

CHAPTER 4

RESULTS AND DISCUSSION

Survey and collecting of Tar spot disease

During surveying and collecting of tar spot disease since May 2014 – August 2016, disease symptoms were found in 12 collection sites within 3 provinces, were Chiang Mai, Lamphun and Lampang. 58 samples were collected CM within 6 districts, including Chom Thong, Fang, Mae Ai, Mae Rim, Mueng and Saraphi. 5 samples were collected from Li and Muang districts, Lamphun province. 2 samples were collected from Soem Ngam district, Lampang province. Host plant were belong to 5 families, including Cyperceae (1) sample, Fabaceae (4) sample, Musaceae (1) sample, Moraceae (4) sample, Phyllanthaceae (1) sample, Poaceae (29) sample and unidentified monocotyledon and dicotyledon plants (26) sample. Of these the symptoms were grouped into 3 type as (1) moderately domed stoma, lesion/stomata 150–500 μm , peritecium 60–400 μm . (2) strongly domed stoma, lesion/stomata 600–2000 μm , peritecium 130–700 μm . (3). chlorotic to yellow halo lesion, flated or clateriform stoma/not domed shape, swollen at the lower leaf surface (Table 3).

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Table 3 Data on Tar spot disease in Chiang Mai.

No	Host name	Host family	Location	Species	date
1	<i>Brachiaria reptans</i>	Poaceae	Maekalngluang, Chom Thong	<i>P. cynodontis</i>	5 Mar 2015
2	<i>Brachiaria reptanns</i>	Poaceae	Doi Suthep	<i>P. cynodontis</i>	15 Aug 2014
3	<i>Brachiaria reptanns</i>	Poaceae	Mae Hia	<i>P. cynodontis</i>	2 Oct2014
4	<i>Echinochlona colane</i>	Poaceae	Li	<i>P. gloiana</i>	11 Nov 2014
5	<i>Eleusine indica</i>	Poaceae	Royal Project Foundation of Nonghoy	<i>P. punctum</i>	2 Aug 2014
6	<i>Eleusine indica</i>	Poaceae	Queensirikit garden	<i>P. punctum</i>	12 Nov 2014
7	<i>Eleusine indica</i>	Poaceae	Maeai	<i>P. punctum</i>	7 Nov 201
8	<i>Eleusine indica</i>	Poaceae	Li	<i>P. punctum</i>	29 Aug 2014
9	<i>Eleusine indica</i>	Poaceae	Mae Hia	<i>P. punctum</i>	12 Dec 2014
10	<i>Eleusine indica</i>	Poaceae	Khunchangkain	<i>P. punctum</i>	15 Aug 2014
11	<i>Eleusine indica</i>	Poaceae	Saraphi	<i>P. punctum</i>	9 Nov2014
12	<i>Chloris barbata</i>	Poaceae	Royal Project Foundation of Nonghoy	<i>P. koondrookensis</i>	2 Aug 2015
13	<i>Chloris barbata</i>	Poaceae	Chom Thong	<i>P. koondrookensis</i>	6 Feb 2015
14	<i>Chloris barbata</i>	Poaceae	Saraphi	<i>P. koondrookensis</i>	9 Nov 2014
15	<i>Cynodon dactylon</i>	Poaceae	Queensirikit garden	<i>P. cynodontis</i>	12 Nov 2015
16	<i>Cynodon dactylon</i>	Poaceae	CMU	<i>P. cynodontis</i>	11 Nov 2015
17	<i>Cynodon dactylon</i>	Poaceae	Khunchangkain	<i>P. cynodontis</i>	20 Mar 2015

Table 3 (continued)

No	Host name	Host family	Loction	Species	Date
18	<i>Cynodon nlemfuensis</i>	Poaceae	Chom Thong	<i>P. cynodontis</i>	6 Feb 2015
19	<i>Cyperus pilosus</i>	Cyperaceae	Mae Hia		2 Oct 2014
20	<i>Digitaria adscendens</i>	Poaceae	Li	<i>P. oryzopsidis</i>	21 Dec 2014
21	<i>Digitaria adscendens</i>	Poaceae	Soem Hgam	<i>P. oryzopsidis</i>	24 Feb 2015
22	<i>Digitaria adscendens</i>	Poaceae	Doi Suthep	<i>P. oryzopsidis</i>	20 Aug 2014
23	<i>Ficus religiosa</i>	Moraceae	Lamphun	<i>P. fici-orbispora</i>	8 Jan 2015
24	<i>Ficus religiosa</i>	Moraceae	CMU	<i>P. fici-orbispora</i>	15 Jan 2015
25	<i>Ficus religiosa</i>	Moraceae	CMU	<i>P. infectoria</i>	5 Feb 2014
26	<i>Imperata cylindrical</i>	Poaceae	Maekalngluang, Chom Thong	<i>P. oryzopsidis</i>	5 Mar 2015
27	<i>Imperata cylindrical</i>	Poaceae	Saraphi	<i>P. oryzopsidis</i>	9 Nov 2014
28	<i>Imperata cylindrical</i>	Poaceae	Doi Suthep	<i>P. oryzopsidis</i>	20 Aug 2014
29	<i>Musa sapientum</i>	Musaceae	Queensirikit garden		11 Nov 2015
30	<i>Phyllanthus reticulatus</i>	Phyllanthaceae	Maekalngluang, Chom Thong	<i>P. leucospila</i>	5 Mar 2015
31	<i>Pterocarpus indicus</i>	Fabaceae	Li	<i>P. pteracarpi</i>	21 Dec 2014
32	<i>Pterocarpus indicus</i>	Fabaceae	Chom Thong	<i>P. pteracarpi</i>	6 Feb 2015
33	<i>Pterocarpus indicus</i>	Fabaceae	Chiang Mai	<i>P. pteracarpi</i>	20 Aug 2014

Table 3 (continued)

No	Host name	Host family	Loction		Date
34	<i>Pterocarpus indicus</i>	Fabaceae	Saraphi	<i>P. pteracarpus</i>	20 Feb 2014
35	<i>Thysanoleana maxima</i>	Poaceae	Maekalngluang, Chom Thong	<i>P. amphibola</i>	5 Mar 2015
36	CMU_TAR37		Royal Project Foundation of Nonghoy	<i>P. bulbosa</i>	2 Aug 2015
37	CMU_TAR38		Queensirikit garden	<i>P. ischaemi</i>	11 Nov 2015
38	CMU_TAR39		Queensirikit garden	<i>P. minutissima</i>	11 Nov 2015
39	CMU_TAR40		Queensirikit garden	<i>P. oryzopsidis</i>	11 Nov 2015
40	CMU_TAR43		Queensirikit garden	<i>P. ramisii</i>	11 Nov 2015
41	CMU_TAR44		Soem Hgam	<i>P. oryzopsidis</i>	24 Feb 2015
42	CMU_TAR45		Maekalngluang, Chom Thong	<i>P. cantonensis</i>	5 Mar 2016
43	CMU_TAR47		Maekalngluang, Chom Thong	<i>P. glycinicola</i>	5 Mar 2016
44	CMU_TAR48		Maekalngluang, Chom Thong	<i>P. dolichogena</i>	5 Mar 2016
45	CMU_TAR50		Maekalngluang, Chom Thong	<i>P. ficuum</i>	5 Mar 2016
46	CMU_TAR51		Maekalngluang, Chom Thong	<i>P. cantonensis</i>	5 Mar 2016
47	CMU_TAR52		Maekalngluang, Chom Thong		5 Mar 2016
48	CMU_TAR53		Maekalngluang, Chom Thong		5 Mar 2016
49	CMU_TAR56		Maekalngluang, Chom Thong	<i>P. queenslandica</i>	5 Mar 2016
50	CMU_TAR57		Maekalngluang, Chom Thong	<i>P. tumatumeriana</i>	5 Mar 2016

Table 3 (continued)

No	Host name	Host family	Loction		Date
51	CMU_TAR58		Maekalngluang, Chom Thong	<i>P. cantonensi</i>	5 Mar 2016
52	CMU_TAR59		Maekalngluang, Chom Thong	<i>P. oryzopsidis</i>	5 Mar 2016
53	CMU_TAR60		Maekalngluang, Chom Thong	<i>P. callistemonis subsp. callistemonis</i>	5 Mar 2016
54	CMU_TAR61		Maekalngluang, Chom Thong	<i>P. callistemonis subsp. similis</i>	5 Mar 2016
55	CMU_TAR65		Maekalngluang, Chom Thong	<i>P. cllistemonis</i>	5 Mar 2016
56	CMU_TAR67		Doi Suthep		20 Aug 2014
57	CMU_TAR68		Doi Suthep		20 Aug 2014
58	CMU_TAR69		Doi Suthep	<i>P. bauhiniae</i>	20 Aug 2014
59	CMU_TAR70		Doi Suthep		20 Aug 2014
60	CMU_TAR72		Doi Suthep	<i>P. glycinicola</i>	20 Aug 2014
61	CMU_TAR73		Doi Suthep	<i>P. gloriana</i>	20 Aug 2014

Table 3 (continued)

No	Host name	Host family	Loction		Date
62	CMU_TAR74		Doi Suthep		20 Aug 2014
63	<i>Vetiveria zizanioides</i>	Poaceae	Queensirikit garden	<i>P. fimbristylidis</i>	11 Nov 2015
64	<i>Vetiveria zizanioides</i>	Poaceae	Royal Project Foundation of Nonghoy	<i>P. fimbristylidis</i>	2 Aug 2015
65	<i>Vetiveria zizanioides</i>	Poaceae	Ongkhong	<i>P. fimbristylidis</i>	12 Nov 2014

Study morphology and of fungi cause Tar spot disease

In total 67 collection of the tar spot fungi associated with 45 families of plant have been examined and identified, consisted of 63 *Phyllachora* and 4 unknown species, 33 species are new to siece in which two species have been validly published or are in the process of publication. Ten speies have are new records to Thailand and nine plant species are new host to this group of fungi.

Taxonomy

***Phyllachora cynodontis* on *Brachiaria reptans*:** 3 isolates were compared morphologically in Table 4.

Table 4 Comparison of *Phyllachora cynodontis* on *Brachiaria reptans*

Isolate	Host	Location	Leaf spot (mm)	Asci (µm)	Ascospores (µm)
CMU_TAR01	<i>Brachiaria reptans</i>	Maekalngluang, Chom Thong	0.2– 1×0.2–0.5	7– 11×51(58– 68)–75	5–6×12–15
CMU_TAR02	<i>Brachiaria reptans</i>	Doi Suthep	0.2– 1×0.2– 0.2–1	7–10×50– 72	5–6×12–15
CMU_TAR03	<i>Brachiaria reptans</i>	Mae Hia	0.2– 2×0.2–2	7.8– 12×45– (55–75)– 87	4–6×9–13

Phyllachora cynodontis

Species examined: CMU_TAR01 collection, Maekalngluang, Chom Thong, Chiang Mai, on living leaves of *Brachiaria reptans*

Anamorph: Spermatophores cylindric, with rounded to swollen apices, spermatia filiform, hyaline, guttulate.

Teleomorph: The blackened on living leaves of *Brachiaria reptans*, Tar spots 0.2–1×0.2–0.5 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata unimultiloculate, 212.5–(400–470) µm wide, 175–(180–340) µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial 152.5–(180–200) µm wide, 92.5–137.5 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 7–11×51–75 µm 8-spored unitunicate, clavate, overlapping uniseriate. Ascospores, 5–6×12–15 µm. unicellular to ellipsoidal, oval, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 9.)

Notes: *Phyllachora cynodontis* was originally described by Cannon (1991), this is first report *Phyllachora* sp. on *Brachiaria reptans* in Thailand, which is similar to *Phyllachora cynodontis* but which has smaller asci and ascospore.

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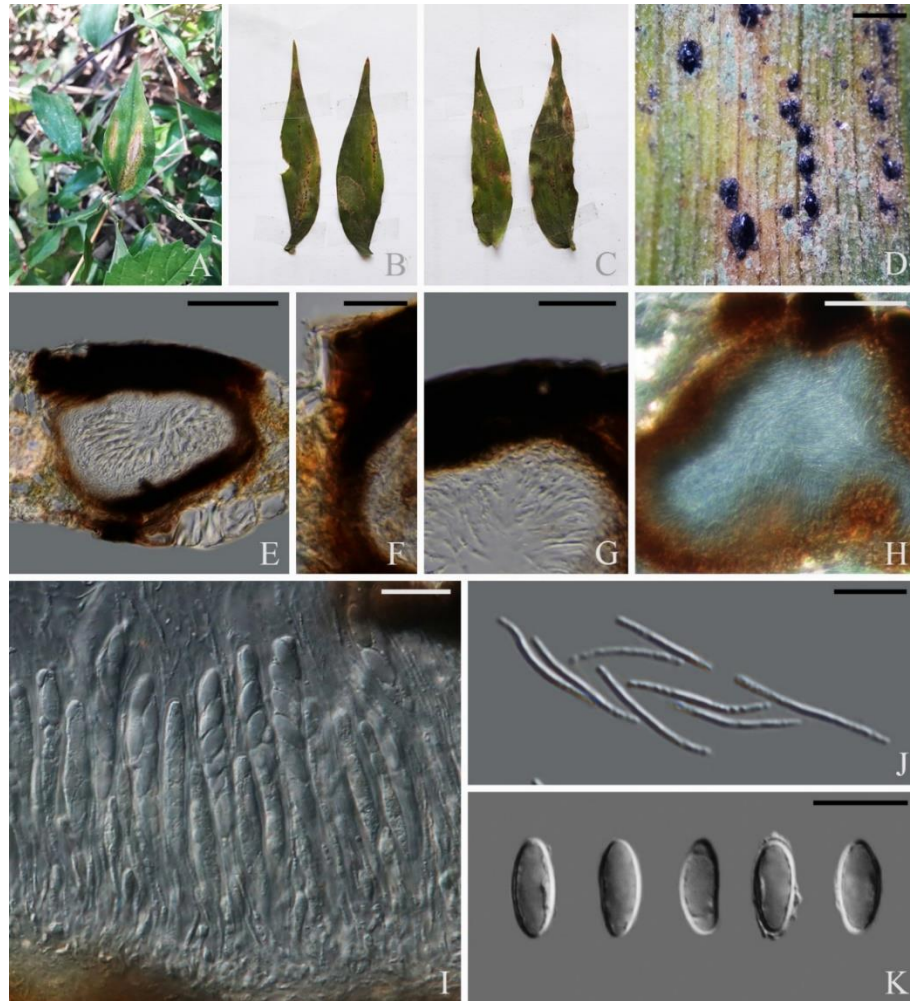


Figure 9. *Phyllachora cynodontis* on leaf, A-C. Tar spots on upper surface, D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Vertical section through ostiolar canal, H. Spermatia stage, I. Asci and paraphyses, J. Apermata, K. Ascospores. Scale bars: D = 5 mm, E = 100 μ m, F = 20 μ m, G = 30 μ m, H = 100 μ m, I = 20 μ m J. = 10 μ m, K. = 10 μ m.

Phyllachora cynodontis

Species examined: CMU_TAR02 collection, Doi Suthep, Chiang Mai, on living leaves of *Brachiaria reptans*.

Teleomorph: The blackened on living leaves of *Brachiaria reptans*, Tar spots 0.2–1×0.2–1 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial, 185–(270–290)–340 µm wide, 110–(127–150)–200 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 7–10×50–72 µm 8–spored unitunicate, clavate, overlapping uniseriate. Ascospores, 5–6×12–15 µm. unicellular to ellipsoidal, oval, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 10.)

Notes: CMU_TAR02 collection which is similar to CMU_TAR01 but which has smaller asci and ascospores.

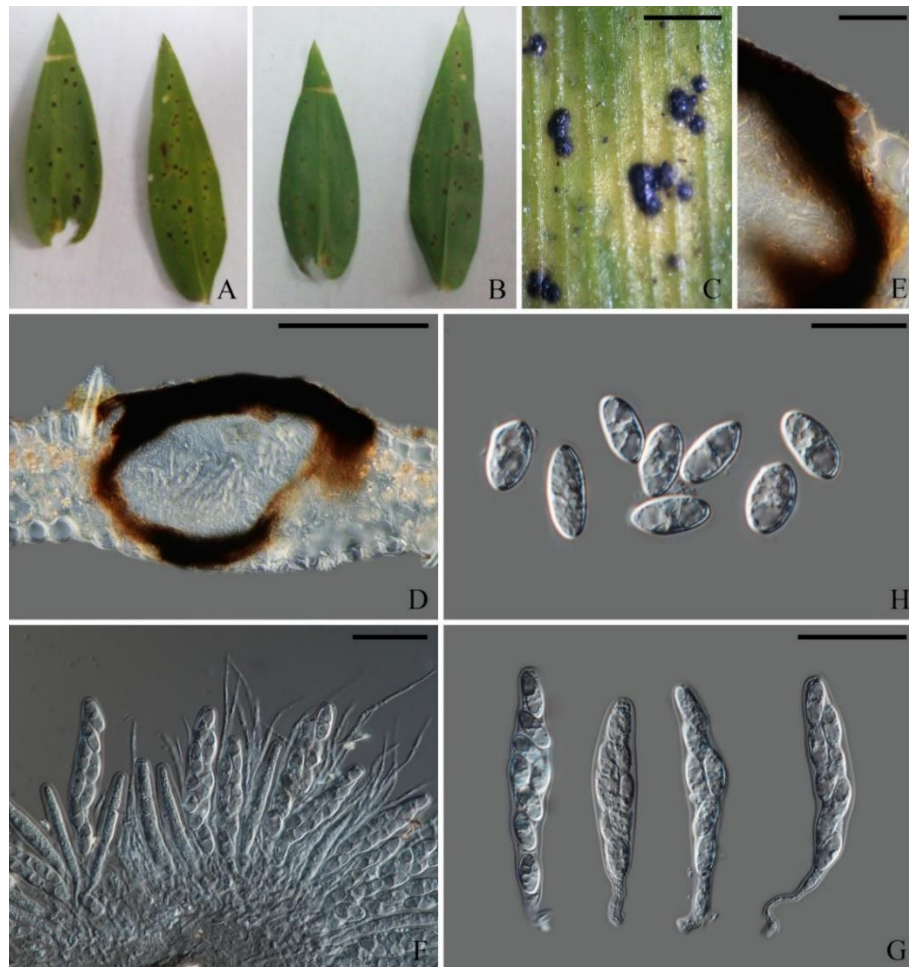


Figure 10. *Phyllachora cynodontis*. on leaf, A-B. Tar spots on upper surface, C. Close up of tar spots on leaf, D. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, E. Vertical section through peridium, F. Asci and paraphyses, G. Asci, H. Ascospores. Scale bars: C = 5 mm, D. = 100 μ m, E = 30 μ m, F = 20 μ m, G = 20 μ m, H = 10 μ m.

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Phyllachora cynodontis

Species examined: CMU_TAR03 collection, Mae Hia, Chiang Mai, on living leaves of *Brachiaria reptans*.

Teleomorph: The blackened on living leaves of *Brachiaria reptans*, Tar spots 0.2–2×0.2–2 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uniloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial, 120–(150–180)–230 µm wide, 95(120–132)–145 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 7–12×45–(55–75)–87 µm 8-spored unitunicate, clavate, overlapping uniseriate. Ascospores, 4–6×9–13 µm. unicellular to ellipsoidal, oval, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 11.)

Notes: CMU_TAR03 collection which is similar to CMU_TAR01 and CMU_TAR02 but which has very small asci and ascospores.

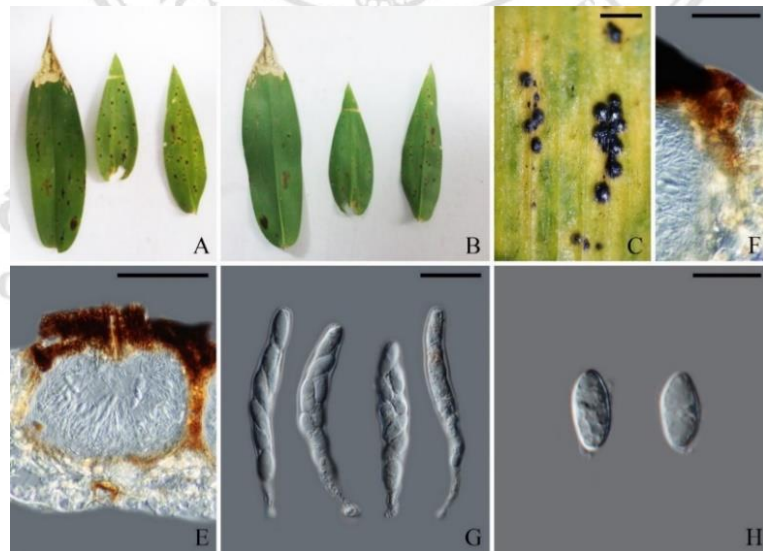


Figure 11. *Phyllachora cynodontis* on leaf, A-B. Tar spots on upper surface, C. Close up of tar spots on leaf, D. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, E. Vertical section through peridium, F. Asci, G. Ascospores. Scale bars: C = 5 mm, D = 100 µm, E = 30 µm, F = 20 µm, G = 20 µm, H = 10 µm.

Phyllachora gloiana

Species examined: CMU_TAR04 collection, Li, Chiang Mai, on living leaves of *Echinochloa colane*.

Teleomorph: The blackened on living leaves of *Echinochloa colane*, Tar spots 0.2–1×0.2–0.5 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 280–(300–400)–470 µm wide, 170–(187–210) µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 110–(162–175)–225 wide, 75–(112–145)–150 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 8–spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 10–3–7×(16–22) µm. unicellular to fusiform, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 12.)

Notes: This species has ascospores which are particularly variable in shape and size, it similar to *P. gloiana* Pearce *et al.*, (1999) on *Asclepiadaceae* hose, but which has very small asci and ascospores.

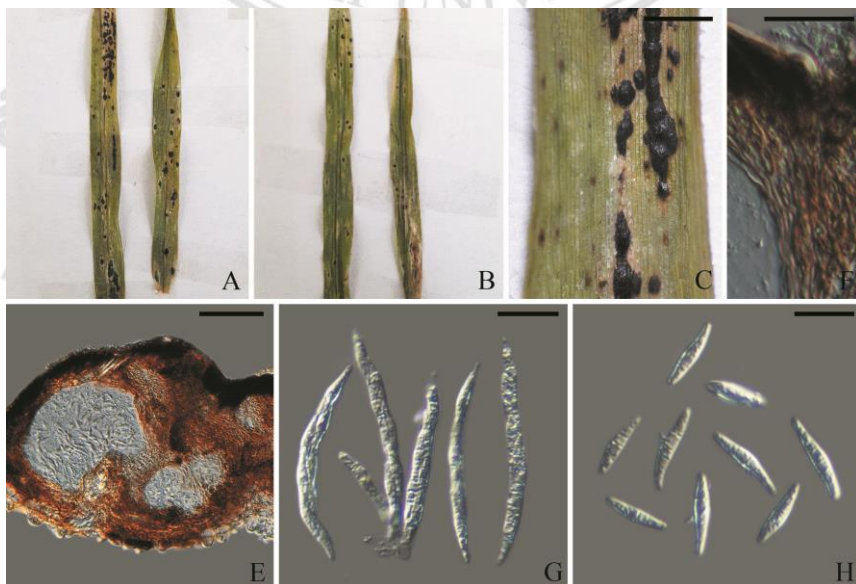


Figure 12. *Phyllachora gloiana* on leaf, A-B. Tar spots on upper surface, C. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Asci, H. Ascospores. Scale bars: C = 5 mm, E. = 150 μ m, F = 20 μ m, G = 30 μ m, H = 10 μ m.

