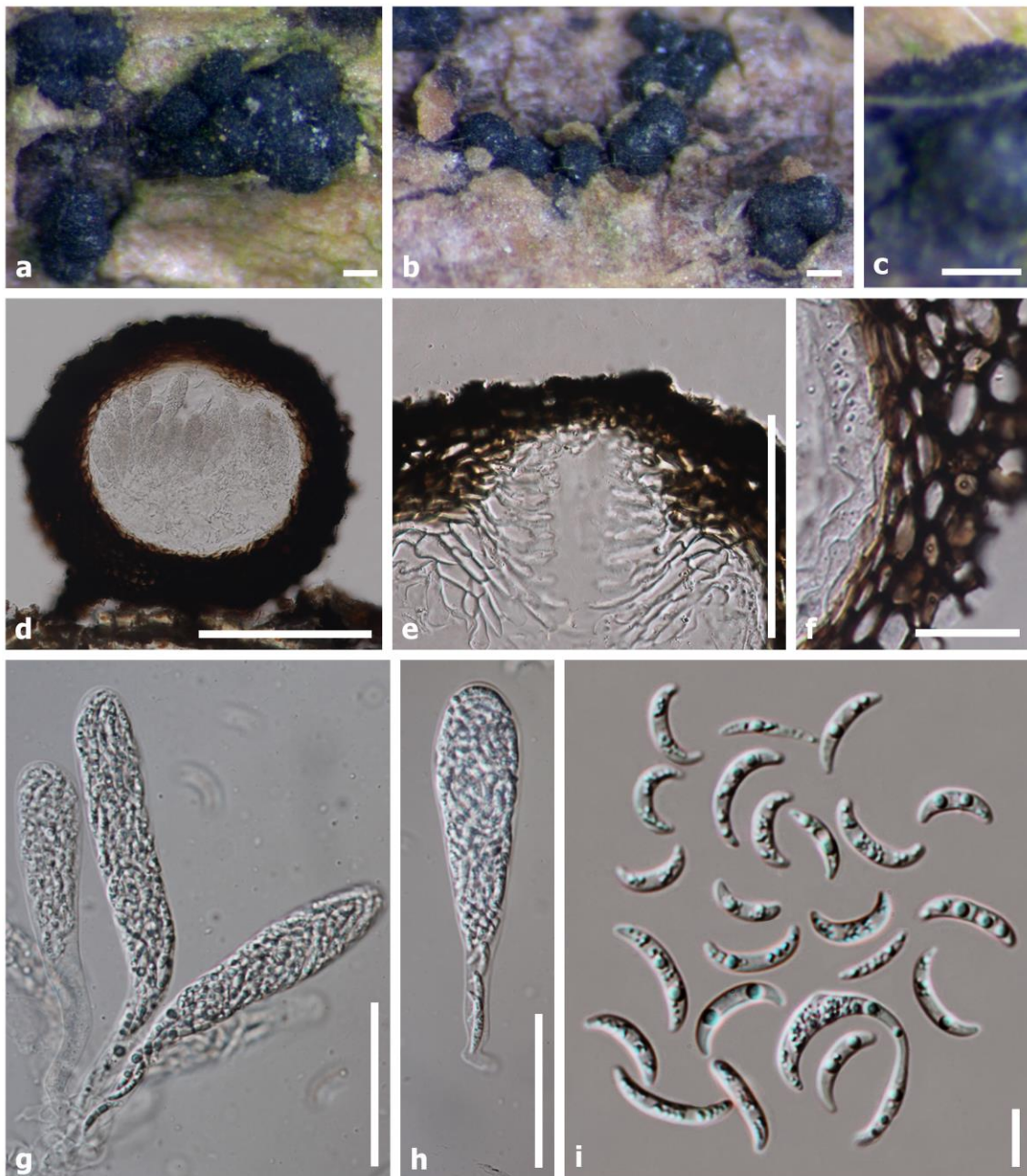


Figure 57 – *Fracchiaea heveae* (MFLU 17-0214, holotype). a–b Habit on substrate. c Section through the ascoma. d Ostiole in section with periphyses. e Peridium. f, g Asci. h Ascospores. Scale bars: a–d = 200 μ m, e = 100 μ m, f = 30 μ m, g, h = 50 μ m, i = 10 μ m.

Sporidesmiales Crous
Sporidesmiaceae Fr.

Sporidesmiaceae is monotypic family which includes a single genus *Sporidesmium* (Crous et al. 2018b, Hyde et al. 2020b). *Sporidesmium* species are saprobic on wood in terrestrial and aquatic habitats or mycoparasites of fungi (Hyde et al. 2020b).

Sporidesmium tropicale M.B. Ellis, Mycol. Pap. 70: 58 (1958)
 Index Fungorum number: IF 306326

Fig. 59

Saprobic on dried twigs of *Hevea brasiliensis*. Sexual morph: Undetermined. Asexual morph: Hyphomycetous. Colonies effuse, olivaceous or black. *Mycelium* partly immersed or partly superficial on the substrate. *Conidiophores* (71–)110–260(–290) × 4–6.5 μm (\bar{x} = 177 × 5.7 μm, n = 21), macronematous, mononematous, erect, unbranched, septate, straight, cylindrical, brown to dark brown, smooth. *Conidiogenous cells* holoblastic, polyblastic, integrated, determinate, terminal, brown. *Conidia* (39–)51–100(–133) × 11–15(–17) μm (\bar{x} = 79.4 × 14.1 μm, n = 21), dry, acrogenous, solitary, obclavate, tapering gradually toward the apex, brown to dark brown, rounded at the apex, truncate at the base, 6–13-septate, basal cell cut off by a dark brown septum, smooth-walled.

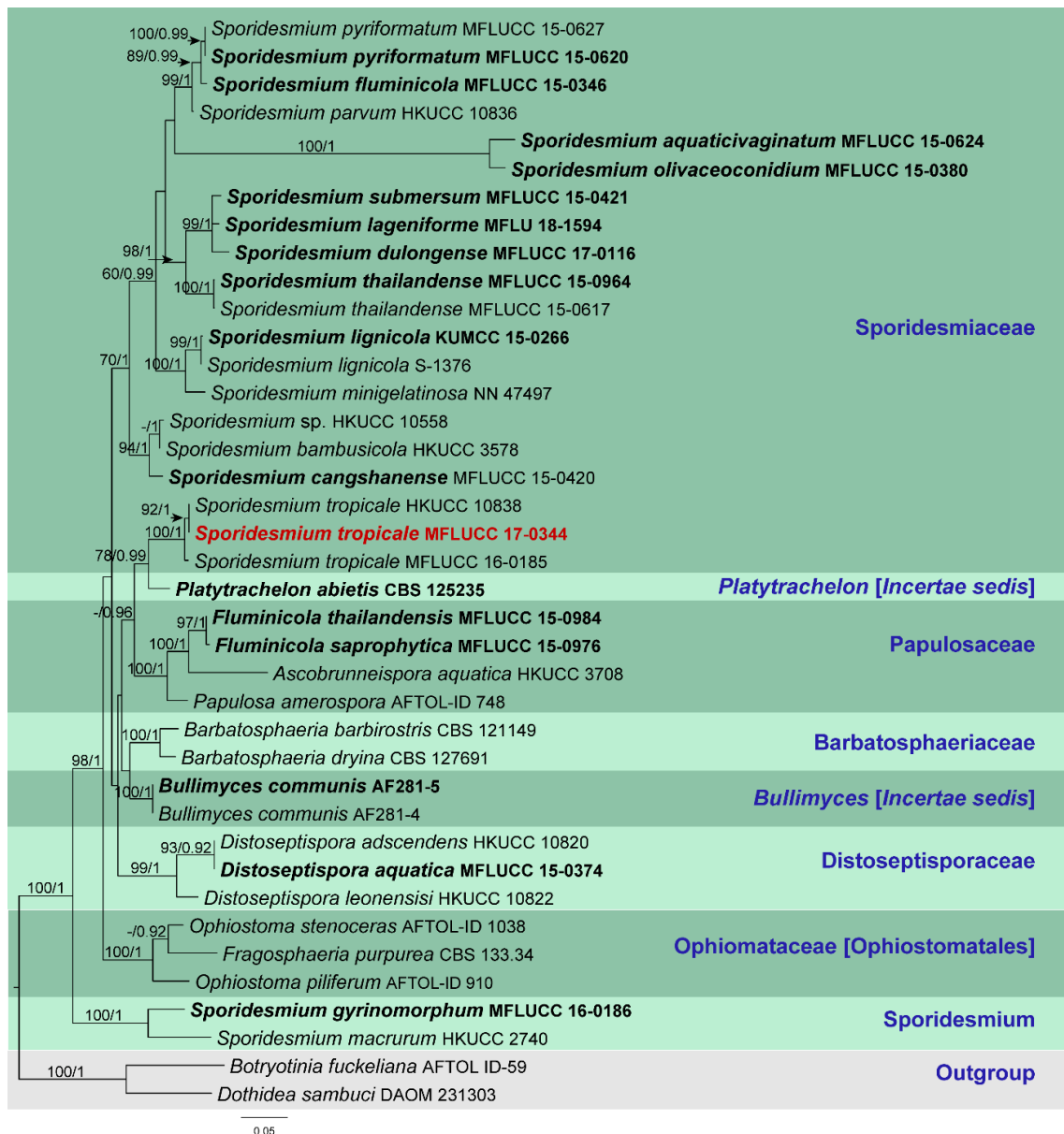


Figure 58 – RAxML tree of *Sporidesmium* based on a combined LSU, SSU, ITS and TEF1 sequence dataset. Thirty-nine strains are included in the combined sequence analysis, which comprise 3734 characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree with a final likelihood value of -17079.179295 is presented. The matrix had 1384 distinct alignment patterns, with 50.74% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.246422, C = 0.250697, G = 0.280180, T = 0.222701; substitution rates: AC = 1.069496, AG = 2.093524, AT = 1.590610, CG = 1.012377, CT = 6.424773, GT = 1.000000; gamma distribution shape parameter α = 0.458862. Bootstrap support

values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Botryotinia fuckeliana* (AFTOL-ID 59) and *Dothidea sambuci* (DAOM231303) are used as outgroup taxa.



Figure 59 – *Sporidesmium tropicale* (MFLU 17-1984, new host record). a Colonies on twigs. b–g Conidium developing on the apex of conidiophores. h–i Conidiophores with conidia. j–p Conidia. q Germinated spore. Scale bars: a = 100 μ m, b–g = 20 μ m, h–q = 50 μ m.

Culture characteristics – Conidia germinating on MEA within 24 hours at room temperature and germ tubes produced from one or both ends. Colonies on MEA circular, mycelium raised, entire, cultures olivaceous-grey at the surface and dark olivaceous-grey to black from the center of the colony in reverse.

Material examined – Thailand, Phayao Province, Muang District, on dried twigs of *Hevea brasiliensis* (Euphorbiaceae), 3 January 2017, C. Senwana, RBPY25 (MFLU 17-1984), living cultures MFLUCC 17-0344.

Host and distribution – Wide host range and widely distributed in temperate, tropical and subtropical regions.

GenBank numbers – MFLUCC 17-0344: ITS = OL780513, LSU = OL782088, TEF1 = OL875112.

Notes – In a BLASTn search, the LSU sequence of RBPY25 showed 100% similarity to *Sporidesmium tropicale* (HKUCC 10838; DQ408560), while the ITS sequence had 98.38% similarity to *S. tropicale* (MFLUCC:16-0185; MF077551). In the present phylogenetic analysis, RBPY25 cluster with *Sporidesmium tropicale* with 100% ML and 0.99 BYPP bootstrap support (Fig. 58). The morphology of our collection is slightly varied in morphological characters from those in Ellis (1972). This may be due to distribution and morphological variability within the species. We, therefore, name our collection as *Sporidesmium tropicale* which is a new host record for *Hevea brasiliensis* in Thailand.

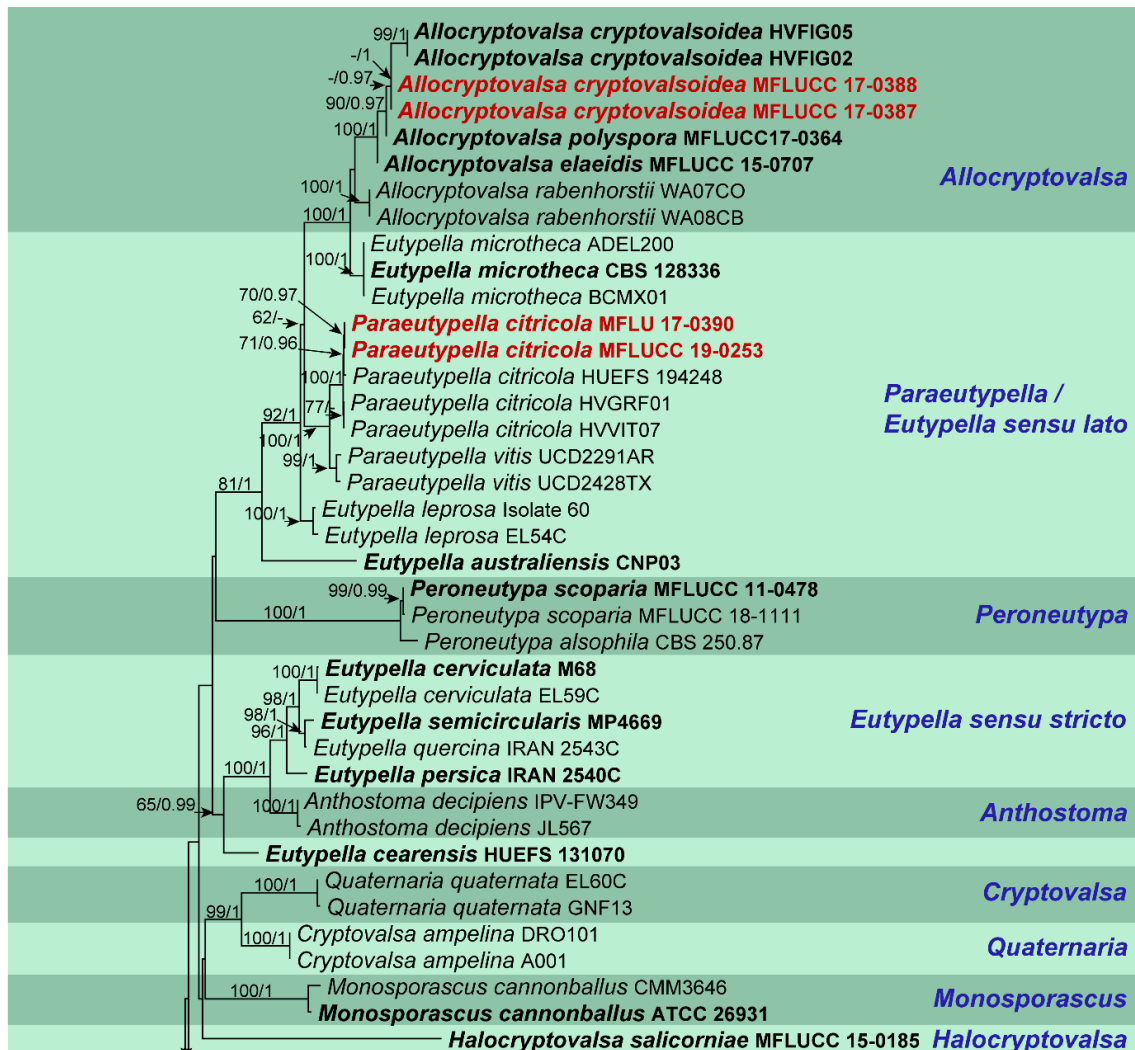


Figure 60 – RAxML tree of Diatriypaceae based on a combined ITS and TUB2 sequence dataset. 73 strains are included in the combined sequence analysis, which comprise 1615 characters with gaps. Tree topology of the ML analysis was similar to the BYPP. The best scoring RAxML tree

with a final likelihood value of -14833.221963 is presented. The matrix had 1101 distinct alignment patterns, with 50.60% of undetermined characters or gaps. Estimated base frequencies were as follows: A = 0.231120, C = 0.263007, G = 0.232197, T = 0.273676; substitution rates: AC = 0.987957, AG = 2.999746, AT = 1.222521, CG = 0.823710, CT = 3.903183, GT = 1.000000; gamma distribution shape parameter α = 0.928682. Bootstrap support values for ML equal to or greater than 60% and BYPP equal to or greater than 0.90 are defined as ML/BYPP above the nodes. Newly generated sequences are in red bold and type species are in bold. *Kretzschmaria deusta* (CBS 826.72) and *Xylaria hypoxylon* (CBS 122620) are used as outgroup taxa.

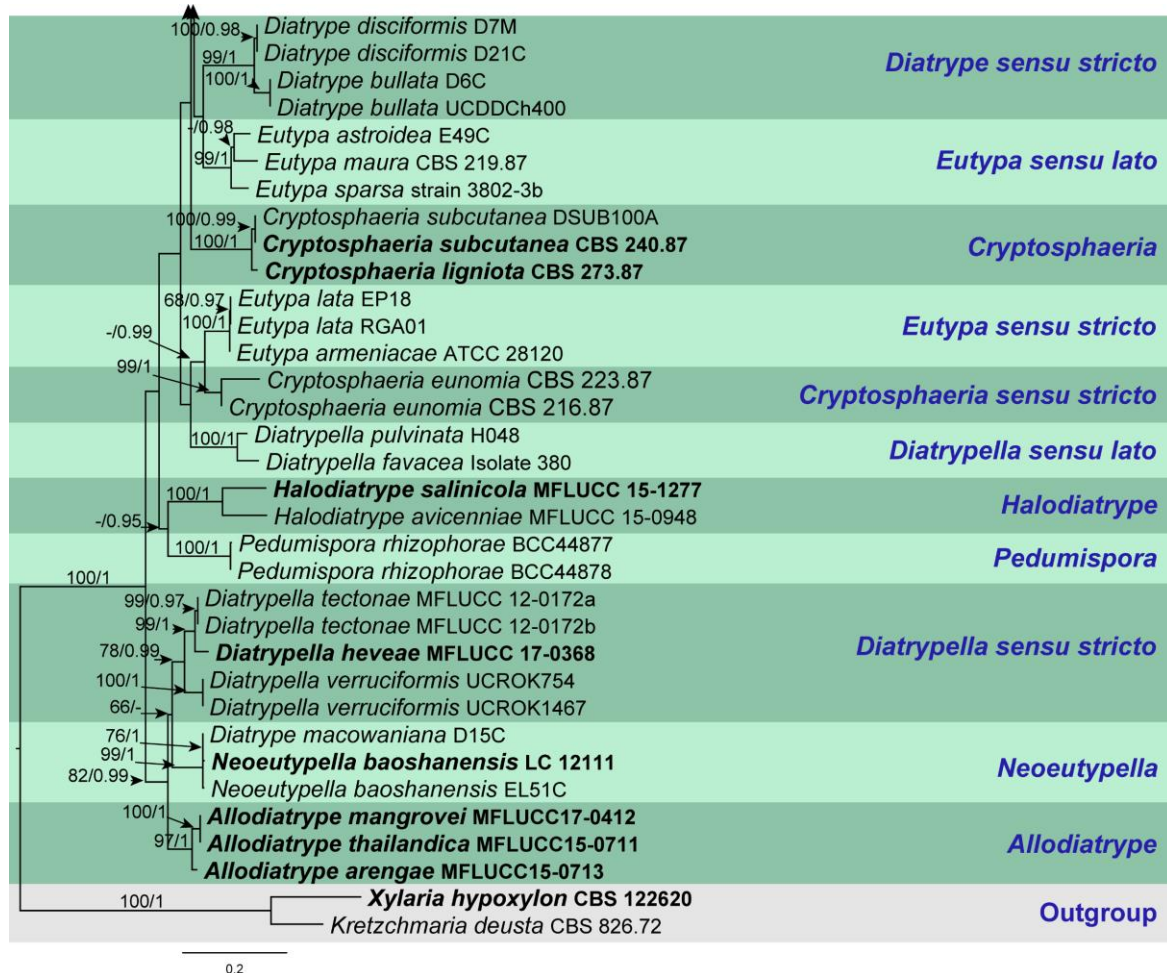


Figure 60 – Continued.

Xylariales Nannf.

Diatrypaceae Nitschke

The members of Diatrypaceae are characterized by perithecial ascomata, immersed to erumpent in the host substrates, cylindric-clavate to clavate or spindle-shaped asci and allantoid ascospores (Trouillas et al. 2011, Mehrabi et al. 2015, de Almeida et al. 2016, Senwanna et al. 2017, Phookamsak et al. 2019, Dayarathne et al. 2020, Konta et al. 2020). The family are saprobes, pathogens and endophytes on various plant hosts in terrestrial and aquatic habitats (Trouillas et al. 2011, Mehrabi et al. 2016, Dayarathne et al. 2020, Hyde et al. 2020b). In this study, *Allocryptovalsa cryptovalsoidea* and *Paraeutypella citricola* are reported as new host records on *Hevea brasiliensis* in Thailand.

Allocryptovalsa cryptovalsoidea (Trouillas, W.M. Pitt & Gubler), in Senwanna et al., Mycosphere 8 (10): 1840 (2017) Fig. 61

Index Fungorum number: IF553863

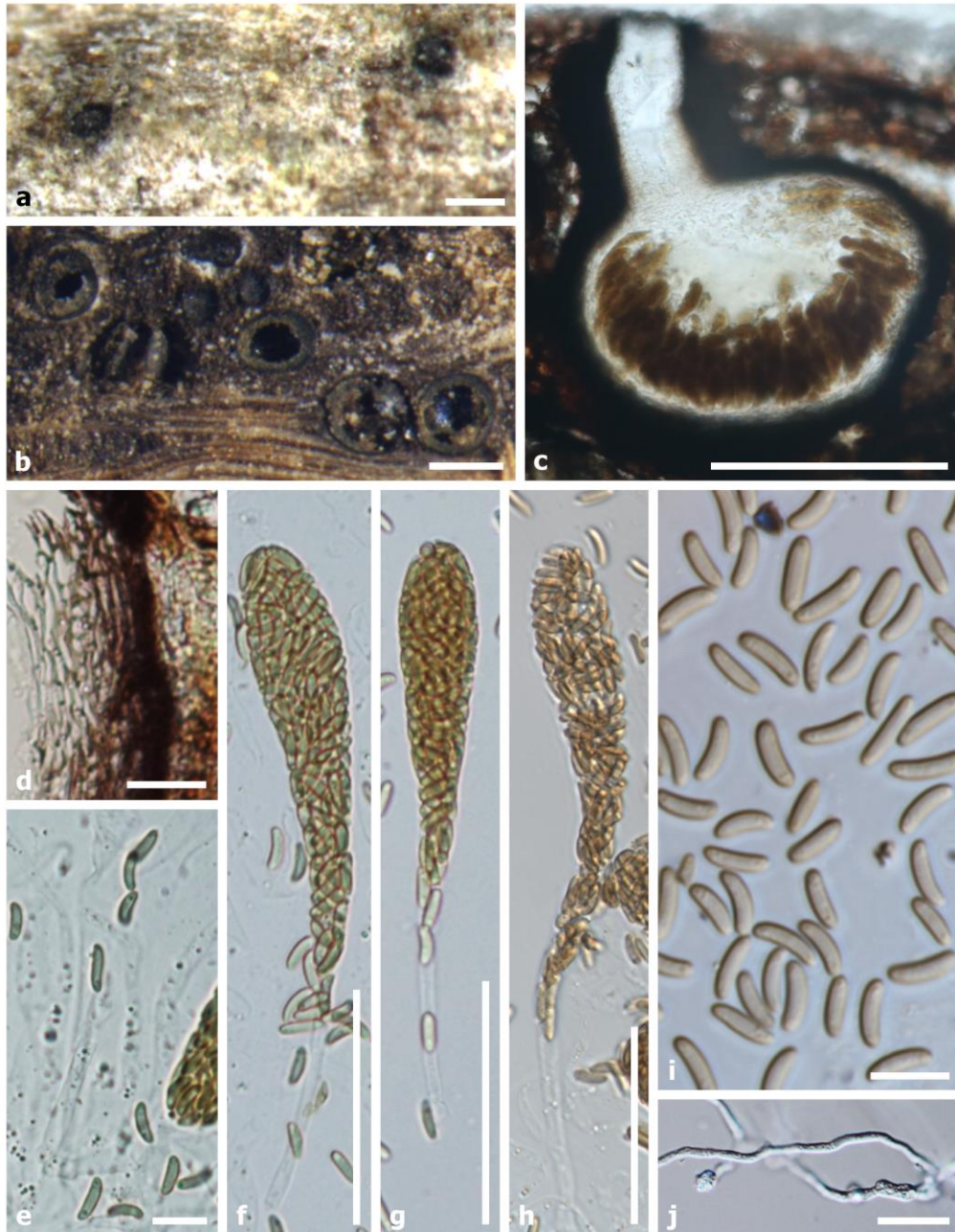


Figure 61 – *Allocryptovalsa cryptovalsoidea* (MFLU 19-0254, new host record). a Habit of ascostromata on substrate. b Transverse sections through ascostroma. c Section through the ascoma. d Peridium. e Paraphyses. f–h Asci. i Ascospores. j Germinated ascospores. Scale bars: a = 200 μm , b = 500 μm , c = 300 μm d = 20 μm , e, i, j = 10 μm , f–h = 50 μm .

Saprobic on dead twig of *Hevea brasiliensis*. Sexual morph: Ascostromata solitary, 1–3-loculate, immersed. Ascromata (including ostiole) 300–500 μm diam., 440–610 μm high, perithecial, dark brown to black, solitary, or gregarious, immersed in substrate, globose to subglobose, dark brown to black, ostiolate. *Ostiole* 130–217 μm wide, central, not prominent, cylindrical, straight, dark brown to black, with periphysate. *Peridium* 24–48 μm wide, composed of two type layers, outer layer comprising several layers of thick-walled, dark brown to black cells of *textura angularis*, inner layer comprising 3–5 layers of thin-walled, hyaline cells of *textura angularis*. *Paraphyses* 4–8.5 μm wide, dense, hyaline, septate, unbranched, slightly constricted at the septa, filamentous. *Asci* (including stalks) (95–)102–154(–177) \times 14–19(–23) μm (\bar{x} = 131.5 \times 17.8 μm , n = 20), spore-bearing part length [p. sp.] (57–)67–104(–125) μm (\bar{x} = 87 μm , n = 25), polysporous, unitunicate, thin-walled, clavate, long pedicellate, apically rounded, with

a refractive, J-, subapical ring. *Ascospores* 7–11 × 2–3.5 µm (\bar{x} = 8.8 × 2.5 µm, n = 60), crowded, pale yellowish to pale brown at maturity, oblong to allantoid, aseptate, slightly curved, smooth-walled, with small guttules. Asexual morph: Undetermined. *Appressoria* hyaline, globose to sub globose, thick-walled.

Culture characteristics – Ascospores germinating on MEA within 24 hours at room temperature and germ tubes produced from one or both ends with developing appressoria structure. Colonies on MEA medium dense, irregular, flat or effuse, slightly raised, fluffy, cultures white at the surface and creamy-white at the in reverse.