***Phyllachora punctum* on *Eleusine indica*:** 7 isolates were compared morphologically in Table 5.

Table 5 Comparison of *Phyllachora punctum* on *Eleusine indica*.

Isolate	Host	Location	Leaf spot (mm)	Asci (μ m)	Ascospores (μ m)
CMU_TAR05	<i>Eleusine indica</i>	Royal Project Foundation of Nonghoy	0.2– 0.5×0.1–2	7–10×50– (60–78)	10–12×7– 13
CMU_TAR06	<i>Eleusine indica</i>	Queensirikit garden	0.2– 1×0.2–0.5	7–10×77– (85–92)	5–6×10–12
CMU_TAR07	<i>Eleusine indica</i>	Maeai	0.2– 1×0.2–0.5	7–10×72– 82	5–6×9–13
CMU_TAR08	<i>Eleusine indica</i>	Li	0.2– 0.5×0.2–1	7–10×62– (80–95)– 105	5–6×10–13
CMU_TAR09	<i>Eleusine indica</i>	Mae Hia	0.2– 2×0.2–1	7–10×50– (60–78)	10–12×7– 13
CMU_TAR10	<i>Eleusine indica</i>	Khunchangkain	0.2– 1×0.2–0.5	7–9×45– 60	5–7×5–12
CMU_TAR11	<i>Eleusine indica</i>	Saraphi	0.1– 1×0.2–1	4–9×45– 65	8–10×6–12

Phyllachora punctum

Species examined: CMU_TAR05 collection, Royal Project Foundation of Nonghoy, Chiang Mai, on living leaves of *Eleusine indica*.

Anamorph: not known.

Teleomorph: The blackened on living leaves of *Echinochloa colane*, Tar spots 0.2–0.5×0.1–2 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 370–(430–490)–570 µm wide, 192–(225–242)–260 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 125–(157–225)–270 wide, 100–(127–142)–175 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 7–10×50–(60–78) µm, 8-spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 7–13×10–12 µm. unicellular to ovate, obovate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 13.)

Notes: This species similar to *P. punctum* Orton and Stevens, (1918), but which has very small asci and ascospores.

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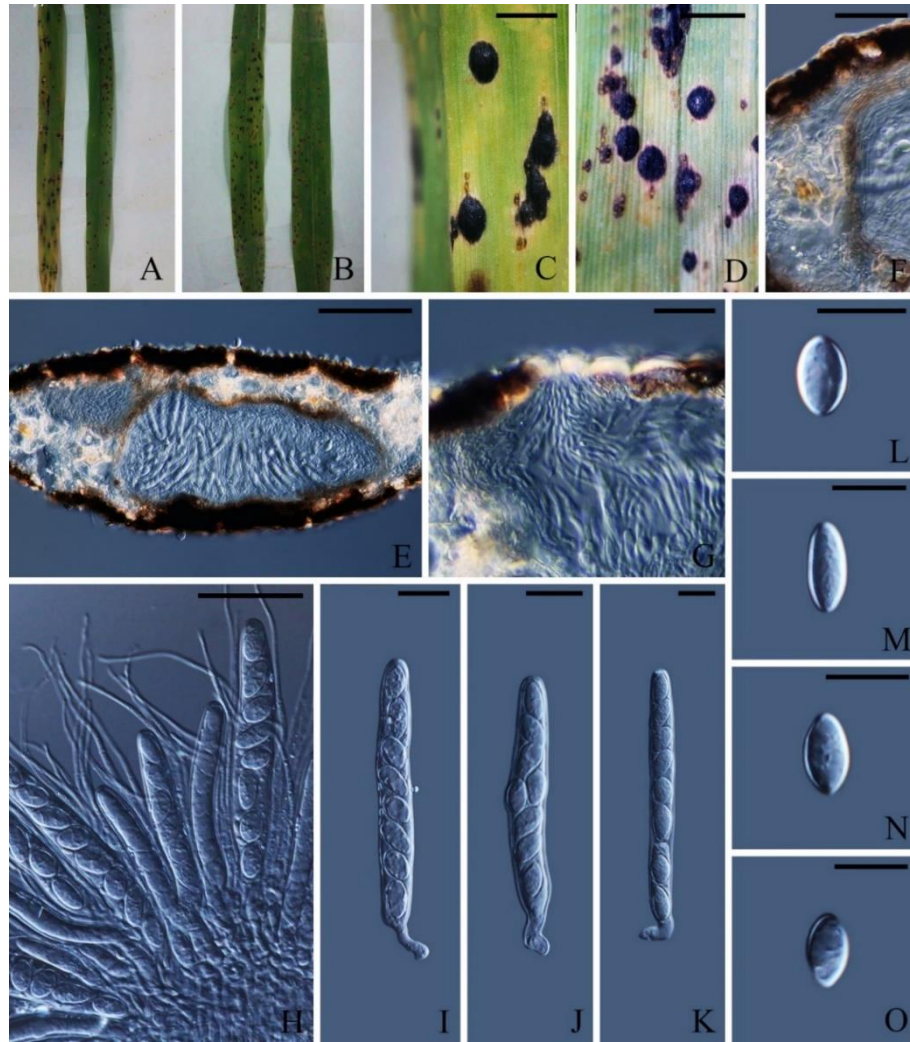


Figure 13. *Phyllachora punctum* on leaf, A-B. Tar spots on upper surface, C-D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Vertical section through ostiolar canal, I. Paraphyses, H. Asci and paraphyses, J. Aplanospores, K. Ascospores. Scale bars: C-D = 5 mm, E = 100 μ m, F = 20 μ m, G = 20 μ m, I = 20 μ m, H = 30 μ m, J = 10 μ m, K = 15 μ m.

Phyllachora punctum

Species examined: CMU_TAR06 collection, Queensirikit garden, Chiang Mai, on living leaves of *Eleusine indica*.

Teleomorph: The blackened on living leaves of *Eleusine indica*, Tar spots 0.2–1×0.2–0.5 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 400–(500–650)–700 µm wide, 157–(187–232)–280 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 130–(175–192)–232 wide, 125–(150–162) µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 7–10×77–(85–92) µm, 8–spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 5–6×10–12 µm. unicellular to ovate to elliptical, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 14.)

Notes: CMU_TAR06 collection which is similar to CMU_TAR05 but which has differences shapes and size ascospores.

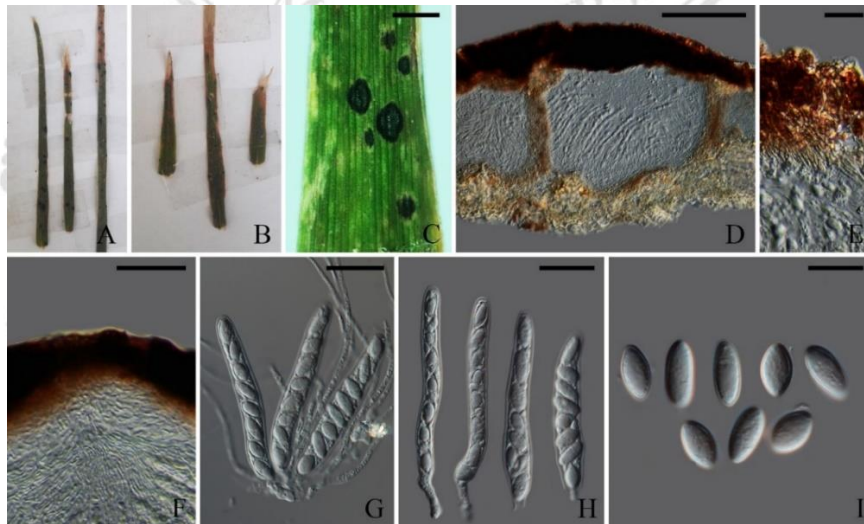


Figure 14. *Phyllachora punctum* on leaf, A-B. Tar spots on upper surface, C. Close up of tar spots on leaf, D. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, E. Vertical section through peridium, F. Vertical section through ostiolar canal, G. Asci and paraphyses, H. Asci, I. Ascospores.

H. Asci, I. Ascospores. Scale bars: C-D = 5 mm, D = 100 μ m, E = 20 μ m, F = 20 μ m, G = 20 μ m, H = 15 μ m I. = 10 μ m.

Phyllachora punctum

Species examined: CMU_TAR07 collection, Maeai, Chiang Mai, on living leaves of *Eleusine indica*.

Teleomorph: The blackened on living leaves of *Eleusine indica*, Tar spots 0.2–1×0.2–0.5 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 380–(410–500)–520 μ m wide, 137–(187–200) μ m high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 135–(155–200) wide, 80–110 μ m high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 7–10×72–82 μ m, 8–spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 5–6×10–13 μ m. unicellular to ovate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 15.)

Notes: CMU_TAR07 collection which is similar to CMU_TAR06 but which has smaller ascospores.

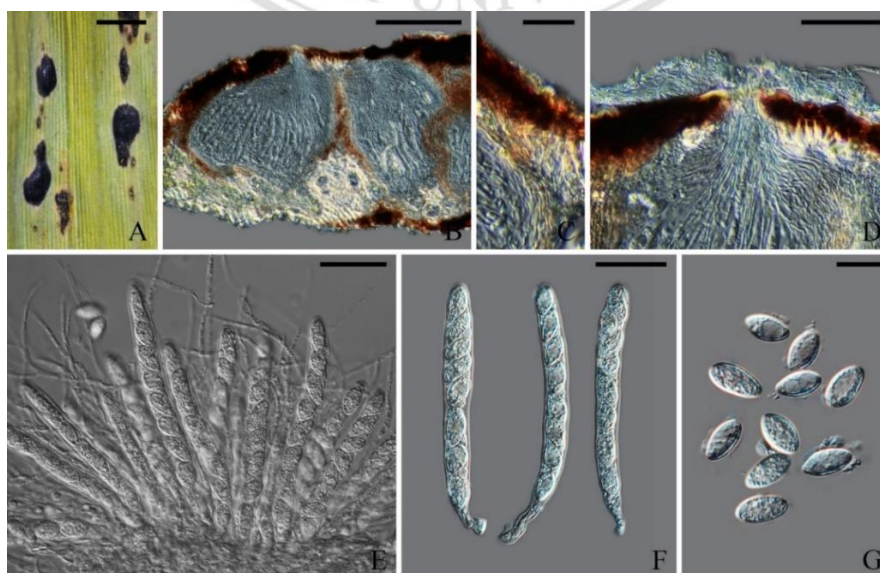


Figure 15. *Phyllachora punctum* on leaf, A. Close up of tar spots on leaf, B. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, C. Vertical section through

peridium, D. Vertical section through ostiolar canal, E. Asci and paraphyses, F. Asci, G. Ascospores. Scale bars: A = 5 mm, B = 100 μ m, C = 20 μ m, D = 30 μ m, E = 20 μ m, F = 20 μ m G. = 15 μ m.

Phyllachora punctum

Species examined: CMU_TAR08 collection, Li, Chiang Mai, on living leaves of *Eleusine indica*.

Teleomorph: The blackened on living leaves of *Eleusine indica*, Tar spots 0.2–0.5×0.2–1 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 340–(520–610)–700 μ m wide, 162–(200–250)–290 μ m high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 155–(195–232) wide, 105–(157–182)–110 μ m high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 7–10×62–(80–95)–105 μ m, 8-spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 5–6×10–13 μ m. unicellular to ovate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 16.)

Notes: CMU_TAR08 collection which is similar to CMU_TAR07, but which has larger asci and ascospores.

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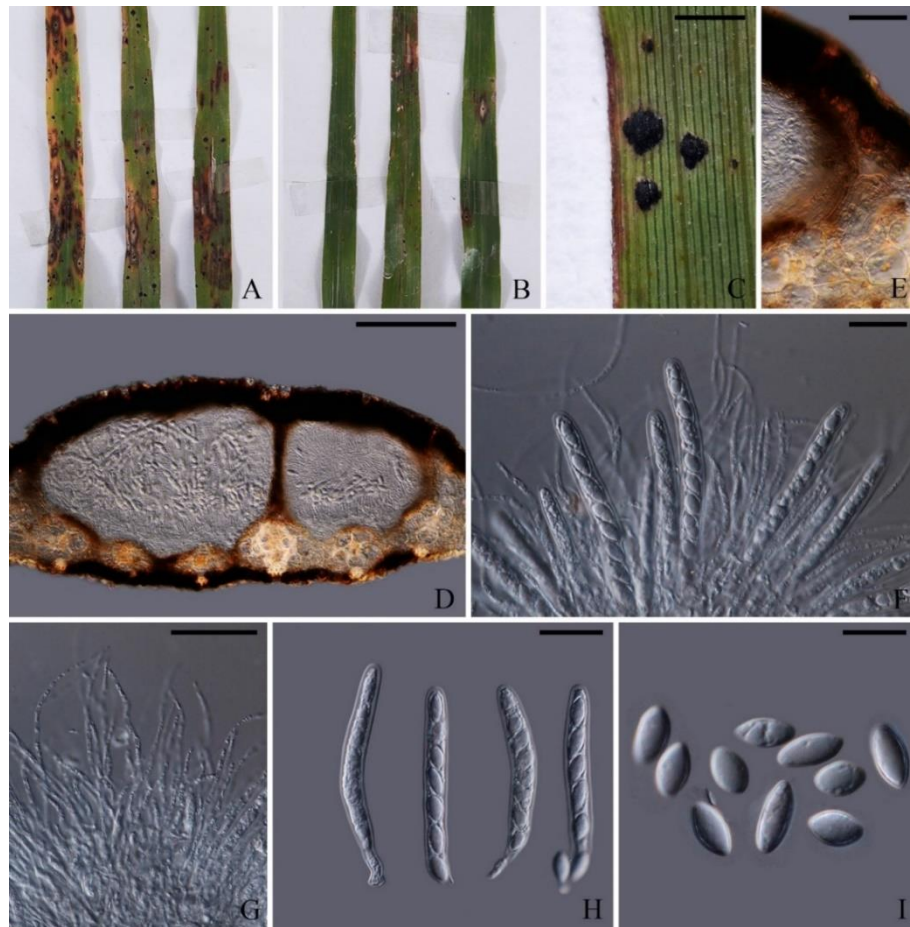


Figure 16. *Phyllachora punctum* on leaf, A-B. Tar spots on upper surface, C. Close up of tar spots on leaf, D. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, E. Vertical section through peridium, F. Asci and paraphyses, G. Paraphyses, H. Asci, I. Ascospores. Scale bars: C = 5 mm, D = 100 μ m, E = 30 μ m, F = 20 μ m, G = 5 μ m, H = 20 μ m, I = 10 μ m.

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Phyllachora punctum

Species examined: CMU_TAR09 collection, Mae Hia, Chiang Mai, on living leaves of *Eleusine indica*.

Teleomorph: The blackened on living leaves of *Eleusine indica*, Tar spots 0.2–2×0.2–1 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, (135–155)–200 wide, 105–110 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not constructed at septate. Asci, 7–10×50–(60–78) µm, 8-spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 10–12×7–13 µm. unicellular to ovate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 17.)

Notes: CMU_TAR09 collection which is similar to CMU_TAR010, but which has larger asci and ascospores.

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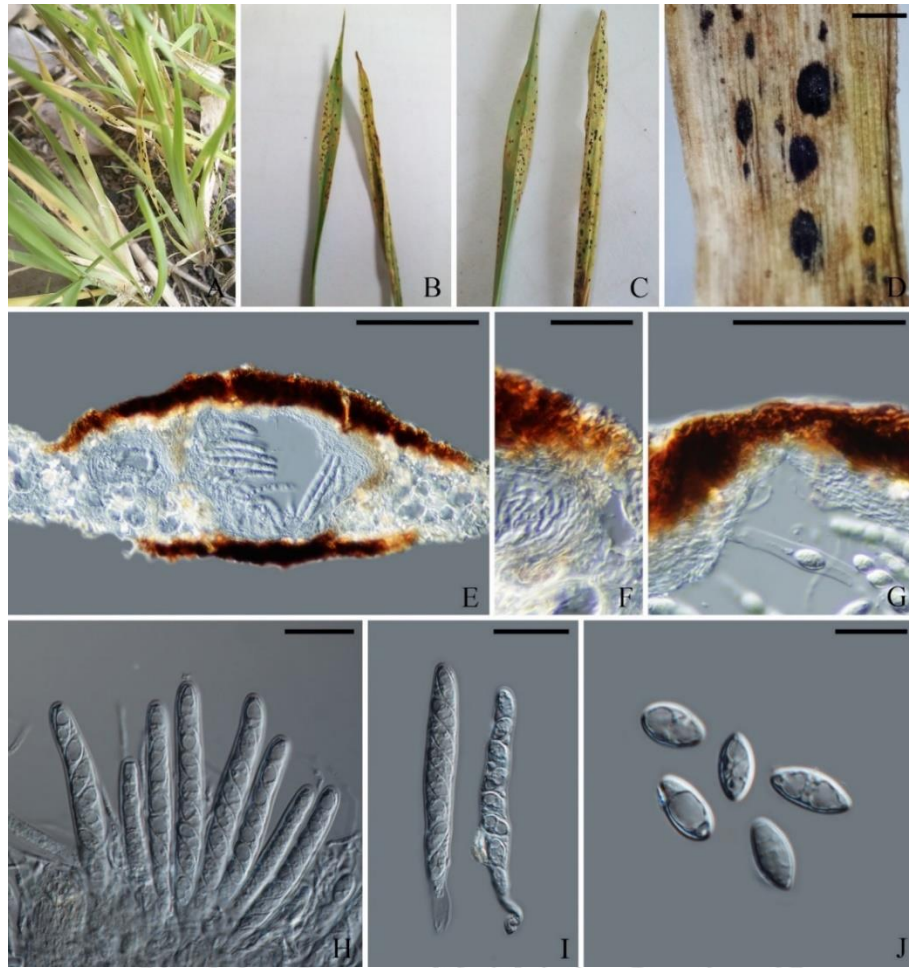


Figure 17. *Phyllachora punctum* on leaf, A-C. Tar spots on upper surface, D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Vertical section through ostiolar canal, H. Asci and paraphyses, I. Asci, J. Ascospores. Scale bars: D = 5 mm, E = 100 μ m, F = 20 μ m, G = 20 μ m, H = 20 μ m, I = 20 μ m, J. = 20 μ m.

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Phyllachora punctum

Species examined: CMU_TAR10 collection, Khunchangkain, Chiang Mai, on living leaves of *Eleusine indica*.

Teleomorph: The blackened on living leaves of *Eleusine indica*, Tar spots 0.2–1×0.2–0.5 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 80–(100–145)–165 wide, 75–(100–150)–180 μ m high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 7–9×45–60 μ m, 8-spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 5–7×7–12 μ m. unicellular to ovate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 18.)

Notes: CMU_TAR10 collection which is similar to CMU_TAR09 but which has smaller shapes and size ascospores.

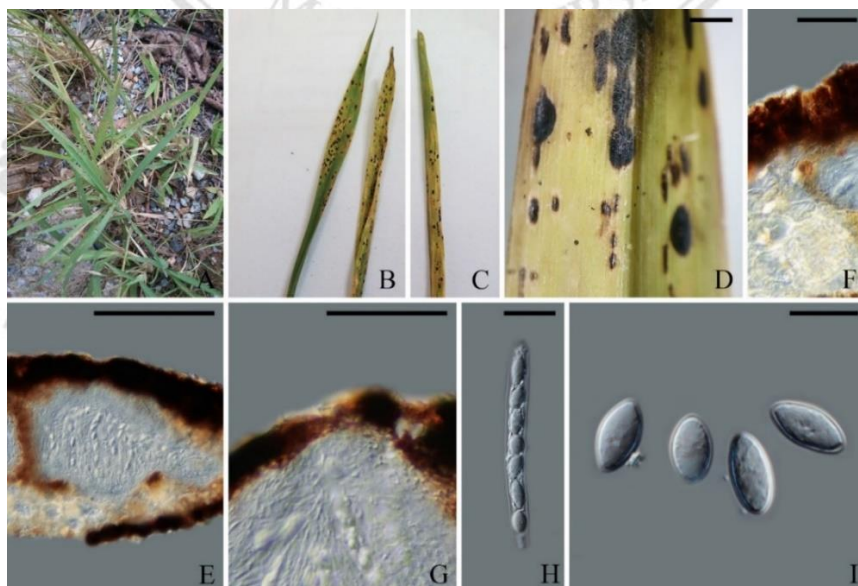


Figure 18. *Phyllachora punctum* on leaf, A-C. Tar spots on upper surface, D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Close up of tar spots on leaf, G. Close up of tar spots on leaf, H. Ascospore, I. Ascospores.

F. Vertical section through peridium, G. Vertical section through ostiolar canal, H. Asci, I. Ascospores.
Scale bars: D = 5 mm, E = 100 μ m, F = 30 μ m, G = 20 μ m, H = 20 μ m, I = 20 μ m.

Phyllachora punctum

Species examined: CMU_TAR11 collection, Saraphi, Chiang Mai, on living leaves of *Eleusine indica*.

Teleomorph: The blackened on living leaves of *Eleusine indica*, Tar spots 0.1–1×0.2–1 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 80–(90–120)–140 wide, 60–(110–130)–170 μ m high, flask-shaped, bowl-shaped, solitary or 1 forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 4–9×45–65 μ m, 8-spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 8–10×6–12 μ m. unicellular to ovate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 19.)

Notes: CMU_TAR11 collection which is similar to CMU_TAR10 but which has smaller shapes and size perithecia.

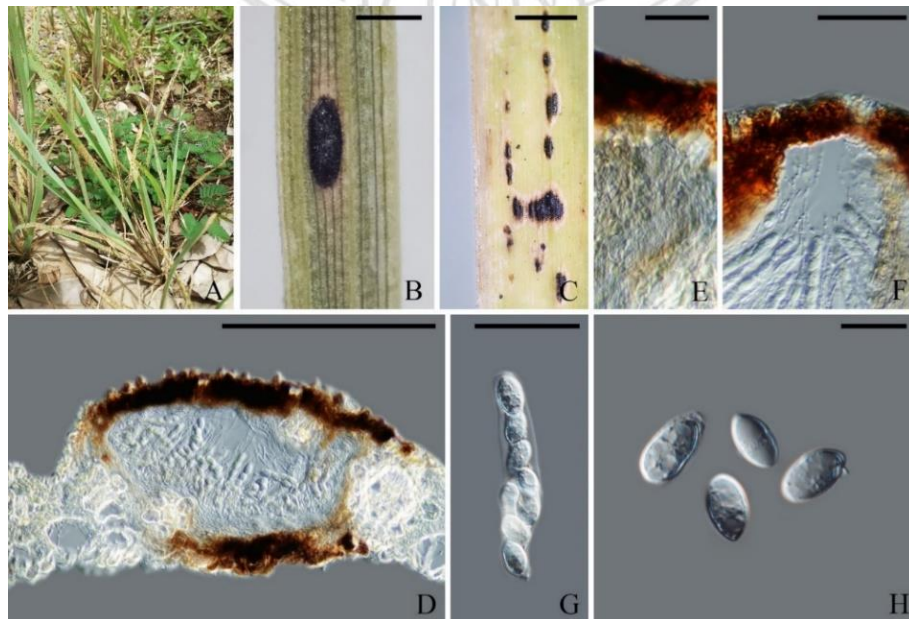


Figure 19. *Phyllachora punctum* on leaf, A. Tar spots on upper surface, B-C. Close up of tar spots on leaf, D. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, E. Vertical section through peridium, F. Vertical section through ostiolar canal, G. Asci, H. Ascospores. Scale bars: B-C = 5 mm, D = 100 μ m, E = 20 μ m, F = 20 μ m, G = 20 μ m, H = 15 μ m.