Material examined – Thailand, Sukhothai Province, Si Satchanalai District, on dead twig of *Hevea brasiliensis* (Euphorbiaceae), 2 January 2017, N. Huanraluek, RBSK04 (MFLU 19-0254), living culture, MFLUCC 17-0387 = MFLUCC 17-0388.

Host and distribution – *Ficus carica* (New South Wales; Trouillas et al. 2011), *Hevea brasiliensis* (Thailand; this study)

GenBank numbers – MFLUCC 17-0387: ITS = OL780514 MFLUCC 17-0388: ITS = OL780515.

Notes – In a BLASTn search of GenBank, the closest match of the ITS sequence of MFLUCC 17-0387 and MFLUCC 17-0388 is *Allocryptovalsa polyspora* (MFLU 17-1218) with 99.59% similarity. Phylogenetic analyses of ITS and BT sequence dataset show that our strains form a sister lineage to *Allocryptovalsa cryptovalsoidea* (Fig. 60). *Allocryptovalsa cryptovalsoidea* differs from *A. polyspora* in size of asci and ascospores (Table 5). The morphology of our strain is similar to *Allocryptovalsa cryptovalsoidea* described by Trouillas et al. (2011). We, therefore, name our collection as *A. cryptovalsoidea* which is a new host record for *Hevea brasiliensis* in Thailand.

Table 5 Synopsis of *Allocryptovalsa* species discussed in this study.

Species name	Asci length/ ([p. sp.]) (µm)	Asci width (µm)	Ascospores length (µm)	Ascospore width (µm)	Reference
<i>Allocryptovalsa polyspora</i> (polysporous)	(33.5–)70–120–177/ (41–)54–74(–101)	(4–)13–19(–21)	(4–)7–12(–14)	2–4	This study
<i>Allocryptovalsa cryptovalsoidea</i> ≡ <i>Eutypella cryptovalsoidea</i> (polysporous)	–/65–120	15–20	8–12(–13.5)	2–3	Trouillas et al. 2011
<i>Allocryptovalsa cryptovalsoidea</i> (polysporous)	(95–)102–154(–177)/ (57–)67–104(–125)	14–19(–23)	7–11	2–3.5	This study
<i>Allocryptovalsa rabenhorstii</i> (polysporous)	–/(55–)70–90(–95)	(15–)18–22(–27)	(10–)13.5–15 (–17.5)	(3–)4–5(–6)	Trouillas et al. 2011

Paraeutypella vitis (Schwein.) L.S. Dissan., J.C. Kang & K.D. Hyde, in Dissanayake, Wijayawardene, Dayarathne, Samarakoon & Dai, Biodiversity Data Journal 9: e63864, 16 (2021) Fig. 62

Index Fungorum number: IF 228646

Saprobic on dead branch of *Hevea brasiliensis*. Sexual morph: *Ascstromata* immersed to semi-immersed, becoming raised to erumpent through the host tissue, visible as black, solitary to gregarious. *Ascomata* (including ostiole) 425–670 µm high, 250–500 µm diam., perithecial, black, clustered, immersed to semi-immersed in ascostroma, ovoid to subglobose, 2–4 locules in ascostroma, glabrous, ostioles not prominent. *Ostiolar canal* 150–260 µm high, 85–150 µm diam., cylindrical, sulcate, periphysate. *Peridium* 19–45 µm wide, composed of two layers, outer layer comprising several layers of thick-walled, dark brown to black cells of *textura angularis*, inner layer comprising thin-walled, hyaline cells of *textura prismatica*. *Paraphyses* 2.6–7.5 µm wide. (\bar{x} = 4.5, n = 32), dense, hyaline, septate, unbranched, filamentous, embedded in hyaline gelatinous

matrix. *Asci* (including stalks) $(62\text{--}70\text{--}95\text{--}103) \times 6\text{--}9\text{--}11) \mu\text{m}$ ($\bar{x} = 80.3 \times 8.3 \mu\text{m}$, $n = 20$), spore-bearing part length [p. sp.] $(25.5\text{--})32\text{--}43\text{--}48) \mu\text{m}$ ($\bar{x} = 36.3 \mu\text{m}$, $n = 20$), 8-spored, unitunicate, thin-walled, clavate to cylindrical-clavate, long pedicellate, apically rounded to truncate with indistinct, J-, subapical ring. *Ascospores* $(6\text{--})8\text{--}11\text{--}13) \times 2\text{--}3 \mu\text{m}$ ($\bar{x} = 10 \times 2.5 \mu\text{m}$, $n = 45$), crowded, initially hyaline, becoming pale yellowish to pale brown at maturity, oblong to allantoid, aseptate, slightly curved, smooth-walled, mostly with small guttules. Asexual morph: Undetermined. *Appressoria* hyaline, globose to sub globose, thick-walled.

Culture characteristics – Ascospores germinated on MEA within 24 hours and germ tube produced from one end of the ascospore with developing appressoria. Colonies on MEA medium dense, irregular, flat or effuse, slightly raised, cottony, white, margin rough, not produced pigmentation on MEA media.

Material examined – Thailand, Sukhothai Province, Si Satchanalai District, on dead branch of *Hevea brasiliensis* (Euphorbiaceae), 2 January 2017, N. Huanraluek, RBSK003 (MFLU 17-0390), living culture MFLUCC 19-0253 (new host record).

Host and distribution – Wide host range and widely distributed in temperate, tropical and subtropical regions.

GenBank numbers – MFLUCC 19-0253: ITS = OL780516, TUB2 = OL875097; MFLU 17-0390: ITS = OL780517.

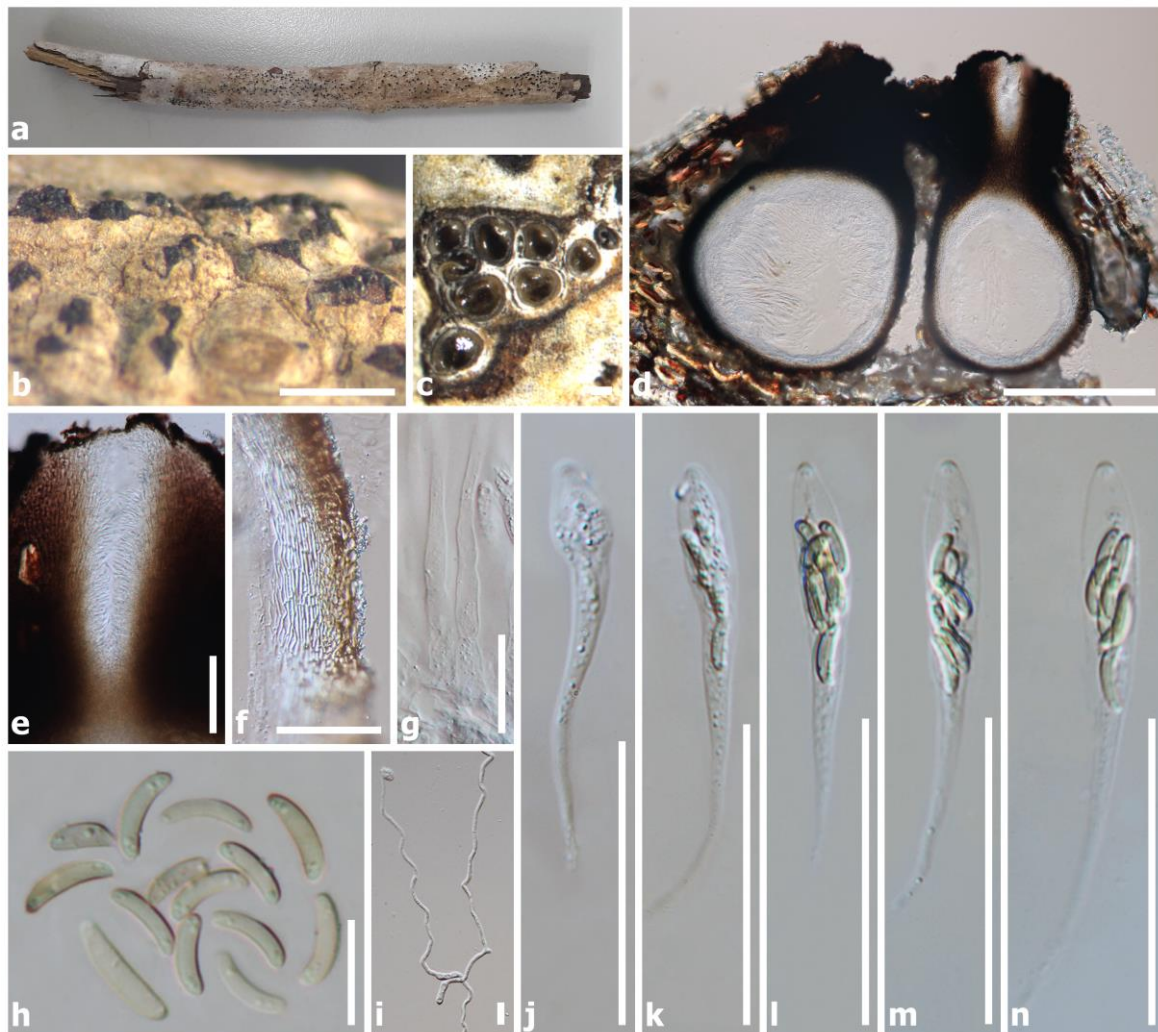


Figure 62 – *Paraeutypella citricola* (MFLU 17-0390, new host record). a–b Ascostromata on substrate. d Vertical section through ascostroma. e Ostiole with short periphyses. f Peridium. g Paraphyses. h Ascospores. i Germinated ascospores. j–n Asci. Scale bars: b = 1000 μm , c = 200 μm , d = 100 μm , e, f = 30 μm g = 10 μm , h–i = 5 μm , j–n = 20 μm .

Notes – Phylogenetic analyses show that the strain MFLU 17-0390 and MFLUCC 19-0253 grouped within the *Paraeutypella citricola* clade (Fig. 60). In a BLASTn search, the closest match of the ITS sequences with 89.91% (MN308410) similarity was to *Allocryptovalsa elaeidis* (MFLUCC 15-0707). Our collection (MFLU 17-0390) is similar to *Paraeutypella citricola* in having 8-spored asci and in the size of spore-bearing part length (p. sp.) and ascospores (de Almeida et al. 2016, Dissanayake et al. 2021). We, therefore, name our collection as *Paraeutypella citricola* which is a new host record for *Hevea brasiliensis* in Thailand.

Checklist of fungi associated with Para rubber

This checklist of fungi associated with *Hevea brasiliensis* is based on U.S. National Fungus Collections Fungus-Host Database (Farr and Rossman 2021) together with published articles in journals and books. The checklist includes fungal species names, information on substrate and locality from where fungi have been recorded on Para rubber. The current names are used according to Index Fungorum (2020).

List of fungi associated with Para rubber (*Hevea brasiliensis*)

Phylum: Ascomycota

Acanthohelicospora aurea (Corda) Rossman & W.C. Allen, in Rossman et al., IMA Fungus 7(1): 2 (2016)

On leaf and branch litter of *H. brasiliensis*: Thailand as *Helicosporium aureum* (Seephueak et al. 2010)

Acanthonitschkea argentinensis Speg., Anal. Mus. nac. B. Aires, Ser. 3 17(10): 116 (1908)

On stems of *H. brasiliensis*: Ghana (Hughes 1953)

Acanthonitschkea pulchella (Sacc.) Nannf., Svensk bot. Tidskr. 69(3): 320 (1975)

On stems of *H. brasiliensis*: Ghana, Malaysia as *Neotrotteria pulchella* (Nannfeldt 1975, Singh 1980)

Acarocybe deightonii M.B. Ellis, Mycol. Pap. 76: 4 (1960)

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Acarocybe formosa (Bat. & J.L. Bezerra) M.B. Ellis, Mycol. Pap. 82: 50 (1961)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Acarocybe hansfordii Syd., Ann. mycol. 35(3/4): 285 (1937)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Acarocybe sp.

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Acremoniula brevis M.B. Ellis ex S. Hughes, N.Z. J Bot. 17(2): 165 (1979)

On branch litter of *H. brasiliensis*: Thailand as *Endophragmia brevis* (Seephueak et al. 2011)

Acremonium alternatum Link, Mag. Gesell. naturf. Freunde, Berlin 3(1-2): 15 (1809)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Acremonium fusidioides (Nicot) W. Gams, Cephalosporium-artige Schimmelpilze (Stuttgart): 70 (1971)

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

- Acremonium byssoides* W. Gams & T.M. Lim, in Gams, Trans. Br. Mycol. Soc. 64(3): 391 (1975)
A hyperparasite of the fungus *Oidium heveae* on *H. brasiliensis*: Malaysia (Gam 1975)
- Acremonium murorum* (Corda) W. Gams, Cephalosporium-artige Schimmelpilze (Stuttgart): 84 (1971)
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)
- Acremonium polychromum* (J.F.H. Beyma) W. Gams, Cephalosporium-artige Schimmelpilze (Stuttgart): 81 (1971)
On bark of *H. brasiliensis*: Indonesia (Perdomo et al. 2011)
- Acremonium* sp.**
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)
- Acrodictys sacchari* M.B. Ellis, Mycol. Pap. 125: 6 (1971)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Acrodictys* sp.**
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Acrophialophora fusispora* (S.B. Saksena) Samson, in Samson & Tariq Mahmood, Acta bot. neerl. 19(6): 805 (1970)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Acrostaurus turneri* Deighton & Piroz., Mycol. Pap. 128: 94 (1972)
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Actinocladium rhodosporum* Ehrenb., Jb. Gewächsk. 1(2): 52 (1819)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Akanthomyces lecanii* (Zimm.) Spatafora, Kepler & B. Shrestha, in Kepler et al., IMA Fungus 8(2): 343 (2017)
On *H. brasiliensis*: Haiti as *Torrubiella confragosa* (Benjamin & Slot 1969)
- Albonectria rigidiuscula* (Berk. & Broome) Rossman & Samuels, in Rossman, Samuels, Rogerson & Lowen 1999
Associated with die back disease of *H. brasiliensis*: Democratic Republic of the Congo, Malaysia, as *Calonectria rigidiuscula* (Spaulding 1961, Singh 1980), on branch of *H. brasiliensis*: Thailand (this study)
- Allocryptovalsa cryptovalsoidea* (Trouillas, W.M. Pitt & Gubler) Senwanna, Phookamsak & K.D. Hyde in Senwanna et al., Mycosphere 8(10): 1840 (2017)
On dead twig of *H. brasiliensis*: Thailand (this study)
- Allocryptovalsa polyspora* Senwanna, Phookamsak & K.D. Hyde, in Senwanna et al., Mycosphere 8(10): 1840 (2017)
On branch of *H. brasiliensis*: Thailand (Senwanna et al. 2017)
- Alternaria alternata* (Fr.) Keissl., Beih. bot. Zbl., Abt. 2 29: 434 (1912)
Associated with leaf blight and black leaf spot of *H. brasiliensis*: China; endophytic on living leaves and sapwoods of *H. brasiliensis*: Peru (Gazis & Chaverri 2010, Cai et al. 2015)

- Alternaria heveae*** E.G. Simmons, Mycotaxon 50: 262 (1994)
Associated with black leaf spot on seedling of *H. brasiliensis*: China, Mexico (Martin 1947, Cai et al. 2014)
- Alternaria radicina*** Meier, Drechsler & E.D. Eddy, Phytopathology 12: 157 (1922)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Alternaria* sp.**
Associated with leaf Spot of *H. brasiliensis*: Brazil, Mexico, Sri Lanka (McGuire et al. 1967, Mendes et al. 1998, Jayasinghe 1999a)
- Alternaria* spp.**
Associated with rubber tree seeds harvested of *H. brasiliensis*: Brazil (Theodoro & Batista 2014)
- Alternaria yunnanensis***
Associated with leaf spots of *H. brasiliensis*: China (Cai et al. 2019)
- Amerosporium* sp.**
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Ampelomyces quisqualis***
A hyperparasite of powdery mildews on *H. brasiliensis*: Myanmar (Thaung 2008)
- Ampullifera* sp.**
On *H. brasiliensis*: Malaysia (Turner 1971)
- Annellophora dendrographii*** M.B. Ellis, Mycol. Pap. 103: 36 (1965)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Annellophora solani*** (Syd.) S. Hughes, Trans. Br. Mycol. Soc. 34(4): 544 (1952) [1951]
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Annulohypoxyton moriforme*** (Henn.) Y.M. Ju, J.D. Rogers & H.M. Hsieh, Mycologia 97(4): 859 (2005)
On bark of *H. brasiliensis*: Viet Nam as *Hypoxyton heveae* (Anonymous 1968)
- Annulohypoxyton* sp.**
Endophytic on living leaves of *H. brasiliensis*: Peru (Gazis & Chaverri 2010)
- Annulohypoxyton stygium*** (Lév.) Y.M. Ju, J.D. Rogers & H.M. Hsieh, Mycologia 97(4): 861 (2005)
On *H. brasiliensis*: Ghana as *Hypoxyton stygium* (Hughes 1953)
- Anthina* sp.**
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Anthostomella formosa*** Kirschst., Verh. bot. Ver. Prov. Brandenb. 66: 29 (1923)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Anthostomella heveae*** Saccas, J. Agric. Trop. Bot. Appl. 1: 182 (1954)
On dead branches of *H. brasiliensis*: French Equatorial Africa (Anonymous 1963)

***Astrosphaeriella* sp.**

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Apiosporium atrum Masee, Bull. Misc. Inf., Kew (3): 104 (1913)

On dead branches of *H. brasiliensis*: Malaysia (Weir 1926, Singh 1980)

Aposphaeria heveae Petch, Ann. R. bot. Gdns Peradeniya 6(3): 234 (1917)

On roots of *H. brasiliensis*: Sri Lanka (Petch 1917)

***Aposphaeria* sp.**

On *H. brasiliensis*: Haiti (Benjamin & Slot 1969)

Aplosporella heveae Saccas [as 'Aplosporella'], J. Agric. Trop. Bot. Appl. 1: 201 (1954)

On dead branches of *H. brasiliensis*: French Equatorial Africa (Anonymous 1963)

Aquaticheirospora lignicola Kodsueb & W.H. Ho, in Kodsueb et al., Bot. J. Linn. Soc. 155(2): 286 (2007)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Arthrinium muelleri M.B. Ellis, More Dematiaceous Hyphomycetes (Kew): 477 (1976)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Arthrobotryum atrocephalum (Ellis) Sacc., Syll. fung. (Abellini) 4: 630 (1886)

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

***Arthrinium* sp.**

Endophytic on living sapwood of *H. brasiliensis*: Peru (Gazis & Chaverri 2010)

***Aschersonia* sp.**

On leaves of *H. brasiliensis*: Malaysia, Papua New Guinea (Turner 1966, Shaw 1984)

Ascochyta heveae Petch, Ann. R. bot. Gdns Peradeniya 6(3): 236 (1917)

Associated with leaf spot of *H. brasiliensis*: China, Democratic Republic of the Congo, Costa Rica, Ghana, India, Malay Peninsula, Sri Lanka (Thompson & Johnston 1953, Spaulding 1961, McGuire & Crandall 1967, Turner 1971, Zhuang 2001)

Ascochyta heveana Saccas, Agronomía trop. 8(2): 182 (1953)

Associated with leaf spot of *H. brasiliensis*: Democratic Republic of the Congo (Spaulding 1961)

***Ascochyta* sp.**

On leaves of *H. brasiliensis*: Brazil (Mendes et al. 1998)

Aspergillus niger Tiegh., Annls Sci. Nat., Bot., sér. 5 8: 240 (1867)

Associated with leaf spot of *H. brasiliensis*: India (Ariharan et al. 2016)

***Aspergillus* sp.**

Associated with transparent spots on unsmoked sheet or biscuit rubber of *H. brasiliensis*: Brazil, on leaf litter of *H. brasiliensis*: Thailand (Weir 1926, Seephueak et al. 2010)

***Aspergillus* spp.**

Associated with rubber tree seeds harvested of *H. brasiliensis*: Brazil (Theodoro & Batista

2014)

Asteroma coryli (Fuckel) B. Sutton, The Coelomycetes (Kew): 496 (1980)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Asteromella sp.
On *H. brasiliensis*: Myanmar (Thaung 2008)

Astrosphaeriella sp.
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Aureobasidium sp.
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Bactrodesmium betulicola M.B. Ellis, Mycol. Pap. 72: 13 (1959)
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Bactrodesmium longisporum M.B. Ellis, More Dematiaceous Hyphomycetes (Kew): 68 (1976)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Bactrodesmium pallidum M.B. Ellis, Mycol. Pap. 72: 11 (1959)
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Bactrodesmium sp.
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Bactrodesmium spilomeum (Berk. & Broome) E.W. Mason & S. Hughes, in Hughes, Can. J. Bot. 31(5): 616 (1953)
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Bactrodesmium rahmii
On decaying log of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Bagnisiella examinans (Berk.) Arx & E. Müll. 1975
On of *H. brasiliensis*: Myanmar as *Auerswaldia examinans* (Thaung 2008)

Balladyna vanderystii (Hansf.) Arx, in Müller & von Arx, Beitr. Kryptfl. Schweiz 11(no. 2): 186 (1962)
On leaf litter of *H. brasiliensis*: Thailand as *Balladynopsis vanderystii* (Seephueak et al. 2010)

Beltrania rhombica Penz., Nuovo G. bot. ital. 14(2): 72 (1882)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Beltrania santapau Piroz. & S.D. Patil, Can. J. Bot. 48(3): 570 (1970)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Beltraniella pirozynskii P.M. Kirk, Trans. Br. Mycol. Soc. 77(3): 457 (1981)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Beltraniella portoricensis (F. Stevens) Piroz. & S.D. Patil, Can. J. Bot. 48(3): 575 (1970)
On leaf and branch litter of *H. brasiliensis*: Thailand as *Ellisiopsis gallsiae* (Seephueak et

al. 2010)

Berkeleyomyces basicola (Berk. & Broome) W.J. Nel, Z.W. de Beer, T.A. Duong & M.J. Wingf., in Nel et al., Pl. Path. 67(4): 877 (2017)

On leaf litter of *H. brasiliensis*: Thailand as *Chalara elegans* (Seephueak et al. 2010)

Berkleasmiium concinnum (Berk.) S. Hughes, Can. J. Bot. 36: 740 (1958)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Berkleasmiium minutissimum (Peck) R.T. Moore, Mycologia 51(5): 736 (1961) [1959]

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Bipolaris cactivora (Petr.) Alcorn, Mycotaxon 17: 67 (1983)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Bidenticula cannae Deighton, Trans. Br. Mycol. Soc. 59(3): 425 (1972)

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Bipolaris cynodontis (Marignoni) Shoemaker, Can. J. Bot. 37(5): 883 (1959)

On leaves of *H. brasiliensis*: Thailand (Worapattamasri et al. 2009)

Bipolaris heveae (Petch) Arx, Beih. Nova Hedwigia 87: 288 (1987)

= *Drechslera heveae* (Petch) M.B. Ellis, Dematiaceous Hyphomycetes (Kew): 451 (1971) -

= *Helminthosporium heveae* Petch, Ann. R. bot. Gdns Peradeniya 3(1): 8 (1906)

Associated with leaf spot, bird's eye leaf spot especially in young nursery plants of *H. brasiliensis*: Andaman Islands, Brazil, Cambodia, China, Costa Rica, Cote d'Ivoire, Democratic Republic of the Congo, Dominican Republic, Florida, Ghana, Guinea, Guatemala, Haiti, Honduras, India, Indonesia, Malay Peninsula, Malaysia, Myanmar, Mexico, Nicaragua, Nigeria, Panama, Papua New Guinea, Philippines, Sri Lanka, Thailand, Viet Nam (Spaulding 1961, Zhuang 2001, Thaug 2008, Manamgoda et al. 2014)

Bipolaris sp.

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Biscogniauxia capnodes (Berk.) Y.M. Ju & J.D. Rogers, in Ju et al., Mycotaxon 66: 23 (1998)

On *H. brasiliensis*: Ghana as *Nummularia maxima* (Hughes 1953), Haiti as *Hypoxylon nummularium* var. *pseudopachyloma* (Benjamin & Slot 1969)

Biscogniauxia mediterranea (De Not.) Kuntze, Revis. gen. pl. (Leipzig) 2: 398 (1891)

On *H. brasiliensis*: Malaysia as *Nummularia repandoides* (Singh 1980)

Biscogniauxia sp.