***Phyllachora koondrookensis* on *Chloris barbata*:** 3 isolates were compared morphologically in Table 6.

Table 6 Comparison of *Phyllachora koondrookensis* on *Chloris barbata*.

Isolate	Host	Location	Leaf spot (mm)	Asci (μ m)	Ascospores (μ m)
CMU_TAR12	<i>Chloris barbata</i>	Royal Project	0.2–	8–10×62–	5–7×8–13
		Foundation of Nonghoy	1×0.2–1	(77–95)–107	
CMU_TAR13	<i>Chloris barbata</i>	Chom Thong	0.2–	7–10×57–	5–7×10–12
			1×0.2–0.5	(72–90)–102	
CMU_TAR14	<i>Chloris barbata</i>	Saraphi	0.2–	7–20×85–	4–7×11–17
			0.5×0.2–1	130	

***Phyllachora* sp.**

Species examined: CMU_TAR12 collection, Royal Project Foundation of Nonghoy, Chiang Mai, on living leaves of *Chloris barbata*.

Teleomorph: The blackened on living leaves of *Chloris barbata*, Tar spots 0.2–1×0.2–1 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 280–(350–390)–450 μ m wide, 125–(147–187)–230 μ m high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial 122–(157–207)–237 μ m wide, 77–(105–135)–152 μ m high, flask-shaped, bowl-shaped, solitary or forming groups of 1–3, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 8–10×62–(70–95)–107 μ m 8-spored

unitunicate, clavate, overlapping uniseriate. Ascospores, 5–7×8–13 μm . unicellular to oval to obovoid, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 20.)

Notes: Pearce (2006) reports a later collection of *P. koondrookensis* from *Choris truncate* in Australia which are remarkably similar to CMU_TAR12, this is first report *Phyllachora* sp. on *Chloris barbata* in Thailand, which is similar to *P. koondrookensis* Parberry (1967) but which has smaller asci and ascospore.

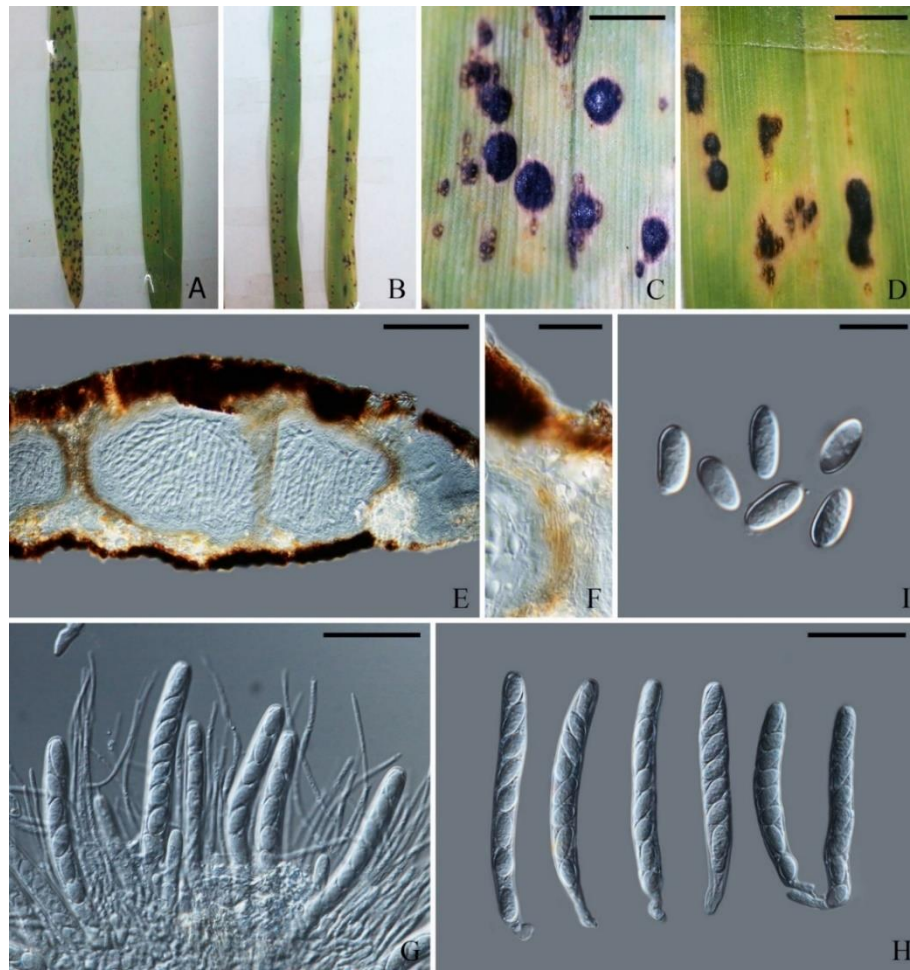


Figure 20. *Phyllachora koondrookensis* on leaf, A-B. Tar spots on upper surface, C-D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Asci and paraphyses, H. Asci, I. Ascospores. Scale bars: C-D = 5 mm, E = 100 μm , F = 20 μm , G = 30 μm , H = 30 μm , I = 15 μm .

Phyllachora koondrookensis

Species examined: CMU_TAR13 collection, Chom Thong, Chiang Mai, on living leaves of *Chloris barbata*.

Teleomorph: The blackened on living leaves of *Chloris barbata*, Tar spots 0.2–1×0.2–0.5 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata 300–(360–420)–460 wide, 150–(192–237)–250 high, uni-multiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial, 125–(162–200)–300 µm wide, 82–(125–150)–172 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 7–10×57–(75–90)–102 µm 8-spored unitunicate, clavate, overlapping uniseriate. Ascospores, 5–7×10–12 µm. unicellular to ellipsoidal, oval, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 21.)

Notes: CMU_TAR13 collection which is similar to CMU_TAR01.

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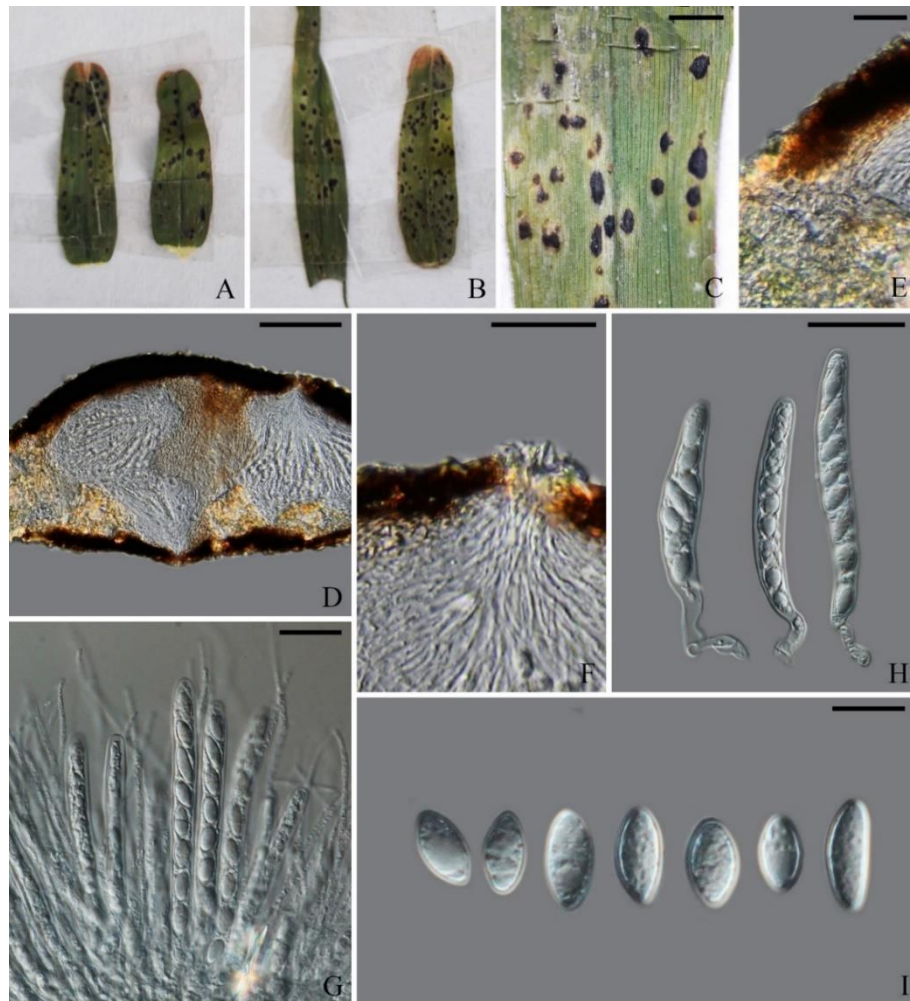


Figure 21. *Phyllachora koondrookensis* on leaf, A-B. Tar spots on upper surface, C. Close up of tar spots on leaf, D. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, E. Vertical section through peridium, F. Vertical section through ostiolar canal, G. Asci and paraphyses, H. Asci, I. Ascospores. Scale bars: C = 10 mm, D. = 100 μ m, E = 20 μ m, F = 20 μ m, G = 20 μ m, H = 20 μ m, I = 10 μ m.

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Phyllachora koondrookensis

Species examined: CMU_TAR14 collection, Saraphi, Chiang Mai, on living leaves of *Chloris barbata*.

Teleomorph: The blackened on living leaves of *Chloris barbata*, Tar spots 0.2–0.5×0.2–1 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial, 105–(135–200)–290 µm wide, 75–(105–120)–162 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 7–20×85–130 µm 8–spored unitunicate, clavate, overlapping uniseriate. Ascospores, 4–7×11–17 µm. unicellular to ellipsoidal, oval, smooth, hyaline, surrounded by mucilaginous sheath.

Notes: CMU_TAR13 collection which is similar to CMU_TAR12 but which has more than asci and ascospores.

***Phyllachora cynodontis* on *Cynocon dactylon*:** 3 isolate were compared morphologically in Table 7.

Table 7 Comparison of *Phyllachora* sp. on *Cynocon dactylon*.

Isolate	Host	Location	Leaf spot (mm)	Asci (µm)	Ascospores (µm)
CMU_TAR15	<i>Cynocon dactylon</i>	Queensirikit garden	0.2–0.5×0.1–1	7–12×55–(70–80)–95	6–7×10–12
CMU_TAR16	<i>Cynocon dactylon</i>	CMU	0.2–1×0.2–0.5	7–12×47–(55–60)–65	5–6×9–12
CMU_TAR17	<i>Cynocon dactylon</i>	Khunchangkain	0.2–2×0.1–3	10–12×45–(52–65)	5–6×9–12

***Phyllachora* sp.**

Species examined: CMU_TAR15 collection, Queensirikit garden, Chiang Mai, on living leaves of *Cynocon dactylon*.

Teleomorph: The blackened on living leaves of *Cynocon dactylon*, Tar spots 0.2–0.5×0.1–1 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata unimultiloculate, 330–(370–430)–460 µm wide, 187–237 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 87–(112–142)–162 wide, 92–(112–155) µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 7–12×55–(70–80)–95 µm, 8–spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 7–12×10–12 µm. unicellular to oblong, ovoid, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 22.)

Notes: This is apparently an Australia version of *Phyllachora cynodontis* Niessl (1876) on *Bouteloua*, *Buchloe*, *Chloris*, *Cynodon* and *Spartina*, with rather larger ascospore.



Figure 22. *Phyllachora cynodontis* on leaf, A. Tar spots on upper surface, B. Close up of tar spots on leaf, C. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, D. Vertical section through peridium, E. Asci, F. Ascospores. Scale bars: B = 10 mm, C = 100 µm, E = 20 µm, F = 15 µm.

Phyllachora cynodontis

Species examined: CMU_TAR16 collection, CMU , Chiang Mai, on living leaves of *Cynocon dactylon*.

Teleomorph: The blackened on living leaves of *Cynocon dactylon*, Tar spots 0.2–0.5×0.1–2 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 330–(370–430)–460 µm wide, 187–237 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 87–(112–142)–162 wide, 92–(112–155) µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 7–12×47–(55–60)–65 µm, 8–spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 5–6×9–12 µm. unicellular to ovate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 23.)

Notes: CMU_TAR16 collection which is similar to CMU_TAR15.

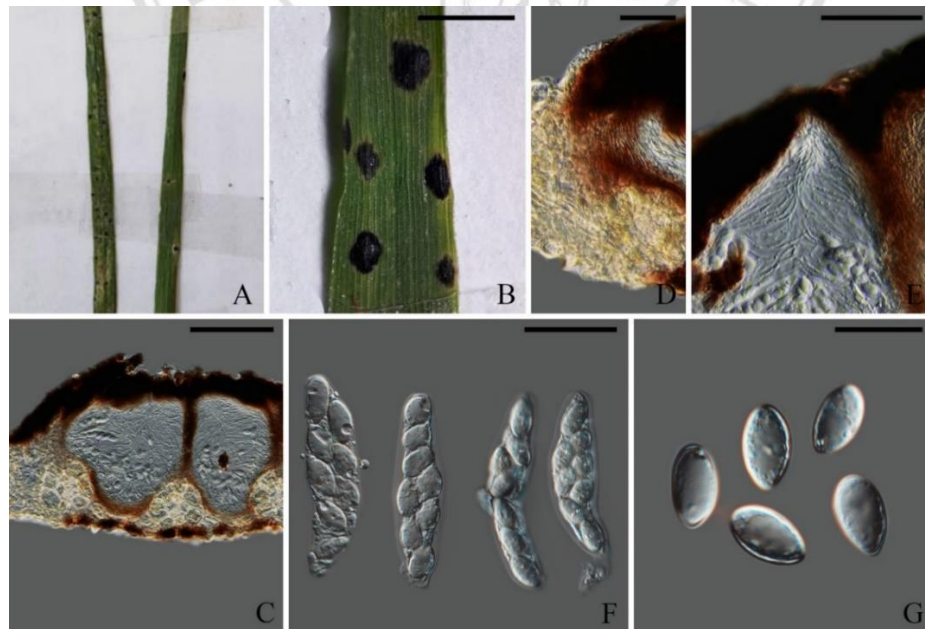


Figure 23. *Phyllachora cynodontis* on leaf, A. Tar spots on upper surface, B. Close up of tar spots on leaf, C. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, D. Vertical section through peridium, E. Vertical section through ostiolar canal, F. Asci, G. Ascospores. Scale bars: B = 10 mm, C = 100 µm, D = 20 µm, E = 30 µm, F = 20 µm, G = 10 µm.

Phyllachora cynodontis

Species examined: CMU_TAR17 collection, Khunchangkain, Chiang Mai, on living leaves of *Cynocon dactylon*.

Teleomorph: The blackened on living leaves of *Cynocon dactylon*, Tar spots 0.2–1×0.2–0.5 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 350–(370–420)–500 µm wide, 105–(155–170)–197 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 87–(120–160)–250 wide, 50–(80–125)–142 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 10–12×45–(52–65) µm, 8-spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 5–6×9–12 µm. unicellular to ovate to elliptical, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 24.)

Notes: CMU_TAR17 collection which is similar to CMU_TAR16 but which has differences shapes and size ascospores.

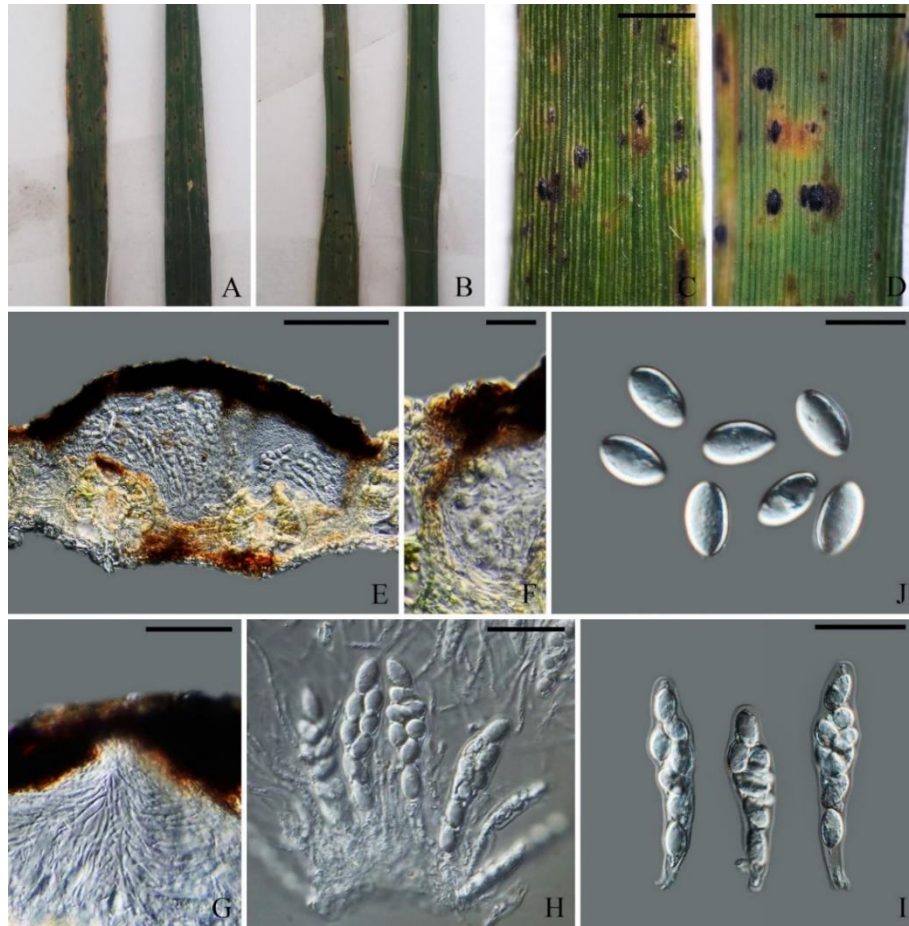


Figure 24. *Phyllachora cynodontis* on leaf, A-B. Tar spots on upper surface, C. Close up of tar spots on leaf, D. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, E. Vertical section through peridium, F. Vertical section through ostiolar canal, G. Asci and paraphyses, H. Asci, I. Ascospores. Scale bars: C-D = 5 mm, D = 100 μ m, E = 20 μ m, F = 20 μ m, G = 20 μ m, H = 15 μ m I. = 10 μ m.

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Phyllachora cynodontis* on *Cynodon nlemfuensi

Species examined: CMU_TAR18 collection, Chom Thong, Chiang Mai, on living leaves of *Cynodon nlemfuensis*.

Teleomorph: The blackened on living leaves of *Eleusine indica*, Tar spots 0.2–1×0.2–0.5 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, irregular or diamond shaped spots, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 250–(330–460)–510 µm wide, 137–(202–250)–280 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 125–(187–225)–280 wide, 112–(125–142)–175 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 10–12×62(75–89)–100 µm, 8-spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 5–7×8–13 µm. unicellular to ovate, oblong, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 25.)

Notes: This species is rather similar to *P. cynodontis* Niessl (1876), but the ascospores are 5–7×8–13 µm size, ovate to oblong in shape.

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Figure 25. *Phyllachora cynodontis* on leaf, A. Close up of tar spots on leaf, B. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, C. Vertical section through peridium, D. Vertical section through ostiolar canal, E. Asci and paraphyses, F. Asci, G. Ascospores. Scale bars: A = 5 mm, B = 100 μ m, C = 20 μ m, D = 30 μ m, E = 20 μ m, F = 20 μ m G. = 15 μ m.

***Phyllachora oryzopsidis* on *Digitaria adscendens*:** 3 isolate were compared morphologically in Table 8.

Table 8 Comparison of *Phyllachora* sp. on *Digitaria adscendens*.

Isolate	Host	Location	Leaf spot (mm)	Asci (μ m)	Ascospores (μ m)
CMU_TAR20	<i>Digitaria adscendens</i>	Li, Lamphun	0.2–2×0.2–1	10–15×75–(80–90)	6–7×11–12
CMU_TAR21	<i>Digitaria adscendens</i>	Some Haam	0.3–1×0.2–0.9	10–12×55–(65–85)	5–6×9–12
CMU_TAR22	<i>Digitaria adscendens</i>	-	0.2–2×0.2–1	10–15×75–(80–95)	6–7×11–12

Phyllachora oryzopsidis

Species examined: CMU_TAR20 collection, Li, Lamphun, on living leaves of *Digitaria adscendens*.

Teleomorph: The blackened on living leaves of *Digitaria adscendens*, Tar spots 0.2–2×0.2–1 mm. on upper and lower leaves surface, as black punctiform spots, roughly ellipsoidal, irregular or diamond shaped spots, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 420–(520–660)–840 µm wide, 150–(175–212)–280 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 77–(152–182)–225 wide, 85–(127–175)–195 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–3, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 7–10×57–(67–75) µm, 8-spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 5–6×9–11 µm. unicellular to ovate, elliptical, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 26.)

Notes: This species is similar to *P. oryzopsidis* Theiss and Syd (1915), but in this taxon ascospores are small (5–6×9–11).

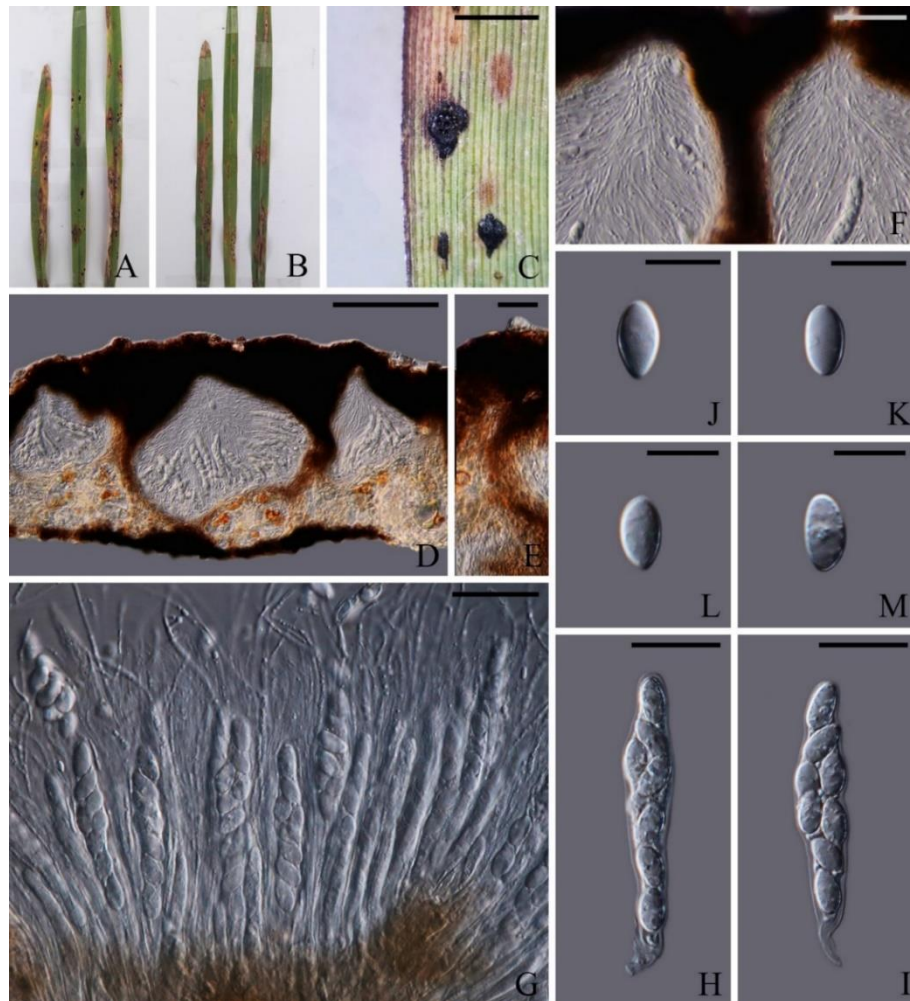


Figure 26. *Phyllachora oryzae* on leaf, A-B. Tar spots on upper surface, C. Close up of tar spots on leaf, D. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, E. Vertical section through peridium, F. Vertical section through ostiolar canal, G. Asci and paraphyses, H. Asci, I. Ascospores. Scale bars: C = 5 mm, D = 100 μm, E = 20 μm, F = 30 μm, G = 30 μm, H = 20 μm, I. = 10 μm.