Endophytic on living sapwood of *H. brasiliensis*: Peru (Gazis & Chaverri 2010)

Bispora antennata (Pers.) E.W. Mason, in Hughes, Can. J. Bot. 31(5): 582 (1953)

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Boerlagiomyces grandisporus S.J. Stanley & K.D. Hyde, Mycol. Res. 101(5): 635 (1997)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Botryodiplodia acerina Ellis & Everh., Proc. Acad. Nat. Sci. Philad. 45: 161 (1893)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

***Botryodiplodia* sp.**

On decaying rubber log and branch of *H. brasiliensis*: Brazil, Papua New Guinea, Thailand (Shaw 1984, Mendes et al. 1998, Seephueak et al. 2011)

Botryosphaeria plicatula (Berk. & Broome) S. Ahmad, Monogr. Biol. Soc. Pakistan 8: 11 (1979) [1978]

On *H. brasiliensis*: Ghana as *Phaeobotryosphaeria plicatula* (Hughes 1953)

***Botryosphaeria* sp.**

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Botryotinia fuckeliana (de Bary) Whetzel, Mycologia 37(6): 679 (1945)

On *H. brasiliensis*: Japan (Kobayashi 2007)

Botryotrichum piluliferum Sacc. & Marchal, in Marchal, Bull. Soc. R. Bot. Belg. 24(1): 66 (1885)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

***Botryotrichum* sp.**

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Brachiosphaera tropicalis Nawawi, in Descals et al., Trans. Br. Mycol. Soc. 67(2): 213 (1976)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Brachydesmiella biseptata G. Arnaud ex S. Hughes, Can. J. Bot. 39: 1095 (1961)

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Brachyhelicoon xylogenum G. Arnaud, Bull. Trimest. Soc. Mycol. Fr. 68: 209 (1952)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Brachysporiella gayana Bat., in Batista & Vital, Bol. Secr. Agric. (Pernambuco) 19(1-2): 109 (1952)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Brachysporiella laxa H.J. Huds. ex M.B. Ellis, Mycol. Pap. 125: 7 (1971)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Brachysporium britannicum S. Hughes, Naturalist: 48 (1951)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

***Brachysporium* sp.**

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Brachysporium dingleyae S. Hughes, N.Z. J. Bot. 3: 27 (1965)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Brevicollum hyalosporum Kaz. Tanaka & Toy. Sato, in Tanaka et al., Mycologia 109(4): 611 (2017)

On branches of *H. brasiliensis*: Thailand (Hyde et al. 2018, this study)

Broomella acuta Shoemaker & E. Müll., Can. J. Bot. 41: 1239 (1963)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

- Calonectria kyotensis* Terash., Trans. Mycol. Soc. Japan 8(3): 124 (1968)
On *H. brasiliensis*: China as *Cylindrocladium floridanum*, Malaysia (Liu 1977, Crous 2002)
- Calonectria reteaudii* (Bugnic.) C. Booth, Mycol. Pap. 104: 41 (1966)
Associated with leaf spot of *H. brasiliensis* as *Cylindrocladium quinqueseptatum*: China, Malaysia, Sri Lanka (Crous 2002, Jayasinghe et al. 2009)
- Calonectria morganii* Crous, Alfenas & M.J. Wingf., Mycol. Res. 97(6): 706 (1993)
On leaf and branch litter of *H. brasiliensis*: Thailand as *Cylindrocladium scoparium* (Seephueak et al. 2010, 2011)
- Calostilbe striispora* (Ellis & Everh.) Seaver, Mycologia 20(4): 248 (1928)
Associated with bark rot disease of *H. brasiliensis*: Ghana, The Republic of Trinidad and Tobago (Spaulding 1961)
- Camarosporidiella elongata* (Fr.) Wanas., Wijayaw. & K.D. Hyde, in Wanasinghe et al. Stud. Mycol. 87: 230 (2017)
On leaf litter of *H. brasiliensis*: Thailand as *Cucurbitaria elongata* (Seephueak et al. 2010)
- Camarosporium rosae* Grove, British Stem- and Leaf-Fungi (Coelomycetes) (Cambridge) 2: 362 (1937)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Camarosporium salicinum* Sacc., M. Rousseau & E. Bommer, Atti Inst. Veneto Sci. lett., ed Arti, Sér. 6 2: no. 13 (1884)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Camillea punctulata* (Berk. & Ravenel) Læssøe, J.D. Rogers & Whalley, Mycol. Res. 93(2): 143 (1989)
On *H. brasiliensis*: Malaysia as *Nummularia punctulata* (Singh 1980)
- Camposporium antennatum* Harkn., Bull. Calif. Acad. Sci. 1(no. 1): 37 (1884)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Camposporium cambrense* S. Hughes, Mycol. Pap. 36: 11 (1951)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Camposporium laundonii* M.B. Ellis, More Dematiaceous Hyphomycetes (Kew): 197 (1976)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Camposporium antennatum* Harkn., Bull. Calif. Acad. Sci. 1(no. 1): 37 (1884)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Camposporium cambrense* S. Hughes, Mycol. Pap. 36: 11 (1951)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Camposporium* sp.
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)
- Canalisporium exiguum* Goh & K.D. Hyde, in Goh et al., Can. J. Bot. 76(1): 145 (1998)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

- Canalisporium pallidum*** Goh, W.H. Ho & K.D. Hyde, in Goh et al., Can. J. Bot. 76(1): 148 (1998)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Capnodium* sp.**
On *H. brasiliensis*: Thailand (Giatgong 1980)
- Cephaliphora irregularis*** Thaxt., Bot. Gaz. 35: 158 (1903)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Cephalosporium* sp.**
On *H. brasiliensis*: Brazil, Malaysia (Mendes et al. 1998, Thompson & Johnston 1953)
- Ceratocystis fimbriata*** Ellis & Halst., Bull. New York Agricultural Experimental Station 76: 14 (1890)
= *Ceratostomella fimbriata* (Ellis & Halst.) J.A. Elliott, Phytopathology 13: 56 (1923)
= *Endoconidiophora fimbriata* (Ellis & Halst.) R.W. Davidson, J. Agric. Res., Washington 50: 800 (1935)
Associated with canker disease on bark and mouldy rot on tapping panels of *H. brasiliensis*: Brazil, Brunei Darussalam, Cambodia, Costa Rica, Ghana, Indonesia, Malay Peninsula, Malaysia, Mexico, Myanmar, Papua New Guinea, Thailand (Spaulding 1961, McGuire & Crandall 1967, Giatgong 1980, Valdetaro et al. 2015)
- Ceratosporella deviata*** Subram., Proc. Indian Acad. Sci., Pl. Sci. 46: 327 (1957)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Ceratosporella novae-zelandiae*** S. Hughes, N.Z. J. Bot. 9(2): 352 (1971)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Ceratosporium fuscescens*** Schwein., Trans. Am. phil. Soc., New Series 4(2): 300 (1832) [1834]
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Ceratosporium productum*** Petch, Ann. R. bot. Gdns Peradeniya 3(1): 9 (1906)
On dead branches of *H. brasiliensis*: Sri Lanka (Ellis 1971)
- Ceratophorum uncinatum*** (Peck & Clinton) Sacc., Syll. fung. (Abellini) 4: 396 (1886)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Ceratostomella* sp.**
On *H. brasiliensis*: Nigeria (West 1938)
- Cercospora achyranthina*** Thirum. & Chupp, Mycologia 40(3): 352 (1948)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Cercospora apii*** Fresen., Beitr. Mykol. 3: 91 (1863)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Cercospora canescens*** Ellis & G. Martin, Am. Nat. 16(12): 1003 (1882)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Cercospora dioscoreae-pyrifoliae*** J.M. Yen, Bull. Trimest. Soc. Mycol. Fr. 84: 6 (1968)
Associated with leaf spots diseases of *H. brasiliensis*: Thailand (this study)

***Cercospora* sp.**

On *H. brasiliensis*: Malay Peninsula, Thailand (Thompson & Johnston 1953, Seephueak et al. 2010)

***Cercospora* spp.**

Associated with rubber tree seeds harvested of *H. brasiliensis*: Brazil (Theodoro & Batista 2014)

Ceriospora polygonacearum (Petr.) Piroz. & Morgan-Jones, Trans. Br. Mycol. Soc. 51(2): 189 (1968)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

***Chaetochalara* sp.**

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Chaetoconidium arachnoideum Zukal, Verh. zool.-bot. Ges. Wien 37: 45 (1887)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Chaetomium globosum Kunze, Mykologische Hefte (Leipzig) 1: 16 (1817)

Associated with black root disease on rubber tree seedlings of *H. brasiliensis*: China (Jiang et al. 2019)

***Chaetomium* sp.**

On *H. brasiliensis*: China, Thailand on leaf and branch litter (Seephueak et al. 2010, 2011, Jiang et al. 2019)

***Chaetomium* spp.**

Associated with rubber tree seeds harvested of *H. brasiliensis*: Brazil (Theodoro & Batista 2014)

***Chaetopsina* sp.**

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Chaetopsis grisea (Ehrenb.) Sacc., Michelia 2(no. 8): 640 (1882)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Chaetothyrium annonicola Hansf., Mycol. Pap. 15: 149 (1946)

On *H. brasiliensis*: Malaysia as *Phaeochaetia annonicola* (Turner 1971)

Chaetothyrium javanicum (Zimm.) Boedijn, Bull. Jard. Bot. Buitenz, 3 Sér. 11(2): 225 (1931)

On *H. brasiliensis*: Malaysia as *Phaeosaccardinula javanica* and *Limacinula javanica* (Thompson & Johnston 1953, Singh 1980)

Chaetothyria tenuissima (Petch) Arx, in Müller & von Arx 1962

On shoot and leaves of *H. brasiliensis* as *Chaetopeltopsis tenuissima*: Brazil, India, Malay Peninsula (Spaulding 1961)

Associated with black mildew on *H. brasiliensis* as *Asterina tenuissima*: India, Malaysia; on stems and fruit of *H. brasiliensis*: Sri Lanka (Willis 1906, Spaulding 1961)

Chalara cylindrosperma (Corda) S. Hughes, Can. J. Bot. 36: 747 (1958)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

- Chalara urceolata* Nag Raj & W.B. Kendr., in Nag Raj & Hughes, N.Z. J Bot. 12: 120 (1974)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Chalara* sp.
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)
- Chalaropsis* sp.
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Chryseidea africana* Onofri, in Onofri et al., Mycotaxon 13(2): 333 (1981)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Chuppia sarcinifera* Deighton, in Deighton & Pirozynski, Mycol. Pap. 101: 32 (1965)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Circinotrichum maculiforme* Nees, Syst. Pilze (Würzburg): 19 (1816) [1816-17]
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Circinotrichum poonense* Piroz. & S.D. Patil, Can. J. Bot. 48(3): 576 (1970)
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)
- Cirrenalia nigrospora* Somrith., Chatmala & E.B.G. Jones, Nova Hedwigia 75(3-4): 479 (2002)
On fallen pod and seed of *H. brasiliensis*: Thailand (Somrithipol et al. 2002)
- Cladophialophora chaetospora* (Grove) Crous & Arzanlou, in Crous et al., Stud. Mycol. 58: 187 (2007)
On leaf litter of *H. brasiliensis*: Thailand as *Heteroconium chaetospora* (Seephueak et al. 2010)
- Cladosporium acaciicola* M.B. Ellis, More Dematiaceous Hyphomycetes (Kew): 342 (1976)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Cladosporium balladynae* Deighton, Mycol. Pap. 118: 32 (1969)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Cladosporium cladosporioides* (Fresen.) G.A. de Vries, Contrib. Knowledge of the Genus Cladosporium Link ex Fries: 57 (1952)
Endophytic on living leaves and sapwoods of *H. brasiliensis*: Peru (Gazis & Chaverri 2010)
- Cladosporium gallicola* B. Sutton, Mycol. Pap. 132: 37 (1973)
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)
- Cladosporium nigrellum* Ellis & Everh., Proc. Acad. Nat. Sci. Philad. 45: 463 (1894) [1893]
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Cladosporium oxysporum* Berk. & M.A. Curtis, in Berkeley, J. Linn. Soc., Bot. 10(no. 46): 362 (1868) [1869]
On leaves of *H. brasiliensis*: Malaysia, Myanmar, Papua New Guinea, Thailand (Williams & Liu 1976, Thaug 2006, Shaw 1984, Seepheuk et al. 2010)
- Cladosporium orchidacearum* Cooke & Masee [as 'orchidearum'], Grevillea 16(no. 79): 80 (1888)

- On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Cladosporium tenuissimum*** Cooke, Grevillea 6(no. 40): 140 (1878)
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)
- Cladosporium uredinicola*** Speg., Anal. Mus. nac. Hist. Nat. B. Aires 23: 122 (1912)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Cladosporium* sp.**
On leaves and branch of *H. brasiliensis*: Malaysia, Thailand (Liu 1977, Seepheuk et al. 2010)
- Clasterosporium cocoicola*** M.B. Ellis, in Shaw & Ellis, Mycol. Pap. 72: 71 (1959)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Clasterosporium flagellatum*** (Syd. & P. Syd.) M.B. Ellis, Mycol. Pap. 70: 5 (1958)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Claussenomyces atrovirens*** (Pers.) Korf & Abawi, Can. J. Bot. 49(11): 1882 (1971)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Claussenomyces prasinulus*** (P. Karst.) Korf & Abawi, Can. J. Bot. 49: 1882 (1971)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Clavariopsis aquatica*** De Wild., Ann. Soc. Belge Microscop. 19: 201 (1895)
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Clavariopsis brachycladia*** Tubaki, Bull. Natn. Sci. Mus., Tokyo, N.S. 3: 255 (1957)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Clavatispora thailandica*** Boonmee & K.D. Hyde, in Boonmee, Bhat, Maharachchikumbura & Hyde, Phytotaxa 176(1): 96 (2014)
On dead twig of *H. brasiliensis*: Thailand (Huanraluek et al. 2020, this study)
- Clavatospora filiformis*** Nawawi, Trans. Br. Mycol. Soc. 61(2): 390 (1973)
On branch litter of *H. brasiliensis*: Thailand as *Nawawia filiformis* (Seephueak et al. 2011)
- Clonostachys rosea*** (Link) Schroers, Samuels, Seifert & W. Gams, Mycologia 91(2): 369 (1999)
On *H. brasiliensis* as *Gliocladium roseum*: Malaysia, Thailand (Seephueak et al. 2010, Williams & Liu 1976)
- Cochliobolus bicolor*** A.R. Paul & Parbery 1966
Associated with leaf spot of *H. brasiliensis*: China as *Bipolaris bicolor* (Liang et al. 2019)
- Cochliobolus heveicola*** Tsukib. & W.H. Chung, Mycoscience 46(1): 20 (2005)
Associated with bird 's eye leaf spot of *H. brasiliensis*: Thailand (Worapattamasri et al. 2009, Manamgoda et al. 2011)
- Cochliobolus geniculatus*** R.R. Nelson 1964
On leaves of *H. brasiliensis*: Malay Peninsula, Thailand as *Curvularia geniculata* (Thompson & Johnston 1953, Worapattamasri et al. 2009, Seephueak et al. 2010)
- Cochliobolus setariae*** (S. Ito & Kurib.) Drechsler ex Dastur 1942

Associated with leaf spot of *H. brasiliensis*: China as *Bipolaris setariae* (Liu et al. 2016b)

***Cochliobolus* sp.**

On leaves of *H. brasiliensis*: Myanmar, Peru (Thaung 2008, Manamgoda et al. 2011)

Codinaea assamica (Agnihotr.) S. Hughes & W.B. Kendr., N.Z. J Bot. 6: 334 (1968)

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

***Codinaea* sp.**

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Corallomycetella repens (Berk. & Broome) Rossman & Samuels, in Rossman et al., Stud. Mycol. 42: 113 (1999)

On *H. brasiliensis*: Malaysia, Myanmar as *Nectria mauritiicola* (Williams & Liu 1976, Thaung 2007)

Endophytic on living leaves and sapwood on *H. brasiliensis*: Peru (Gazis & Chaverri 2010)

Colletotrichum acutatum J.H. Simmonds, Queensland J. agric. Anim. Sci. 25: 178A (1968)

Associated with leaf diseases, anthracnose of *H. brasiliensis*: India, Indonesia, Sri Lanka Brown & Soepena 1994, Saha et al. 2002)

Colletotrichum annellatum Damm, P.F. Cannon & Crous, in Damm, Cannon, Woudenberg, Johnston, Weir, Tan, Shivas & Crous, Stud. Mycol. 73: 6 (2012)

On leaves of *H. brasiliensis*: Colombia (Damm et al. 2012a)

Colletotrichum australisinense X.B. Liu, Sci. Rep. 8 (10435): 5 (2018)

Associated with leaf diseases of *H. brasiliensis*: China (Liu et al. 2018b)

Colletotrichum bannaense X.B. Liu, Sci. Rep. 8(10435): 2 (2018)

Associated with leaf diseases of *H. brasiliensis*: China (Liu et al. 2018b)

Colletotrichum brachytrichum Delacr., Bull. Soc. Mycol. Fr. 21: 192 (1905)

On *H. brasiliensis*: Malaysia (Turner 1971)

Colletotrichum citri F. Huang, L. Cai, K.D. Hyde & Hong Y. Li, in Huang et al., Fungal Divers. 61(1): 69 (2013)

Associated with leaf diseases of *H. brasiliensis*: Sri Lanka (Hunupolagama et al. 2017)

Colletotrichum coccodes (Wallr.) S. Hughes, Can. J. Bot. 36: 754 (1958)

= *Gloeosporium alborubrum* Petch, Ann. R. bot. Gdns Peradeniya 3(1): 8 (1906)

On leaves of young plants and also leaves developing toward the latter part of the refoliation season and dieback of green stems and shoots of *H. brasiliensis*: China, Dominican Republic, Malay Peninsula, Myanmar, Sri Lanka, Thailand (Petch 1906, Thompson & Johnston 1953, Ciferri 1961, Tai 1979, Giatgong 1980, Liyanage 1985, Thaung 2008)

Colletotrichum coffeanum F. Noack, Z. PflKrankh. 11: 202 (1901)

On *H. brasiliensis*: Nigeria (West 1938)

Colletotrichum corchori Ikata & I. Tanaka [as 'corchorum'], Ann. phytopath. Soc. Japan 10: 148 (1940)

On *H. brasiliensis*: Malaysia (Singh 1980)

- Colletotrichum crassipes* (Speg.) Arx, Verh. K. ned. Akad. Wet., tweede sect. 51(3): 77 (1957)
On leaves of *H. brasiliensis*: Malaysia, Myanmar (Williams & Liu 1976, Thaung 2008)
- Colletotrichum dematium* (Pers.) Grove, J. Bot., Lond. 56: 341 (1918)
On leaves of *H. brasiliensis*: Malaysia, Thailand (Williams & Liu 1976, Seephueak et al. 2010)
- Colletotrichum derridis* Hoof, Ann. Phytopath. Soc. Japan 13(3-4): 8 (1949)
On leaves of *H. brasiliensis*: Malaysia (Johnston 1960)
- Colletotrichum falcatum* Went, Archiv, voor de Java Suekerrind 1: 265 (1893)
On *H. brasiliensis*: Fiji as *Glomerella tucumanensis* (Dingley et al. 1981)
- Colletotrichum ficus* Koord., Bot. Unters. Java 13: 19 (1907)
On *H. brasiliensis*: Malay Peninsula (Thompson & Johnston 1953)
- Colletotrichum fructi* (F. Stevens & J.G. Hall) Sacc. [as 'fructus'], in Saccardo & Trotter, Syll. fung. (Abellini) 22(2): 1201 (1913)
On leaf litter of *H. brasiliensis*: Thailand as *Volutella fructi* (Seephueak et al. 2010)
- Colletotrichum fructicola* Prihast., L. Cai & K.D. Hyde, in Prihastuti et al., Fungal Divers. 39: 96 (2009)
On leaves of *H. brasiliensis*: China (Liu et al. 2018b)
- Colletotrichum gloeosporioides* (Penz.) Penz. & Sacc., Atti Inst. Veneto Sci. lett., ed Arti, Sér. 6 2: 670 (1884)
= *Glomerella cingulata* (Stoneman) Spauld. & H. Schrenk, in Schrenk & Spaulding, Science, N.Y. 17: 751 (1903)
Associated with leaf spot, anthracnose diseases of *H. brasiliensis*: Brazil, Brunei Darussalam, Cambodia, China, Democratic Republic of the Congo, Costa Rica, Fiji, Florida, India, Indonesia, Japan, Malaysia, Mexico on seedling, Myanmar, Nigeria, Papua New Guinea, Peru, Philippines, Sierra Leone, Sri Lanka, Thailand, Uganda (Martin 1947, Spaulding 1961, Litzenberger et al. 1962, Mendes et al. 1998, Jayasinghe 1999b, Zhuang 2001, Saha et al. 2002, Thuang 2008, Seephueak et al. 2010)
- Colletotrichum heveae* Petch, Ann. R. bot. Gdns Peradeniya 3(1): 8 (1906)
Associated with anthracnose diseases on leaves of *H. brasiliensis*: Brazil, China, Democratic Republic of the Congo, Cote d'Ivoire, Dominican Republic, India, Malay Peninsula, Malaysia, Sri Lanka, Thailand (Thompson & Johnston 1953, Resplandy et al. 1954, Ciferri 1961, Spaulding 1961, Tai 1979, Giatgong 1980)
- Colletotrichum karsti* You L. Yang, Zuo Y. Liu, K.D. Hyde & L. Cai [as 'karstii'], in Yang et al., Cryptog. Mycol. 32(3): 241 (2011)
Associated with anthracnose diseases on leaves of *H. brasiliensis*: China (Cai et al. 2016)
- Colletotrichum laticiphilum* Damm, P.F. Cannon & Crous, in Damm, Cannon, Woudenberg, & Crous, Stud. Mycol. 73: 74 (2012)
Associated with leaf diseases of *H. brasiliensis*: China, Colombia, India, Sri Lanka (Damm et al. 2012b, Braganca et al. 2016, Jayawardena et al. 2016, Hunupolagama et al. 2017, Shi et al. 2019)
- Colletotrichum ledongense* X.B. Liu, Sci. Rep. 8(10435): 6 (2018)

Associated with leaf diseases of *H. brasiliensis*: China (Liu et al. 2018b)

Colletotrichum nymphaeae (Pass.) Aa, Net. J. Plant Pathol. Supplement 1 84(3): 110 (1978)

Associated with leaf diseases of *H. brasiliensis*: Sri Lanka (Hunupolagama et al. 2017)

Colletotrichum siamense Prihast., L. Cai & K.D. Hyde, in Prihastuti et al., Fungal Divers. 39: 98 (2009)

Associated with leaf diseases of *H. brasiliensis*: China (Liu et al. 2018b)

Colletotrichum simmondsii R.G. Shivas & Y.P. Tan, Fungal Divers. 39: 119 (2009)

Associated with leaf diseases of *H. brasiliensis*: India, Sri Lanka (Hunupolagama et al. 2017)

***Colletotrichum* sp.**

On *H. brasiliensis*: Australia, Brazil, Cambodia, China, Cote d'Ivoire, Fiji, Haiti, Malay Peninsula, Malaysia (Thompson & Johnston 1953, Litzenberger et al. 1962, Benjamin & Slot 1969, Williams & Liu 1976, Dingley et al. 1981, Nandris 1987, Mendes et al. 1998)

Colletotrichum truncatum (Schwein.) Andrus & W.D. Moore, Phytopathology 25: 121 (1935)

On *H. brasiliensis*: Malaysia (Thompson & Johnston 1953)

Colletotrichum wanningense X.R. Cao, H.Y. Che & D.Q. Luo, in Cao et al., Plant Dis. 103(1): 120 (2018)

Associated with anthracnose diseases of *H. brasiliensis*: China (Cao et al. 2019)

***Conioscypha* sp.**

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Coniothyrium heveae Saccas, Agronomía trop. 8(2): 195 (1953)

Associated with leaf spot of *H. brasiliensis*: Democratic Republic of the Congo (Spaulding 1961)

Cookeina garethjonesii Ekanayaka, Q. Zhao & K.D. Hyde, in Ekanayaka, Hyde & Zhao, Mycosphere 7(9): 1403 (2016)

Associated with *H. brasiliensis*: Thailand (Surawut et al. 2021)

Cookeina sulcipes (Berk.) Kuntze, Revis. gen. pl. (Leipzig) 2: 849 (1891)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011, Surawut et al. 2021)

Cookeina tricholoma (Mont.) Kuntze, Revis. gen. pl. (Leipzig) 2: 849 (1891)

Associated with *H. brasiliensis*: Thailand (Surawut et al. 2021)

Corallomycetella elegans (Berk. & M.A. Curtis) C.S. Herrera & P. Chaverri, Mycosystema 32(3): 533 (2013)

On *H. brasiliensis*: Brazil, Cote d'Ivoire, Liberia (Herrera et al. 2013)

Corallomycetella repens (Berk. & Broome) Rossman & Samuels, in Rossman et al., Stud. Mycol. 42: 113 (1999)

= *Sphaerostilbe repens* Berk. & Broome, J. Linn. Soc., Bot. 14(no. 74): 114 (1873) [1875] - (*Corallomycetella repens*)

Associated with root rot disease of *H. brasiliensis*: China, Democratic Republic of the Congo, Cote d'Ivoire, Fiji, Ghana, India, Indonesia, Malay Peninsula, Malaysia, Papua New Guinea, Sri

Lanka (Thompson & Johnston 1953, Spaulding 1961, Dingley et al. 1981, Nandris et al. 1987, Shaw 1984)

Cordana pauciseptata Preuss, *Linnaea* 24: 129 (1851)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Cordana terrestris (Timonin) Hern.-Restr., Gené & Guarro, in Hernández-Restrepo et al., *Mycologia* 106(4): 729 (2014)

On branch litter of *H. brasiliensis*: Thailand as *Pseudobotrytis terrestris* (Seephueak et al. 2011)

Cordella clarkii M.B. Ellis, *More Dematiaceous Hyphomycetes* (Kew): 478 (1976)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Corynespora cassicola (Berk. & M.A. Curtis) C.T. Wei, *Mycol. Pap.* 34: 5 (1950)

Associated with leaf spots and leaf fall of *H. brasiliensis*: Brazil, China, Florida, Ghana, Malaysia, Papua New Guinea, Sierra Leone, Nigeria, Indonesia, Brazil, Sri Lanka, Thailand, Cameroon (Mendes et al. 1998, Jacob 2006, Jinji et al. 2007; Seephueak et al. 2010, Hieu et al. 2014; Sumabat et al. 2018, this study)

Corynespora proliferata Loer., *Persoonia* 8(2): 220 (1975)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Corynespora trichiliae M.B. Ellis, *Mycol. Pap.* 76: 23 (1960)

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

***Corynespora* sp.**

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Corynesporopsis quercicola (Borowska) P.M. Kirk, *Trans. Br. Mycol. Soc.* 77(2): 284 (1981)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Coryneum elevatum (Riess) B. Sutton, *Mycol. Pap.* 138: 31 (1975)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Coryneum heveanum Senwanna, Cheewangkoon & K.D. Hyde, in Senwanna et al., *MycKeys* 43: 81 (2018)

Associated with canker disease on twigs of *H. brasiliensis*: Thailand (Senwanna et al. 2018a, this study)

***Coryneum* sp.**

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Cosmospora butyri (J.F.H. Beyma) Gräfenhan, Seifert & Schroers, in Gräfenhan, Schroers, Nirenberg & Seifert, *Stud. Mycol.* 68: 96 (2011)

On leaf litter of *H. brasiliensis*: Thailand as *Acremonium butyri* (Seephueak et al. 2010)

Crassiparies octosporarum Senwanna, Cheewangkoon & K.D. Hyde

On twigs of *H. brasiliensis*: Thailand (this study)

Crassiparies quadrisporus M. Matsum., K. Hiray. & Kaz. Tanaka, in Li et al., *Fungal Divers.* 78: 63 (2016)

On twigs of *H. brasiliensis*: Thailand (this study)

Cryptocoryneum condensatum (Wallr.) E.W. Mason & S. Hughes ex S. Hughes, Can. J. Bot. 36: 758 (1958)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Curvularia australiensis (Bugnic. ex M.B. Ellis) Manamgoda, L. Cai & K.D. Hyde, in Manamgoda et al., Fungal Divers. 56(1): 140 (2012)

On branch litter of *H. brasiliensis*: Thailand as *Bipolaris australiensis* (Seephueak et al. 2011)

Cryptospora heveae Saccas, J. Agric. Trop. Bot. Appl. 1: 186 (1954)

On dead branches of *H. brasiliensis*: French Equatorial Africa (Anonymous 1963)

Cryptovalsa microspora Sacc., Bulletino dell'orto Botanico della R. Università di Napoli 6: 46 (1921)

On *H. brasiliensis*: Malaysia (Singh 1980)

Curvularia affinis Boedijn, Bull. Jard. Bot. Buitenz, 3 Sér. 13(1): 130 (1933)

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Curvularia clavata B.L. Jain, Trans. Br. Mycol. Soc. 45(4): 542 (1962)

On leaves of *H. brasiliensis*: Thailand (Worapattamasri et al. 2009)

Curvularia deightonii M.B. Ellis, Mycol. Pap. 106: 3 (1966)

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Curvularia fallax Boedijn, Bull. Jard. Bot. Buitenz, 3 Sér. 13(1): 129 (1933)

On leaves of *H. brasiliensis*: Thailand (Worapattamasri et al. 2009)

Curvularia lunata (Wakker) Boedijn 1933

On leaves of *H. brasiliensis*: Nigeria, Malaysia as *Cochliobolus lunatus*, Thailand (Williams & Liu 1976, Seephueak et al. 2010)

Curvularia neoindica Manamgoda, Rossman & K.D. Hyde, in Manamgoda et al., Stud. Mycol. 79: 280 (2014)

On branch litter of *H. brasiliensis*: Thailand as *Bipolaris indica* (Seephueak et al. 2011)

Curvularia pallescens Boedijn, Bull. Jard. bot. Buitenz, 3 Sér. 13(1): 127 (1933)

= *Cochliobolus pallescens* (Tsuda & Ueyama) Sivan, Mycol. Pap. 158: 118 (1987)

On leaves of *H. brasiliensis*: Sri Lanka, Thailand (Jayasinghe 1999, Worapattamasri et al. 2009, Managoda et al. 2011)

Curvularia penniseti (Mitra) Boedijn, Bull. Jard. Bot. Buitenz, 3 Sér. 13(1): 128 (1933)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Curvularia ravenelii (M.A. Curtis ex Berk.) Manamgoda, L. Cai & K.D. Hyde, in Manamgoda et al., Fungal Divers. 56(1): 142 (2012)

On branch litter of *H. brasiliensis*: Thailand as *Bipolaris ravenelii* (Seephueak et al. 2011)

Curvularia richardiae Alcorn, Trans. Br. Mycol. Soc. 56(1): 155 (1971)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

- Curvularia senegalensis*** (Speg.) Subram., J. Indian Bot. Soc. 35(4): 467 (1956)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Curvularia uncinata*** Bugnic., Monogr. Cantharelloid Fungi 57: 72 (1950)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Curvularia* sp.**
On branches of *H. brasiliensis*: Myanmar, Thailand (Seepheuk et al. 2010, Thaung 2008)
- Curvularia* spp.**
Associated with rubber tree seeds harvested of *H. brasiliensis*: Brazil (Theodoro & Batista 2014)
- Cyathicula cyathoidea*** (Bull.) Thüm., Fungi austr. exsicc. 11-13: no. 1115 (1874)
On branch litter of *H. brasiliensis*: Thailand as *Cylindrocolla urticae* (Seephueak et al. 2011)
- Cylindrocladium parvum*** P.J. Anderson, Bull. Mass. agric. Experimental Station 183: 37 (1919)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Cylindrocladium* sp.**
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)
- Cylindrocarpon aquaticum*** (Sv. Nilsson) Marvanová & Descals, Trans. Br. Mycol. Soc. 89(4): 501 (1987)
On leaf litter of *H. brasiliensis*: Thailand as *Bacillispora aquatica* (Seephueak et al. 2010)
- Cylindrocarpon didymum*** (Harting) Wollenw., Fusaria autographica delineata 2: no. 650 (1924)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Cylindrotrichum oligospermum*** (Corda) Bonord., Handb. Allgem. Mykol. (Stuttgart): 88 (1851)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Cylindrotrichum* sp.**
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Cytospora diopuiensis*** Q.J. Shang, J.K. Liu & K.D. Hyde, in Shang et al., Mycosphere 11(1): 202 (2020)
On twig and dead branch of *H. brasiliensis*: Thailand (this study)
- Cytospora heveae*** Senwanna, Cheewangkoon & K.D. Hyde
Associated with canker disease on seedling stem of *H. brasiliensis* (this study)
- Cytospora thailandica*** Norph., T.C. Wen & K.D. Hyde, in Norphanphoun, Raspé, Jeewon, Wen & Hyde, MycoKeys 38: 106 (2018)
Associated with canker disease on twig of *H. brasiliensis* (this study)
- Cytosporina* sp.**
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Dactylaria acanthacearum*** (Cooke) de Hoog & Arx [as 'acanthearum'], Kavaka 1: 58 (1974) [1973]

On leaf and branch litter of *H. brasiliensis*: Thailand as *Scolecobasidium acanthacearum* (Seephueak et al. 2010)

Dactylaria obtriangularia Matsush., Icon. microfung. Matsush. lect. (Kobe): 51 (1975)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Dactylaria parvispora (Preuss) de Hoog & Arx, Kavaka 1: 58 (1974) [1973]

On leaf litter of *H. brasiliensis*: Thailand as *Pleurophragmium simplex* (Seephueak et al. 2010)

Dactylaria purpurella (Sacc.) Sacc., Michelia 2(no. 6): 20 (1880)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

***Dactylaria* sp.**

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Dactylella ellipsospora (Preuss) Grove, in Saccardo, Syll. fung. (Abellini) 4: 194 (1886)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

***Dactylella* sp.**

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Dactylellina ellipsospora (Preuss) M. Scholler, Hagedorn & A. Rubner, Sydowia 51(1): 110 (1999)

On leaf litter of *H. brasiliensis*: Thailand as *Dactylella ellipsospora* (Seephueak et al. 2010)

Daldinia caldariorum Henn., Verh. bot. Ver. Prov. Brandenb. 40: 158 (1898) [1899]

On *H. brasiliensis*: Cameroon, Central African Republic, Chad, Democratic Republic of the Congo, Republic of the, Gabon (Stadler et al. 2014)

Daldinia concentrica (Bolton) Ces. & De Not., Comm. Soc. crittog. Ital. 1(fasc. 4): 197 (1863)

Associated with mottled rot on bark or wood of *H. brasiliensis*: Brazil, India, Malaysia, Sri Lanka (Spaulding 1961)

Daldinia eschscholtzii (Ehrenb.: Fr.) Rehm, Anns EMycol. 2(2): 175. (1904)

On *H. brasiliensis*: Ghana, Singapore, Thailand on branch litter (Hughes 1952, Seephueak et al. 2011, Stadler et al. 2014, Surawut et al. 2021)

Dendrospora erecta Ingold, Trans. Br. Mycol. Soc. 26(3-4): 107 (1943)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Dendryphion comosum Wallr., Fl. Crypt. Germ. (Norimbergae) 2: 300 (1833)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Devriesia staurophora (W.B. Kendr.) Seifert & N.L. Nick., in Seifert et al., Can. J. Bot. 82(7): 919 (2004)

On leaf litter of *H. brasiliensis*: Thailand as *Cladosporium staurophorum* (Seephueak et al. 2010)

Diaporthe heveae Petch, Ann. R. bot. Gdns Peradeniya 3(1): 3 (1906)

On branches and leaves of *H. brasiliensis*: Brazil, Honduras, India, Srilanka (Petch 1906, McGuire & Crandall 1967, Gomes et al. 2013)

- Diaporthe heveicola*** Senwanna, Cheewangkoon & K.D. Hyde
On dead branches of *H. brasiliensis*: Thailand (this study)
- Diaporthe rosae*** Samarakoon & K.D. Hyde, in Wanasinghe et al., Fungal Divers. 89: 1–236. [185] (2018)
On dead branches of *H. brasiliensis*: Thailand (this study)
- Diatrypella heveae*** Senwanna, Phookamsak & K.D. Hyde, in Senwanna et al., Mycosphere 8(10): 1846 (2017)
On dead twig of *H. brasiliensis*: Thailand (Senwanna et al. 2017)
- Dichomera prunicola*** Ellis & Dearn., in Ellis & Everhart, Fungi Columb.: no. 2021 (1905)
On leaf litter of *H. brasiliensis*: Thailand as *Codinaea assamica* (Seephueak et al. 2010)
- Dicyma biophila*** (Cif.) Arx, Gen. Fungi Sporul. Cult., Edn 3 (Vaduz): 316 (1981)
On branch litter of *H. brasiliensis*: Thailand as *Hansfordia biophila* (Seephueak et al. 2011)
- Dicyma nebularis*** (Cooke & Ellis) Arx, Gen. Fungi Sporul. Cult., Edn 3 (Vaduz): 316 (1981)
On branch litter of *H. brasiliensis*: Thailand as *Hansfordia nebularis* (Seephueak et al. 2011)
- Dicyma ovalispora*** (S. Hughes) Arx, Gen. Fungi Sporul. Cult., Edn 3 (Vaduz): 316 (1981)
On branch litter of *H. brasiliensis*: Thailand as *Hansfordia ovalispora* (Seephueak et al. 2011)
- Dictyoarthrinium* sp.**
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Dictyochaeta assamica*** (Agnihotr.) Aramb., Cabello & Mengasc., Darwiniana 28: 297 (1988) [1987]
On leaf litter of *H. brasiliensis*: Thailand as *Codinaea assamica* (Seephueak et al. 2010)
- Dictyochaeta fertilis*** (S. Hughes & W.B. Kendr.) Hol.-Jech., Folia geobot. phytotax. 19(4): 426 (1984)
On leaf litter of *H. brasiliensis*: Thailand as *Codinaea fertilis* (Seephueak et al. 2010)
- Dictyochaeta hughesii*** (M.B. Ellis) Whitton, McKenzie & K.D. Hyde, Fungal Divers. 4: 140 (2000)
On leaf litter of *H. brasiliensis*: Thailand as *Codinaea hughesii* (Seephueak et al. 2010)
- Dictyocheirospora gigantea*** (Goh & K.D. Hyde) M.J. D'souza, Boonmee & K.D. Hyde, in Boonmee et al., Fungal Divers. 80: 469 (2016)
On branch litter of *H. brasiliensis*: Thailand as *Dictyosporium giganteum* (Seephueak et al. 2011)
- Dictyocheirospora heptaspora*** (Garov.) M.J. D'souza, Boonmee & K.D. Hyde, in Boonmee et al., Fungal Divers. 80: 469 (2016)
On leaf and branch litter of *H. brasiliensis*: Thailand as *Dictyosporium heptasporum* (Seephueak et al. 2010, 2011)
- Dictyosporium manglietiae*** Kodsueb & McKenzie, in Kodsueb et al., Cryptog. Mycol. 27(2): 113 (2006)
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

***Dictyosporium* sp.**

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Dicyma ovalispora (S. Hughes) Arx, Gen. Fungi Sporul. Cult., Edn 3 (Vaduz): 316 (1981)

On leaf litter of *H. brasiliensis*: Thailand as *Hansfordia ovalispora* (Seephueak et al. 2010)

Didymella heveana Saccas, Agronomía trop. 8: 229 (1953)

Associated with leaf spot *H. brasiliensis*: Democratic Republic of the Congo (Spaulding 1961)

Didymella oligospora Sacc., Bulletino dell'orto Botanico della R. Università di Napoli 6: 44 (1921)

In dead branch of *H. brasiliensis*: Malaysia, Singapore (Singh 1980, Petrak 1930)

***Didymella* sp.**

On seedling of *H. brasiliensis*: Mexico (Martin 1947)

***Didymosphaeria* sp.**

On *H. brasiliensis*: Malaysia (Turner 1971)

Diplocladiella scalaroides G. Arnaud ex M.B. Ellis, More Dematiaceous Hyphomycetes (Kew): 229 (1976)

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Diplococcium asperum Piroz., Mycol. Pap. 129: 14 (1972)

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Diplococcium clarkii M.B. Ellis, More Dematiaceous Hyphomycetes (Kew): 391 (1976)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Diplococcium lawrencei B. Sutton, Mycol. Pap. 132: 49 (1973)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

***Diplococcium* sp.**

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Diplococcium spicatum Grove, J. Bot., Lond. 23: 167 (1885)

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Diplodia rapax Masee, Bull. Misc. Inf., Kew: 3 (1910)

On living branches, roots and trunks of *H. brasiliensis*: Cuba, Singapore (Masee 1910, Arnold 1986)

Diplodia melaena Lév., Anns Sci. Nat., Bot., sér. 3 5: 292 (1846)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

***Diplodia* sp.**

On *H. brasiliensis*: Brazil, China, Mexico, Thailand (McGuire & Crandall 1967, Giatgong 1980, Mendes et al. 1998, Zhuang 2001)

Diplodia zaeae Van der Byl, (1916)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

- Diplodia zebrina*** Petch, Ann. R. bot. Gdns Peradeniya 3(1): 6 (1906)
On dead fruit of *H. brasiliensis*: SriLanka (Petch 1906)
- Diplodina* sp.**
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Discosia artocreas*** (Tode) Fr., Summa veg. Scand., Sectio Post. (Stockholm): 423 (1849)
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)
- Dothidotthia* sp.**
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)
- Dothiorella* sp.**
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)
- Drechslera ellisii*** Danquah, Trans. Br. Mycol. Soc. 64(3): 545 (1975)
On branch litter of *H. brasiliensis*: Thailand as *Bipolaris ellisii* (Seephueak et al. 2011)
- Drechslera* sp.**
On *H. brasiliensis*: Brazil (Mendes et al. 1998)
- Drepanopeziza brunnea*** (Ellis & Everh.) Rossman & W.C. Allen, in Rossman et al., Mycotaxon 132(4): 952 (2017)
On *H. brasiliensis*: Malaysia as *Gloeosporium brunneum* (Singh 1980)
- Dyfrolomyces sinensis*** Samarak., Tennakoon & K.D. Hyde, in Hyde et al., Mycosphere 9(2): 354 (2018)
On branch of *H. brasiliensis*: Thailand (this study)
- Ellisembia bambusae*** (M.B. Ellis) W.P. Wu, in Wu & Zhuang, Fungal Divers. Res. Ser. 15: 109 (2005)
On leaf litter of *H. brasiliensis*: Thailand as *Sporidesmium bambusae* (Seephueak et al. 2010)
- Ellisembia bambusicola*** (M.B. Ellis) J. Mena & G. Delgado, in Mena-Portales et al., Boln Soc. Micol. Madrid 25: 266 (2000)
On branch litter of *H. brasiliensis*: Thailand as *Sporidesmium bambusaicola* (Seephueak et al. 2011)
- Ellisembia dioscoreae*** (M.B. Ellis) Subram., Proc. Indian Natn Sci. Acad., Part B. Biol. Sci. 58(4): 183 (1992)
On leaf and branch litter of *H. brasiliensis*: Thailand as *Sporidesmium dioscoreae* (Seephueak et al. 2010, 2011)
- Ellisembia leptospora*** (Sacc. & Roum.) W.P. Wu, in Wu & Zhuang, Fungal Divers. Res. Ser. 15: 140 (2005)
On leaf and branch litter of *H. brasiliensis*: Thailand as *Sporidesmium leptosporum* (Seephueak et al. 2010, 2011)
- Ellisembia paravaginata*** McKenzie, Mycotaxon 56: 16 (1995)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Ellisembia repentioriunda*** Goh & K.D. Hyde, Fungal Divers. 3: 75 (1999)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

***Ellisiopsis* sp.**

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

***Ellisembia vaginata* McKenzie, Mycotaxon 56: 19 (1995)**

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

***Elsinoe heveae* Bitanc. & Jenkins, Archos Inst. biol., S. Paulo 23: 50 (1956)**

On leaves, petioles and shoots of *H. brasiliensis*: Brazil as *Sphaceloma heveae* (Anonymous 1963, Mendes et al. 1998)

***Endomelanconiopsis endophytica* E.I. Rojas & Samuels, in Rojas et al., Mycologia 100(5): 770 (2008)**

Endophytic on living sapwood of *H. brasiliensis*: Peru (Gazis & Chaverri 2010)

***Endomelanconiopsis microspora* (Verkley & Aa) E.I. Rojas & Samuels, in Rojas et al., Mycologia 100(5): 772 (2008)**

Endophytic on living leaves and sapwood of *H. brasiliensis*: Peru (Gazis & Chaverri 2010)

***Endophragmia* sp.**

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

***Endophragmiella bisbyi* B. Sutton ex P.M. Kirk, Index Fungorum 421: 1 (2019)**

On leaf and branch litter of *H. brasiliensis*: Thailand as *Endophragmia bisbyi* (Seephueak et al. 2010, 2011)

***Endophragmiella boewei* J.L. Crane ex S. Hughes, N.Z. JI Bot. 17(2): 147 (1979)**

On branch litter of *H. brasiliensis*: Thailand as *Endophragmia boewei* (Seephueak et al. 2011)

***Endophragmiella cesatii* (Mont.) S. Hughes, N.Z. JI Bot. 17(2): 148 (1979)**

On leaf and branch litter of *H. brasiliensis*: Thailand as *Endophragmia cesatii* (Seephueak et al. 2010)

***Endophragmiella lignicola* S. Hughes, N.Z. JI Bot. 17(2): 151 (1979)**

On branch litter of *H. brasiliensis*: Thailand as *Endophragmia boewei* (Seephueak et al. 2011)

***Endophragmiella pinicola* M.B. Ellis ex P.M. Kirk, Index Fungorum 421: 1 (2019)**

On branch litter of *H. brasiliensis*: Thailand as *Endophragmia pinicola* (Seephueak et al. 2011)

***Endophragmiella* sp.**

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

***Endophragmiella theobromae* M.B. Ellis, More Dematiaceous Hyphomycetes (Kew): 144 (1976)**

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

***Ephelis borealis* Ellis & Everh., J. Mycol. 1(7): 86 (1885)**

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

- Eriomyces heveae*** Huanraluek, Thambugala & K.D. Hyde, in Hyde et al., Fungal Divers. 100: 147 (2020)
On dead twigs of *H. brasiliensis*: Thailand (Hyde et al. 2020b)
- Erysiphe quercicola*** S. Takam. & U. Braun, in Takamatsu et al., Mycol. Res. 111(7): 819 (2007)
Associated with powdery mildew diseases of *H. brasiliensis*: Brazil, China, Japan, Malaysia, Sri Lanka, Thailand, Viet Nam (Liyanage et al. 2016, Tam et al. 2016, Nguyen et al. 2018, Takamatsu et al. 2018, Wu et al. 2019)
- Eupenicillium* sp.**
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)
- Eutypa caulivora*** Masee, Bull. Misc. Inf., Kew: 251 (1910)
On trunk of *H. brasiliensis*: Malaysia, Singapore (Masee 1910, Singh 1980)
- Eutypa erumpens*** Masee, Bull. Misc. Inf., Kew: 134 (1898)
On *H. brasiliensis*: Ghana (Dade 1940)
- Eutypa heveana*** Saccas, J. Agric. Trop. Bot. Appl. 1: 194 (1954)
On dead branches of *H. brasiliensis*: French Equatorial Africa Cote d'Ivoire (Anonymous 1963, Rappaz 1987)
- Eutypa ludibunda*** Sacc., *Michelia* 1(no. 1): 15 (1877)
On stems and branches, dead limbs of *H. brasiliensis* as *Eutypa ludibunda* var. *heveana*: Brazil, Singapore, Malaysia (Chipp 1920, Weir 1923, Petrak 1930, Singh 1980)
- Eutypella heveae*** H.S. Yates, Philipp. J. Sci., C, Bot. 13(6): 378 (1918)
On dead branches of *H. brasiliensis*: Cote d'Ivoire, Philippines (Saccardo 1928, Teodoro 1937, Rappaz 1987)
- Excipularia narsapurensis*** Subram., J. Indian Bot. Soc. 35(1): 56 (1956)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Exosporium monanthotaxis*** Piroz., Mycol. Pap. 129: 47 (1972)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Exserohilum rostratum*** (Drechsler) K.J. Leonard & Suggs, Mycologia 66(2): 290 (1974)
Associated with leaf spot of *H. brasiliensis*: China (Liu et al. 2016a)
- Fenestella heveana*** Saccas, J. Agric. Trop. Bot. Appl. 1: 198 (1954)
On dead branches of *H. brasiliensis*: French Equatorial Africa (Anonymous 1963)
- Fimetariella rabenhorstii*** (Niessl) N. Lundq., Bot. Notiser 117: 239 (1964)
Endophytic on living leaves of *H. brasiliensis*: Peru (Gazis & Chaverri 2010)
- Flabellospora amphibia*** (I.P. Price & P.H.B. Talbot) Descals, in Descals & Webster, Trans. Br. mycol. Soc. 78(3): 414 (1982)
On branch litter of *H. brasiliensis*: Thailand as *Tetracrium amphibium* (Seephueak et al. 2010)
- Fracchiaea heveae*** Senwana, Cheewangkoon & K.D. Hyde
On branch of *H. brasiliensis*: Thailand (this study)

- Fracchiaea hystricula*** (Berk. & Broome) Petch, Ann. R. Bot. Gdns Peradeniya 5(4): 290 (1912)
On *H. brasiliensis*: Ghana, Malaysia (Hughes 1953, Williams & Liu 1976)
- Fraseriella* sp.**
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Fulvia* sp.**
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Fusariella kansensis*** (Ellis & Barthol.) M.B. Ellis, More Dematiaceous Hyphomycetes (Kew): 459 (1976)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Fusariella sarniensis*** M.B. Ellis, More Dematiaceous Hyphomycetes (Kew): 460 (1976)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Fusariella* sp.**
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Fusarium bugnicourtii*** Brayford, Trans. Br. Mycol. Soc. 89(3): 350 (1987)
Associated with borer-damaged and dieback of *H. brasiliensis*: Malaysia (Brayford 1987, Aoki et al. 2018)
- Fusarium heveae*** Vincens, Bull. Soc. Path. vég. Fr. 2: 19 (1915)
On leaves of *H. brasiliensis*: Brazil (Saccardo 1931)
- Fusarium fujikuroi*** Nirenberg, Mitt. Biol. BundAnst. Ld- u. Forstw. 169: 32 (1976)
On leaf litter of *H. brasiliensis*: Thailand as *Fusarium moniliforme* (Seephueak et al. 2010)
- Fusarium incarnatum*** (Desm.) Sacc., Syll. Fung. (Abellini) 4: 712 (1886)
On *H. brasiliensis* as *Fusarium semitectum*: Malaysia, Thailand (Williams & Liu 1976, Seephueak et al. 2010)
- Fusarium oxysporum*** Schldt., Fl. Berol. (Berlin) 2: 139 (1824)
Associated with stem rot of *H. brasiliensis*: China, Malaysia (Williams & Liu 1976, Li et al. 2014)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Fusarium polyphialidicum*** Marasas, P.E. Nelson, Toussoun & P.S. van Wyk, Mycologia 78(4): 678 (1986)
Endophytic on living leaves of *H. brasiliensis*: Peru (Gazis & Chaverri 2010)
- Fusarium* sp.**
On *H. brasiliensis*: Brazil, China, Costa Rica, Malay Peninsula, Malaysia, Mexico, Papua New Guinea, Thailand (Thompson & Johnston 1953, McGuire Jr. & Crandall 1967, Shaw 1984, Mendes et al. 1998, Zhuang 2001, Seephueak et al. 2010, Na et al. 2018)
- Fusarium* spp.**
Associated with rubber tree seeds harvested of *H. brasiliensis*: Brazil, Sri Lanka (Jayasinghe 1999a, Theodoro & Batista 2014)

- Fusarium tuaranense*** T. Aoki, Kasson, S. Freeman, Geiser & O'Donnell, in Aoki et al., Mycologia 111(6): 926 (2019)
 From a beetle-damaged on *H. brasiliensis*, associated with dieback and canker diseases: Malaysia (Aoki et al. 2019)
- Fusarium tumidum*** Sherb., Phytopathology 18: 148 (1928)
 On *H. brasiliensis*: Malaysia (Williams & Liu 1976)
- Fusicladium orchidis*** (E.A. Ellis & M.B. Ellis) K. Schub. & U. Braun, Sydowia 56(2): 314 (2004)
 On leaf and branch litter of *H. brasiliensis*: Thailand as *Cladosporium orchidis* (Seephueak et al. 2010, 2011)
- Fusicladium britannicum*** (M.B. Ellis) U. Braun & K. Schub., Mycotaxon 103: 211 (2008)
 On branch litter of *H. brasiliensis*: Thailand as *Cladosporium britannicum* (Seephueak et al. 2011)
- Fusicladium* sp.**
 On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)
- Fusicoccum* sp.**
 On *H. brasiliensis*: Sri Lanka (Jayasinghe 1999a, b)
- Fusicolla aquaeductuum*** (Radlk. & Rabenh.) Gräfenhan, Seifert & Schroers, in Gräfenhan et al., Stud. Mycol. 68: 100 (2011)
 On branch litter of *H. brasiliensis*: Thailand as *Fusarium aquaeductuum* (Seephueak et al. 2011)
- Gaeumannomyces graminis*** (Sacc.) Arx & D.L. Olivier, Trans. Br. Mycol. Soc. 35(1): 32 (1952)
 On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)
- Geniculifera cystosporia*** (Dudd.) Rifai, Mycotaxon 2(2): 215 (1975)
 On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Gliomastix cerealis*** (P. Karst.) C.H. Dickinson, Mycol. Pap. 115: 19 (1968)
 On branch litter of *H. brasiliensis*: Thailand as *Acremonium cereale* (Seephueak et al. 2011)
- Gliomastix musicola*** (Speg.) C.H. Dickinson, Mycol. Pap. 115: 8 (1968)
 On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Gloeosporium heveae*** Petch, Ann. R. bot. Gdns Peradeniya 3(1): 8 (1906)
 On leaves of seedling and associated with dieback disease of *H. brasiliensis*: Cote d'Ivoire, Malaysia, Sri Lanka (Petch 1906, Saccardo 1913, Resplandy et al. 1954, Singh 1980)
- Gloeosporium* sp.**
 On *H. brasiliensis*: Cote d'Ivoire, Fiji, Mexico (Nandris et al. 1987, Dingley et al. 1981, Alvarez 1976)
- Gloniopsis leucaenae*** Jayasiri, E.B.G. Jones & K.D. Hyde, Mycosphere 10 (1): 16 (2019)
 On branch of *H. brasiliensis*: Thailand (this study)
- Gnomonia amoena*** (Nees & T. Nees) Fuckel, Jb. nassau. Ver. Naturk. 23-24: 120 (1870) [1869-70]

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

***Goidanichiella* sp.**

On branch litter of *H. brasiliensis*: Thailand as *Acremonium cereale* (Seephueak et al. 2011)

Graphium rhodophaeum Sacc. & Trotter, in Bresadola & Saccardo, Bull. Soc. R. Bot. Belg. 38(2): 166 (1899)

On *H. brasiliensis*: Ghana (Hughes 1952)

Guignardia heveae Syd. & P. Syd., Anns Mycol. 14(5): 360 (1916)

On leaves of *H. brasiliensis*: Dominican Republic, Malay Peninsula, Malaysia, Myanmar, Peru as endophytic on living sapwood of *H. brasiliensis*, Philippines, Sri Lanka (Ciferri 1929, Teodoro 1937, Thompson & Johnston 1953, Thaug 2008, Gazis & Chaverri 2010)

Guignardia heveicola Cif., Quad. Ist. Bot. Univ. Pavia 19: 224 (1961)

On leaves of *H. brasiliensis*: Dominican Republic (Ciferri 1961)

Gyrothrix circinata (Berk. & M.A. Curtis) S. Hughes, Can. J. Bot. 36: 771 (1958)

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Gyrothrix podosperma (Corda) Rabenh., Deutschl. Krypt.-Fl. (Leipzig) 1: 72 (1844)

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Hansfordia pulvinata (Berk. & M.A. Curtis) S. Hughes, Can. J. Bot. 36: 771 (1958)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Haplariopsis fagicola Oudem., Ned. kruidk. Archf, 3 sér. 2(4): 902 (1903)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