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Phyllachora oryzopsidis

Species examined: CMU_TAR21 collection, Some Hgam, Lampang, on living leaves of *Digitaria adscendens*.

Teleomorph: The blackened on living leaves of *Digitaria adscendens*, Tar spots 0.3–1×0.2–0.9 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 175–(350–400)–450 µm. wide, 170–(187–237) µm. high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 92–(145–195)–250 µm. wide, 80–(127–157) µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 10–12×55–(65–85) µm, 8-spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 5–6×9–12 µm. unicellular to ovate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 27.)

Notes: CMU_TAR21 collection which is similar to CMU_TAR021, but which has small asci and ascospores.

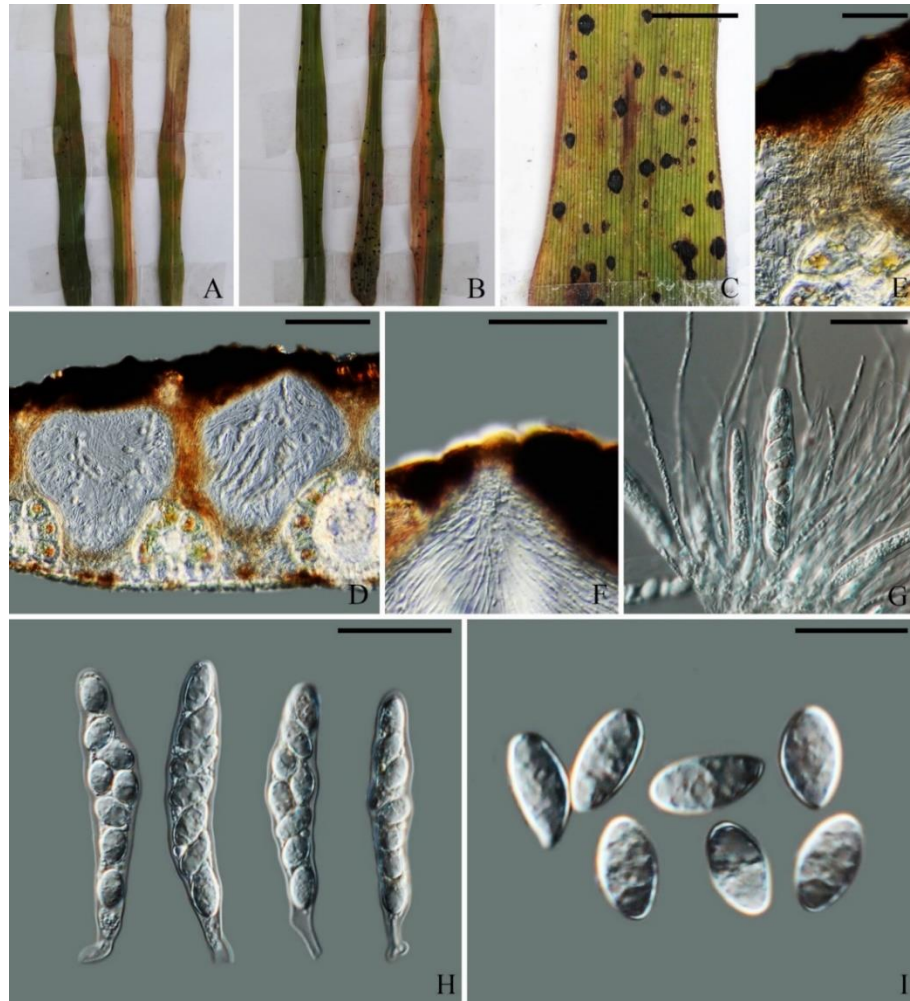


Figure 27. *Phyllachora oryzopsidis* on leaf, A-B. Tar spots on upper surface, C. Close up of tar spots on leaf, D. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, E. Vertical section through peridium, F. Vertical section through ostiolar canal, G. Asci and paraphyses, H. Asci, I. Ascospores. Scale bars: C = 10 mm, D = 100 μm , E = 30 μm , F = 30 μm , G = 20 μm , H = 20 μm , I. = 10 μm .

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Phyllachora oryzopsidis

Species examined: CMU_TAR22 collection, Chiang Mai, on living leaves of *Digitaria adscendens*.

Teleomorph: The blackened on living leaves of *Digitaria adscendens*, Tar spots 0.2–2×0.2–1 mm. on upper and lower leaves surface, as black punctiform spots, ovoid to irregular, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 330–(380–450)–520 µm. wide, 175–(207–290)–270 µm. high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 152–(187–220)–270 µm. wide, 80–(117–132)–162 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 10–15×75–(80–95) µm, 8-spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 6–7×11–12 µm. unicellular to ovate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 28.)

Notes: CMU_TAR21 collection which is similar to CMU_TAR22.



Figure 28. *Phyllachora oryzopsidis* on leaf, A-B. Tar spots on upper surface, C-D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Asci and paraphyses, H. Asci, I. Ascospores. Scale bars: C-D = 5 mm, E = 150 μ m, F = 30 μ m, G = 20 μ m, H = 20 μ m, I = 10 μ m.

***Phyllachora fici-orbispora* and *P. infectoria* on *Ficus religiosa*:** 3 isolate were compared morphologically in Table 9.

Table 9 Comparison of *Phyllachora* sp. on *Ficus religiosa*.

Isolate	Host	Location	Leaf spot (mm)	Asci (μ m)	Ascospores (μ m)
CMU_TAR23	<i>Ficus religiosa</i>	Lamphum	0.5–3×0.5–2	17–22×72–(80–95)–112	8–9×14–16
CMU_TAR24	<i>Ficus religiosa</i>	CMU	0.5–2×0.5–3	40–55×127–(150–182)	14–15×23–25
CMU_TAR25	<i>Ficus religiosa</i>	CMU	1–10×1–5	10–(15–20–30×85–(100–130)	4–7×12–18

Phyllachora fici-orbispora

Species examined: CMU_TAR23 collection, Lamphun, on living leaves of *Ficus religiosa*.

Teleomorph: The blackened on living leaves of *Ficus religiosa*, Tar spots 0.5–3×0.5–2 mm. on upper and lower leaves surface, as black punctiform spots, globose, shiny, often coalescing adjacent to leaf veins, shallow to strongly domed, often multidomed, occurring singly or gregarious, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 0.8–(1.1–1.2)–1.3 mm wide, 180–(250–280)–350 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial 220–(270–360)–480 µm wide, 160–206 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–3, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 17–12×72–(80–97)–112 µm 8-spored unitunicate, clavate, overlapping uniseriate, retraction of plasmalemma. Ascospores, 8–9×14–16 µm. unicellular to ovate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 29.)

Notes: This species seems to be a close relative of *P. fici-orbispora* Pearce and Hyde (2006), on the unrelated host genus *Ficus*. But CMU_TAR23 has rather larger ascospores.

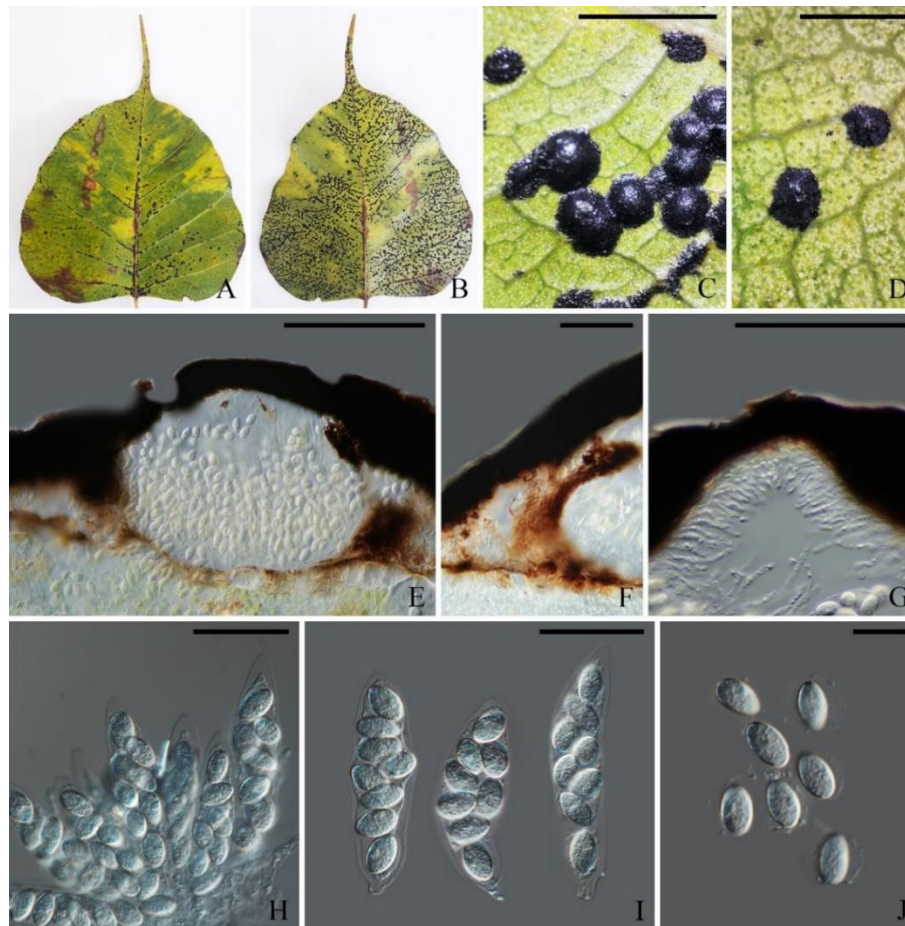


Figure 29. *Phyllachora fici-orbispora* on leaf, A-B. Tar spots on upper surface, C-D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Asci and paraphyses, H. Asci, I. Ascospores. Scale bars: C-D = 5 mm, E = 100 μ m, F = 20 μ m, G = 30 μ m, H = 30 μ m, I = 15 μ m.

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Phyllachora fici-orbispora

Species examined: CMU_TAR24 collection, CMU, Chiang Mai, on living leaves of *Ficus religiosa*.

Teleomorph: The blackened on living leaves of *Ficus religiosa*, Tar spots 0.5–2×0.5–3 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata 0.8–(1.1–1.2)–1.3 mm. wide, 180–(250–280)–350 µm high, uni-multiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial, 220–(270–360)–480 µm wide, 160–206 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–3, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 17–22×72–(80–97)–112 µm 8-spored unitunicate, clavate, overlapping uniseriate. Ascospores, 8–9×14–16 µm. unicellular to ellipsoidal, oval, smooth, hyaline, surrounded by mucilaginous sheath.

Notes: CMU_TAR24 collection which is similar to CMU_TAR23.

Phyllachora infectoria

Species examined: CMU_TAR25 collection, CMU, Chiang Mai, on living leaves of *Ficus religiosa*.

Teleomorph: The blackened on living leaves of *Ficus religiosa*, Tar spots 1–10×1–5 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, roughly circular to irregular, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial, 210–(250–350)–500 µm wide, 170–(220–320)–700 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–5, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 10–(15–20)–30×85–(100–130) µm 8-spored unitunicate, clavate, overlapping uniseriate, refractive subapical ring. Ascospores, 4–7×12–18 µm. unicellular to ellipsoidal, oval, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 30-31.)

Notes: This is apparently a Sri Lanka (Cooke, 1885) version of *Phyllachora infectoria* with rather larger ascospores.

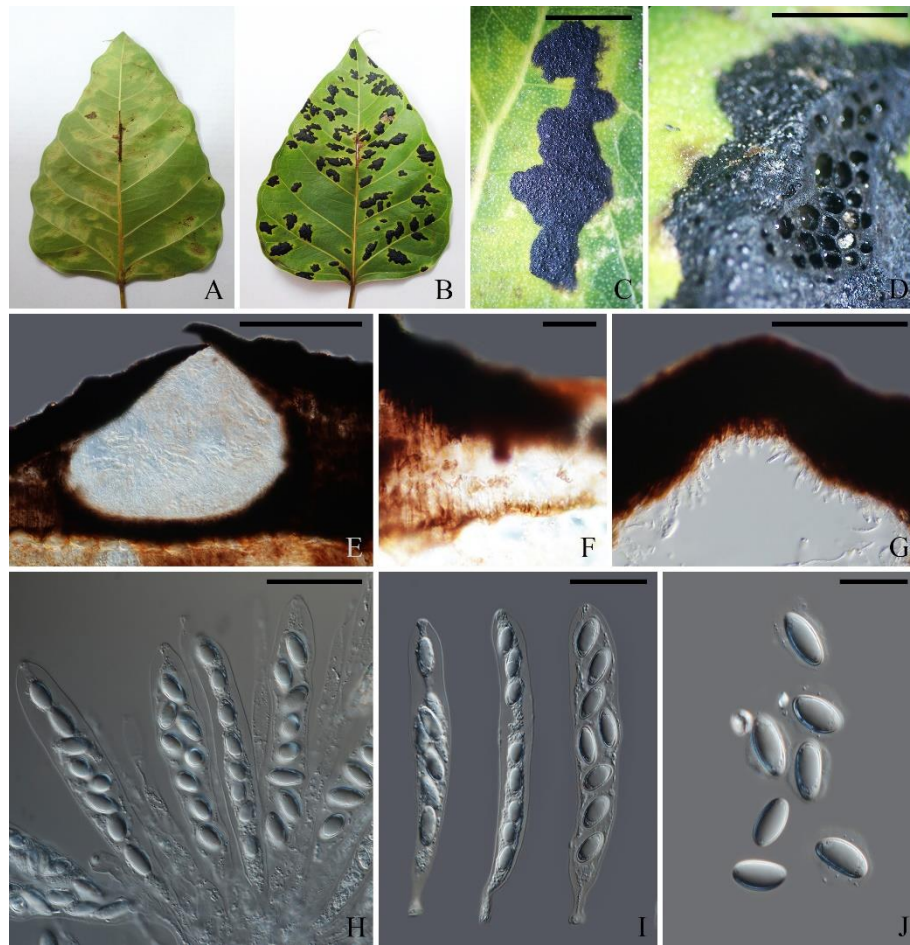


Figure 30. *Phyllachora infectoria*. on leaf, A-B. Tar spots on upper surface, C-D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Vertical section through ostiolar canal, H. Asci and paraphyses, I. Asci, J. Ascospores. Scale bars: C = 5 mm, D = 3 mm, E = 200 μ m, F = 30 μ m, G = 50 μ m, H = 50 μ m, I = 50 μ m, J = 15 μ m.

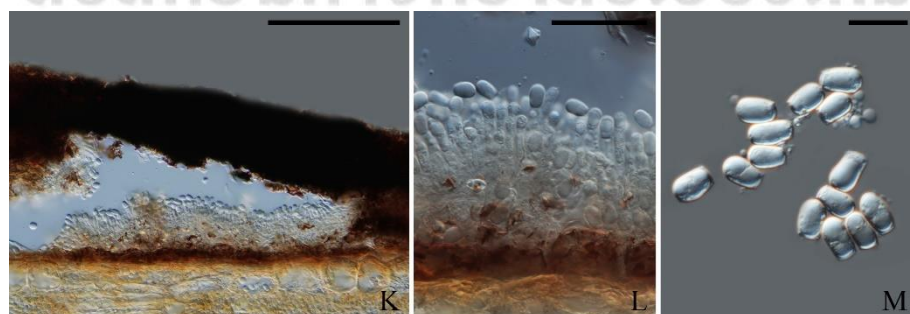


Figure 31. Coelomycetes.

***Phyllachora oxsyspora* on *Imperata cylindrical*:** 3 isolate were compared morphologicacally in Table 11.

Table 10 Comparison of *Phyllachora oxsyspora* on *Imperata cylindrical*.

Isolate	Host	Location	Leaf spot (mm)	Asci (µm)	Ascospores (µm)
CMU_TAR27	<i>Imperata cylindrical</i>	Maekalnluang	0.2– 0.5×0.1–1	10– 12×90– 125	6–7×17–22
CMU_TAR28	<i>Imperata cylindrical</i>	Saraohi	0.2– 1×0.5–1	12– 20×78– 113	3–4×7–10
CMU_TAR29	<i>Imperata cylindrical</i>	Doi Suthep	0.2– 0.5×0.2–1	7–10×62– 90	5–6×11–13

Phyllachora oxsyspora

Species examined: CMU_TAR27 collection, Maekalnluang, Chiang Mai, on living leaves of *Imperata cylindrical*.

Teleomorph: The blackened on living leaves of *Imperata cylindrical*, Tar spots 0.2–0.5×0.1–1 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 310–400 µm wide, 145–(170–182) µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 195–212 wide, 87–(102–125) µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 10–12×90–125 µm, 8–spored unitunicate, clavate to

cylindrical, overlapping un-biseriate. Ascospores, $6-7 \times 17-22 \mu\text{m}$. unicellular to ellipsoidal, ovoid, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 32.)

Notes: This species seems to be a close relative of *Phyllachora oxyspora* Parbery (1967), on the unrelated host genus *Imperata*, but CMU_TAR27 collection has smaller ascospores.

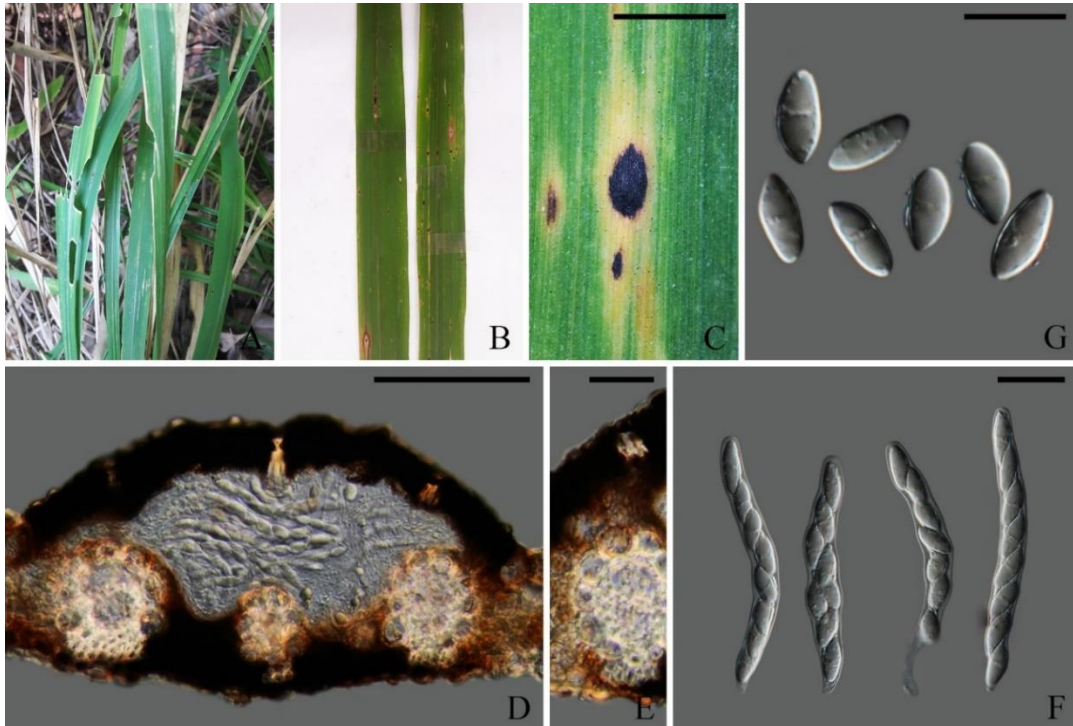


Figure 32. *Phyllachora oxyspora* on leaf, A-B. Tar spots on upper surface, C. Close up of tar spots on leaf, D. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, E. Vertical section through peridium, F. Asci, G. Ascospores. Scale bars: C = 5 mm, D. = 100 μm , E = 20 μm , F = 20 μm G = 15 μm .

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Phyllachora oxyspora

Species examined: CMU_TAR28 collection, Saraphi, Chiang Mai, on living leaves of *Imperata cylindrical*.

Teleomorph: The blackened on living leaves of *Imperata cylindrical*, Tar spots 0.2–1×0.5–1 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata unimultiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 100–(135–185)–201 µm. wide, 125–(160–220) µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 12–20×78–130 µm, 8-spored unitunicate, clavate to cylindrical, overlapping unbiseriate. Ascospores, 3–4×7–10 µm. unicellular to ovate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 33)

Notes: CMU_TAR28 collection which is similar to CMU_TAR27.



Figure 33. *Phyllachora oxyspora* on leaf, A-B. Tar spots on upper surface, C-D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Vertical section through ostiolar canal, H. Asci and paraphyses, I. Asci, J. Ascospores. Scale bars: C-D = 5 mm, E = 100 μ m, F = 30 μ m, G = 30 μ m, H = 30, I. = 30 μ m, J = 10 μ m.

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Phyllachora oxyspora

Species examined: CMU_TAR29 collection, Doi suthep, Chiang Mai, on living leaves of *Imperata cylindrical*.

Teleomorph: The blackened on living leaves of *Imperata cylindrical*, Tar spots 0.5–1×0.2–1 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata unimultiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 150–(175–215) wide, 135–(150–185) µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 7–10×62–90 µm, 8–spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 5–6×11–13 µm. unicellular to ovate to elliptical, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 34.)

Notes: CMU_TAR29 collection which is similar to CMU_TAR28 but which has differences shapes and size ascospores.

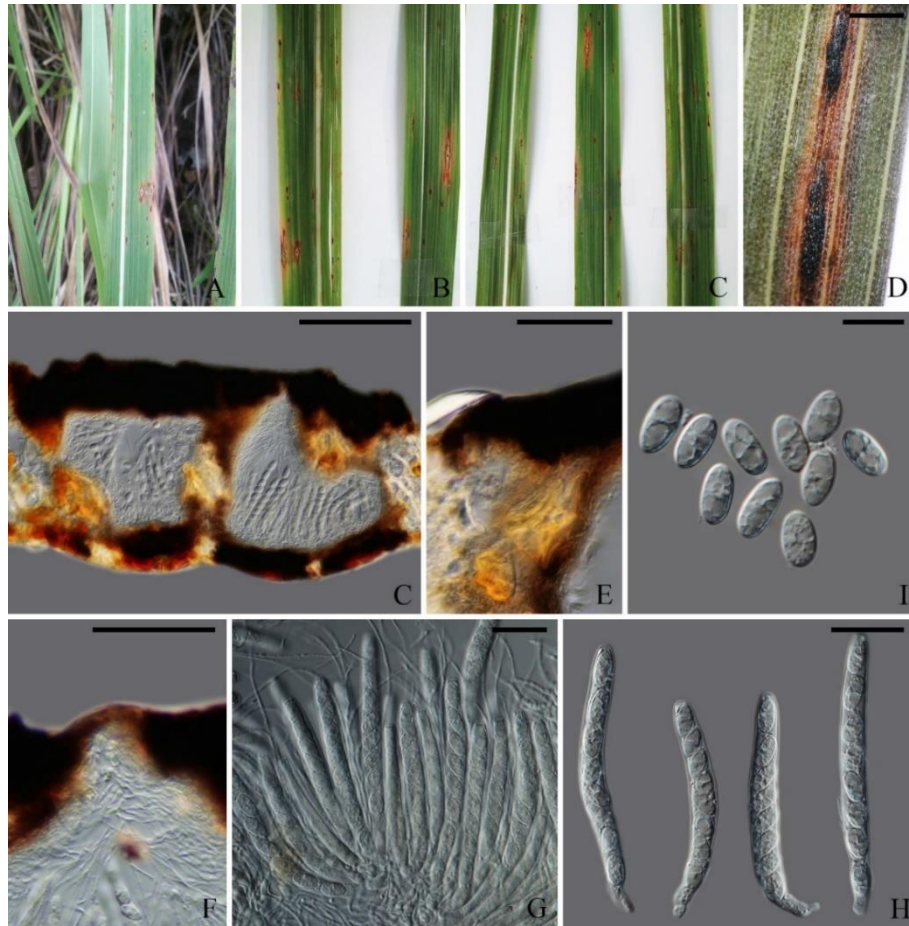


Figure 34. *Phyllachora oxyspora* on leaf, A-B. Tar spots on upper surface, C-D. Close up of tar spots on leaf, C. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, E. Vertical section through peridium, F. Vertical section through ostiolar canal, G. Asci and paraphyses, H. Asci, I. Ascospores. Scale bars: C-D = 5 mm, C = 100 μm , E = 30 μm , F = 20 μm , G = 20 μm , H = 20 μm I. = 10 μm .

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Phyllachora leucospila

Species examined: CMU_TAR31 collection, Maekalngluang, Chom Thong, Chiang Mai, on living leaves of *Phyllanthus reticulatus*.

Teleomorph: The blackened on living leaves of *Phyllanthus reticulatus*, Tar spots 0.5–1×0.5–3 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata unitiloculate, 805–(966–1127)–1288 µm wide, 220–(250–270)–300 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial 182–(220–260)–300 µm wide, 132–(162–190)–220 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–3, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 7–12×72–(80–95)–107 µm 8-spored unitunicate, clavate, biseriate. Ascospores, 3–5×15–24 µm. unicellular to narrowly ovoid to ellipsoidal or narrowly fusiform, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 35.)

Notes: This species is similar to *Phyllachora leucospila* Cannon (1991), except for stromatal characters. Blackened regions of this species are larger. Ascospore size is rather large.

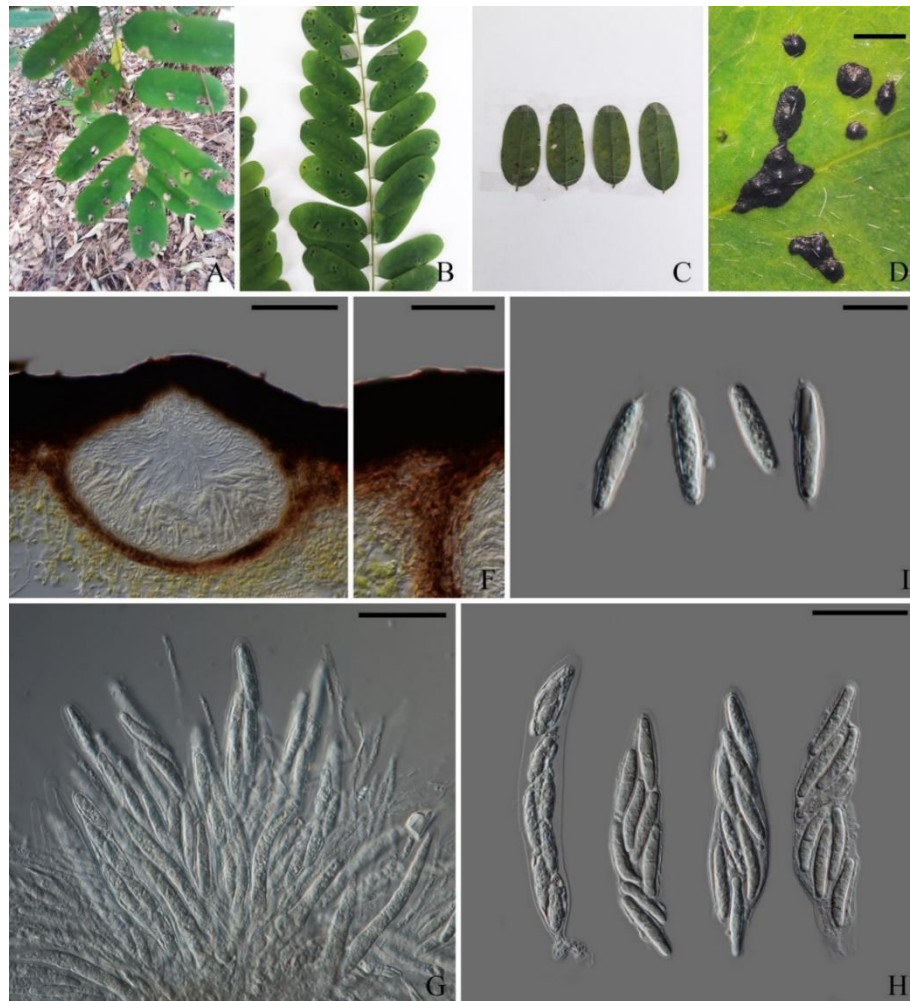


Figure 35. *Phyllachora leucospila* on leaf, A-C. Tar spots on upper surface, D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Asci and paraphyses, H. Asci, I. Ascospores. Scale bars: D = 5 mm, E = 100 μ m, F = 20 μ m, G = 20 μ m, H = 15 μ m, I = 10 μ m.

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***Phyllachora* on *Pterocarpus indicus*:** 4 isolate were compared morphology in Table 11.

Table 11 Comparison of *Phyllachora pteracarpi* on *Pterocarpus indicus*.

Isolate	Host	Location	Leaf spot (mm)	Asci (μm)	Ascospores (μm)
CMU_TAR32	<i>Pterocarpus indicus</i>	Li	0.5– 2×0.5–1.5	10– 12×(80– 92)–112	5–6×19–22
CMU_TAR33	<i>Pterocarpus indicus</i>	Chom Thong	1–5×1–3	10– 12×50– (75–87)	5–6×9–12
CMU_TAR34	<i>Pterocarpus indicus</i>	Chiang Mai	0.5– 2×0.5–3	5–12×45– (50–75)– 87	4–7×45– (50–75)– 87
CMU_TAR35	<i>Pterocarpus indicus</i>	Saraphi	0.5– 1×0.5–2	7–12×75– 95	3–5×14–20

Phyllachora pteracarp

Species examined: CMU_TAR32 collection, Li, Lamphun, on living leaves of *Brachiaria reptans*.

Teleomorph: The blackened on living leaves of *Pterocarpus indicus* Tar spots 0.5–2×0.5–1.5 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata unitiloculate, 610–(680–750)–800 µm wide, 187–(227–270)–310 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial, 202–(250–300)–360 µm wide, 127–(162–185)–225 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 10–12×80–(92–112) µm 8-spored unitunicate, clavate, biseriate. Ascospores, 5–6×19–22 µm. unicellular to ellipsoidal, oval, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 36.)

Notes: This species seems to be a close relative of *Phyllachora pteracarp* H. Sydow (1912) on the unrelated host genus *Pterocarpus indicus*, but this species has rather larger ascospores and different shape.

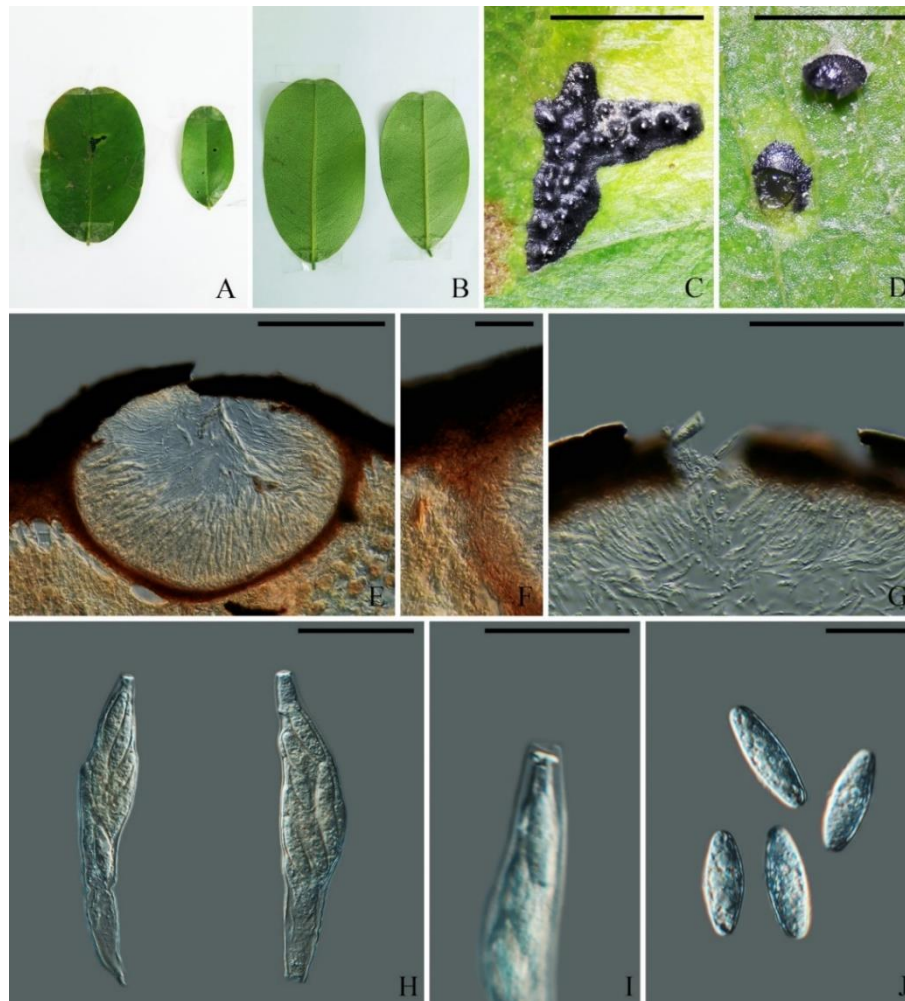


Figure 36. *Phyllachora pteracarpi* on leaf, A-B. Tar spots on upper surface, C-D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Vertical section through ostiolar canal, H. Asci, I Apical ring, J. Ascospores. Scale bars: C-D = 5 mm, E = 150 μ m, F = 30 μ m, G = 50 μ m, H = 20 μ m, I = 20 μ m, J = 10 μ m.

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Phyllachora pteracarpi

Species examined: CMU_TAR33 collection, Chom Thong, Chiang Mai, on living leaves of *Pterocarpus indicus*.

Teleomorph: The blackened on living leaves of *Pterocarpus indicus* Tar spots 1–5×1–3 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 700–(850–980) µm wide, 290–(310–360)–400 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial, 192–(260–320)–400 µm wide, 150–(205–242)–300 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 10–12×50–(60–87) µm 8-spored unitunicate, clavate, biseriate. Ascospores, 5–6×9–12 µm. unicellular to cylindrical or ovate, oval, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 37.)

Notes: CMU_TAR33 collection which is similar to host plant on CMU_TAR32, but which has very small asci and ascospores.

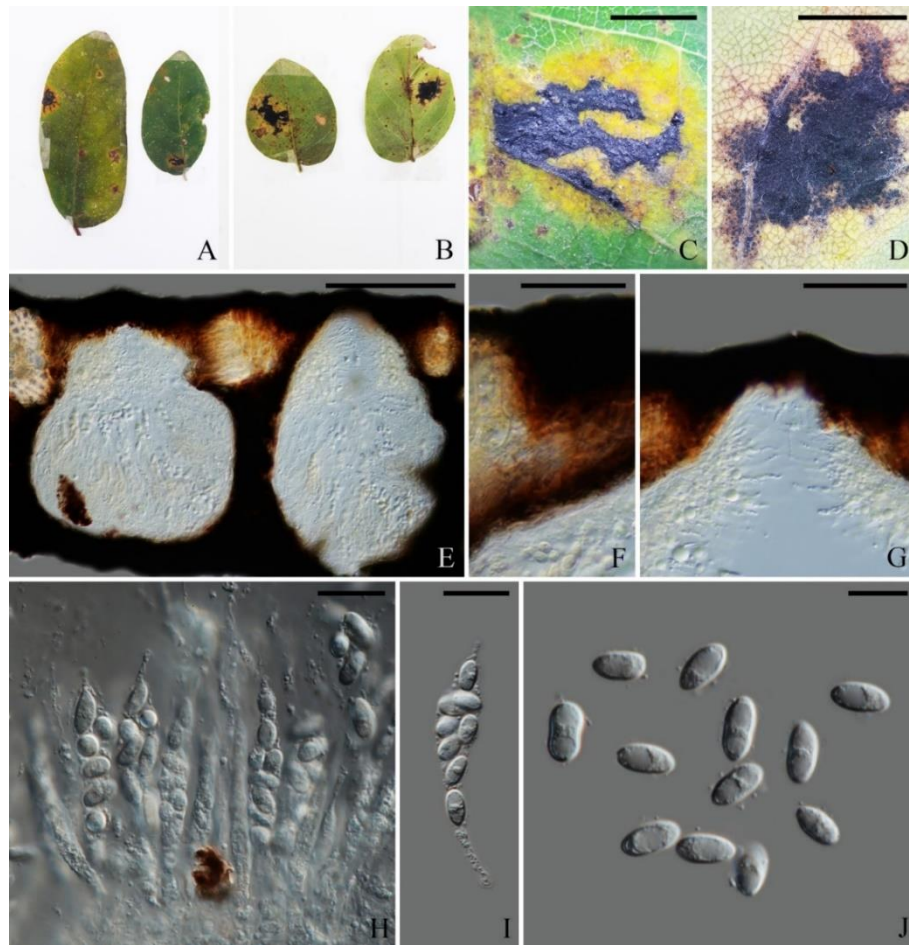


Figure 37. *Phyllachora pteracarpi* on leaf, A-B. Tar spots on upper surface, C-D. Close up of tar spots on leaf, D. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, E. Vertical section through peridium, F. Asci and paraphyses, G. Vertical section through ostiolar canal, H. Asci and paraphyses, I. Asci, J. Ascospores. Scale bars: C-D = 5 mm, E. = 200 μm, F = 20 μm, G = 20 μm, H = 20 μm, I = 15 μm, J = 10 μm.

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Phyllachora pteracarpi

Species examined: CMU_TAR34 collection, Chiang Mai, on living leaves of *Pterocarpus indicus*.

Teleomorph: The blackened on living leaves of *Pterocarpus indicus*, Tar spots 0.5–2×0.5–3 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial, 200–(220–300)–330 µm wide, 100–(120–175)–200 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 5–12×45–(50–75)–87 µm 8-spored unitunicate, clavate, biseriate. Ascospores, 4–7×15–(18–24)–33 µm. unicellular to ellipsoidal, oval, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 38.)

Notes: CMU_TAR34 collection which is similar to CMU_TAR33, but which has largely ascospores size, cylindrical to cylindric-ellipsoidal in shape.

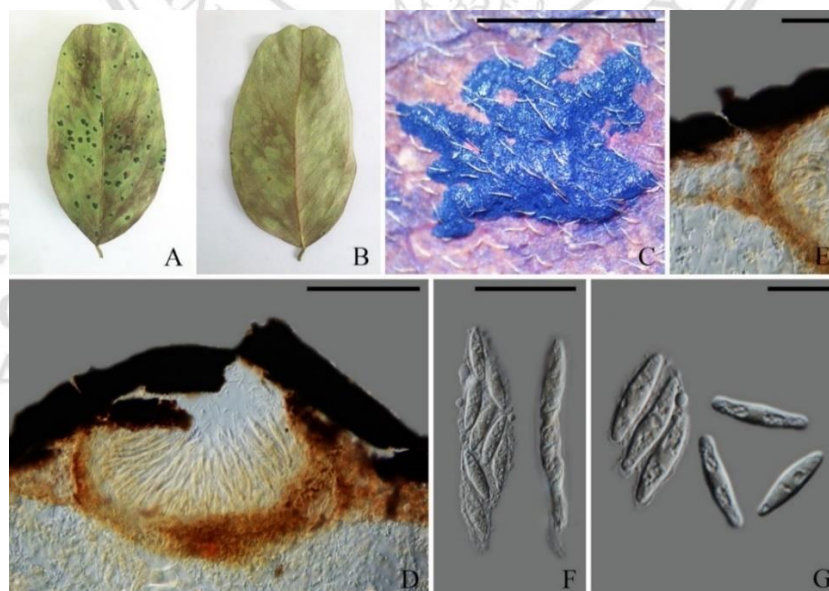


Figure 38. *Phyllachora pteracarpi* on leaf, A-B. Tar spots on upper surface, C. Close up of tar spots on leaf, D. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, E. Vertical section through peridium, F. Asci, G. Ascospores. Scale bars: C = 2 mm, E. = 50 µm, D = 150 µm, F = 20 µm, G = 15 µm.

Phyllachora pteracarp

Species examined: CMU_TAR35 collection, Saraphi, Chiang Mai, on living leaves of *Pterocarpus indicus*.

Teleomorph: The blackened on living leaves of *Pterocarpus indicus*, Tar spots 0.5–1×0.5–2 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata unimultiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 160–(220–235)–260 wide, 120–(150–190)–220 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not constructed at septate. Asci, 7–12×75–95 µm. 8-spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 3–5×14–20 µm. unicellular to fusiform or cylindrical, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 39.)

Notes: CMU_TAR35 collection which is similar to CMU_TAR34, but which has smaller ascospores, uniloculate blackened regions, and much longer asci.

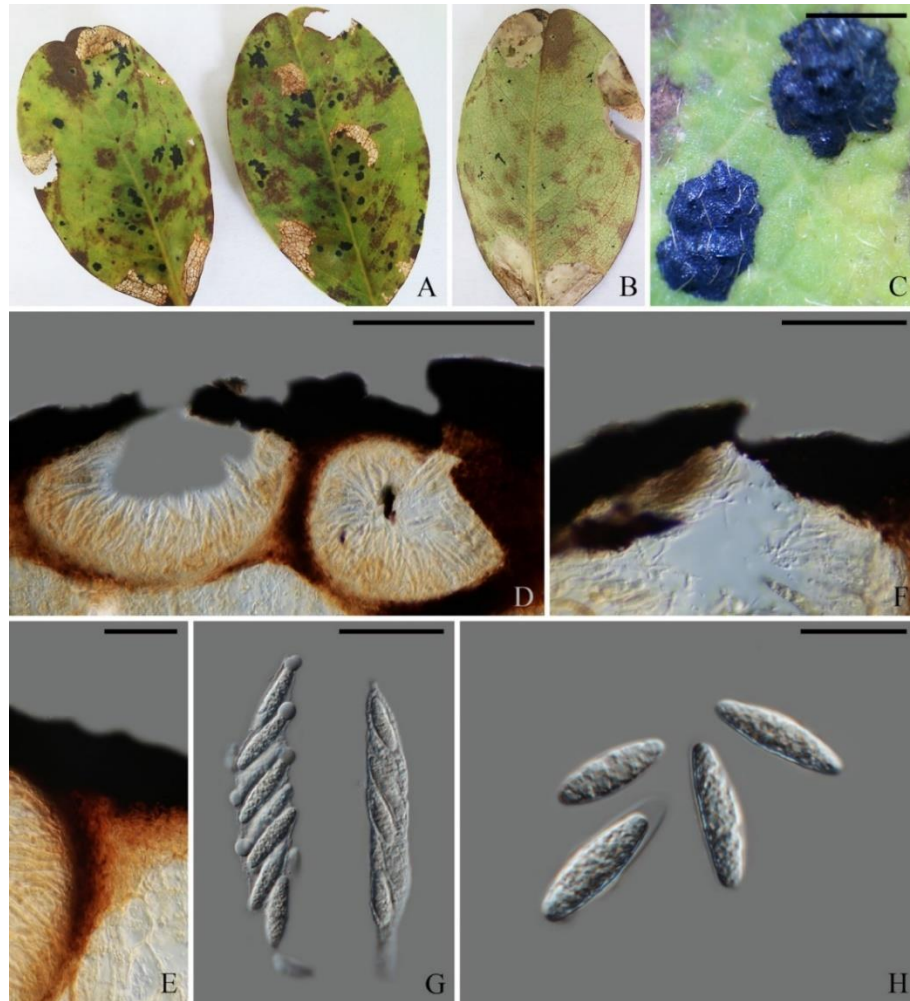


Figure 39. *Phyllachora pteracarpi* on leaf, A-B. Tar spots on upper surface, C. Close up of tar spots on leaf, D. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, E. Vertical section through peridium, F. Vertical section through ostiolar canal, G. Asci, H. Ascospores. Scale bars: C = 2 mm, D. = 150 μ m, E = 30 μ m, F = 50 μ m, G = 20 μ m, H = 10 μ m.

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Phyllachora amphibola

Species examined: CMU_TAR36 collection, Maekalngluang Chom Thong, Chiang Mai, on living leaves of *Thysanoleana maxima*.

Teleomorph: The blackened on living leaves of *Thysanoleana maxima*, Tar spots 0.3–1.2×0.2–1.5 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata, chlorotic of reddish yellow discoloured host tissue. Stromata uni-multiloculate, 0.3–0.4 μm high, 0.6–1.5 mm diam., ovoid, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial 175–(205–250) μm high, 270–(300–370)–410 μm diam., flask to bowl shape, single or forming in group of 1–4, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 13–18×(100–114)–126 μm ellipsoid to obclavate, fairly short-stalked, very thin-walled, the apex obtuse to rounded without visible apical structures. Ascospores, 4–5×21–24 μm . arranged irregularly, cylindrical - fusiform, occasionally very slightly curved, guttulate, thin-walled, hyaline, surrounded by mucilaginous sheath. (Figure 40.)

Notes: This species similar to *P. amphibola* Cannon, (1991), but which has small asci and ascospores.

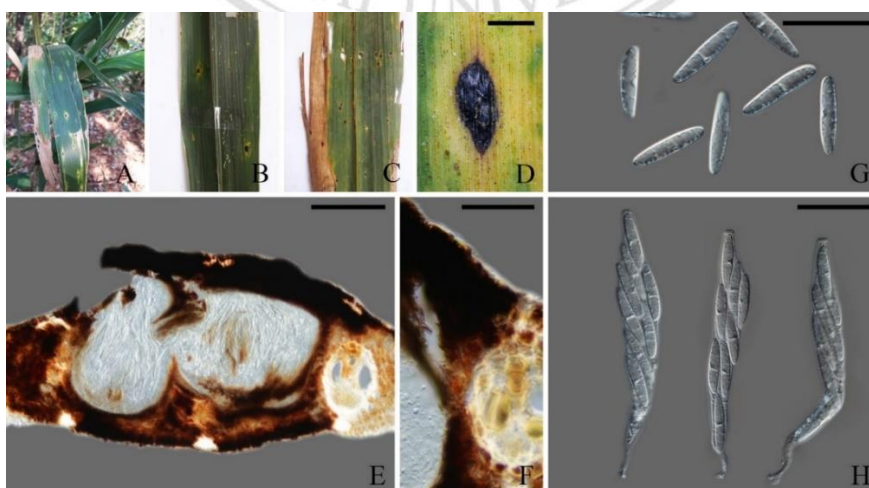


Figure 40. *Phyllachora amphibola* on leaf, A-C. Tar spots on upper surface, D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, H. Asci, G. Ascospores. Scale bars: D = 5 mm, E = 500 μm , F = 30 μm , H = 25 μm , G = 20 μm .

Phyllachora bulbosa

Species examined: CMU_TAR37 collection, Royal Project Foundation of Nonghoy, Chiang Mai, on living leaves of *Monocotyledon*.