***Harknessia* sp.**

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

***Harpoglyphium* sp.**

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

***Harposporium* sp.**

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Haploglyphium mangiferae Deighton, in Cejp & Deighton, Mycol. Pap. 117: 8 (1969)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

***Helicomyces* sp.**

On branch litter of *H. brasiliensis*: Thailand as *Hansfordia ovalispora* (Seephueak et al. 2011)

Helicomyces roseus Link, Mag. Gesell. naturf. Freunde, Berlin 3(1-2): 21 (1809)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Helicorhoidion botryoideum (Cooke) S. Hughes, Can. J. Bot. 36: 773 (1958)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Helminthosporium phyllanthum Sacc. [as 'Helmisporium'], Atti Accad. Sci. Ven.-Trent.-Istr. 10: 91 (1917)

On leaf and branch litter of *H. brasiliensis*: Thailand as *Exosporium phyllanthum* (Seephueak et al. 2010)

***Helminthosporium* sp.**

On *H. brasiliensis*: Cote d'Ivoire, Fiji, Thailand on leaf litter (Dingley et al. 1981, Nandris et al. 1987, Seephueak et al. 2010)

***Helminthosporium* spp.**

Associated with rubber tree seeds harvested of *H. brasiliensis*: Brazil (Theodoro & Batista 2014)

Helminthosporium velutinum Link [as 'Helmisporium'], Mag. Gesell. Naturf. Freunde, Berlin 3(1-2): 10 (1809)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Hendersonia celtifolia Cooke, Nuovo G. bot. ital. 10: 22 (1878)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Hendersonia heveae Petch, Ann. R. bot. Gdns Peradeniya 7(4): 313 (1922)

On stems and fruits of *H. brasiliensis*: Sri Lanka (Petraik 1930, Saccardo 1972)

***Hendersonula* sp.**

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Henicospora coronata B. Sutton & P.M. Kirk, in Kirk & Sutton, Trans. Br. Mycol. Soc. 75(2): 249 (1980)

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Hermatomyces sphaericus (Sacc.) S. Hughes, Mycol. Pap. 50: 100 (1953)

On dried branch of *H. brasiliensis*: Thailand (this study)

Herpotrichia diffusa (Cooke) Ellis & Everh., N. Amer. Pyren. (Newfield): 158 (1892)

On twig of *H. brasiliensis*: Ghana as *Neopeckia diffusa* (Hughes 1953)

***Heteroconium* sp.**

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Heteropatella alpina (Ellis & Everh.) W.B. Cooke, Mycologia 31(1): 48 (1939)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Hirudinaria macrospora Ces., in Rabenhorst, Klotzschii Herb. Viv. Mycol., Edn Nov, Ser. Sec., Cent. 3: no. 269 (1856)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Hormiactis alba Preuss, Linnaea 24: 128 (1851)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Hormiactis candida Höhn., Centbl. Bakt. ParasitKde, Abt. II 60: 20 (1923) [1924]

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

***Hormiactis* sp.**

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

***Hyalotiella* sp.**

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Hymenoscyphus tetracladius Abdullah, Descals & J. Webster, Trans. Br. Mycol. Soc. 77(3): 477 (1981)

On branch litter of *H. brasiliensis*: Thailand as *Articulospora tetracladia* (Seephueak et al. 2011)

Hyphodiscosia jaipurensis Lodha & K.R.C. Reddy, Trans. Br. Mycol. Soc. 62(2): 421 (1974)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Hypocrea splendens W. Phillips & Plowr., Grevillea 13(no. 67): 79 (1885)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Hypoxylon deustum (Hoffm.) Grev., Scott. Crypt. fl. (Edinburgh) 6: 324 (1828)

On *H. brasiliensis*: China, Fiji (Tai 1979, Dingley et al. 1981)

Hypoxylon lenormandii Berk. & M.A. Curtis [as 'lenormandi'], in Berkeley, J. Linn. Soc., Bot. 10(no. 46): 385 (1868) [1869]

On dead branch of *H. brasiliensis*: Malaysia as *Hypoxylon oodes* (Singh 1980)

Hypoxylon notatum Berk. & M.A. Curtis, in Berkeley, Grevillea 4(no. 30): 50 (1875)

On *H. brasiliensis*: India (Pande 2008)

Hypoxylon placentiforme Berk. & M.A. Curtis, in Berkeley, J. Linn. Soc., Bot. 10(no. 46): 383 (1868) [1869]

On *H. brasiliensis*: Ghana (Hughes 1953)

Hypoxylon rubiginosum (Pers.) Fr., Summa veg. Scand., Sectio Post. (Stockholm): 384 (1849)

On *H. brasiliensis*: Brunei Darussalam, Dominican Republic, Ghana, Haiti (Hughes 1953, Ciferri 1961, Benjamin & Slot 1969, Peregrine & Ahmad 1982)

***Hypoxylon* sp.**

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Hypoxylon suborbiculare Welw. & Curr., Trans. Linn. Soc. London 26(1): 281 (1868) [1870]

On *H. brasiliensis*: Ghana (Dade 1940)

Hysterium heveanum Sacc., Bulletino dell'orto Botanico della R. Università di Napoli 6: 53 (1921)

On decaying branches of *H. brasiliensis*: Singapore, Malaysia (Petraik 1930, Singhe 1980)

Hysterostegiella dumeti (Sacc. & Speg.) B. Hein, Nova Hedwigia 38: 690 (1983)

On branch litter of *H. brasiliensis*: Thailand as *Stegopeziza dumeti* (Seephueak et al. 2011)

Idriella lunata P.E. Nelson & S. Wilh., Mycologia 48(4): 550 (1956)

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

***Idriella* sp.**

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

- Irenopsis vincensii*** Pinho & O.L. Pereira, in Pinho et al., Trop. Plant Pathol. 39(1): 90 (2014)
 = *Irenopsis heveae* Hansf., Beih. Sydowia 2: 207 (1961)
 = *Meliola heveae* Vincens, Bull. Soc. Path. vég. Fr. 2: 26 (1915)
 Associated with black mildew on leaves of *H. brasiliensis*: Brazil, Peru, Amazon Rainforest (Vincens 1915, Hansford 1961, Pinho et al. 2014)
- Jackrogersella cohaerens*** (Pers.) L. Wendt, Kuhnert & M. Stadler, in Wendt et al., Mycol. Progr. 17 (1–2): 141 (2017)
 On leaf litter of *H. brasiliensis*: Thailand as *Hypoxylon cohaerens* (Seephueak et al. 2010)
- Kirschsteiniothelia atra*** (Corda) D. Hawksw., in Wijayawardene et al., Fungal Divers. 69: 37 (2014)
 On leaf litter of *H. brasiliensis*: Thailand as *Dendryphiopsis atra* (Seephueak et al. 2010)
- Kirschsteiniothelia* sp.**
 On leaves of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Kramasamuha* sp.**
 On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Kretzschmaria cetrarioides*** (Welw. & Curr.) Sacc., Syll. fung. (Abellini) 2: XXIX (1883)
 On *H. brasiliensis*: Ghana, Malaysia as *Kretzschmaria botrites* (Dade 1940, Singh 1980)
- Kretzschmaria micropus*** (Fr.) Sacc., Syll. fung. (Abellini) 1: 389 (1882)
 On *H. brasiliensis*: Ghana (Dade 1940)
- Kretzschmaria zonata*** (Lév.) P.M.D. Martin, JI S. Afr. Bot. 42(1): 75 (1976)
 = *Ustulina zonata* (Lév.) Sacc., Syll. fung. (Abellini) 1: 352 (1882)
 On *H. brasiliensis*: Ghana, Malay Peninsula, Mexico, Myanmar on root tissue, Nigeria, Sierra Leone, Thailand (Deighton 1936, West 1938, Dade 1940, Thompson & Johnston 1953, Alvarez 1976, Giatgong 1980, Thaug 2007)
- Lasiodiplodia chinensis*** Z.P. Dou & Y. Zhang ter, in Dou et al., Mycosphere 8(2): 528 (2017)
 On branches of *H. brasiliensis*: China (Dou et al. 2017)
- Lasiodiplodia pseudotheobromae*** A.J.L. Phillips, A. Alves & Crous, Fungal Divers. 28: 8 (2008)
 Associated with canker diseases, on asymptomatic and symptomatic leaves, stems and twigs of *H. brasiliensis*: China, Thailand, on seed cover of *H. brasiliensis* (Trakunyingcharoen et al. 2015a, Wu et al. 2019, this study)
- Lasiodiplodia theobromae*** (Pat.) Griffon & Maubl., Bulletin de la Société Mycologique de France 25: 57 (1909)
 = *Botryodiplodia elasticae* Petch, Ann. R. bot. Gdns Peradeniya 3(1): 7 (1906)
 = *Botryodiplodia theobromae* Pat., in Patouillard & Lagerheim, Bull. Soc. Mycol. Fr. 8(3): 136 (1892)
 = *Chaetodiplodia grisea* Petch, Ann. R. Bot. Gdns Peradeniya 3(1): 6 (1906)
 = *Diplodia theobromae* (Pat.) W. Nowell, Diseases of Crop Plants in the Lesser Antilles: 158 (1923)
 = *Phyalospora rhodina* Berk. & M.A. Curtis, Grevillea 17(no. 84): 92 (1889)
 Associated with canker and dieback diseases on stem, twigs and branches, dead seedling, dried petiole, root rot diseases of seedling and endophytic fungi on *H. brasiliensis*: Brazil, China, Democratic Republic of the Congo, Costa Rica, Fiji, Haiti, Ghana, Honduras, India, Indonesia,

Malay Peninsula, Malaysia, Mexico, Myanmar, Nigeria, Papua New Guinea, Philippines, Sri Lanka, Thailand, Uganda (Petch 1906, West 1938, Thompson & Johnston 1953, Benjamin & Slot 1969, Turner 1971, Firman 1972, Williams & Liu 1976, Mathur 1979, Giatgong 1980, Shaw 1984, Mendes et al. 1998, Seephueak et al. 2010, 2011, Ghazali 2013, Picos-Muñoz et al. 2015, this study)

Lateriramulosa uniinflata Matsush., Microfungi of the Solomon Islands and Papua-New Guinea (Osaka): 34 (1971)

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Lauriomyces sakaeratensis Somrith., Kosol & E.B.G. Jones, Nova Hedwigia 82(1-2): 210 (2006)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Lembosia glonioidea Sacc., Bulletino dell'orto Botanico della R. Università di Napoli 6: 53 (1921)

On *H. brasiliensis*: Malaysia (Singh 1980)

Lemonniera terrestris Tubaki, J. Hattori bot. Lab. 20: 165 (1958)

On branch litter of *H. brasiliensis*: Thailand as *Lemonniera brachycladian* (Seephueak et al. 2011)

Leptodiscella africana (Papendorf) Papendorf, Trans. Br. Mycol. Soc. 53(1): 146 (1969)

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Leptosphaeria blumeri E. Müll., Sydowia 4(1-6): 275 (1950)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Leptosphaeria cercocarpi Syd. & P. Syd., Ann. Mycol. 5(4): 339 (1907)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Leptosphaeria darkeri Shoemaker, Can. J. Bot. 62(12): 2699 (1985) [1984]

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Leptosphaeria doliolum (Pers.) Ces. & De Not., Comm. Soc. crittog. Ital. 1(fasc. 4): 234 (1863)

On branch litter of *H. brasiliensis*: Thailand as *Leptosphaeria conoidea* (Seephueak et al. 2011)

Leptosphaeria heveae Saccas, Agronomía Trop. 8: 244 (1953)

Associated with leaf spot of *H. brasiliensis*: Democratic Republic of the Congo (Spaulding 1961, Anonymous 1963)

Leptosphaeria millefolii (Fuckel) Sacc., Syll. Fung. (Abellini) 2: 45 (1883)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Leptosphaeria russellii Shoemaker, Can. J. Bot. 62(12): 2711 (1985) [1984]

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Leptosphaerulina trifolii (Rostr.) Petr., Sydowia 13(1-6): 76 (1959)

On *H. brasiliensis*: Malaysia as *Pseudoplea trifolii* (Williams & Liu 1976)

Libertella heveae (Petch) B. Sutton, The Coelomycetes (Kew): 221 (1980)

In crack of branches of *H. brasiliensis*: Sri Lanka as *Phlyctema heveae* (Saccardo 1931)

***Linocarpon* sp.**

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Linodochium hyalinum (Lib.) Höhn., Sber. Akad. Wiss. Wien, Math.-naturw. Kl., Abt. 1 118: 1239 (1909)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

***Linospora* sp.**

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Lophiostoma semiliberum (Desm.) Ces. & De Not., Comm. Soc. crittog. Ital. 1(fasc. 4): 220 (1863)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Lophiostoma viridarium Cooke, Trans. Bot. Soc. Edinb. 9: 328 (1868)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

***Lophodermium* sp.**

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Macgarvieomyces juncicola (MacGarvie) Klaubauf, M.-H. Lebrun & Crous, in Klaubauf et al., Stud. Mycol. 79: 107 (2014)

On leaf and branch litter of *H. brasiliensis*: Thailand as *Dactylaria junci* (Seephueak et al. 2010)

Mariannaea elegans (Corda) Samson, Stud. Mycol. 6: 75 (1974)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Macrophomina phaseolina (Tassi) Goid., Annali Sper. Agr., N.S. 1(3): 457 (1947)

= *Macrophomina phaseoli* (Maubl.) S.F. Ashby, Trans. Br. Mycol. Soc. 12(2-3): 145 (1927)

= *Rhizoctonia bataticola* (Taubenh.) E.J. Butler, in Britton-Jones, Bull. Minist. Agric. Egypt, Bot. Sect. 49: 65 (1925)

Associated with root rot diseases on root and stems of *H. brasiliensis*: India, Indonesia, Malay Peninsula, Malaysia, Sri Lanka, Uganda (Small 1928, Thompson & Johnston 1953, Spaulding 1961)

***Macrophomina* sp.**

On *H. brasiliensis*: Thailand (Giatgong 1980)

***Massariothea* sp.**

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Mastigosporium rubricosum (Dearn. & Barthol.) Nannf., in Lundell & Nannfeldt, Fungi Exsiccati Suecici: no. 876a (1939)

On leaf litter of *H. brasiliensis*: Thailand as *Fusoma rubricosum* (Seephueak et al. 2010)

Melomastia heveae Saccas, J. Agric. Trop. Bot. Appl. 1: 343 (1954)

On moribund branches and trunks of *H. brasiliensis*: French Equatorial Africa (Anonymous 1963)

Memnoniella oenantes (M.B. Ellis) L. Lombard & Crous, in Lombard, Houbraken, Decock, Samson, Meijer, Réblová, Groenewald & Crous, Persoonia 36: 199 (2016)

On branch litter of *H. brasiliensis*: Thailand as *Stachybotrys oenanthos* (Seephueak et al. 2011)

***Menispora* sp.**

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

***Menisporopsis profusa* Piroz. & Hodges, Can. J. Bot. 51(1): 164 (1973)**

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

***Menisporopsis theobromae* S. Hughes, Mycol. Pap. 48: 59 (1952)**

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

***Metacapnodium dennisii* S. Hughes, Kew Bull. 31(3): 573 (1977)**

On leaves of *H. brasiliensis*: Malaysia (Sivanesan 1984, Anonymous 1977)

***Micropeltis heveae* Bat. & Peres, Publicações. Instituto de Micologia da Universidade do Recife & Instituto Nacional de Pesquisas 386: 59 (1963)**

On leaves of *H. brasiliensis*: Brazil (Anonymous 1968)

***Microthyrium fagi* J.P. Ellis, Trans. Br. Mycol. Soc. 67(3): 387 (1977) [1976]**

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

***Monacrosporium* sp.**

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

***Monilinia* sp.**

On *H. brasiliensis*: Thailand (Giatgong 1980)

***Miladina lecithina* (Cooke) Svrček [as 'lechithina'], Česká Mykol. 26(4): 214 (1972)**

On branch litter of *H. brasiliensis*: Thailand as *Actinospora megalospora* (Seephueak et al. 2011)

***Minimelanolocus hughesii* (M.B. Ellis) R.F. Castañeda & Heredia, in Castañeda Ruiz, Heredia, Reyes, Arias & Decock, Cryptog. Mycol. 22(1): 9 (2001)**

On leaf and branch litter of *H. brasiliensis*: Thailand as *Pseudospiropes hughesii* (Seephueak et al. 2010, 2011)

***Minimelanolocus rousselianus* (Mont.) R.F. Castañeda & Heredia, in Castañeda Ruiz, Heredia, Reyes, Arias & Decock, Cryptog. Mycol. 22(1): 10 (2001)**

On branch litter of *H. brasiliensis*: Thailand as *Pseudospiropes rousselianus* (Seephueak et al. 2011)

***Minimelanolocus subulifer* (Corda) R.F. Castañeda & Heredia [as 'subuliferus'], in Castañeda Ruiz, Heredia, Reyes, Arias & Decock, Cryptog. Mycol. 22(1): 9 (2001)**

On branch litter of *H. brasiliensis*: Thailand as *Pseudospiropes subuliferus* (Seephueak et al. 2011)

***Monochaetia* sp.**

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

***Monodictys cerebriiformis* G.Z. Zhao & T.Y. Zhang, Mycosystema 23(3): 325 (2004)**

On dead wood of *H. brasiliensis*: China (Zhao & Zhang 2004)

- Monodictys glauca* (Cooke & Harkn.) S. Hughes, Can. J. Bot. 36: 785 (1958)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Monodictys nigriglobulosa* G.Z. Zhao & T.Y. Zhang, Mycosystema 26(3): 328 (2007)
On *H. brasiliensis*: China (Tianyu 2009)
- Montagnula thailandica* Mapook & K.D. Hyde, in Mapook et al., Fungal Divers. 101: 35 (2020)
On dried twig of *H. brasiliensis*: Thailand (this study)
- Muscodor heveae* Siri-Udom & Lumyong, Ann. Microbiol. 66(1): 437 (2015)
Isolated from *H. brasiliensis*: Thailand (Siri-udom et al. 2015)
- Muyocopron dipterocarpi* Mapook, Boonmee & K.D. Hyde, in Mapook et al., Phytotaxa 265(3): 232 (2016)
On twig of *H. brasiliensis*: Thailand (Senwanna et al. 2019)
- Muyocopron Garethjonesii* Tibpromma, Karun. & K.D. Hyde, in Tibpromma et al., Mycosphere 7(9): 1485 (2016)
On twig of *H. brasiliensis*: Thailand (this study)
- Muyocopron heveae* Senwanna & K.D. Hyde, in Senwanna et al., Mycol. Progr. 18(5): 747 (2019)
On twig of *H. brasiliensis*: Thailand (Senwanna et al. 2019)
- Muyocopron sahnii* Hern.-Restr. & Crous, in Hernández-Restrepo et al., Persoonia 42: 219 (2019)
On branch litter of *H. brasiliensis*: Thailand as *Mycoleptodiscus indicus* (Seephueak et al. 2011)
- Mycosphaerella heveana* (Sacc.) M. Morelet, Ann. Soc. Sci. Nat. Arch. Toulon et du Var 20: 105 (1968)
On leaves of *H. brasiliensis*: Singapore, Mauritius as *Sphaerella heveana* (Petraik 1930, Orioux and Felix 1968)
- Mycosphaerella heveicola* Saccas [as 'hevicola'], Agronomía Trop. 8: 247 (1953)
Associated with leaf spot of *H. brasiliensis*: China, Democratic Republic of the Congo (Spaulding 1961)
- Mystrosporiella litseae* Munjal & Kulshr., Mycopath. Mycol. Appl. 39: 357 (1969)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Myxocyclus* sp.
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Nectria cinnabarina* (Tode) Fr., Summa veg. Scand., Sectio Post. (Stockholm): 388 (1849)
On leaf litter of *H. brasiliensis*: Thailand as *Tubercularia vulgaris* (Seephueak et al. 2010)
- Nectria diversispora* Petch, Ann. R. bot. Gdns Peradeniya 3(1): 4 (1906)
On dead bark of *H. brasiliensis*: Sri Lanka, Myanmar (Petch 1906, Thaug 2007)
- Nectria pseudotrichia* Berk. & M.A. Curtis, J. Acad. nat. Sci. Philad., N.S. 2(6): 289 (1854) [1853]
= *Megalonectria pseudotrichia* (Schwein.) Speng., Anal. Soc. Cient. Argent. 12(5): 217 (1881)
= *Thyronectria pseudotrichia* (Schwein.) Seeler, J. Arnold Arbor. 21: 438 (1940)

On bark of *H. brasiliensis*: Fiji, Philippines, Ghana, Indonesia, Singapore, Thailand on branch litter (Reinking 1919, Firman 1972, Seifert 1985, Hirooka et al. 2012, Seephueak et al. 2011)

On dead branch of *H. brasiliensis*: Thailand (this study)

***Nectria* sp.**

On *H. brasiliensis*: Ghana (Dade 1940)

Neocosmospora solani (Mart.) L. Lombard & Crous, in Lombard et al., Stud. Mycol. 80: 228 (2015)

= *Fusarium solani* (Mart.) Sacc., Michelia 2(no. 7): 296 (1881)

= *Fusarium javanicum* Koord., Verh. K. Akad. Wet., tweede sect. 13(4): 247 (1907)

= *Nectria haematococca* Berk. & Broome, J. Linn. Soc., Bot. 14(no. 74): 116 (1873) [1875]

Associated with root lesion, gummosis, witling and death of *H. brasiliensis*: China, India, Malaysia, Sri Lanka, Thailand, Papua New Guinea (Williams & Liu 1976, Liyanage & Dantanarayana 1983, Shaw 1984, Zhuang 2001, Seephueak et al. 2010, Huang et al. 2016, Spaulding 1961)

Neofusicoccum parvum (Pennycook & Samuels) Crous, Slippers & A.J.L. Phillips, in Crous et al., Stud. Mycol. 55: 248 (2006)

Associated with leaf spot of *H. brasiliensis*: China (Liu et al. 2017)

Neofusicoccum mangiferae (Syd. & P. Syd.) Crous, Slippers & A.J.L. Phillips, in Crous et al., Stud. Mycol. 55: 248 (2006)

Associated with foot canker and sudden wilt on seedling of *H. brasiliensis*: Sri Lanka as *Nattrassia mangiferae* (Jayasinghe and Silva 1994)

Neofusicoccum ribis (Slippers, Crous & M.J. Wingf.) Crous, Slippers & A.J.L. Phillips, in Crous et al., Stud. Mycol. 55: 249 (2006)

Associated with leaf blight of *H. brasiliensis*: Malaysia (Nyaka Ngobisa et al. 2013)

Neonectria coccinea (Pers.) Rossman & Samuels, in Rossman et al., Stud. Mycol. 42: 158 (1999)

On *H. brasiliensis*: Malaysia as *Nectria coccinea* (Singh 1980)

Neolinocarpon phayaoense Senwanna, & K.D. Hyde, in Senwanna et al., Phytotaxa 362(1): 79 (2018)

On branch of *H. brasiliensis*: Thailand (Senwanna et al. 2018b)

Neopestalotiopsis cubana Maharachch., K.D. Hyde & Crous, in Maharachchikumbura et al., Stud. Mycol. 79: 138 (2014)

Associated with leaf fall disease of *H. brasiliensis*: Thailand (Pornsuriya et al. 2020)

Neopestalotiopsis formicidarum Maharachch., K.D. Hyde & Crous [as ‘formicarum’], in Maharachchikumbura et al., Stud. Mycol. 79: 140 (2014)

Associated with leaf fall disease of *H. brasiliensis*: Thailand (Pornsuriya et al. 2020)

Neopseudocercospora zambiensis (Deighton) Crous & U. Braun, in Braun et al., IMA Fungus 5(2): 204 (2014)

On branch litter of *H. brasiliensis*: Thailand as *Sporidesmium zambiensis* (Seephueak et al. 2011)

- Neorousoella heveae*** Senwanna, Phookamsak & K.D. Hyde, in Phookamsak et al., Fungal Divers. 95: 66 (2019)
On twigs of *H. brasiliensis*: Thailand (Phookamsak et al. 2019)
- Neorousoella leucaenae*** Jayasiri, E.B.G. Jones & K.D. Hyde, Mycosphere 10(1): 1–186 (2019)
On dead twigs of *H. brasiliensis*: Thailand (Phookamsak et al. 2019)
- Neoscytalidium dimidiatum*** (Penz.) Crous & Slippers, in Crous et al., Stud. Mycol. 55: 244 (2006)
On *H. brasiliensis*: Malaysia as *Hendersonula toruloidea* (Singh 1980)
- Neottiosporella* sp.**
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Neovaginatipora fuckelii*** (Sacc.) A. Hashim., K. Hiray. & Kaz. Tanaka, Stud. Mycol. 90: 188 (2018)
= *Vaginatipora fuckelii* (Sacc.) Thambug., Wanas., Kaz. Tanaka & K.D. Hyde, Fungal Divers. 74: 242 (2015)
On branch litter of *H. brasiliensis*: Thailand as *Lophiostoma fuckelii* (Seephueak et al. 2011)
- Nigrograna fuscidula*** (Sacc.) Jaklitsch & Voglmayr, Stud. Mycol. 85: 54 (2016)
On *H. brasiliensis*: Ghana as *Melanomma fuscidulum* (Hughes 1953)
- Nigrospora oryzae*** (Berk. & Broome) Petch, J. Indian Bot. Soc. 4: 24 (1924)
On *H. brasiliensis* as *Nigrospora sphaerica*: Malaysia, Thailand (Williams & Liu 1976, Seephueak et al. 2010)
- Nitschkia tetraspora*** Nannf., Svensk bot. Tidskr. 69(3): 316 (1975)
On *H. brasiliensis*: Ghana (Nannfeldt 1975)
- Nummularia anthracodes*** (Fr.) Cooke, (1883)
Associated with black bark on bark of *H. brasiliensis*: Dominican Republic, Ghana (Weir 1926, Hughes 1952, Ciferri 1961)
- Nummularia broomeana*** (Berk. & M.A. Curtis) J.H. Mill. [as ‘broomeiana’], Mycologia 33(1): 77 (1941)
On *H. brasiliensis*: Haiti as *Nummularia broomeiana* (Benjamin & Slot 1969)
- Nummularia cincta*** Ferd. & Winge, Bot. Tidsskr. 29(1): 15 (1908)
On *H. brasiliensis*: Dominican Republic (Ciferri 1961)
- Orbilina* sp.**
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Ochrocladosporium elatum*** (Harz) Crous & U. Braun, in Crous et al., Stud. Mycol. 58: 46 (2007)
On leaf and branch litter of *H. brasiliensis*: Thailand as *Cladosporium elatum* (Seephueak et al. 2010, 2011)
- Oedothea vismiae*** Syd., Ann. Mycol. 28(1/2): 203 (1930)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Oidium heveae*** B.A. Steinm., De Zickten en Ragen van Hevea brasiliensis in Nederlandsch-Indie: 91 (1925)