Teleomorph: The blackened on living leaves of *Monocotyledon*, Tar spots 0.2–1×0.2–0.7 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 112–(137–187)–200 µm wide, 270–(310–350)–400 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 80–(125–175)–212 wide, 82–(112–127)–162 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 10–12×50–(60–67) µm, 8-spored unitunicate, clavate to cylindrical, biseriate. Ascospores, 5–6×9–12 µm. unicellular to ovate to elliptical or ovate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 41.)

Notes: This species is rather similar to *P. bulbosa* Parbery (1967), but the ascospores are 5–6×9–12 µm in size, elliptical to ovate in shape.

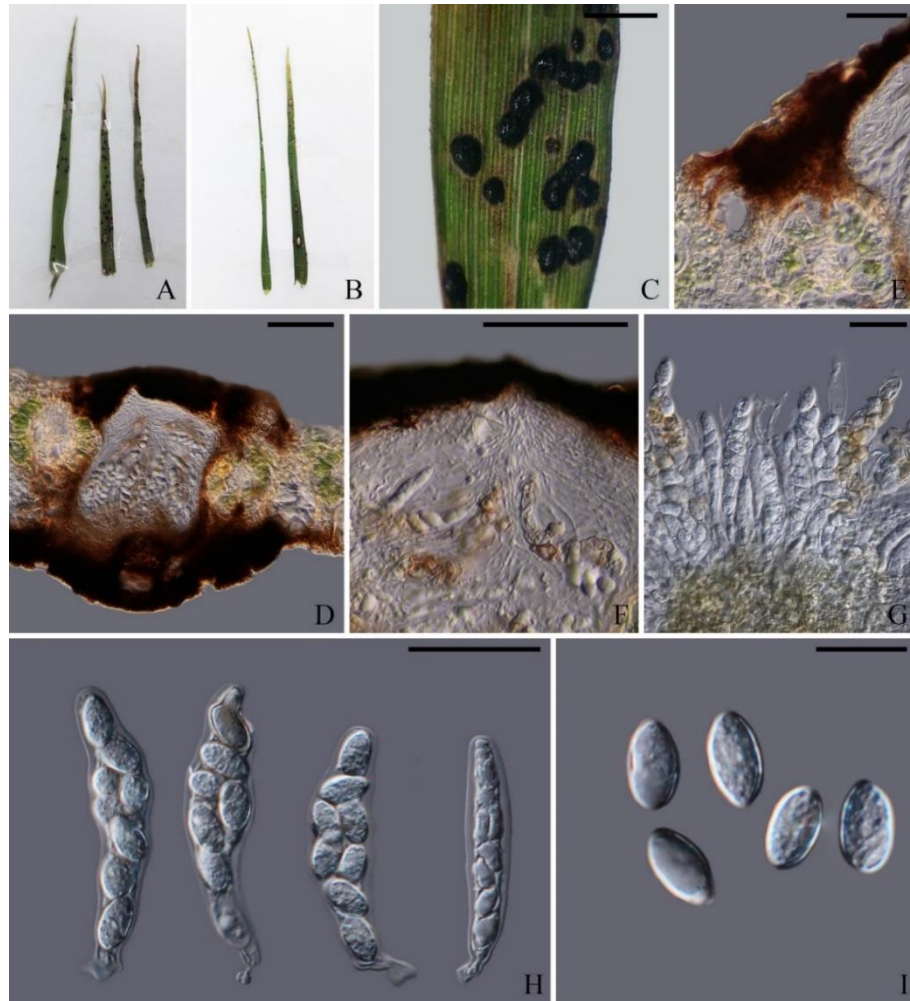


Figure 41. *Phyllachora bulbosa* on leaf, A-B. Tar spots on upper surface, C. Close up of tar spots on leaf, D. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, E. Vertical section through peridium, F. Vertical section through ostiolar canal, G. Asci and paraphyses, H. Asci, I. Ascospores. Scale bars: C = 5 mm, D = 100 μm, E = 30 μm, F = 30 μm, G = 20 μm, H = 20 μm I. = 10 μm.

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Phyllachora ischaemi

Species examined: CMU_TAR38 collection, Queensirikit garden, Chiang Mai, on living leaves of *Monocotyledon*.

Teleomorph: The blackened on living leaves of *Monocotyledon*, Tar spots 0.2–0.5×0.1–2 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 150–(215–330)–460 µm wide, 175–(202–230)–265 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 142–(200–265)–380 wide, 75–(115–147)–181 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not constrict at septate. Asci, 10–12×67–(80–97)–110 µm, 8-spored unitunicate, clavate to cylindrical, overlapping uniseriate. Ascospores, 6–7×11–15 µm. unicellular to ovate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 42.)

Notes: This species similar to *P. ischaemi* Syd., (1915), but which has small asci and ascospores.

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Figure 42. *Phyllachora ischaemi* on leaf, A-B. Tar spots on upper surface, C-D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Asci and paraphyses, H. Asci, I. Ascospores. Scale bars: C-D = 5 mm, E = 150 μ m, F = 30 μ m, G = 20 μ m, H = 20 μ m, I = 10 μ m.

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Phyllachora imnutissima

Species examined: CMU_TAR39 collection, Queensirikit garden, Chiang Mai, on living leaves of *Monocotyledon*.

Teleomorph: The blackened on living leaves of *Monocotyledon*, Tar spots 0.1–0.2×0.1–0.5 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 310–(400–670)–800 µm wide, 132–(155–187)–240 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 87–(127–150)–242 wide, 82–(100–125)–155 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 7–10×45–52 µm, 8–spored unitunicate, clavate to cylindrical, biseriate. Ascospores, 5–6×9–11 µm. unicellular to ovate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 43.)

Notes: This species similar to *P. minutissima* A.L. Sm., (1898), but which has small asci and ascospores.

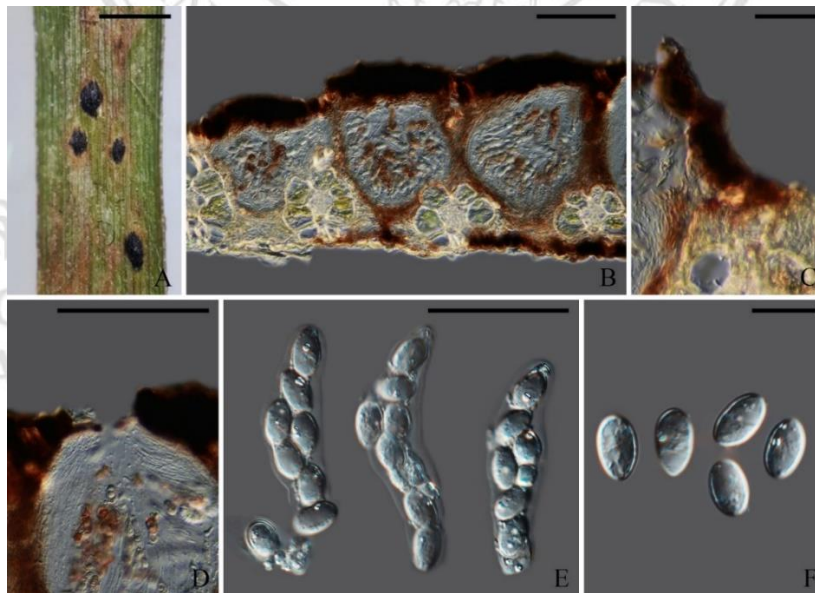


Figure 43. *Phyllachora imnutissima* on leaf, A. Close up of tar spots on leaf, B. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, C. Vertical section through peridium, D. Vertical section through ostiolar canal, E. Asci, F. Ascospores. Scale bars: A = 5 mm, B = 100 µm, C = 30 µm, D = 50 µm, E = 20 µm, F = 10 µm.

Phyllachora oryzopsidis

Species examined: CMU_TAR40 collection, Queensirikit garden, Chiang Mai, on living leaves of *Monocotyledon*.

Teleomorph: The blackened on living leaves of *Monocotyledon*, Tar spots 0.2–1×0.2–0.5 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 410–(520–600)–650 µm wide, 220–(250–280)–310 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 132–(150–250)–350 wide, 80–(125–157)–180 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 10–12×75–(80–100)–110 µm, 8-spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 6–7×12–15 µm. unicellular to elliptical, ovate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 44.)

Notes: This species is rather similar to *P. oryzopsidis*, but which has largely asci and ascospores.

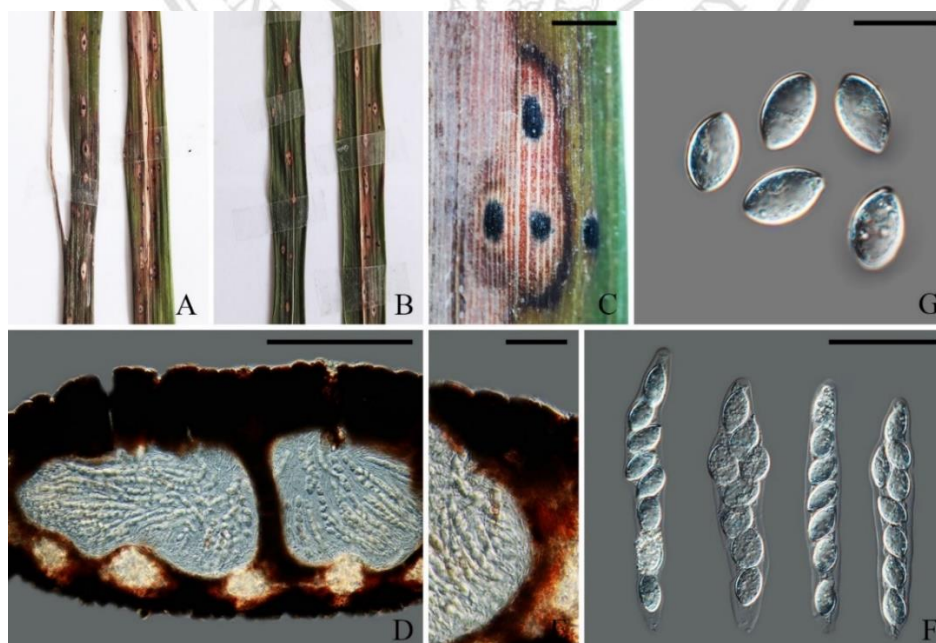


Figure 44. *Phyllachora oryzopsidis* on leaf, A-B. Tar spots on upper surface, C. Close up of tar spots on leaf, D. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues,

E. Vertical section through peridium, F. Asci, G. Ascospores. Scale bars: C = 5 mm, D = 100 μ m, E = 50 μ m, F = 20 μ m, G = 10 μ m.

Phyllachora ramosii

Species examined: CMU_TAR43 collection, Maekalngluang, Chom Thong, Chiang Mai, on living leaves of *Monocotyledon*.

Teleomorph: The blackened on living leaves of *Monocotyledon*, Tar spots 0.2–1×0.2–0.5 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 220–(270–350)–600 μ m wide, 167–(190–212)–250 μ m high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial 127–(157–195)–250 μ m wide, 100–(137–160)–205 μ m high, flask-shaped, bowl-shaped, solitary or forming groups of 1–3, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 7–12×47–(52–62)–87 μ m 8-spored unitunicate, clavate, biseriate. Ascospores, 4–5×10–17 μ m. unicellular to ovate, fusiform, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 45.)

Notes: This species is difficult to distinguish from *P. ramosii*, Cannon (1991) but its ascospores are usually relatively narrower.

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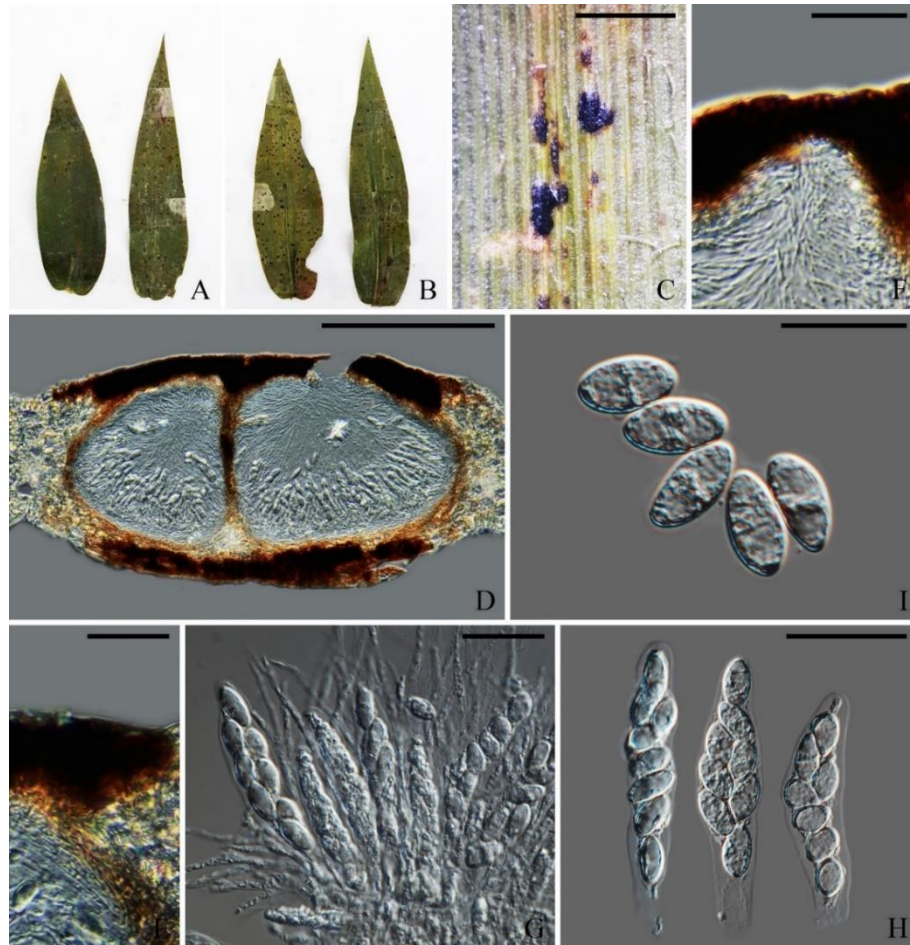


Figure 45. *Phyllachora ramosii* on leaf, A-B. Tar spots on upper surface, C. Close up of tar spots on leaf, D. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, E. Vertical section through peridium, F. Vertical section through ostiolar canal, G. Asci and paraphyses, H. Asci, I. Ascospores. Scale bars: C = 5 mm, D = 150 μ m, E = 20 μ m, F = 20 μ m, G = 20 μ m, H = 2015 μ m, I = 10 μ m.

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Phyllachora oryzopsidis

Species examined: CMU_TAR44 collection, Some Hgagn, Lamphun, on living leaves of *Monocotyledon*.

Teleomorph: The blackened on living leaves of *Monocotyledon*. Tar spots 0.2–1×0.2–0.8 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 500–(600–750) µm wide, 190–215 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial, 67–(87–177)–150 µm wide, 77–(87–120)–75µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 7–12×52–57 µm 8-spored unitunicate, clavate, biseriate. Ascospores, 5–6×10–11 µm. unicellular to ellipsoidal, oval, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 46.)

Notes: This species is similar to *P. oryzopsidis*, but has shorter and relatively wider ascospores.

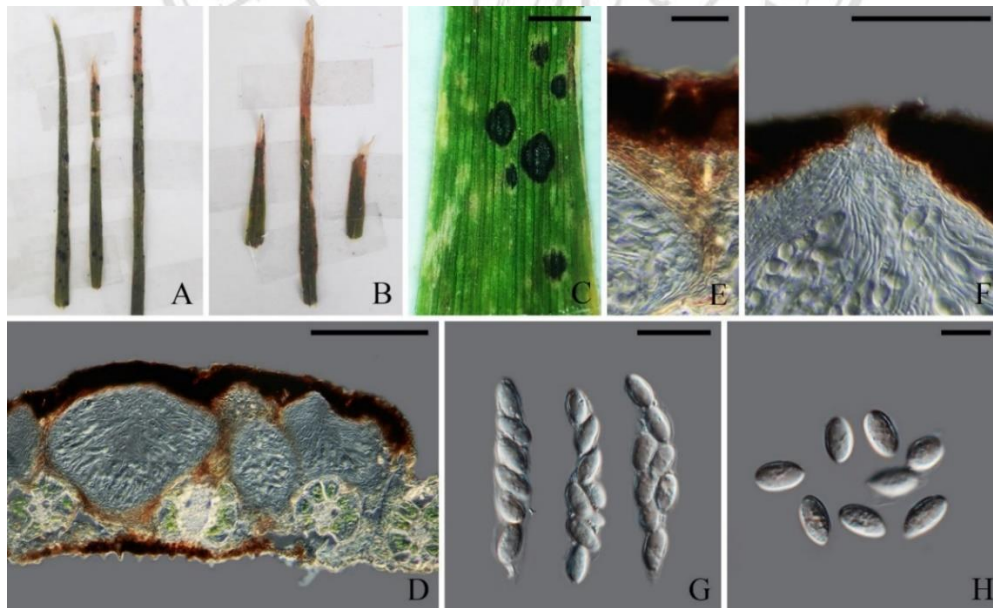


Figure 46. *Phyllachora oryzopsidis* on leaf, A-B. Tar spots on upper surface, C. Close up of tar spots on leaf, D. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, E. Vertical section through peridium, F. Vertical section through ostiolar canal, G. Asci, H. Ascospores. Scale bars: C = 5 mm, D = 100 µm, E = 20 µm, F = 30 µm, G = 20 µm, H = 10 µm.

Phyllachora cantonensis

Species examined: CMU_TAR45 collection, Maekalngluang, Chom Thong, Chiang Mai, on living leaves of *Dicotyledons*.

Teleomorph: The blackened on living leaves of *Dicotyledon*, Tar spots 0.2–2×0.2–1 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 400–(470–590)–620 µm wide, 157–(187–205)–250 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial, 137–(177–235)–290 µm wide, 100–(125–150)–170 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 10–12×60–(65–70) µm 8-spored unitunicate, clavate, biseriate. Ascospores, 4–5×8–10 µm. unicellular to cylindrical or ovate, sometimes ellipsoidal with rounded poles, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 47.)

Notes: This is the type species of the genus *Phyllachora*. In the similar *P. cantonensis*, but which has significantly smaller ascospores which are not inaequilateral.

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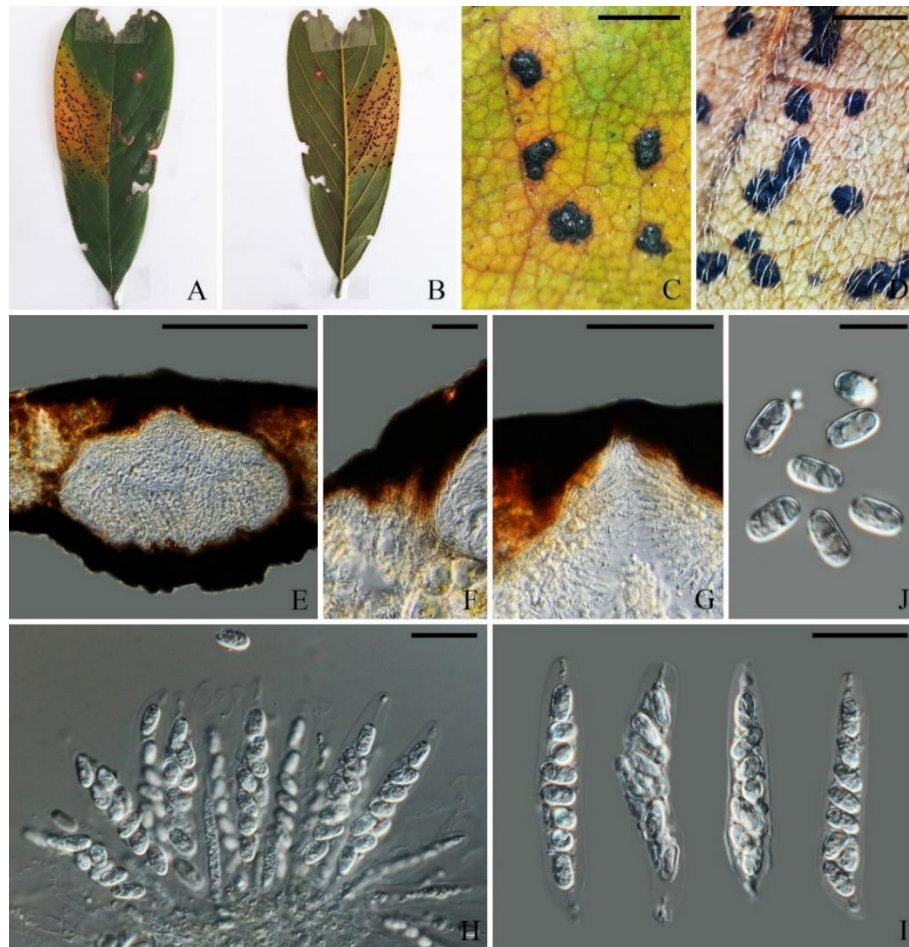


Figure 47. *Phyllachora cantonensis* on leaf, A-B. Tar spots on upper surface, C-D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Vertical section through ostiolar canal, H. Asci and paraphyses, I. Asci, J. Ascospores. Scale bars: C-D = 5 mm, E. = 150 μ m, F = 30 μ m, G = 30 μ m, H = 20 μ m, I = 20 μ m, J = 10 μ m.

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Phyllachora glycinicola

Species examined: CMU_TAR47 collection, Chiang Mai, on living leaves of *Dicotylrdon*

Teleomorph: The blackened on living leaves of *Dicotylrdon*, Tar spots 0.2–1×0.2–2 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 8–spored unitunicate, clavate, biseriate. Ascospores unicellular to globose, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 48.)

Notes: This species is very similar to *P. glycinicola*, except for stromatal characters. Blackened regions of *P. glycinicola* are larger.

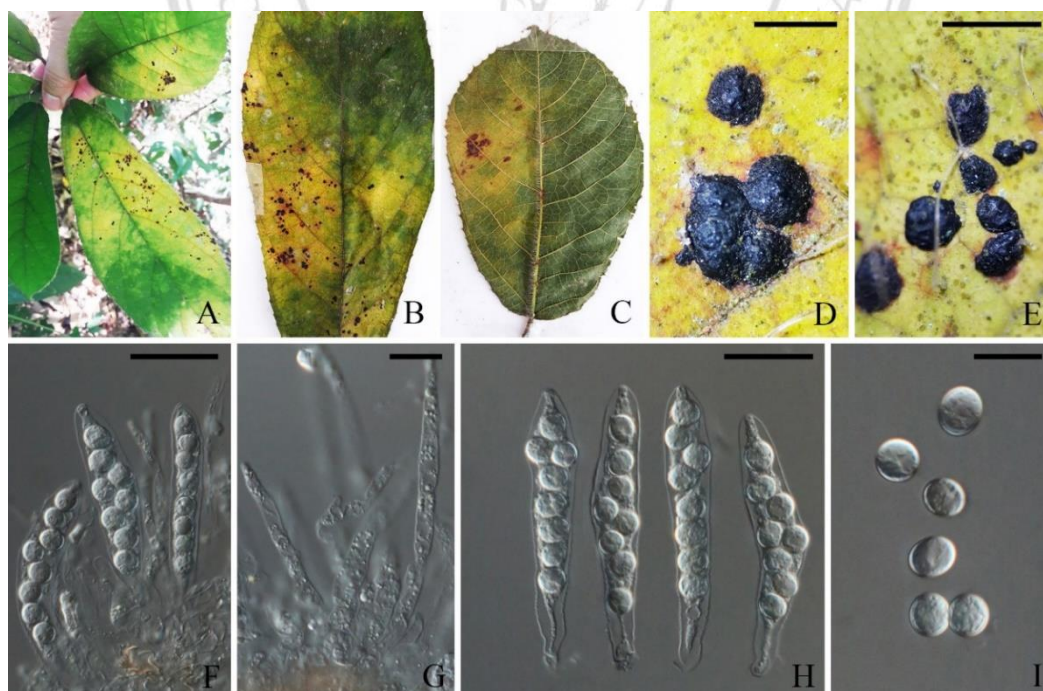


Figure 48. *Phyllachora glycinicola* on leaf, A-C. Tar spots on upper surface, D-E. Close up of tar spots on leaf, F. Asci and paraphyses, G. Paraphyses, H. Asci, I. Ascospores. Scale bars: D = 2 mm, E. = 5 mm, F. = 20 μ m, G = 10 μ m, H = 20 μ m, I = 10 μ m.