Associated with powdery mildew of *H. brasiliensis*: Brazil, Brunei Darussalam, Cambodia, Cameroon, China, Democratic Republic of the Congo, Ghana, India, Indonesia, Malawi, Malay Peninsula, Malaysia, Myanmar, Papua New Guinea, Sri Lanka, Tanzania, Thailand, Uganda, Viet Nam (Thompson & Johnston 1953, Spaulding 1961, Amano 1986, Mendes et al. 1998, Limkaisang et al. 2005)

***Oidium* sp.**

On leaves of *H. brasiliensis*: Cote d'Ivoire (Nandris et al. 1987)

Oidium tenerum B.A. Steinm., De Zickten en Ragen van Hevea brasiliensis in Nederlandsch-Indie: 91 (1925)

On leaves of *H. brasiliensis*: Ghana (Hughes 1952)

Ophiobolus heveae Henn., Hedwigia 43(4): 248 (1904)

Associated with leaf spot of *H. brasiliensis*: Brazil, Dominican Republic, Florida, Haiti (Ciferri 1961, Spaulding 1961, Benjamin & Slot 1969, Alfieri et al. 1984)

Ophiostoma ulmi (Buisman) Nannf., in Melin & Nannfeldt, Svensk Skogsvårdsförening Tidskr. 3-4: 408 (1934)

On leaf and branch litter of *H. brasiliensis*: Thailand as *Ceratocystis ulmi* (Seephueak et al. 2010, 2011)

***Oxydothis* sp.**

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

***Paecilomyces* sp.**

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Panchanania jaipurensis Subram. & N.G. Nair, Antonie van Leeuwenhoek 32: 382 (1966)

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Paraconiothyrium cyclothyrioides Verkley, in Verkley et al., Stud. Mycol. 50(2): 330 (2004)

From soil under *H. brasiliensis*: Sri Lanka (Crous et al. 2015b)

Paradendryphiella salina (G.K. Sutherl.) Woudenb. & Crous, Stud. Mycol. 75(1): 207 (2013)

On leaf and branch litter of *H. brasiliensis*: Thailand as *Scolecobasidium salinum* (Seephueak et al. 2010, 2011)

Paraeutypella citricola (Speg.) L.S. Dissan., Wijayaw., J.C. Kang & K.D. Hyde, in Dissanayake, Wijayawardene, Dayarathne, Samarakoon & Dai, Biodiversity Data Journal 9: e63864, 14 (2021)

On dead branch of *H. brasiliensis*: Thailand (this study)

Paragnomonium fragariae (Kleb.) Senan. & K.D. Hyde, in Senanayake et al., Mycosphere 8 (1): 199 (2017)

On leaf litter of *H. brasiliensis*: Thailand as *Gnomonia fragariae* (Seephueak et al. 2010)

Paramyrothecium roridum (Tode) L. Lombard & Crous, in Lombard et al., Persoonia 36: 211 (2016)

On leaf and branch litter of *H. brasiliensis*: Thailand as *Myrothecium roridum* (Seephueak et al. 2010, 2011)

***Parapleurotheciopsis* sp.**

- On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Parascedosporium putredinis*** (Corda) Lackner & de Hoog, IMA Fungus 2(1): 44 (2011)
On leaf litter of *H. brasiliensis*: Thailand as *Graphium putredinis* (Seephueak et al. 2010)
- Parasymphodiella podocarpi*** Crous & Seifert, in Crous et al., S. Afr. J. Bot. 62(2): 92 (1996)
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Paratomenticola lanceolata*** (Cooke) M.B. Ellis [as 'lanceolatus'], More Dematiaceous Hyphomycetes (Kew): 175 (1976)
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)
- Paratrichoconis chinensis*** (Hansf.) Deighton & Piroz., Mycol. Pap. 128: 32 (1972)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Passalora berkheyae*** (Syd. & P. Syd.) U. Braun & Crous, in Crous & Braun, CBS Diversity Ser. (Utrecht) 1: 441 (2003)
On leaf litter of *H. brasiliensis*: Thailand as *Fulvia berkheyae* (Seephueak et al. 2010)
- Passalora marmorata*** (Tranzschel) U. Braun & Crous, in Crous & Braun, CBS Diversity Ser. (Utrecht) 1: 267 (2003)
On branch litter of *H. brasiliensis*: Thailand as *Phaeoramularia marmorata* (Seephueak et al. 2011)
- Passalora oldenlandiae*** (Hansf.) U. Braun & Crous, in Crous & Braun, CBS Diversity Ser. (Utrecht) 1: 297 (2003)
On branch litter of *H. brasiliensis*: Thailand as *Phaeoramularia oldenlandiae* (Seephueak et al. 2011)
- Passalora pithecellobii*** (J.L. Mulder) U. Braun & Crous, in Crous & Braun, CBS Diversity Ser. (Utrecht) 1: 465 (2003)
On leaf and branch litter of *H. brasiliensis*: Thailand as *Stenella pithecellobii* (Seephueak et al. 2010)
- Passalora solani-torvi*** (Gonz. Frag. & Cif.) U. Braun & Crous, in Crous & Braun, CBS Diversity Ser. (Utrecht) 1: 380 (2003)
On branch litter of *H. brasiliensis*: Thailand as *Mycovellosiella solani-torvi* (Seephueak et al. 2011)
- Passalora vaginae*** (W. Krüger) U. Braun & Crous, in Crous & Braun, CBS Diversity Ser. (Utrecht) 1: 417 (2003)
On leaf litter of *H. brasiliensis*: Thailand as *Cercospora vaginae* (Seephueak et al. 2010)
- Penicillifer pulcher*** Emden, Acta Bot. Neerl. 17: 54 (1968)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Penicillium brevicompactum*** Dierckx, Ann. Soc. Sci. Bruxelles 25: 88 (1901)
Endophytic on living leaves and sapwood of *H. brasiliensis*: Peru (Gazis & Chaverri 2010)
- Penicillium chrysogenum*** Thom, Bull. U.S. Department of Agriculture, Bureau Animal Industry 118: 58 (1910)
Associated with leaf spot of *H. brasiliensis*: India (Ariharan et al. 2016)

Penicillium dodgei Pitt, The Genus *Penicillium* and its teleomorph states *Eupenicillium* and *Talaromyces* (London): 117 (1980) [1979]

On branch litter of *H. brasiliensis*: Thailand as *Eupenicillium brefeldianum* (Seephueak et al. 2011)

Penicillium javanicum J.F.H. Beyma, Verh. K. Akad. Wet., tweede sect. 26(4): 17 (1929)

On branch litter of *H. brasiliensis*: Thailand as *Eupenicillium javanicum* (Seephueak et al. 2011)

Penicillium paxilli Bainier, Bull. Soc. Mycol. Fr. 23(2): 95 (1907)

Endophytic on living leaves and sapwood of *H. brasiliensis*: Peru (Gazis & Chaverri 2010)

Penicillium sclerotiorum J.F.H. Beyma, Centbl. Bakt. ParasitKde, Abt. II 96(20-23): 416 (1937)

Endophytic on living leaves and sapwood of *H. brasiliensis*: Peru (Gazis & Chaverri 2010)

***Penicillium* spp.**

Associated with rubber tree seeds harvested of *H. brasiliensis*: Brazil (Theodoro & Batista 2014)

Penzigomyces flagellatus (S. Hughes) Subram. [as 'flagellata'], Proc. Indian natn Sci. Acad., Part B. Biol. Sci. 58(4): 186 (1992)

On leaf litter of *H. brasiliensis*: Thailand as *Sporidesmium flagellatum* (Seephueak et al. 2010)

Penzigomyces nodipes (Penz. & Sacc.) Subram., Proc. Indian natn Sci. Acad., Part B. Biol. Sci. 58(4): 186 (1992)

On leaf and branch litter of *H. brasiliensis*: Thailand as *Sporidesmium nodipes* (Seephueak et al. 2010, 2011)

Penzigomyces parvus (S. Hughes) Subram., Proc. Indian natn Sci. Acad., Part B. Biol. Sci. 58(4): 187 (1992)

On branch litter of *H. brasiliensis*: Thailand as *Sporidesmium parvum* (Seephueak et al. 2010)

Periconia byssoides Pers., Syn. meth. fung. (Göttingen) 2: 686 (1801)

= *Periconia pycnospora* Fresen., Beitr. Mykol. 1: 20 (1850)

On tips dead, seedling leaves of *H. brasiliensis*: Ghana, Haiti, Malaysia, Thailand (Hughes 1953, Benjamin & Slot 1969, Liu 1977, Seephueak et al. 2011)

Periconia cambrensis E.W. Mason & M.B. Ellis, Mycol. Pap. 56: 108 (1953)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Periconia lateralis Ellis & Everh., J. Mycol. 2(9): 104 (1886)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Periconia jabalpurensis D.P. Tiwari & P.D. Agrawal, Curr. Sci. 41(12): 463 (1972)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Periconia heveae J.A. Stev. & Imle, Mycologia 37(5): 580 (1945)

Associated with blight diseases on leaf, petiole and twigs of *H. brasiliensis*: Brazil, China, Costa Rica, Mexico (Spaulding 1961, McGuire & Crandall 1967, Zhuang 2001)

Associated with leaf spot of *H. brasiliensis*: Thailand (this study)

Periconia manihoticola (Vincens) Viégas, Bragantia 14(7): 63 (1955)

Associated with leaf spot and blight on seedling of *H. brasiliensis*: Brazil, Malawi, Myanmar, India (Peregrine & Siddiqi 1972, Mehrotra 1988, Mendes et al 1998, Thaung 2008)

***Periconia* sp.**

On *H. brasiliensis*: Mexico (Alvarez 1976)

Periconia tirupatiensis Subram., J. Indian Bot. Soc. 34: 356 (1955)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Periconiella cyatheae M.B. Ellis, Mycol. Pap. 111: 19 (1967)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Periconiella heveae M.B. Ellis, Mycol. Pap. 111: 34 (1967)

On leaves of *H. brasiliensis*: Malaysia (Ellis 1967)

***Periconiella* sp.**

On *H. brasiliensis*: Malaysia (Williams & Liu 1976)

Perisporiopsis lateritia P. Chaverri & Gazis, Mycotaxon 113: 164 (2010)

On underside of decaying leaves of *H. brasiliensis*: Peru (Chaverri & Gazis 2011)

Perisporiopsis melioloides (Berk. & M.A. Curtis) Arx, in Müller & von Arx, Beitr. Kryptfl. Schweiz 11(no. 2): 171 (1962)

Endophytic on living leaves and sapwoods of *H. brasiliensis*: Peru (Gazis & Chaverri 2010)

Peroneutypa heteracanthoides Sacc., Bulletino dell'orto Botanico della R. Università di Napoli 6: 47 (1918)

On *H. brasiliensis*: Malaysia (Singh 1980)

Peroneutypa longiasca Senwanna, Phookamsak & K.D. Hyde, in Senwanna et al., Mycosphere 8(10): 1848 (2017)

On dead twig of *H. brasiliensis*: Thailand (Senwanna et al. 2017)

Pestalosphaeria hansenii Shoemaker & J.A. Simpson, Can. J. Bot. 59(6): 986 (1981)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

***Pestalotia* sp.**

On leaves of *H. brasiliensis*: Brazil, Fiji, Ghana, Mexico, Thailand (Dade 1940, Firman 1972, Alvarez 1976, Mendes et al. 1998, Seephueak et al. 2010)

Pestalotiopsis adusta (Ellis & Everh.) Steyaert, Trans. Br. Mycol. Soc. 36(2): 82 (1953)

On *H. brasiliensis*: Malaysia (Williams & Liu 1976)

Pestalotiopsis disseminata (Thüm.) Steyaert, Bull. Jard. Bot. État Brux. 19: 319 (1949)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Pestalotiopsis guepinii (Desm.) Steyaert [as 'guepini'], Bull. Jard. Bot. État Brux. 19(3): 312 (1949)

On *H. brasiliensis*: Fiji, Thailand (Dingley et al. 1981, Seephueak et al. 2010)

Pestalotiopsis microspora (Speg.) G.C. Zhao & Nan Li, Journal of Northeast Forestry University 23(4): 23 (1995)

Associated with leaf blight disease of *H. brasiliensis*: Cameroon (Nyaka Ngobisa et al. 2018)

- Pestalotiopsis palmarum*** (Cooke) Steyaert, Bull. Jard. bot. État Brux. 19(3): 322 (1949)
 On *H. brasiliensis*: China, Malay Peninsula, Peru as endophytic on living leaf and sapwood (Thompson & Johnston 1953, Zhuang 2001, Gasiz and Chervarri 2010, Selmaoui et al. 2014)
- Pestalotiopsis* sp.**
 On leaves of *H. brasiliensis*: Myanmar, Thailand (Thaung 2008, Seephueak et al. 2010)
- Pestalotiopsis versicolor*** (Speg.) Steyaert, Bull. Jard. bot. État Brux. 19(3): 336 (1949)
 On *H. brasiliensis*: Malaysia (Singh 1980)
- Peyronellaea* sp.**
 On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Piricauda pseudarthriae*** (Hansf.) M.B. Ellis, More Dematiaceous Hyphomycetes (Kew): 40 (1976)
 On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Pithomyces graminicola*** R.Y. Roy & B. Rai, Trans. Br. Mycol. Soc. 51(1): 154 (1968)
 On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Phaeodactylium alpiniae*** (Sawada) M.B. Ellis, Dematiaceous Hyphomycetes (Kew): 215 (1971)
 On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Phaeodothis winteri*** (Niessl) Aptroot, Nova Hedwigia 60(3-4): 358 (1995)
 On *H. brasiliensis*: Liberia, Malaysia (Aptroot 1995)
- Phaeoisaria sparsa*** B. Sutton, Mycol. Pap. 132: 87 (1973)
 On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Phaeoisariopsis cercosporoides*** (M.L. Farr) M.B. Ellis [as ‘cercosporioides’], More Dematiaceous Hyphomycetes (Kew): 236 (1976)
 On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)
- Phaeoisariopsis* sp.**
 On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Phaeosphaeria* sp.**
 On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)
- Phaeostilbella nigra*** (Sacc.) Seifert, CBS Biodiversity Series 12: 307 (2013)
 On branch litter of *H. brasiliensis*: Thailand as *Saccardaea atra* (Seephueak et al. 2010, 2011)
- Phoma pezizoides*** (Ellis & Everh.) Boerema & Kesteren, Persoonia 11(3): 322 (1981)
 On leaf litter of *H. brasiliensis*: Thailand as *Aposphaeria pezizoides* (Seephueak et al. 2010)
- Phoma* sp.**
 On *H. brasiliensis*: Brazil, Papua New Guinea, Thailand (Mendes et al. 1998, Shaw 1984, Seephueak et al. 2010)
- Phomatospora heveae*** Saccas, J. Agric. Trop. Bot. Appl. 1: 465 (1954)
 On dead branches of *H. brasiliensis*: French Equatorial Africa (Anonymous 1963)

- Phomopsis heveae*** (Petch) Boedijn, Rec. Trav. Bot. Néerl. 26: 423 (1929)
Associated with dieback of young tissue of seedlings of *H. brasiliensis*: Brazil, China, India, Indonesia, Malay Peninsula, Malaysia, Mauritius, Myanmar, Sri Lanka, Thailand on branches of *H. brasiliensis*: Sri Lanka as *Phoma heveae* (Saccardo 1913, Spaulding 1961, Thaung 2008, Udayanga et al. 2011)
- Phomopsis heveicola*** Li Ma, M.M. Xiang & P.K. Chi, in Ma, Xiang, Chi & Jiang, Mycosystema 23(4): 458 (2004)
On branches of *H. brasiliensis*: China (Ma et al. 2004, Chi et al. 2007)
- Phomopsis ramicola*** (Petch) Aa, in van der Aa & Vaney, A Revision of the Species Described in Phyllosticta (Utrecht): 392 (2002)
= *Phyllosticta ramicola* Petch, Ann. R. bot. Gdns Peradeniya 3(1): 5 (1906)
On living stems of *H. brasiliensis*: Sri Lanka, Malay Peninsula, Malaysia (Petch 1906, Thompson & Johnston 1953, Turner 1971)
- Phomopsis* sp.**
Associated with dieback and leaf diseases of *H. brasiliensis*: Brazil, Florida, Mexico, Thailand on leaf litter (Alvarez 1976, Alfieri et al. 1984, Mendes et al. 1998, Seephueak et al. 2010, Sittisart et al. 2017)
- Phragmocephala elliptica*** (Berk. & Broome) S. Hughes, N.Z. J Bot. 17(2): 164 (1979)
On leaf and branch litter of *H. brasiliensis*: Thailand as *Endophragmia elliptica* (Seephueak et al. 2010)
- Phyllachora huberi*** Henn. 1900
= *Catacauma huberi* (Henn.) Theiss. & Syd., Ann. Mycol. 13(3/4): 390 (1915)
Associated with tar spot disease of *H. brasiliensis*, Brazil, Costa Rica, Peru (Spaulding 1961)
- Phyllosticta heveae*** Henn., Notizbl. Königl. bot. Gart. Museum Berlin 4(no. 34): 137 (1904)
Associated with of leaf spot on leaves of *H. brasiliensis*: Brazil, China, Democratic Republic of the Congo, Cote d'Ivoire, Dominican Republic, Ethiopia, Fiji, Haiti, India, Indonesia, Malaysia, Philippines, Sri Lanka, Taiwan, Thailand, The Republic of Trinidad and Tobago, Uganda (Sawada 1943, Castellani & Ciferri 1950, Resplandy et al. 1954, Ciferri 1961, Spaulding 1961, Dennis 1970, Firman 1972, Tai 1979, Giatgong 1980)
- Phyllosticta heveana*** Saccas, Agronomía trop. 8: 259 (1953)
On *H. brasiliensis*: Central African Republic, Malaysia (Nag Raj 1993, Williams & Liu 1976, Anonymous 1963)
- Phyllosticta* sp.**
Associated with leaf spot on nursery plant of *H. brasiliensis*: Brazil, Cambodia, Malay Peninsula, Mexico, Papua New Guinea, Thailand on leaf litter (Thompson & Johnston 1953, Litzenger et al. 1962, McGuire & Crandall 1967, Alvarez 1976, Shaw 1984, Mendes et al. 1998, Seephueak et al. 2010)
- Phyllostictina* sp.**
On *H. brasiliensis*: Philippine (Weir 1926)
- Physalospora heveae*** Saccas, Agronomía Trop. 8: 264 (1953)
On *H. brasiliensis*: French Equatorial Africa (Anonymous 1963)

- Pithomyces graminicola*** R.Y. Roy & B. Rai, Trans. Br. Mycol. Soc. 51(1): 154 (1968)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Placophomopsis heveae*** Grove, Taxonomie und medizinische Bedeutung der zur Gattung Geotrichum Link gehorenden Arten (Med. Habil.-Schrift, Magdeburg) 59: 315 (1921)
On wood of *H. brasiliensis*: Uganda (Petraik 1921)
- Plectosphaerella cucumerina*** (Lindf.) W. Gams, in Domsch & Gams, Fungi in Agricultural Soils: 160 (1972)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Pleonectria heveana*** Sacc., Bulletino dell'orto Botanico della R. Università di Napoli 24: 13 [repr.] (1918)
In decaying bark of the trunk of *H. brasiliensis*: Singapore, Malaysia (Saccardo 1928, Petraik 1930, Singh 1980)
- Pleosphaerulina heveae*** Saccas, Agronomía Trop. 8: 267 (1953)
On *H. brasiliensis*: French Equatorial Africa (Anonymous 1963)
- Pleopunctum heveae*** Senwanna, Cheewangkoon & K.D. Hyde
On dried twig of *H. brasiliensis*: Thailand (this study)
- Pleospora* sp.**
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Pleurophragmium acutum*** (Grove) M.B. Ellis, More Dematiaceous Hyphomycetes (Kew): 164 (1976)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Pleurophragmium capense*** (Thüm.) S. Hughes, Can. J. Bot. 36: 796 (1958)
On leaf litter of *H. brasiliensis*: Thailand as *Spiropes capensis* (Seephueak et al. 2010)
- Pleurotheciopsis pusilla*** B. Sutton, Trans. Br. Mycol. Soc. 61(3): 418 (1973)
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)
- Podocrea pezizoidea*** (Möller) Sacc. & D. Sacc., Syll. Fung. (Abellini) 17: 799 (1905)
On branch litter of *H. brasiliensis*: Thailand as *Hypocrea pezizoidea* (Seephueak et al. 2011)
- Polyschema* sp.**
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Polymorphum* sp.**
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Protostegia heveae*** Charles, in Weir, U.S.D.A. Dept. Bull. 1380: 92 (1926)
In dead branches of *H. brasiliensis*: Amazonas (Weir 1926)
- Pseudobeltrania penzigii*** Piroz., Mycol. Pap. 129: 53 (1972)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Pseudocercospora opuli*** (Höhn.) U. Braun & Crous, in Crous & Braun, CBS Diversity Ser. (Utrecht) 1: 299 (2003)
On leaf litter of *H. brasiliensis*: Thailand as *Cercospora apuli* (Seephueak et al. 2010)

- Pseudocercospora heveae*** (Vincens) Deighton 1976
 = *Cercospora heveae* Vincens, Bull. Soc. Path. vég. Fr. 2: 25 (1915)
 Associated with leaf spot of *H. brasiliensis*: Brazil, Brunei Darussalam, China, Costa Rica, Panama, Thailand (Chupp 1954, McGuire & Crandall 1967, Giatgong 1980, Peregrine & Ahmad 1982, Mendes et al. 1998, Jayasinghe 1999a, Zhuang 2001, Piepenbring 2006)
- Pseudocercospora pterocauli*** (Petr.) Deighton, in Ellis, More Dematiaceous Hyphomycetes (Kew): 177 (1976)
 On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Pseudocercospora ulei*** (Henn.) B.T. Hora & Mizubuti, in Hora Júnior et al., PLOS ONE 9(8): e104750, 6 (2013)
 = *Dothidella ulei* Henn., Hedwigia 43(4): 254 (1904)
 = *Fusicladium heveae* K. Schub. & U. Braun, in Crous & Braun, CBS Diversity Ser. (Utrecht) 1: 481 (2003)
 Associated with leaf bright (South American leaf blight: SALB) of *H. brasiliensis*: Bolivia, Brazil, China, Cameroon, Central America, Colombia, Costa Rica, Ecuador, Florida, French Guiana, Guatemala, Guyana, Honduras, Malaysia, Mexico, Nicaragua, Panama, Papua New Guinea, Peru, Sri Lanka, Suriname, The Republic of Trinidad and Tobago, Venezuela, West Africa (Spaulding 1961, Williams & Liu 1976, Alfieri et al. 1984, Shaw 1984, Mendes et al. 1998, Jayasinghe 1999a, Zhuang 2001, Hora Júnior et al. 2014, Guyot & Le Guen 2018)
- Pseudodiplodia* sp.**
 On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Pseudofusicoccum adansoniae*** Pavlic, T.I. Burgess & M.J. Wingf., Mycologia 100(6): 855 (2008)
 Endophytic on *H. brasiliensis* and associated with canker diseases of *H. brasiliensis*: Thailand (Trakunyingcharoen et al. 2015a, Senwanna et al. 2020)
- Pseudofusicoccum ardesiacum*** Pavlic, T.I. Burgess & M.J. Wingf., Mycologia 100(6): 858 (2008)
 Endophytic on *H. brasiliensis* and associated with canker diseases of *H. brasiliensis*: Thailand (Trakunyingcharoen et al. 2015a, Senwanna et al. 2020)
- Pseudogliomastix* sp.**
 On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Pseudogymnoascus pannorum*** (Link) Minnis & D.L. Lindner, Fungal Biol. 117(9): 646 (2013)
 On leaf litter of *H. brasiliensis*: Thailand as *Chrysosporium pannorum* (Seephueak et al. 2010)
- Pseudopithomyces palmicola*** Jun F. Li, Ariyaw. & K.D. Hyde, in Ariyawansa et al., Fungal Divers. 75: 27–274 (2015)
 On dried leaf of *H. brasiliensis*: Thailand (this study)
- Pseudorobillarda phragmitis*** (Cunnell) M. Morelet, Bull. Soc. Sci. nat. Arch. Toulon et du Var 175: 6 (1968)
 On leaf litter of *H. brasiliensis*: Thailand as *Robillarda phragmitis* (Seephueak et al. 2010)
- Pseudorobillarda* sp.**
 On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Pseudospiropes obclavatus*** M.B. Ellis, More Dematiaceous Hyphomycetes (Kew): 219 (1976)
 On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

- Pteroconium intermedium*** M.B. Ellis, More Dematiaceous Hyphomycetes (Kew): 479 (1976)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Pucciniopsis* sp.**
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Pyricularia parasitica*** Ellis & Everh., Proc. Acad. Nat. Sci. Philad. 45: 462 (1894) [1893]
On leaf litter of *H. brasiliensis*: Thailand as *Elletevera parasitica* (Seephueak et al. 2010)
- Pyriculariopsis parasitica*** (Sacc. & Berl.) M.B. Ellis, Dematiaceous Hyphomycetes (Kew): 207 (1971)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Pyriculariopsis* sp.**
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Quadrisporella heveae*** Senwanna, Cheewangkoon & K.D. Hyde
On dried twig of *H. brasiliensis*: Thailand (this study)
- Ramichloridium apiculatum*** (J.H. Mill., Giddens & A.A. Foster) de Hoog, Stud. Mycol. 15: 69 (1977)
On branch litter of *H. brasiliensis*: Thailand as *Veronaea apiculata* (Seephueak et al. 2011)
- Ramularia aromatica*** (Sacc.) Höhn., Öst. bot. Z. 55(1): 23 (1905)
On leaf litter of *H. brasiliensis*: Thailand as *Septocylindrium aromaticum* (Seephueak et al. 2010)
- Ramularia grevilleana*** (Tul. & C. Tul. ex Oudem.) Jørst., Meld. Stat. Plantepat. Inst. Oslo 50: 17 (1945)
On leaf litter of *H. brasiliensis*: Thailand as *Ramularia tulasnei* (Seephueak et al. 2010)
- Repetophragma aburiense*** (M.B. Ellis) Subram., Proc. Indian natn Sci. Acad., Part B. Biol. Sci. 58(4): 185 (1992)
On branch litter of *H. brasiliensis*: Thailand as *Sporidesmium cambrense* (Seephueak et al. 2011)
- Repetophragma cambrense*** (M.B. Ellis) McKenzie, Mycotaxon 56: 22 (1995)
On leaf litter of *H. brasiliensis*: Thailand as *Sporidesmium aburiense* (Seephueak et al. 2010)
- Repetophragma ellisii*** (Piroz.) R.F. Castañeda, McKenzie & K.D. Hyde, in Castañeda-Ruíz et al., Mycosphere 2(3): 276 (2011)
On branch litter of *H. brasiliensis*: Thailand as *Sporidesmium ellisii* (Seephueak et al. 2011)
- Repetophragma subulatum*** (Cooke & Ellis) Subram. [as 'subulata'], Proc. Indian natn Sci. Acad., Part B. Biol. Sci. 58(4): 185 (1992)
On branch litter of *H. brasiliensis*: Thailand as *Sporidesmium subulatum* (Seephueak et al. 2011)
- Rhabdospora* sp.**
On *H. brasiliensis*: Malaysia (Williams & Liu 1976)
- Rhexoacrodictys fuliginosa*** (B. Sutton) W.A. Baker & Morgan-Jones, in Baker et al., Mycotaxon 82: 106 (2002)