Phyllachora dolichogena

Species examined: CMU_TAR48 collection, Saraphi, Chiang Mai, on living leaves of *Dicotyledon*.

Teleomorph: The blackened on living leaves of *Dicotyledon*, Tar spots 0.2–1×0.5–3 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 470–(500–652)–750 µm wide, 215–(250–280) µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 200–(250–290) wide, 140–(175–225)–245 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 11–12×70–82 µm. 8-spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 7–9×8–9 µm. unicellular to globose, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 49.)

Notes: This species was stated by the authors to have smaller ascospores than *Phyllachora dolichogena* Cannon (1991), and differing in perithecium characters.

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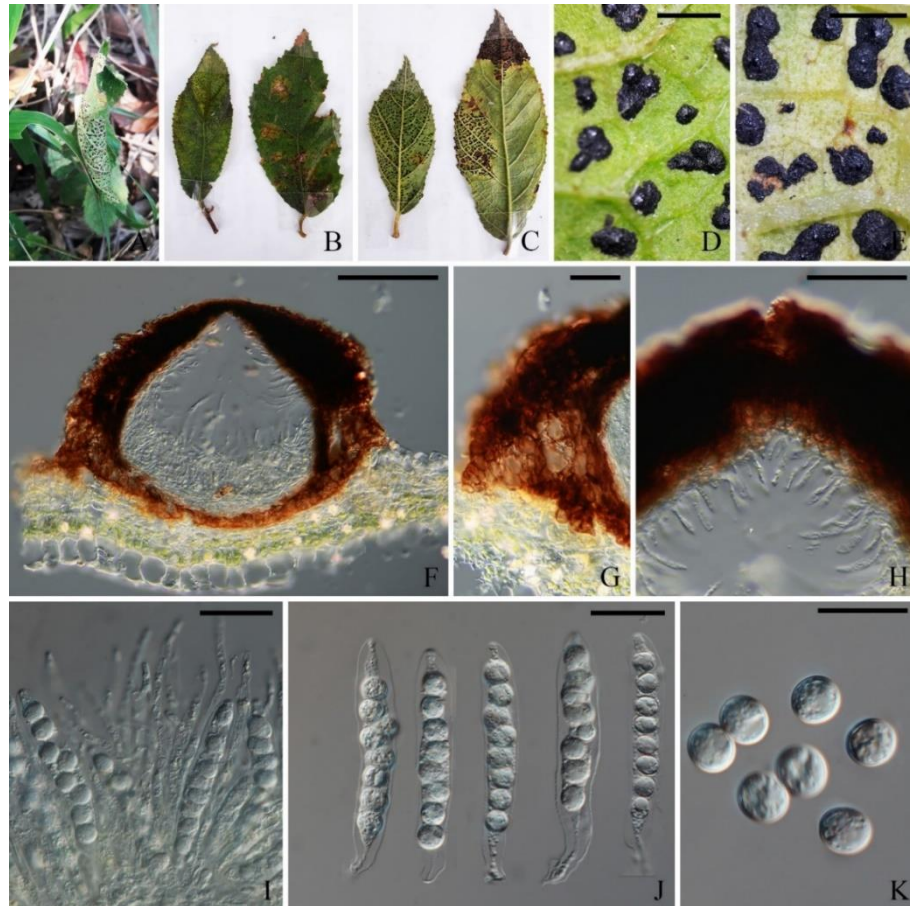


Figure 49. *Phyllachora dolichogena* on leaf, A-C. Tar spots on upper surface, D-E. Close up of tar spots on leaf, F. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, G. Vertical section through peridium, H. Vertical section through ostiolar canal, I. Asci and paraphyses, J. Asci, K. Ascospores. Scale bars: D-E = 5 mm, F. = 150 μ m, G = 30 μ m, H = 20 μ m, I = 20 μ m, J = 20 μ m, K = 15 μ m..

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Phyllachora ficuum

Species examined: CMU_TAR50 collection, Maekalngluang Chom Thong, Chiang Mai, on living leaves of *Dicotyledon*.

Teleomorph: The blackened on living leaves of *Dicotyledon*, Tar spots 0.2–4×0.1–2 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata, chlorotic of reddish yellow discoloured host tissue. Stromata uni-multiloculate, 600–(710–900)–1060 µm wide, 185–(220–257)–270 µm high, ovoid, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial 145–(195–230)–260 µm high, 75–(112–170)–195 µm diam., flask to bowl shape, single or forming in group of 1–4, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 10–12×95–(100–125)–140 µm ellipsoid to obclavate, fairly short-stalked, very thin-walled, the apex obtuse to rounded without visible apical structures. Ascospores, 5–6×11–13 µm. arranged irregularly, cylindrical - fusiform, occasionally very slightly curved, guttulate, thin-walled, hyaline, surrounded by mucilaginous sheath. (Figure 50.)

Notes: This species is superficially very similar to *P. ficuum*, which has usually smaller and sometimes rather irregularly shaped ascospores.

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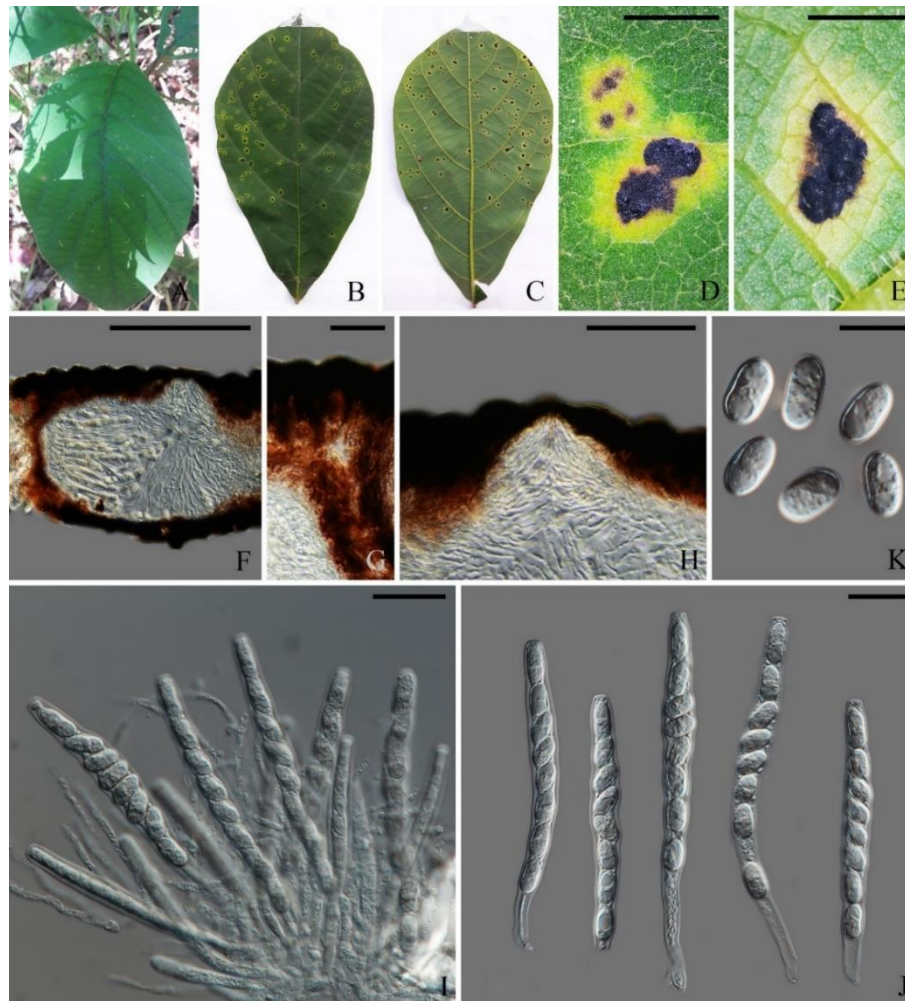


Figure 50. *Phyllachora ficuum* on leaf, A-C. Tar spots on upper surface, D-E. Close up of tar spots on leaf, F. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, G. Vertical section through peridium, H. Vertical section through ostiolar canal, H. Asci, G. Ascospores. Scale bars: D = 5 mm, E = 500 μ m, F = 30 μ m, H = 25 μ m, G = 20 μ m.

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Phyllachora cantonensis

Species examined: CMU_TAR51 collection, Maekalngluang, Chom Tong, Chiang Mai, on living leaves of *Dicotyledon*.

Teleomorph: The blackened on living leaves of *Dicotyledon*, Tar spots 0.5–2×0.2–1 mm. on upper and lower leaves surface, as black punctiform spots, globose, shiny, often coalescing adjacent to leaf veins, shallow to strongly domed, often multidomed, occurring singly or gregarious, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 550–(650–770)–810 µm wide, 250–(270–320)–350 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial 155–(207–270)–460 µm wide, 107–(155–210)–250 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–3, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 7–12×95–115 µm 8-spored unitunicate, clavate, retraction of plasmalemma. Ascospores, 5–7×12–16 µm. unicellular to ovate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 51.)

Notes: This species is closely similar to *Phyllachora cantonensis*, but has ascomata in rather larger, usually multiloculate blackened regions.

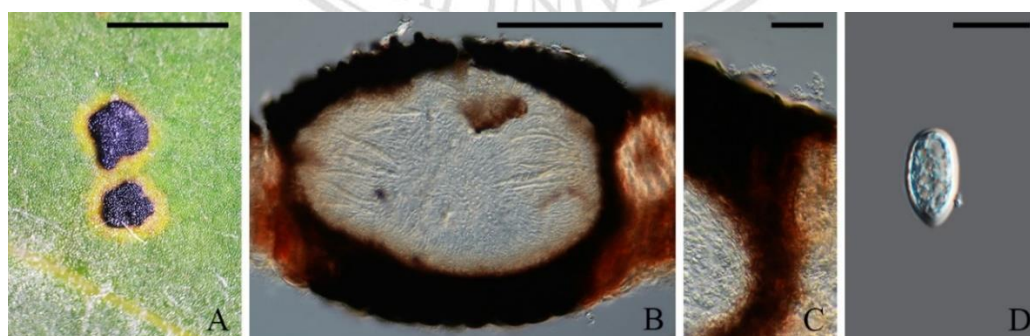


Figure 51. *Phyllachora cantonensis* on leaf, A. Tar spots on upper surface, B. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, C. Vertical section through peridium, D. Ascospores. Scale bars: A = 5 mm, B = 150 µm, C = 30 µm, D = 10 µm.

***Phyllachora* sp.**

Species examined: CMU_TAR52 collection, Maekalnluang, Chom Tong, Chiang Mai, on living leaves of *Dicotyledon*.

Telemorph: The blackened on living leaves of *Dicotyledon*, Tar spots 0.2–1×0.5–2 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata, halo yellow. Stromata 440–(500–710)–780 µm. wide, 200–(250–310)–380 µm high, uni-multiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial, 137–(155–202)–230 µm wide, 112–(130–175)–210 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–3, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 10–12×57–77 µm 8-spored unitunicate, clavate, overlapping uniseriate. Ascospores, 4–5×13–15 µm. unicellular to cylindrical, hyaline, surrounded by mucilaginous sheath. (Figure 52.)

Notes: This species is difficult to distinguish from *Phyllachora cantonensis*, but its ascospores are usually relatively narrower.

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Figure 52. *Phyllachora* sp. on leaf, A-C. Tar spots on upper surface, D-E. Close up of tar spots on leaf, F. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, G. Vertical section through peridium, H. Vertical section through ostiolar canal, I. Asci, J. Ascospores. Scale bars: D-E = 5 mm, F = 150 μ m, G = 30 μ m, I = 20 μ m, J = 10 μ m.

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***Phyllachora* sp.**

Species examined: CMU_TAR53 collection, Maekalnluang, Chom Tong, Chiang Mai, on living leaves of *Dicotyledon*.

Teleomorph: The blackened on living leaves of *Dicotyledon*, Tar spots 0.5–3×0.2–4 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, roughly circular to irregular, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 650–(730–810)–1076 μm wide, 250–(270–320) μm high ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial, 240–(260–280)–350 μm wide, 150–(175–200)–212 μm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–5, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 3–10×92–105 μm 8–spored unitunicate, clavate, overlapping uniseriate, refractive subapical ring. Ascospores unicellular to ellipsoidal, oval, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 53.)

Notes: The holotype is parasitized by hyaline hyphae of an unknown fungus.

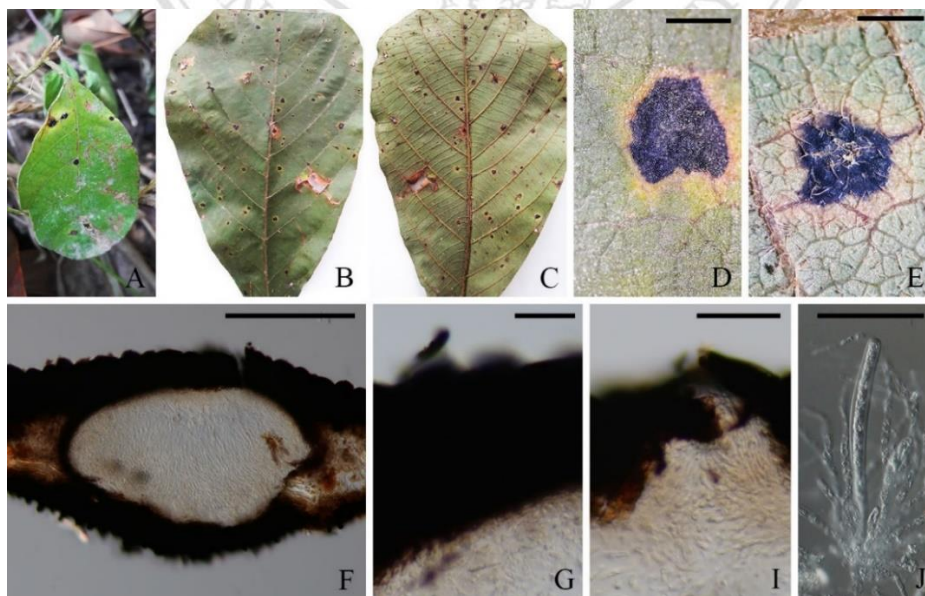


Figure 53. *Phyllachora* sp. on leaf, A-C. Tar spots on upper surface, D-E. Close up of tar spots on leaf, F. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, G. Vertical section through peridium, I. Vertical section through ostiolar canal, I. Asci. Scale bars: C = 5 mm, D-E = 5 mm, F = 150 μm , G = 30 μm , I = 30 μm , J = 20 μm .

Phyllachora queenslandica

Species examined: CMU_TAR56 collection, Maekalnluang, Chom Tong, Chiang Mai, on living leaves of *Didotyledon*.

Teleomorph: The blackened on living leaves of *Didotyledon*, Tar spots 0.2–0.5×0.1–1 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 770–(850–916)–1099 µm wide, 350–(400–572)–618 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 280–(320–430)–490 wide, 230–(260–290)–370 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–3, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 15–25×120–(132–167)–187 µm, 8-spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 7–9×16–20 µm. unicellular to ovate, ovoid, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 54.)

Notes: This species is similar to *Phyllachora queenslandica* Hansf (1956), but has shorter and relatively wider ascospore.

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Figure 54. *Phyllachora queenslandica* on leaf, A-C. Tar spots on upper surface, D-E. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, G. Vertical section through peridium, H. Vertical section through ostiolar canal, I. Asci and paraphyses J. Asci, K. Ascospores. Scale bars: D-E = 2 mm, F. = 200 μ m, G = 50 μ m, H = 30 μ m K = 15 μ m, I. = 30 μ m, J. = 30 μ m.

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Phyllachora tumatumeriana

Species examined: CMU_TAR57 collection, Maekalnluang, Chom Tong, Chiang Mai, on living leaves of *Monocotyledon*.

Teleomorph: The blackened on living leaves of *Monocotyledon*, Tar spots 0.2–1×0.5–2 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 370–(400–430)–470 wide, 175–(200–230)–250 µm, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 225–(290–310)–390 µm. wide, 125–(157–200)–227 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 12–15×77–(82–100)–115 µm, 8-spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 6–7×10–13 µm. unicellular to ovate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 55.)

Notes: This species is similar *Phyllachora tumatumeriana*, but the ascospoera are 6–7×10–13 µm in size, ovate in shape.



Figure 55. *Phyllachora tumatumeriana* on leaf, A-B. Tar spots on upper surface, C-D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Vertical section through ostiolar canal, H. Asci and paraphyses, I. Asci, J. Ascospores. Scale bars: C-D = 5 mm, E = 150 μm, F = 30 μm, G = 30 μm, H = 20, I. = 20 μm, J = 10 μm.

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Phyllachora oryzodsidis

Species examined: CMU_TAR59 collection, Maekalnluang, Chom Tong, Chiang Mai, on living leaves of *Dicotyledon*.

Teleomorph: The blackened on living leaves of *Dicotyledon*, Tar spots 0.1–0.5×0.2–0.7 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 690–740 µm. wide, 260–280 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 125–(200–230)–280 wide, 110–(140–175)–200 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 12–15×87–(95–102)–120 µm, 8-spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 6–7×13–17 µm. unicellular to ovate to elliptical or ovate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 56.)

Notes: This species is similar *Phyllachora oryzopsidis*, but the ascospores are larger.

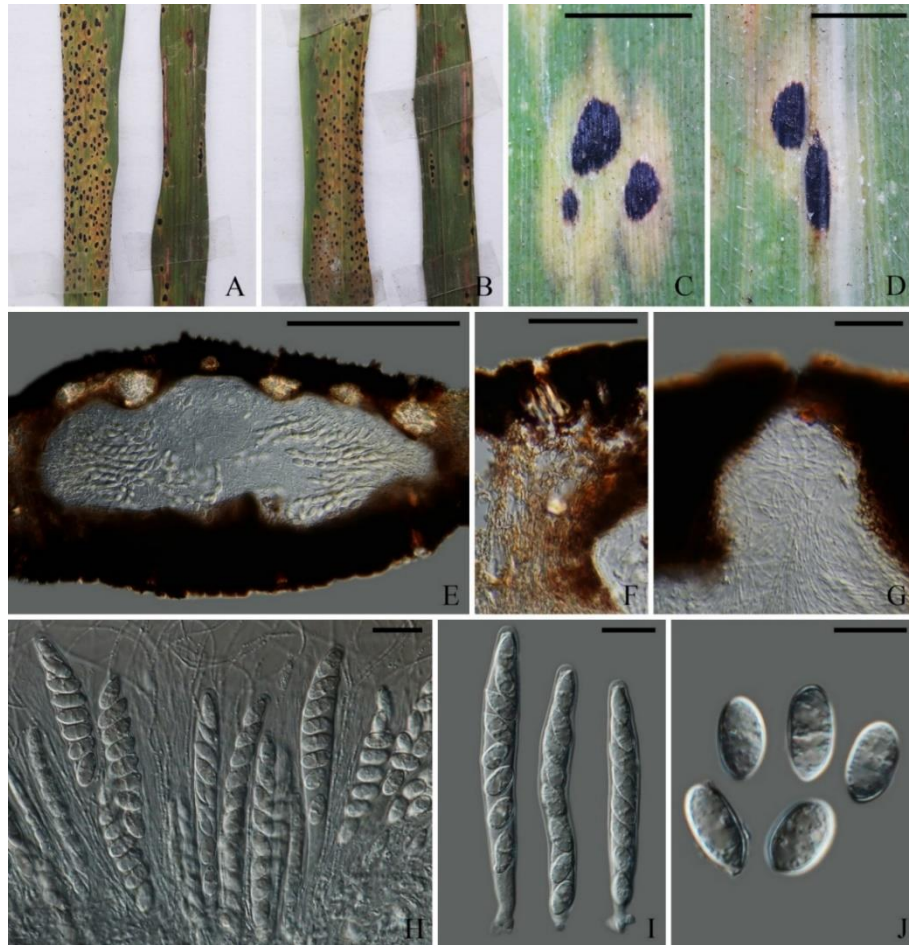


Figure 56. *Phyllachora oryzae* on leaf, A-B. Tar spots on upper surface, C-D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Vertical section through ostiolar canal, H. Asci and paraphyses, I. Asci, J. Ascospores. Scale bars: C-D = 5 mm, E = 100 μ m, F = 50 μ m, G = 30 μ m, H = 20 μ m, I = 20 μ m J. = 10 μ m.

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Phyllachora cantonensi

Species examined: CMU_TAR58 collection, Maekalnluang, Chom Tong, Chiang Mai, on living leaves of *Monocotyledon*.

Teleomorph: The blackened on living leaves of *Monocotyledon*, Tar spots 0.1–2×0.2–1 mm. on upper and lower leaves surface, as black punctiform spots, ovoid to irregular, shiny, with the raised glossy black clypeus covering the ascomata. Stromata unitiloculate, 400–(610–670) µm. wide, 250–299 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 177–(212–237)–250 wide, 142–(177–215)–250 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 10–12×45–(60–70)–82 µm, 8-spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 4–5×8–10 µm. unicellular to ovate to cylindrical or ovate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 57.)

Notes: This species is similar *Phyllachora cantonensis*, has much smaller ascospore, and narrower asci.

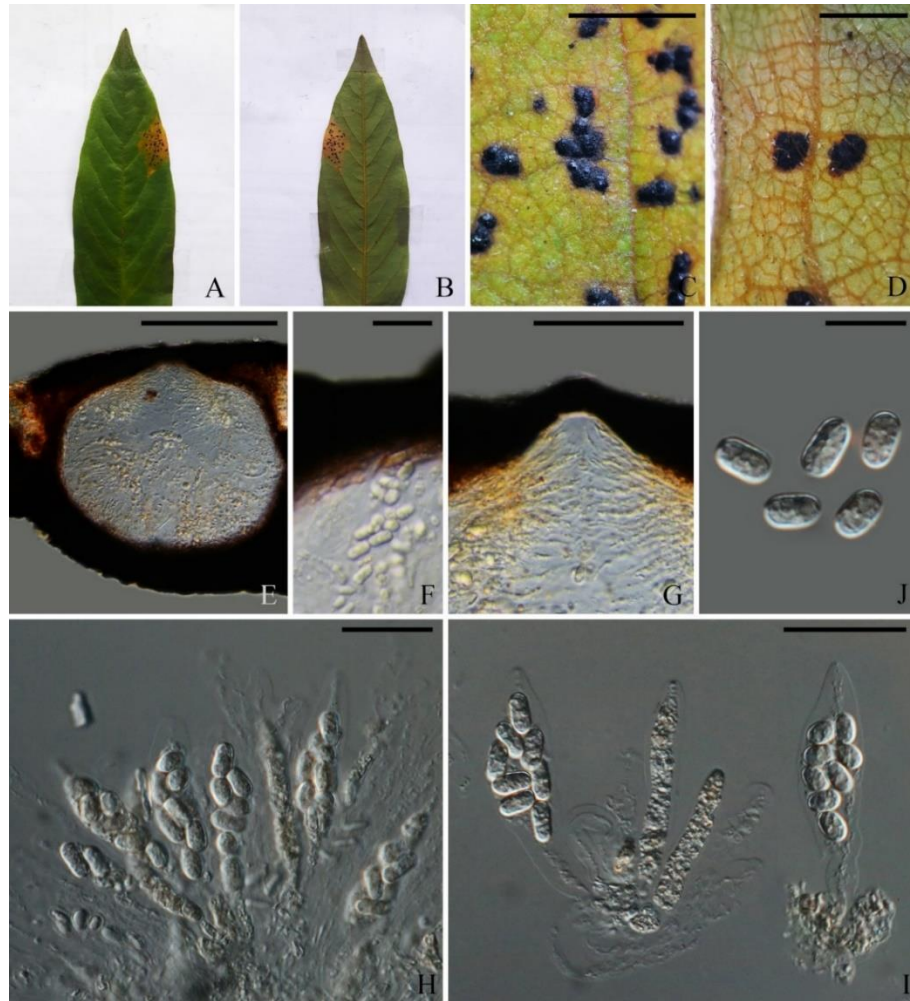


Figure 57. *Phyllachora cantonensi*. on leaf, A-B. Tar spots on upper surface, C-D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Vertical section through ostiolar canal, H. Asci and paraphyses, I. Asci, J. Ascospores. Scale bars: C-D = 5 mm, E = 150 μ m, F = 30 μ m, G = 30 μ m, H = 20 μ m, I = 20 μ m J. = 10 μ m.