On branch litter of *H. brasiliensis*: Thailand as *Acrodictys fuliginosa* (Seephueak et al. 2011)

***Rhexoampullifera* sp.**

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

***Rhinocladiella* sp.**

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

***Rhombostilbella rosae* Zimm., Centbl. Bakt. ParasitKde, Abt. I 8: 221 (1902)**

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***Rhytidhysteron rufulum* (Spreng.) Speg., Anal. Soc. Cient. Argent. 90(3-6): 177 (1921) [1920]**

On *H. brasiliensis*: Ghana as *Tryblidiella rufula* (Hughes 1952)

***Rhytidhysteron neorufulum* Thambug. & K.D. Hyde, in Thambugala et al., Cryptog. Mycol. 37(1): 110 (2016)**

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***Rhytidhysteron tectonae* Doilom & K.D. Hyde, in Doilom et al., Fungal Divers. 82: 107–182 (2016)**

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***Rosellinia africana* Saccas, Agronomía Trop. 8: 269 (1953)**

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***Rosellinia bunodes* (Berk. & Broome) Sacc., Syll. Fung. (Abellini) 1: 254 (1882)**

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***Sarocladium strictum* (W. Gams) Summerb., in Summerbell, Gueidan, Schroers, Hoog, Starink, Arocha Rosete, Guarro & Scott 2011**

On leaf and branch litter of *H. brasiliensis*: Thailand as *Acremonium strictum* (Seephueak et al. 2010, 2011)

***Schizotrichum lobeliae* McAlpine, Proc. Linn. Soc. N.S.W. 28(3): 562 (1903)**

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***Scolicotrichum heveae* Vincens, Bull. Soc. Path. vég. Fr. 2: 17 (1915)**

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***Scolecobasidiella avellanea* (Sappa & Mosca) M.B. Ellis, Mycol. Pap. 125: 10 (1971)**

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

***Scolecobasidiella* sp.**

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***Scolecobasidium anellii* Graniti, G. bot. ital., n.s. 69(4-6): 364 (1963) [1962]**

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- Scolecobasidium* sp.
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- Selenosporella* sp.
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On *H. brasiliensis*: Fiji (Dingley et al. 1981)
- Setodochium* sp.
On *H. brasiliensis*: Papua New Guinea (Shaw 1984)
- Seynesiella* sp.
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

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- Sphaeronaema album* Petch, Ann. R. bot. Gdns Peradeniya 3(1): 5 (1906)
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On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
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- Stilbella heveae* Zimm., in Hennings, Hedwigia 41: 148 (1902)
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- Tetraposporium* sp.**
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- Thyrsidina* sp.**
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
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- Torula fici*** Crous, IMA Fungus 6 (1): 192 (2015)
On dried twig of *H. brasiliensis*: Thailand (this study)
- Torula herbarum*** (Pers.) Link, Mag. Gesell. naturf. Freunde, Berlin 3(1-2): 19 (1809)
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- Tryblidiella mindanaoensis* Henn. [as 'mindanaoënsis'], Hedwigia 47: 261 (1908)
On *H. brasiliensis*: Philippines (Reinking 1919)
- Tubercularia lateritia* (Berk.) Seifert, Stud. Mycol. 27: 119 (1985)
On *H. brasiliensis*: Indonesia (Seifert 1990)
- Tubeufia cerea* (Berk. & M.A. Curtis) Höhn., Sber. Akad. Wiss. Wien, Math.-naturw. Kl., Abt. 1 128(7-8): 562 (1919)
On branch litter of *H. brasiliensis*: Thailand as *Helicosporium vegetum* (Seephueak et al. 2011)
- Uniseta* sp.
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Urnulla mexicana* (Ellis & Holw.) M. Carbone, Agnello, A.D. Parker & P. Alvarado, Ascomycete.org 5(1): 14 (2012)
On branch litter of *H. brasiliensis*: Thailand as *Bulgaria mexicana* (Seephueak et al. 2011)
- Ustulina deusta* (Hoffm.) Lind, Danish Fungi (Copenhagen): 252 (1913)

Associated with root rot disease of *H. brasiliensis*: Brazil, China, Democratic Republic of the Congo, Fiji, Ghana, India, Indonesia, Malaysia, Papua New Guinea, Seychelles, Sierra Leone (Spaulding 1961)

Uwemyces elaeidis (Steyaert) Hern.-Restr., Sarria & Crous, in Crous et al., *Persoonia* 36: 455 (2016)

On branch litter of *H. brasiliensis*: Thailand as *Cercospora elaeidis* (Seephueak et al. 2011)

Vaginatispora amygdali A. Hashim., K. Hiray. & Kaz. Tanaka, in Hashimoto et al., *Stud. Mycol.* 90: 179 (2018)

On branch of *H. brasiliensis*: Thailand (this study)

***Valsa* sp.**

On *H. brasiliensis*: Malaysia (Williams & Liu 1976)

Varicosporium elodeae W. Kegel, *Ber. Dt. Bot. Ges.* 24: 213 (1906)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Venturia crataegi Aderh., *Ber. Dt. Bot. Ges.* 20: 200 (1902)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Veronaea coprophila (Subram. & Lodha) M.B. Ellis, *More Dematiaceous Hyphomycetes (Kew)*: 210 (1976)

On *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Veronaea botryosa Cif. & Montemart., *Atti Ist. Bot. Univ. Lab. crittog. Pavia, sér. 5* 15: 68 (1957)

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

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On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

Veronaea coprophila (Subram. & Lodha) M.B. Ellis, *More Dematiaceous Hyphomycetes (Kew)*: 210 (1976)

On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)

***Veronaea* sp.**

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Verruconis heveae Huanrluek, Senwanna, Jayawardena & K.D. Hyde, in Huanraluek et al., *Phytotaxa* 403(1): 50 (2019)

On dried latex on bark of *H. brasiliensis*: Thailand (Huanraluek et al. 2019, this study)

Verruconis phayaoensis Senwanna, Cheewangkoon & K.D. Hyde

On dried latex on bark and twig of *H. brasiliensis*: Thailand (this study)

Verticillium dahliae Kleb., *Mykol. Zentbl.* 3: 66 (1913)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

***Verticillium* sp.**

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

***Wentiomyces* sp.**

On *H. brasiliensis*: Brunei Darussalam (Peregrine & Ahmad 1982)

- Wiesneriomyces laurinus* (Tassi) P.M. Kirk, Trans. Br. Mycol. Soc. 82(4): 748 (1984)
On leaf litter and bark of *H. brasiliensis*: Thailand as *Wiesneriomyces javanicus* (Seephueak et al. 2010, Hongsanan et al. 2020)
- Xylaria allantoides* (Berk.) Fr., Nova Acta R. Soc. Scient. upsal., Ser. 3 1(1): 127 (1851) [1855]
On *H. brasiliensis*: Thailand (Srihanant & Petcharat 2015)
- Xylaria anisopleura* (Mont.) Fr., Nova Acta R. Soc. Scient. upsal., Ser. 3 1(1): 127 (1851) [1855]
On *H. brasiliensis*: Thailand (Srihanant & Petcharat 2015)
- Xylaria apiculate* Cooke, Grevillea 8(no. 46): 66 (1879)
On *H. brasiliensis*: Thailand (Srihanant & Petcharat 2015)
- Xylaria arbuscula* Sacc., Michelia 1(no. 2): 249 (1878)
On *H. brasiliensis*: Thailand (Srihanant & Petcharat 2015)
- Xylaria caespitulosa* Ces., Atti Accad. Sci. Fis. Mat. Napoli 8(8): 15 (1879)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Xylaria cubensis* (Mont.) Fr., Nova Acta R. Soc. Scient. Upsal., Ser. 3 1(1): 126 (1851) [1855]
On *H. brasiliensis*: Thailand (Srihanant & Petcharat 2015)
- Xylaria cynoglossa* Cooke, Grevillea 12(no. 61): 1 (1883)
On *H. brasiliensis*: Malaysia (Singh 1980)
- Xylaria deserticola* Speg., Anal. Mus. Nac. B. Aires, Ser. 3 1: 70 (1902)
Associated with root rot disease of *H. brasiliensis*: Malaysia (Spaulding 1961)
- Xylaria fastigiata* (Speg.) Mussat, in Saccardo, Syll. Fung. (Abellini) 15: 452 (1901)
On *H. brasiliensis*: Haiti (Benjamin & Slot 1969)
- Xylaria feejeensis* (Berk.) Fr., Nova Acta R. Soc. Scient. Upsal., Ser. 3 1(1): 128 (1851) [1855]
On *H. brasiliensis*: Malaysia (Singh 1980)
- Xylaria hypoxylon* (L.) Grev., Fl. Edin.: 355 (1824)
On *H. brasiliensis*: Thailand (Srihanant & Petcharat 2015)
- Xylaria hypsipoda* Masee, Bull. Misc. Inf., Kew: 174 (1899)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Xylaria laevis* Lloyd, Mycol. Notes (Cincinnati) 65(no. 5): 8 (1918)
On *H. brasiliensis*: Thailand (Srihanant & Petcharat 2015)
- Xylaria multiplex* (Kunze) Fr., Nova Acta R. Soc. Scient. Upsal., Ser. 3 1(1): 127 (1851) [1855]
On *H. brasiliensis*: Haiti, Malaysia, Thailand (Benjamin & Slot 1969, Singh 1980, Seephueak et al. 2011)
- Xylaria mesenterica* (Möller) M. Stadler, Læssøe & J. Fourn., Mycol. Progr. 7(1): 67 (2008)
Endophytic on living leaves and sapwood of *H. brasiliensis*: Peru as *Entonaema pallida* (Gazis & Chaverri 2010)
- Xylaria obovata* (Berk.) Berk., Nova Acta R. Soc. Scient. Upsal., Ser. 3 1(1): 127 (1851) [1855]
On *H. brasiliensis*: Malaysia (Singh 1980)

- Xylaria scopiformis* Mont. ex Berk. & Broome [as 'scopaeformis'], J. Linn. Soc., Bot. 14(no. 74): 119 (1875) [1873]
On dead trees of *H. brasiliensis* as *Xylaria scopiformis* var. *heveana*: Malaysia, Singapore (Saccardo 1928, Singh 1980, Petrak 1930)
- Xylaria* sp.
On leaf and branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010, 2011)
- Xylaria terricola* Y.M. Ju, H.M. Hsieh & W.N. Chou, in Chou, Hsieh & Ju, Fungal Science, Taipei 32(1): 3 (2017)
Associated with *H. brasiliensis*: Thailand (Surawut et al. 2021)
- Xylaria thwaitesii* Berk. & Cooke, Grevillea 12(no. 61): 1 (1883)
Associated with root rot disease of *H. brasiliensis*: China, India, Indonesia, Sri Lanka (Spaulding 1961)
- Xylona heveae* Gazis & P. Chaverri, in Gazis et al., Mol. Phylogen. Evol. 65(1): 302 (2012)
Isolated from sapwood of *H. brasiliensis*: Peru (Gazis et al. 2012)
- Zanclospora brevispora* S. Hughes & W.B. Kendr., N.Z. J Bot. 3: 156 (1965)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Zanclospora* sp.
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Zasmidium musigenum* Videira & Crous, in Videira et al., Stud. Mycol. 87: 361 (2017)
On leaf and branch litter of *H. brasiliensis*: Thailand as *Veronaea musae* (Seephueak et al. 2010, 2011)
- Zukaliopsis heveae* Petch, Ann. R. Bot. Gdns Peradeniya 7(4): 299 (1922)
On leaves of *H. brasiliensis*: Sri Lanka (Petrak 1930, Saccardo 1972)
- Zygosporium deightonii* M.B. Ellis, More Dematiaceous Hyphomycetes (Kew): 344 (1976)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Zygosporium echinosporum* Bunting & E.W. Mason, in Mason, Annot. Acct Fungi rec'd Imp. Mycol. Inst. 2(3): 135 (1941)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Zygosporium gibbum* (Sacc., M. Rousseau & E. Bommer) S. Hughes, Can. J. Bot. 36: 825 (1958)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Zygosporium majus* Piroz., Mycol. Pap. 129: 60 (1972)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Zygosporium masonii* S. Hughes, Mycol. Pap. 44: 15 (1951)
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Zygosporium minus* S. Hughes, Mycol. Pap. 44: 6 (1951)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Zygosporium oscheoides* Mont., Annl. Sci. Nat., Bot., sér. 2 17: 121 (1842)
On *H. brasiliensis*: Ghana, Samoa (Dade 1940, Dingley et al. 1981)

On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

Zygosporium paraense Vincens, Bull. Soc. Path. vég. Fr. 2: 19 (1915)

Associated with leaf spot of *H. brasiliensis*: Brazil, Dominican Republic (Saccardo 1931, Ciferri 1961)

Phylum: Basidiomycota

Acanthophysium oakesii (Berk. & M.A. Curtis) Parmasto, Eesti NSV Tead. Akad. Toim., Biol. seer 16(4): 378 (1967)

On branch litter of *H. brasiliensis*: Thailand as *Aleurodiscus oakesii* (Seephueak et al. 2011)

Aleurodiscus mirabilis (Berk. & M.A. Curtis) Höhn., Sber. Akad. Wiss. Wien, Math.-naturw. Kl., Abt. 1 118: 818 (1909)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Amauroderma scopulosum (Berk.) Imazeki, Bull. Gov. Forest Exp. Stn Tokyo 57: 99 (1952)

On *H. brasiliensis*: Malaysia as *Microporus scopulosus* (Singh 1980)

Armillaria mellea (Vahl) P. Kumm., Der Führer in die Pilzkunde: 134 (1871)

On *H. brasiliensis*: Democratic Republic of the Congo, Malawi, Uganda (Wiehe 1953, Spaulding 1961)

Athelia rolfsii (Curzi) C.C. Tu & Kimbr. 1978

Associated with root crown rot and seedling blight of seedling of *H. brasiliensis*: East Indies as *Pellicularia rolfsii*, Malaysia as *Corticium rolfsii* (Spaulding 1961, Singh 1980)

Auricularia auricula-judae (Bull.) QuéL., Enchir. Fung. (Paris): 207 (1886)

On *H. brasiliensis*: Ghana, Thailand on branch litter (Hughes 1953, Seephueak et al. 2011)

Auricularia brasiliensis Nomen dubium

On dead stems and branches of *H. brasiliensis*: Malaysia (Singh 1980)

Auricularia fuscosuccinea (Mont.) Henn. [as 'fusco-succinea'], Bot. Jb. 17: 19 (1893)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Auricularia nigricans (Sw.) Birkebak, Looney & Sánchez-García, in Looney et al. N. Am. Fungi 8 (6): 12 (2013)

On dead trunks and branches and decaying wood of *H. brasiliensis* as *Auricularia polytricha*: Philippines, Thailand (Musngi et al. 2005, Seephueak et al. 2011)

***Auricularia* sp.**

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Byssomerulius corium (Pers.) Parmasto, Eesti NSV Tead. Akad. Toim., Biol. seer 16(4): 383 (1967)

On branch litter of *H. brasiliensis*: Thailand as *Meruliopsis corium* (Seephueak et al. 2011)

Ceriporiopsis hypolateritia (Berk. ex Cooke) Ryvardeen [as 'hypolateritius'], Syn. Fung. (Oslo) 33: 9 (2015)

Associated with root rot diseases of *H. brasiliensis* as *Poria hypolateritia*: India, Sri Lanka (Spaulding 1961)

- Corioloopsis occidentalis*** (Klotzsch) Murrill, Bull. Torrey bot. Club 32(7): 358 (1905)
On *H. brasiliensis*: Ghana as *Polystictus occidentalis*, Malaysia (Hughes 1953, Singh 1980)
- Corioloopsis polyzona*** (Pers.) Ryvarden, Norw. JI Bot. 19: 230 (1972)
On *H. brasiliensis*: India (Sarbhoy & Agarwal 1990)
- Cerioporus squamosus*** (Huds.) QuéL., Enchir. Fung. (Paris): 167 (1886)
On branch litter of *H. brasiliensis*: Thailand as *Polyporus retirugus* (Seephueak et al. 2011)
- Coriolus hirsutus*** (Wulfen) Pat., Cat. Rais. Pl. Cellul. Tunisie (Paris): 47 (1897)
On *H. brasiliensis*: Malaysia (Singh 1980)
- Corticium koleroga*** (Cooke) Höhn., Sber. Akad. Wiss. Wien, Math.-naturw. Kl., Abt. 1 119: 395 (1910)
= *Pellicularia koleroga* Cooke, Grevillea 4(no. 31): 116 (1876)
Associated with thread blight, bark lesions on branches and leaf blight of *H. brasiliensis*: Argentina, East Indies (Spaulding 1961)
- Corticium* sp.**
On *H. brasiliensis*: Papua New Guinea (Shaw 1984)
- Cryptomarasmius micraster*** (Petch) T.S. Jenkinson & Desjardin, Mycologia 106(1): 92 (2014)
On branch litter of *H. brasiliensis*: Thailand as *Marasmius micraster* (Seephueak et al. 2011)
- Cryptomarasmius sphaerodermus*** (Speg.) T.S. Jenkinson & Desjardin, Mycologia 106(1): 92 (2014)
On *H. brasiliensis*: Dominican Republic as *Poria floridae* (Ciferri 1961)
- Cyathus poeppigii*** Tul. & C. Tul., Anns Sci. Nat., Bot., sér. 3 1: 77 (1844)
On *H. brasiliensis*: Ghana (Hughes 1953)
- Cymatoderma dendriticum*** (Pers.) D.A. Reid 1959
On *H. brasiliensis*: Malaysia, Philippines as *Cladoderris dendritica* (Reinking 1919, Singh 1980)
- Cyphella heveae*** Masee, Bull. Misc. Inf., Kew (4): 157 (1914)
On bark of *H. brasiliensis*: Malay Peninsula, Thailand (Thompson & Johnston 1953, Giatgong 1980)
- Dacryopinax spathularia*** (Schwein.) G.W. Martin, Lloydia 11: 116 (1948)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Daedalea dochmia*** (Berk. & Broome) T. Hatt., Mycoscience 46(5): 307 (2005)
On *H. brasiliensis*: Malaysia as *Ganoderma ferreum* (Singh 1980)
- Earliella scabrosa*** (Pers.) Gilb. & Ryvarden, Mycotaxon 22(2): 364 (1985)
= *Trametes corrugata* (Pers.) Bres., Hedwigia 51(4): 316 (1912)
Associated with trunk rot of *H. brasiliensis*: Brazil, Brunei Darussalam, Ghana, India, Indonesia, Malaysia, Thailand on branch litter as *Trametes scabrosa* (Hughes 1953, Spaulding 1961, Turner 1971, Peregrine & Ahmad 1982, Sarbhoy & Agarwal 1990, Seephueak et al. 2011)

- Eichleriella tenuicula*** (Lév.) Spirin & Malysheva, in Malysheva & Spirin, Fungal Biology 121(8): 709 (2017)
On *H. brasiliensis*: Philippines as *Heterochaete tenuicula* (Teodoro 1937)
- Entoloma repens*** (Petch) Blanco-Dios, Tarrellos 19: 29 (2017)
On branch litter of *H. brasiliensis*: Thailand as *Claudopus repens* (Seephueak et al. 2011)
- Erythricium salmonicolor*** (Berk. & Broome) Burds. 1985
= *Corticium salmonicolor* Berk. & Broome, J. Linn. Soc., Bot. 14(no. 74): 71 (1873) [1875]
= *Phanerochaete salmonicolor* salmonicolor (Berk. & Broome) Jülich, Persoonia 8(3): 294 (1975)
= *Pellicularia salmonicolor* (Berk. & Broome) Dastur, Curr. Sci. 15(7): 193 (1946)
Associated with pink disease on branches and trunks of *H. brasiliensis*: Brazil, Brunei Darussalam, Cambodia, Costa Rica, Fiji, Guatemala, Malay Peninsula, Mexico, Nigeria, Papua New Guinea, Thailand (Spaulding 1961, Dingley et al. 1981, Shaw 1984, Mendes et al. 1998)
- Favolus grammocephalus*** (Berk.) Imazeki, Bull. Tokyo Sci. Mus. 6: 95 (1943)
On *H. brasiliensis*: Philippines as *Favolus tener*, Malaysia as *Polyporus grammocephalus* (Reinking 1919, Singh 1980)
- Favolus spatulatus*** (Jungh.) Lév. [as 'spathulatus'], Anns Sci. Nat., Bot., sér. 3 2: 203 (1844)
On *H. brasiliensis*: Philippines (Teodoro 1937)
- Fibulocoela* sp.**
On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Flavodon flavus*** (Klotzsch) Ryvarden, Norw. JI Bot. 20(1): 3 (1973)
On branch litter of *H. brasiliensis*: Malaysia, Thailand as *Irpex flavus* (Singh 1980, Seephueak et al. 2011)
- Fomes* sp.**
On *H. brasiliensis*: Fiji, Papua New Guinea (Firman 1972, Dingley et al. 1981, Shaw 1984)
- Fomitopsis lignea*** (Berk.) Ryvarden, Norw. JI Bot. 19: 231 (1972)
Associated with root rot disease of *H. brasiliensis*: Brazil as *Fomes ligneus* (Spaulding 1961)
- Fulvifomes umbrinellus*** (Bres.) Y.C. Dai, Fungal Divers. 45: 203 (2010)
On *H. brasiliensis*: Haiti as *Poria umbrinella* (Benjamin & Slot 1969)
- Fuscocerrena portoricensis*** (Fr.) Ryvarden, Trans. Br. Mycol. Soc. 79(2): 280 (1982)
On dead branches of *H. brasiliensis*: Brazil as *Irpex farinaceous* (Weir 1926)
- Ganoderma applanatum*** (Pers.) Pat., Hyménomyc. Eur. (Paris): 143 (1887)
On *H. brasiliensis*: Malaysia (Singh 1980)
- Ganoderma australe*** (Fr.) Pat., Bull. Soc. Mycol. Fr. 5(2,3): 65 (1889)
= *Fomes annularis* Lloyd, Mycol. Writ. 4(Letter 40): 6 (1912)
Associated with rot disease of *H. brasiliensis*: Brazil, Malaysia (Spaulding 1961)
- Ganoderma lucidum*** (Curtis) P. Karst., Revue Mycol., Toulouse 3(no. 9): 17 (1881)
Associated with heart rot and white rot disease of *H. brasiliensis*: Brunei Darussalam, East Indies, Malaysia, Sri Lanka, Thailand (Spaulding 1961, Cherdchim & Satansat 2016)

- Ganoderma philippii*** (Bres. & Henn. ex Sacc.) Bres., Iconogr. Mycol. 21: tab. 1014 (1932)
 = *Fomes pseudoferreus* Wakef. [as 'pseudo-ferreus'], Bull. Misc. Inf., Kew: 208 (1918)
 = *Ganoderma pseudoferreum* (Wakef.) Overeem & B.A. Steinm., Bull. Jard. Bot. Buitenz, 3 Sér. 7: 437 (1925)
 Associated with rot diseases of *H. brasiliensis*: Brazil, China, Democratic Republic of the Congo, India, Indonesia, Myanmar, Nigeria, Malay Peninsula, Malaysia, Sri Lanka, Thailand (Saccardo 1925, West 1938, Thompson & Johnston 1953, Spaulding 1961, Tai 1979, Giatgong 1980, Jayasinghe 1999a, Mendes et al. 1998, Thaug 2007, Ogbebor et al. 2010)
- Ganoderma* sp.**
 On *H. brasiliensis*: Papua New Guinea (Shaw 1984)
- Geastrum velutinum*** Morgan [as 'Geaster'], J. Cincinnati Soc. Nat. Hist. 18: 38 (1895)
 On *H. brasiliensis*: Ghana (Hughes 1953)
- Gloeophyllum concentricum*** G. Cunn., Bull. N.Z. Dept. Sci. Industr. Res. 164: 263 (1965)
 On *H. brasiliensis*: Samoa (Dingley et al. 1981)
- Gloeophyllum striatum*** (Fr.) Murrill, Bull. Torrey Bot. Club 32(7): 370 (1905)
 Associated with brown rot of *H. brasiliensis*: Thailand (Cherdchim & Satansat 2016)
- Haplotrichum croceum*** (Mont.) Partr. & Morgan-Jones, in Partridge et al., Mycotaxon 82: 51 (2002)
 On *H. brasiliensis*: Ghana as *Allescheriella crocea* (Hughes 1952)
- Helicobasidium longisporum*** Wakef., Bull. Misc. Inf., Kew (nos 9 & 10): 310 (1917)
 = *Helicobasidium compactum* (Boedijn) Boedijn, Arch. voor de Thee Cultuur 1: 10 (1930)
 Associated with root rot disease of *H. brasiliensis*: Costa Rica, East Indies, Mexico (Spaulding 1961, McGuire & Crandall 1967)
- Helicobasidium purpureum*** (Tul.) Pat., Bull. Soc. Bot. Fr. 32: 172 (1885)
 On *H. brasiliensis*: Mexico, Sri Lanka (Alvarez 1976, Jayasinghe 1999a)
- Hexagonia thwaitesii*** Berk. & M.A. Curtis, Proc. Amer. Acad. Arts & Sci. 4: 122 (1860)
 On *H. brasiliensis*: Philippines (Teodoro 1937)
- Hexagonia umbrinella*** Fr., Summa veg. Scand., Sectio Prior (Stockholm): 137 (1845)
 On *H. brasiliensis*: Ghana (Dade 1940)
- Hobsonia mirabilis*** (Peck) Linder, Ann. Mo. Bot. Gdn 16: 340 (1929)
 On leaf litter of *H. brasiliensis*: Thailand (Seephueak et al. 2010)
- Hyalodendron* sp.**
 On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Hydnum duriusculum*** Lloyd, Mycol. Writ. 6(Letter 64): 1002 (1920) [1921]
 On *H. brasiliensis*: Malaysia (Singh 1980)
- Hymenochaete noxia*** Berk. ex Cooke, Grevillea 8(no. 48): 150 (1880)
 On *H. brasiliensis*: Philippines (Teodoro 1937)
- Hypochnus* sp.**
 On *H. brasiliensis*: Malay Peninsula (Thompson & Johnston 1953)

- Inonotus rickii*** (Pat.) D.A. Reid, Kew Bull. [12](2): 141 (1957)
Associated with canker and decay in trunk of *H. brasiliensis*: China (Dai et al. 2010)
- Lactarius hygrophoroides*** Berk. & M.A. Curtis, Ann. Mag. nat. Hist., Ser. 3 4: 293 (1859)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Lentinus connatus*** Berk., London J. Bot. 1(3): 145 (1842)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Lentinus squarrosulus*** Mont., Annls Sci. Nat., Bot., sér. 2 18: 21 (1842)
On *H. brasiliensis*: Malaysia (Liu 1977)
- Lentinus velutinus*** Fr., Linnaea 5: 510 (1830)
On *H. brasiliensis*: Malaysia (Singh 1980)
- Leiotrametes menziesii*** (Berk.) Welti & Courtec., in Welti et al., Fungal Divers. 55(1): 60 (2012)
On *H. brasiliensis*: Malaysia as *Polystictus vittatus* (Singh 1980)
- Lopharia cinerascens*** (Schwein.) G. Cunn., Trans. Roy. Soc. N.Z. 83(4): 622 (1956)
On dead branch of *H. brasiliensis*: Malaysia as *Lopharia mirabilis* (Singh 1980)
- Marasmiellus candidus*** (Fr.) Singer, Pap. Mich. Acad. Sci. 32: 129 (1948) [1946]
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Marasmiellus scandens*** (Masse) Dennis & D.A. Reid, Kew Bull. [11](2): 289 (1957)
Associated with Thread blight of *H. brasiliensis*: Malaysia, Nigeria as *Marasmius scandens* (West 1938, Turner 1971)
- Marasmius arborescens*** (Henn.) Beeli, Bull. Soc. R. Bot. Belg. 60(2): 156 (1928)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Marasmius cyphella*** Dennis & D.A. Reid, Kew Bull. [12](2): 288 (1957)
On leaves and branches of *H. brasiliensis*: Malaysia (Johnston 1960, Anonymous 1963)
- Marasmius crinis-equi*** F. Muell. ex Kalchbr., in Kalchbrenner, Grevillea 8(no. 48): 153 (1880)
= *Marasmius equicrinis* F. Muell. ex Berk., Grevillea 8(no. 48): 153 (1880)
Associated with horsehair blight and white thread blight on branches, twigs and leaves of *H. brasiliensis*: Brazil, East Indies, Malay Peninsula, Malaysia (Thompson & Johnston 1953, Spaulding 1961, Turner 1966, 1971)
- Marasmius florideus*** Berk. & Broome, J. Linn. Soc., Bot. 14(no. 73): 39 (1873) [1875]
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Marasmius palmivorus*** Sharples, Malay. Agric. Journal 16(nos 9-10): [1] (1928)
Associated with white fan blight of *H. brasiliensis*: Malay Peninsula, Malaysia (Thompson & Johnston 1953, Holiday 1980)
- Marasmius pulcherripes*** Peck, Ann. Rep. N.Y. St. Mus. 24: 77 (1872) [1871]
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Marasmius siccus*** (Schwein.) Fr., Epicr. Syst. Mycol. (Upsaliae): 382 (1838) [1836-1838]
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

***Marasmius* sp.**

Associated with white thread blight on branched of *H. brasiliensis*: Ghana, Sri Lanka, on branch litter: Thailand (Dade 1940, Jayasinghe 1999a, Seephueak et al. 2011)

Mycena stylobates (Pers.) P. Kumm., Führ. Pilzk. (Zerbst): 108 (1871)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Naucoria conicopapillata (Henn.) Sacc. & P. Syd., Syll. fung. (Abellini) 16: 101 (1902)

On branch litter of *H. brasiliensis*: Thailand as *Marasmius conicopapillatus* (Seephueak et al. 2011)

Navisporus floccosus (Bres.) Ryvarden [as 'floccosa'], in Ryvarden & Johansen, Prelim. Polyp. Fl. E. Afr. (Oslo): 443 (1980)

On *H. brasiliensis*: Ghana as *Trametes floccosa* (Hughes 1953)

***Ozonium* sp.**

On dead branches of *H. brasiliensis*: Philippines (Weir 1926, Teodoro 1937)

Panus similis (Berk. & Broome) T.W. May & A.E. Wood, Mycotaxon 54: 148 (1995)

On branch litter of *H. brasiliensis*: Thailand as *Lentinus similis* (Seephueak et al. 2011)

Pilatoporus hemitephrus (Berk.) Zmitr., Folia Cryptogamica Petropolitana (Sankt-Peterburg) 6: 89 (2018)

On *H. brasiliensis*: Brunei Darussalam as *Fomitopsis hemitephra* (Peregrine & Ahmad 1982)

Podoscypha nitidula (Berk.) Pat., in Duss, Enum. Champ. Guadeloupe (Lons-le-Saunier): 21 (1903)

On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Poria hypobrunnea Petch, Ann. R. bot. Gdns Peradeniya 6(1): 137 (1916)

Associated with red root rot disease of *H. brasiliensis*: India, Malaysia, Sri Lanka (Johnston 1960, Spaulding 1961)

Pseudofavolus tenuis (Fr.) G. Cunn., Bull. N.Z. Dept. Sci. Industr. Res. 164: 185 (1965)

On *H. brasiliensis* as *Hexagonia tenuis*: Malaysia, Thailand (Chipp 1921, Seephueak et al. 2011)

Pycnoporus sanguineus (L.) Murrill, Bull. Torrey Bot. Club 31(8): 421 (1904)

On branch of *H. brasiliensis*: Thailand, Malaysia (Singh 1980, Seephueak et al. 2011)

Pyrrhoderma lamaoense (Murrill) L.W. Zhou & Y.C. Dai [as 'lamaëense'], in Zhou et al., Mycologia 110(5): 882 (2018)

On *H. brasiliensis* as *Fomes lamaoensis*: Democratic Republic of the Congo, Cote d'Ivoire, East Indies, Ghana, India, Malaysia, Philippines, Sri Lanka, Fiji as *Phellinus lamaoensis* (Spaulding 1961, Dingley et al. 1981)

Pyrrhoderma noxium (Corner) L.W. Zhou & Y.C. Dai, in Zhou et al., Mycologia 110(5): 882 (2018)

= *Phellinus noxius* (Corner) G. Cunn., Bull. N.Z. Dept. Sci. Industr. Res. 164: 221 (1965)

Associated with brown root rot of *H. brasiliensis*: Brazil, Cote d'Ivoire, Fiji, Myanmar, Papua New Guinea, Thailand; on root of *H. brasiliensis* as *Fomes noxius*: Ghana, Malay Peninsula, Nigeria (West 1938, Dade 1940, Thompson & Johnston 1953, Giatgong 1980, Dingley et al. 1981,

Shaw 1984, Nandris et al. 1987, Holliday 1995, Mendes et al. 1998, Thaung 2007, Ogbemor et al. 2010)

Rhizoctonia anceps (Bres., Syd. & P. Syd.) Oberw., R. Bauer, Garnica & R. Kirschner, Mycol. Prog. 12: 774 (2013)

On *H. brasiliensis*: Brazil as *Ceratobasidium anceps* (Mendes et al. 1998)

Rhizoctonia solani J.G. Kühn, Ann. Sper. Agr., N.S.: 224 (1858)

= (Pat.) D.P. Rogers, Farlowia 1(1): 113 (1943) [1943-1944]

On *H. brasiliensis* as *Thanatephorus cucumeris*: Brazil, Malaysia, Papua New Guinea; associated with web blight on host stem at soil surface or dead roots of *H. brasiliensis* as *Pellicularia filamentosa*: Bolivia, Brazil, Colombia, Costa Rica, Honduras, Peru, Sri Lanka, (Spaulding 1961, Liu 1977, Shaw 1984, Mendes et al. 1998)

***Rhizoctonia* sp.**

On *H. brasiliensis*: Brazil (Mendes et al. 1998)

***Rhizoctonia* spp.**

Associated with rubber tree seeds harvested of *H. brasiliensis*: Brazil (Theodoro & Batista 2014)

Rigidoporus lineatus (Pers.) Ryvarde, Norw. JI Bot. 19: 236 (1972)

= Berk., Ann. Mag. nat. Hist., Ser. 1 10: 375 (1843) [1842]

Associated with heart rot of heartwood of *H. brasiliensis*: Brazil as *Polyporus zonalis*, Papua New Guinea (Spaulding 1961, Shaw 1984)

Rigidoporus microporus (Sw.) Overeem, Icon. Fung. Malay. 5: 1 (1924)

= *Fomes lignosus* (Klotzsch) Bres., Hedwigia 4(39): 519 (1912)

= *Fomes semitostus* (Berk.) Cooke, Grevillea 14(no. 69): 21 (1885)

= *Leptoporus lignosus* (Klotzsch) R. Heim, Annals Cryptog. Exot. 7: 22 (1934)

= *Polyporus lignosus* Klotzsch, Linnaea 8(4): 485 (1833)

= *Rigidoporus lignosus* (Klotzsch) Imazeki, Bull. Gov. Forest Exp. Stn Tokyo 57: 118 (1952)

Associated with white root rot disease *H. brasiliensis*: Africa, Brazil, China, Democratic Republic of the Congo, Costa Rica, Cote d'Ivoire, Equatorial Guinea, Ghana, India, Indonesia, Malay Peninsula, Malaysia, Mexico, Myanmar, Nigeria, Papua New Guinea, Philippines, Sri Lanka, Thailand, West Africa (West 1938, Dade 1940, Hughes 1953, Thompson & Johnston 1953, Spaulding 1961, Giatgong 1980, Oghenekaro et al. 2014)

Schizophyllum commune Fr. [as 'Schizophyllum communis'], Observ. Mycol. (Havniae) 1: 103 (1815)

On decaying logs and branches of *H. brasiliensis*: Ghana, Malaysia, Philippines, Thailand (Teodoro 1937, Hughes 1953, Williams & Liu 1976, Seephueak et al. 2011)

Schizophyllum umbrinum Berk., Hooker's J. Bot. Kew Gard. Misc. 3: 15 (1851)

On *H. brasiliensis*: Dominican Republic, Haiti (Ciferri 1961, Benjamin & Slot 1969)

Scytinostroma duriusculum (Berk. & Broome) Donk, Fungus 26: 20 (1956)

On *H. brasiliensis*: Malaysia as *Stereum duriusculum* (Williams & Liu 1976)

Septobasidium atratum Pat., Bull. Soc. Mycol. Fr. 16(4): 181 (1900)

On *H. brasiliensis*: Brazil (Mendes et al. 1998)

- Septobasidium bogoriense* Pat., in Hennings in Warburg, *Monsunia* 1: 138 (1899) [1900]
On *H. brasiliensis*: Malaysia (Singh 1980)
- Septobasidium heveae* Couch ex L.D. Gómez & Henk, *Lankesteriana* 4(1): 84 (2004)
On bark of *H. brasiliensis* associated with *Coccoidea*: Amazonas (Gómez & Henk 2004)
- Septobasidium* sp.
On *H. brasiliensis*: Malaysia, Thailand (Turner 1971, Giatgong 1980)
- Stereopsis hiscens* (Berk. & Ravenel) D.A. Reid, *Beih. Nova Hedwigia* 18: 298 (1965)
On *H. brasiliensis*: Malaysia as *Stereum cuneiforme* (Singh 1980)
- Stilbum heveae* Zimm., *Bulletin Inst. Bot. Buitenzorg* 10: 21 (1901)
On dead branches of *H. brasiliensis*: Indonesia (Saccardo 1902)
- Stilbum* sp.
On *H. brasiliensis*: Thailand (Giatgong 1980)
- Tilletiopsis* sp.
On *H. brasiliensis*: Papua New Guinea (Shaw 1984)
- Tinctoporellus epimiltinus* (Berk. & Broome) Ryvardeen, *Trans. Br. Mycol. Soc.* 73(1): 18 (1979)
On *H. brasiliensis*: Dominican Republic as *Poria borbonica*, Haiti as *Poria epimiltina* (Ciferri 1961, Benjamin & Slot 1969)
- Trametes apiaria* (Pers.) Zmitr., Wasser & Ezhov, in Zmitrovich, Ezhov & Wasser, *Int. J. Med. Mushrooms* 14(3): 317 (2012)
On branch litter of *H. brasiliensis*: Thailand as *Hexagonia apiaria* (Seephueak et al. 2011)
- Trametes cingulata* Berk., *Hooker's J. Bot. Kew Gard. Misc.* 6: 164 (1854)
On *H. brasiliensis*: Brunei Darussalam (Peregrine & Ahmad 1982)
- Trametes elegans* (Spreng.) Fr., *Epicr. Syst. Mycol. (Upsaliae)*: 492 (1838) [1836-1838]
On *H. brasiliensis* as *Lenzites elegans*: Malaysia, Thailand on branch litter (Singh 1980, Seephueak et al. 2011)
- Trametes hirsuta* (Wulfen) Lloyd, *Mycol. Writ.* 7(Letter 73): 1319 (1924)
On branch litter of *H. brasiliensis*: Thailand as *Coriolus hirsutus* (Seephueak et al. 2011)
- Trametes personii* (Mont.) Pat., *Bull. Soc. Mycol. Fr.* 23: 80 (1907)
On *H. brasiliensis*: Philippines (Teodoro 1937)
- Tremella fuciformis* Berk., *Hooker's J. Bot. Kew Gard. Misc.* 8: 277 (1856)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Typhula ishikariensis* S. Imai, *Trans. Sapporo nat. Hist. Soc.* 11(1): 75 (1930) [1929]
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)
- Xeromphalina campanella* (Batsch) Kühner & Maire, in Konrad & Maublanc, *Icones selectae Fungorum*, 6 Texte general 6: 284 (1934)
On branch litter of *H. brasiliensis*: Thailand (Seephueak et al. 2011)

Phylum: Oomycota

Globisporangium splendens (Hans Braun) Uzuhashi, Tojo & Kakish., Mycoscience 51(5): 363 (2010)

On *H. brasiliensis*: Malaysia as *Pythium splendens* (Liu 1977)

Phytophthora botryosa Chee, Trans. Br. Mycol. Soc. 52(3): 428 (1969)

Associated with abnormal leaf fall disease and stripe canker on petioles of *H. brasiliensis*: Malaysia, Thailand as black strip and phytophthora leaf fall, Viet Nam (Drenth et al. 2004, Deechouy 2013)

Phytophthora cactorum (Lebert & Cohn) J. Schröt., in Cohn, Krypt.-Fl. Schlesien (Breslau) 3.1(9–16): 236 (1886) [1889]

Associated with seedling blight of *H. brasiliensis*: China, India, Indonesia, Sri Lanka, USSR (Spaulding 1961, Erwin & Ribeiro 1996)

Phytophthora capsici Leonian, Phytopathology 12(9): 403 (1922)

Associated with black stripe and stem canker of *H. brasiliensis*: Brazil, China, Nigeria, Thailand (Mendes et al. 1998, Yu 1998, Drenth et al. 2004)

Phytophthora citricola Sawada, Report of the Department of Agriculture, Government Research Institute of Formosa 27: 21 (1927)

On *H. brasiliensis*: Sri Lanka (Erwin & Ribeiro 1996)

Phytophthora citrophthora (R.E. Sm. & E.H. Sm.) Leonian, Am. J. Bot. 12: 445 (1925)

Associated with abnormal leaf fall disease of *H. brasiliensis*: Brazil, China, Cote d'Ivoire, Indonesia, Thailand (Erwin & Ribeiro 1996, Mendes et al. 1998, Laohasakul et al. 2017)

Phytophthora colocasiae Racib., Parasit. Alg. Pilze Java's (Jakarta) 1: 9 (1900)

Associated with leaf fall, stem canker and black stripe of *H. brasiliensis*: China (Erwin & Ribeiro 1996)

Phytophthora meadii McRae, J. Bombay nat. Hist. Soc. 25: 760 (1918)

Associated with abnormal leaf fall, pod rot, stripe canker and black stripe of *H. brasiliensis*: Brazil, Cambodia, Cameroon, China, Democratic Republic of the Congo, Costa Rica, Ghana, India, Indonesia, Liberia, Malay Peninsula, Malaysia, Myanmar, Nicaragua, Nigeria, Peru, Philippines, Sri Lanka, Thailand, Venezuela, Viet Nam (Thompson & Johnston 1953, Tai 1979, Erwin & Ribeiro 1996, Drenth et al. 2004)

Phytophthora nicotianae Breda de Haan, Meded. Lds PItuin, Batavia 15: 57 (1896)

= *Phytophthora nicotianae* var. *parasitica* (Dastur) G.M. Waterh., Mycol. Pap. 92: 14 (1963)

= *Phytophthora parasitica* Dastur, Memoirs of the Dept. Agric. India, Bot. Ser. 5(4): 226 (1913)

Associated with abnormal leaf fall, pod rot, stripe canker and black stripe of *H. brasiliensis*: China, Nigeria, India, Malaysia, Thailand (Giatgong 1980, Erwin & Ribeiro 1996, Drenth et al. 2004, Rubber Research Institute of Thailand 2010, Latifah et al. 2017)

Phytophthora palmivora (E.J. Butler) E.J. Butler, Science Rep. Agric. Res. Inst. Pusa: 82 (1919) [1918]

= *Phytophthora arecae* (L.C. Coleman) Pethybr., Scientific Proc. R. Dublin Soc., N.S. 13: 555 (1913)

= *Phytophthora faberi* Maubl., Agriculture prat. Pays chauds 79: 315 (1909)

= *Phytophthora heveae* A.W. Thomps., Malay. agric. Journal 17(3-4): 77 (1929)

Associated with abnormal leaf fall, patch canker, stripe canker, pod rot and rot disease on bark, seedling and fruit of *H. brasiliensis*: Brazil, Cambodia, China, Democratic Republic of the Congo, Costa Rica, Ghana, India, Indonesia, Liberia, Malay Peninsula, Malaysia, Mexico, Myanmar, Nigeria, Papua New Guinea, Philippines, Samoa, Sri Lanka, Thailand as black strip and phytophthora leaf fall, Viet Nam (Thompson & Johnston 1953, Teodoro 1937, West 1938, Spaulding 1961, Litzenberger et al. 1962, McGuire & Crandall 1967, Dingley et al. 1981, Shaw 1984, Erwin & Ribeiro 1996, Drenth et al. 2004, Thaung 2008, Deechouy 2013)

Phytophthora palmivora* var. *palmivora (E.J. Butler) E.J. Butler, Science Rep. Agric. Res. Inst. Pusa: 82 (1919) [1918]

On *H. brasiliensis*: Brazil, Cameroon, China, Democratic Republic of the Congo, Costa Rica, Fiji, India, Indonesia, Liberia, Malaysia, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Thailand, Uganda (Erwin & Ribeiro 1996)

Phytophthora phaseoli Thaxt., Bot. Gaz. 14(11): 274 (1889)

Associated with seedling blight of *H. brasiliensis*: Philippines (Erwin & Ribeiro 1996)

***Phytophthora* sp.**

On *H. brasiliensis*: Cote d'Ivoire, India, Malaysia, Mexico as die-back of young budded shoots of seedling, Thailand on leaves, Viet Nam (West 1938, Alvarez 1976, Nandris et al. 1987, Drenth et al. 2004, Seephueak et al. 2010, Martin et al. 2014)

Phytophthora vexans (de Bary) Abad, de Cock, Bala, Robideau, A.M. Lodhi & Lévesque, Persoonia 34: 37 (2014)

Associated with patch canker on bark and root rot of *H. brasiliensis*: China as *Pythium vexans*, Malay Peninsula as *Pythium complectens* (Thompson & Johnston 1953, Spaulding 1961, Zeng et al. 2005)

Pythium acanthicum Drechsler, J. Wash. Acad. Sci. 20: 408 (1930)

On *H. brasiliensis*: China (Yu 1998)

***Pythium* sp.**

On *H. brasiliensis*: Cote d'Ivoire (Nandris et al. 1987)

Division: Zygomycota

Choanephora cucurbitarum (Berk. & Ravenel) Thaxt., Rhodora 5: 99 (1903)

On branches, leaves and stems of *H. brasiliensis*: Liberia, Malaysia, Papua New Guinea (Turner 1971, Schreurs 1972, Shaw 1984)

Mortierella polycephala Coem., Bull. Soc. R. Bot. Belg., sér. 2 16: 536 (1863)

On leaves of *H. brasiliensis*: Thailand (Seephueak et al. 2010)

***Rhizopus* spp.**

Associated with rubber tree seeds harvested of *H. brasiliensis*: Brazil (Theodoro & Batista 2014)

***Umbelopsis* sp.**

Endophytic on living leaves and sapwood of *H. brasiliensis*: Peru (Gazis & Chaverri 2010)

Discussion

Para rubber plantations have been expanding rapidly throughout Southeast Asia and especially in Thailand (Herrmann et al. 2016, Vongkhamheng et al. 2016). The tree is a favorable host for many pests and diseases, especially fungi (Jayasinghe 2000, Gazis & Chaverri 2010, Ariharan et al. 2015). In this study, 167 fungal specimens were collected from Chiang Mai, Chiang Rai, Loei, Phayao, Ranong, and Sukhothai provinces in Thailand. We collected symptomatic and asymptomatic ascomycetes associated with *Hevea brasiliensis* and identified them based on morphology together with multi-gene phylogeny. Fifty-one collections were isolated, and five were sequenced directly from fruiting structures. There were 36 taxa distributed among 21 families in 12 orders. Twenty-four taxa are accommodated in seven orders, 14 families and 19 genera in Dothideomycetes, which included one new genus, four new species, 12 new host records, one sexual morph record and one reference specimen. Twelve taxa are accommodated in five orders, seven families and nine genera in Sordariomycetes, which includes three new species, eight new host records and one asexual morph record. Of these, Pleosporales and Diaporthales were the dominant orders in Dothideomycetes and Sordariomycetes yielding ten and six taxa, respectively.

Although studies of fungi in Thailand have resulted in large numbers of novel taxa (Hyde et al. 2018), this was not the case with rubber trees. The reason for this may be that 1) as rubber trees were introduced to Thailand, they may have been colonized by a weed-like consortium of fungi, 2) twigs and branches attached to trees were mostly collected or 3) that fungal discovery in Thailand is coming to an end. This does not appear to be the case (Hyde et al. 2020c), but it will be interesting to establish the reasons for lack of novelty.

Fungi show high ecological as well as functional diversity (Walker et al. 2014, Braunsdorf et al. 2016, Raja et al. 2017, Lücking et al. 2020, Chethana et al. 2021). The term “host-jump” and “host-shift” were proposed by Roy (2001) for fungal taxa that colonized unrelated or related host species. Some species such as *Neoroussoella heveae*, *Muyocopron dipterocarpi* and *Pernoetypa longiasca* isolated from Para rubber formed appressoria on agar (Senwanna et al. 2017, 2019, Phookamsak et al. 2019). Appressoria are functionally specialized cells found in certain plant pathogens and endophytes (Chethana et al. 2021) and may indicate adaptations for an endophytic lifestyle (Konta et al. 2016, Phukhamsakda et al. 2016, Senwanna et al. 2017, 2019, Demoor et al. 2019, Chethana et al. 2021). In this study, the appressoria-like structures were found in *Allocryptovalsa cryptovalsoidea*, *Hermatomyces sphaericus*, *Paraeutypella citricola*, *Pleopunctum heveae*, *Pseudopithomyces palmicola* and *Verruconis phayaoensis*. Most previous studies of fungi on Para rubber focused on endophytes, symptomatic material, and saprobes on decaying substrates (Weir 1926, Spaulding 1961, Jayasinghe 1999a, Gazis & Chaverri 2010, Seephueak et al. 2010, 2011, Trakunyingcharoen et al. 2015a). We collected symptomatic and asymptomatic branches and twigs attached to the Para rubber trees, for the present study. *Corynespora cassiicola*, *Lasiodiplodia theobromae* and *Periconia heveae* found in our study have also been also reported from Amazon Forest areas (Spaulding 1961). which are the original areas for Para rubber. *Corynespora cassiicola* and *Lasiodiplodia theobromae* are common cosmopolitan species on various hosts with diverse life modes (Lopez et al. 2018, Pujade-Renaud et al. 2019, Salvatore et al. 2020a, b, Farr and Rossman 2021). *Periconia heveae* is commonly found on *Hevea* causing leaf spot and blight disease (Spaulding 1961, Farr & Rossman 2021). Most other taxa found on rubber trees have previously been collected on other plants in Thailand, such as *Bauhinia purpurea*, *Chromolaena odorata*, *Coffea arabica*, *Dimocarpus longan*, *Mangifera indica*, *Pandanus* spp., *Persea americana*, and *Tectona grandis* (Trakunyingcharoen et al. 2015a, b, Doilom et al. 2017, Tibpromma et al. 2016, 2018, Phookamsak et al. 2019, Mapook et al. 2020). The fungi associated with Para rubber are interesting as they have been subjected to few molecular studies. Furthermore, with modern multi-gene approaches, approach, there is a likelihood of discovering asexual/sexual morph connections, e.g., *Cytospora diopuiensis*, *Gloniopsis leucaenae* and *Pseudofusicoccum adansoniae* (Senwanna et al. 2020). Para rubber is not a native plant to Thailand and therefore, the fungi occurring on this host have most likely jumped from surrounding hosts plants.

According to the U.S. National Fungus Collections Fungus-Host Database (Farr & Rossman 2020), together with relevant literature, there are 785 species and 180 taxa identified to genus on Para rubber from 59 countries. These species are classified in four phyla: (i) Ascomycota: 672 species and 163 taxa named only to genus, in 44 orders, 124 families and 434 genera, (ii) Basidiomycota: 97 species and 13 taxa named only to genus, in 19 orders, 38 families and 71 genera, (iii) Oomycota: 14 species and two taxa named only to genus, in Peronosporales, two families and four genera, and (iv) Zygomycota: two species and two taxa named only to genus, in three orders, four families and four genera. The largest number of reports are from Thailand (670 taxa) and Malaysia (128 taxa); however, most previous taxa were identified based on morphology. The most commonly reported genera are *Colletotrichum* (associated with leaves and commonly known as anthracnose disease), followed by *Xylaria*, *Sporidesmium*, *Curvularia*, *Phytophthora*, *Cladosporium* and *Fusarium* species. These taxa on Para rubber are plant pathogens and endophytes, or are associated with degrading plant material or soil in plantations. However, different species show varying abundance for different plant parts (Seephueak et al. 2010, 2011, Araújo et al. 2020). Many taxa on Para rubber are asexual forms and mostly occur on decomposing plant debris (Lodge 1977). Asexual states have more frequently been isolated from plant litter (Shanthy & Vittal 2010, Osono 2020), and via isolation from tree leaf litter and decaying branch litter (Seephueak et al. 2010, 2011). Studies revealed that the abundant species on Para rubber are Ascomycota followed by Basidiomycota (Venkatachalam et al. 2006, Gazis & Chaverri 2010, Chaverri et al. 2011, Rocha et al. 2011, Déon et al. 2012a, b, Cai et al. 2013, Sunpapao & Pornsuriya 2014, Monkai et al. 2017, Meeboon & Takamatsu 2020).

This study focused on fungi collected from specimens that were attached to Para rubber trees. Only 48% of our collections were successfully sequenced and therefore included in this report. Another 52% of our collections have morphological data. However, we were unable to obtain sequence data as the spores of some species did not germinate, or we could not extract DNA from the fungal structures. The information of diversity and geographic distribution of fungi on rubber is currently incomplete. Thus, studies of fungi on Para rubber and surrounding plants should be continued.

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