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Phyllachora callistemonis* subsp. *callistemonis

Species examined: CMU_TAR60 collection, Maekalnluang, Chom Tong, Chiang Mai, on living leaves of *Dicotyledon*.

Teleomorph: The blackened on living leaves of *Dicotyledon*, Tar spots 0.1–2×0.2–3 mm. on upper and lower leaves surface, as black punctiform spots, low to moderately dome, solitary or forming small groups, sometimes coalescing, sometimes with a yellowish or reddish halo of discoloured host tissue, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 250–(310–350)–400 µm. wide, 230–(250–270)–320 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 250–(290–310)–320 wide, 150–(187–217)–250 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 10–12×80–(90–100)–112 µm, 8-spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 5–6×11–13 µm. unicellular to ovate to cylindrical or ovate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 58.)

Notes: This species is similar *Phyllachora callistemonis* subsp. *callistemonis* Papers and Proceedings (1917), the has significantly smaller ascospores.

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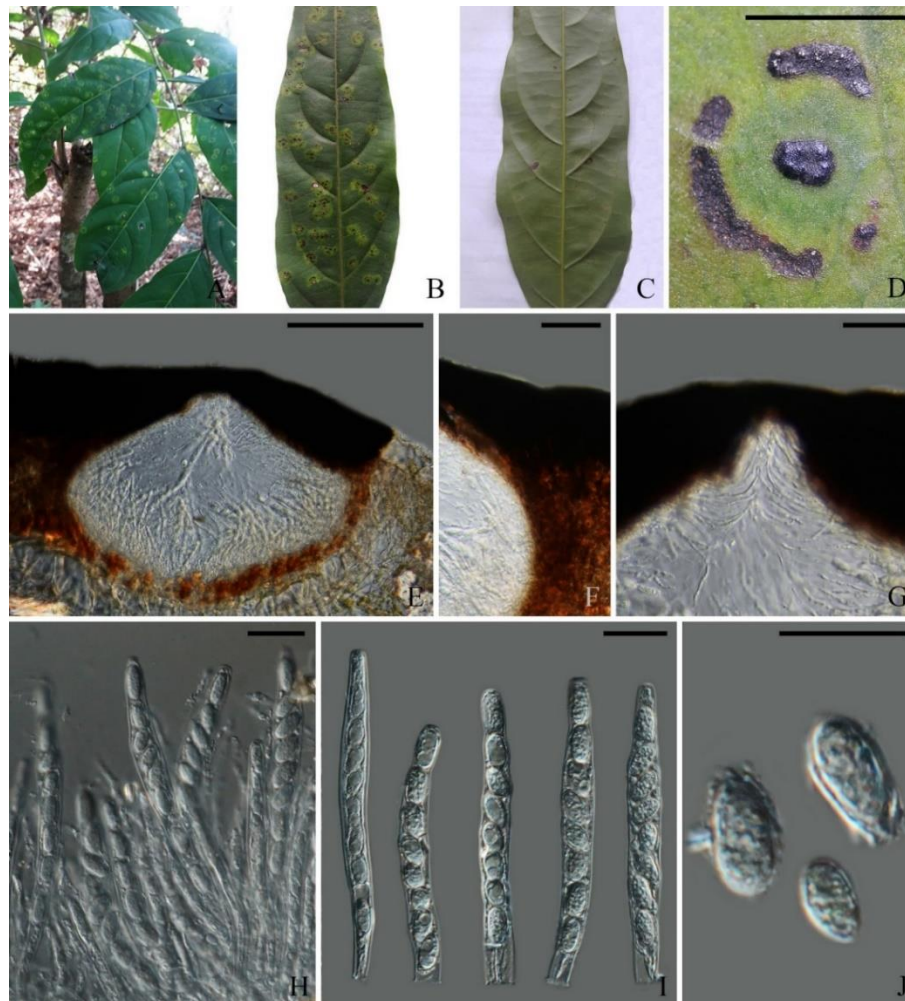


Figure 58. *Phyllachora callistemonis* subsp. *callistemonis* on leaf, A-C. Tar spots on upper surface, D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Vertical section through ostiolar canal, H. Asci and paraphyses, I. Asci, J. Ascospores. Scale bars: D = 5 mm, E = 150 μ m, F = 30 μ m, G = 30 μ m, H = 20 μ m, I = 20 μ m J. = 10 μ m.

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Phyllachora callistemonis* subsp. *similis

Species examined: CMU_TAR61 collection, Maekalnluang, Chom Tong, Chiang Mai, on living leaves of *Dicotyledon*.

Teleomorph: The blackened on living leaves of *Dicotyledon*, Tar spots 0.2–3×0.2–2 mm. on upper and lower leaves surface, as black punctiform spots, globose, shiny, often coalescing adjacent to leaf veins, shallow to strongly domed, often multidomed, occurring singly or gregarious, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 9400–(1145–1259) µm wide, 360–(380–410) µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial 458–(732–980)–1090 µm wide, 240–(260–290)–300 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–3, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 15–25×92–(122–132)–147 µm 8-spored unitunicate, clavate, retraction of plasmalemma. Ascospores, 7–9×16–18 µm. unicellular to ovate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 59.)

Notes: This is apparently version of *Phyllachora callistemonis* subsp. *similis*, with reter larger asci and ascospores.

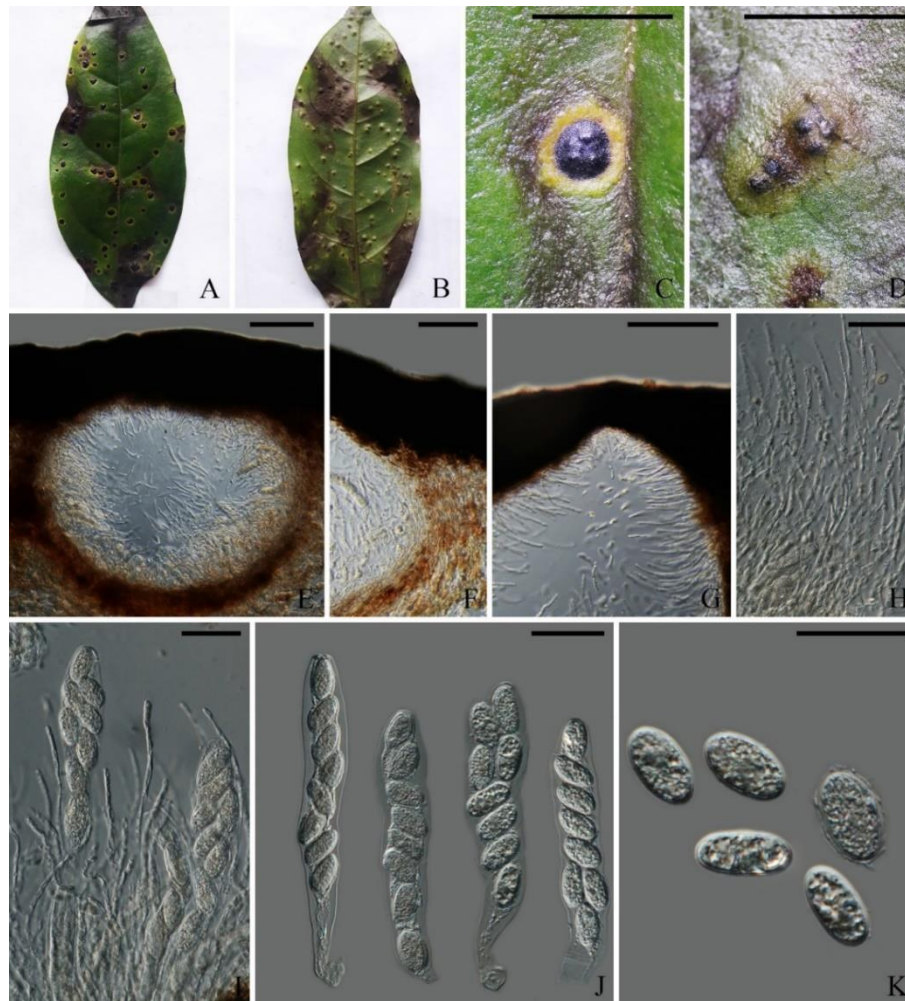


Figure 59. *Phyllachora callistemonis* subsp. *similis* on leaf, A-B. Tar spots on upper surface, C-D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, C. Vertical section through peridium, H. Paraphyses, I. Asci and paraphyses J. Asci, K. Ascospores. Scale bars: C-D = 5 mm, E = 250 μ m, F = 50 μ m, G = 30 μ m, H = 50 μ m, I = 30 μ m, I = 30 μ m, K = 20 μ m..

Phyllachora cllistemonis

Species examined: CMU_TAR65 collection, Maekalngluang, Chom Tong, Chiang Mai, on living leaves of *Dicotyledon*.

Teleomorph: The blackened on living leaves of *Dicotyledon*, Tar spots 0.2–1×0.2–2 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata, halo yellow. Stromata, uni-multiloculate, 280–(580–400)–700 µm wide, 187–(210–250) µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial, 150–(200–300)–350 µm wide, 145–(182–225)–250 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–4, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 7–10×85–(95–112) µm 8-spored unitunicate, clavate, overlapping uniseriate. Ascospores, 5–6×10–14 µm. unicellular to ovate or elliptical, hyaline, surrounded by mucilaginous sheath. (Figure 60.)

Notes: This species seems to be a close relative of *Phyllachora cllistemonis* subsp. *langdonii*, but has rather smaller ascospores.

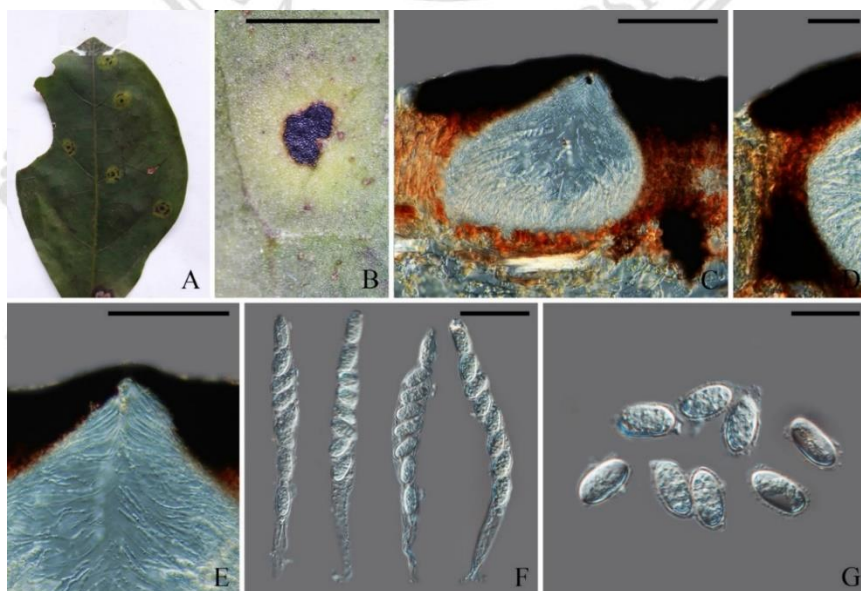


Figure 60. *Phyllachora cllistemonis* on leaf, A. Tar spots on upper surface, B. Close up of tar spots on leaf, C. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues,

D. Vertical section through peridium, E. Vertical section through ostiolar canal, F. Asci, G. Ascospores.
Scale bars: B = 5 mm, C = 150 μ m, D= 50 μ m, E = 20 μ m, F = 10 μ m, G = 10 μ m.

***Phyllachora* sp.**

Species examined: CMU_TAR67 collection, Doi Suthep, Chiang Mai, on living leaves of *Monocotyledon*.

Teleomorph: The blackened on living leaves of *Monocotyledon*, Tar spots 0.2–0.5×0.2–1 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, roughly circular to irregular, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial, 110–(145–195)–230 μ m wide, 100–(130–172) μ m high, flask-shaped, bowl-shaped, solitary or forming groups of 1–5, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 7–10×56–70 μ m 8-spored unitunicate, clavate, overlapping uniseriate, refractive subapical ring. Ascospores, 4–5×11–14 μ m. unicellular to ellipsoidal, oval, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 61.)

Notes: The holotype is parasitized by hyaline hyphae of an unknown fungus.

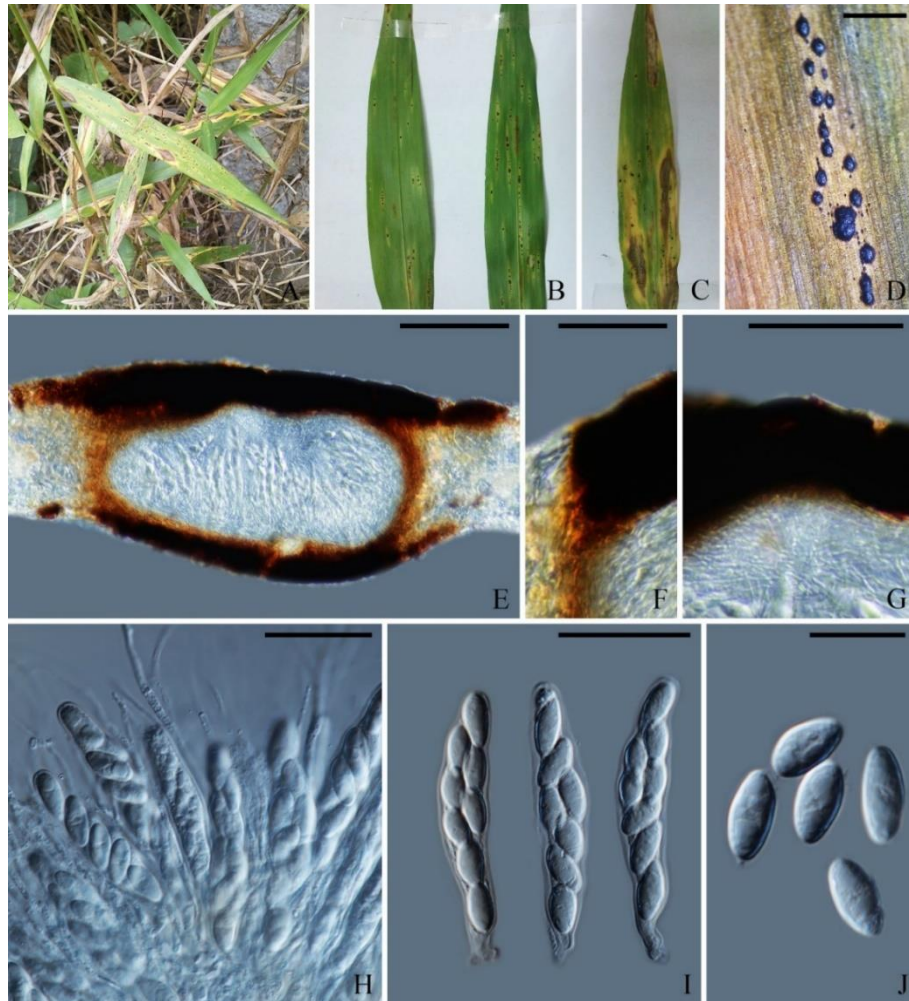


Figure 61. *Phyllachora* sp. on leaf, A-C. Tar spots on upper surface, D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Vertical section through ostiolar canal, H. Asci and paraphyses, I. Asci, J. Ascospores. Scale bars: D = 5 mm, E = 100 μ m, F = 30 μ m, G = 30 μ m, H = 20 μ m, I = 20 μ m, J = 10 μ m.

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***Phyllachora* sp.**

Species examined: CMU_TAR68 collection, Maekalngluang, Chiang Mai, on living leaves of *Dicotyledon*.

Teleomorph: The blackened on living leaves of *Dicotyledon*, Tar spots 0.2–1×0.2–2 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 115–(205–310)–360 wide, 70–(95–175)–240 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–3, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 7–12×75–110 µm, 8–spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 6–8×7–18 µm. unicellular to club-shape, sometime pear-shape, ovoid, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 62.)

Notes: This species has ascospores which are particularly variable in shape and size. Most collections seem to have ascospores that are club-shape.

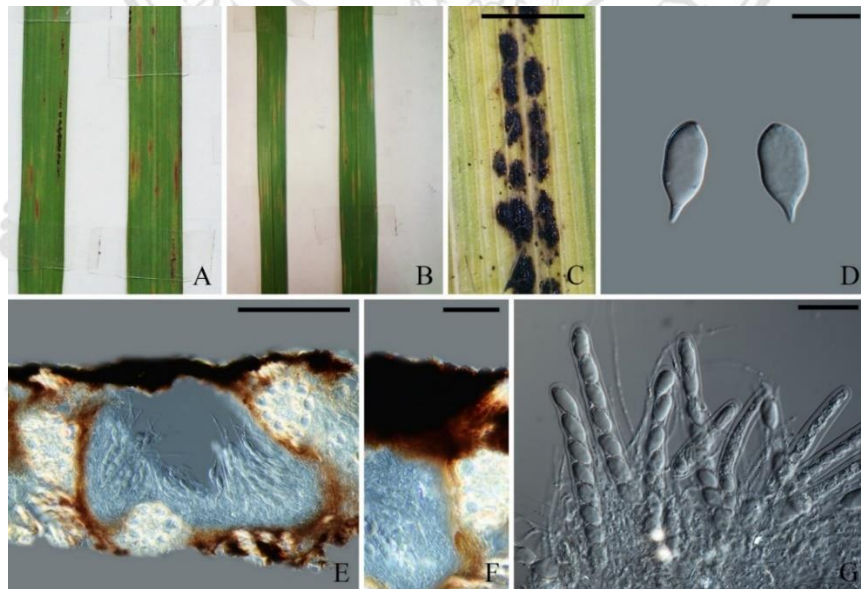


Figure 62. *Phyllachora* sp. on leaf, A-B. Tar spots on upper surface, C. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Asci and paraphyses, D. Ascospores. Scale bars: C = 5 mm, D. = 10 µm, E = 150 µm, F = 30 µm G = 20 µm, I. = 30 µm.

Phyllachora bauhiniae

Species examined: CMU_TAR69 collection, Doi Suthep, Chiang Mai, on living leaves of *Monocotyledon*.

Teleomorph: The blackened on living leaves of *Monocotyledon*, Tar spots 0.2–0.5×0.1–1 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 157–(190–215)–290 µm. wide, 100–(150–185)–235 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 10–15×65–112 µm, 8-spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 5–7×12–20 µm. unicellular to globose to ellipsoidal when immature, sometimes conspicuously guttulate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 63.)

Notes: This species is similar *Phyllachora bauhiniae*, but which has rather larger ascospores.

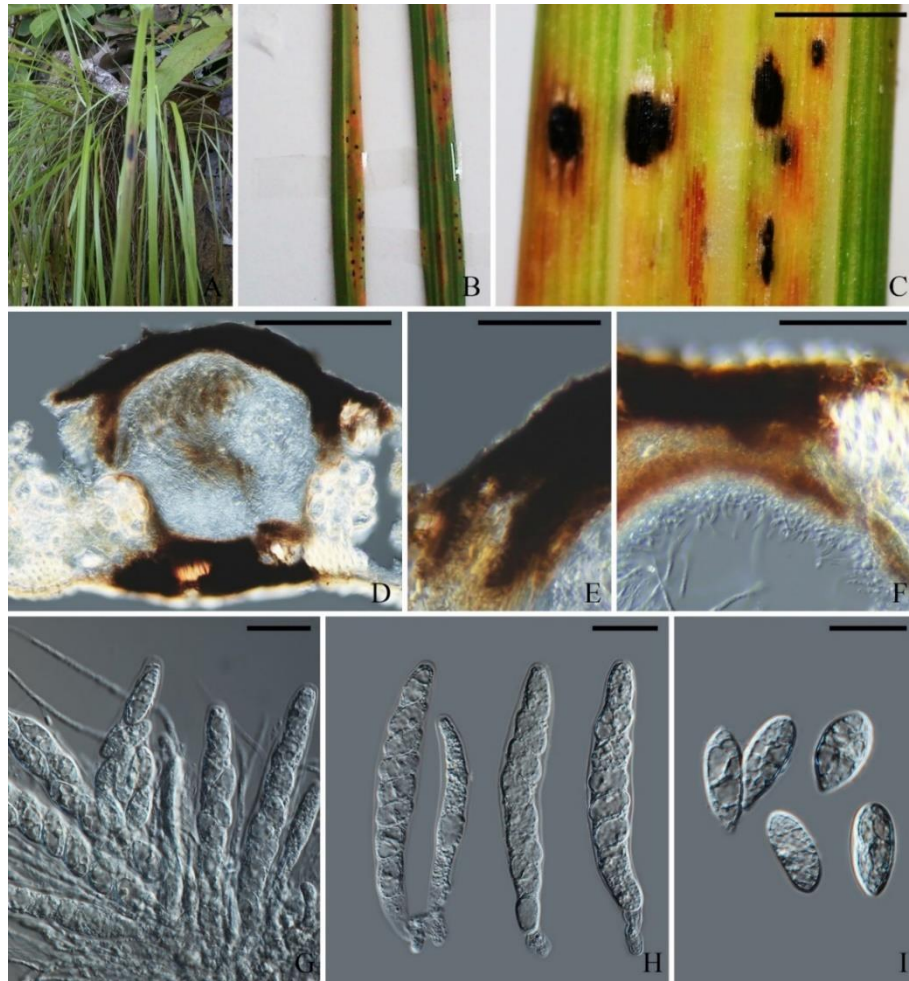


Figure 63. *Phyllachora bauhiniae* on leaf, A-B. Tar spots on upper surface, C. Close up of tar spots on leaf, D. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, E. Vertical section through peridium, F. Vertical section through ostiolar canal, G. Asci and paraphyses, H. Asci, I. Ascospores. Scale bars: C = 5 mm, D = 150 µm, E = 30 µm, F = 20 µm, G = 20, H = 20 µm, I = 10 µm.

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***Phyllachora* sp.**

Species examined: CMU_TAR70 collection, Doi Suthep, Chiang Mai, on living leaves of *Monocotyledon*.

Teleomorph: The blackened on living leaves of *Monocotyledon*, Tar spots 0.2–0.5×0.1–0.5 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 155–(175–250)–330 wide, 135–(175–200)–225 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 10–15×65–147 µm, 8-spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 6–8×11–18 µm. unicellular to club-shape, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 64.)

Notes: This species has ascospores which are particularly variable in shape and size. Most collections seem to have ascospores that are club-shape.

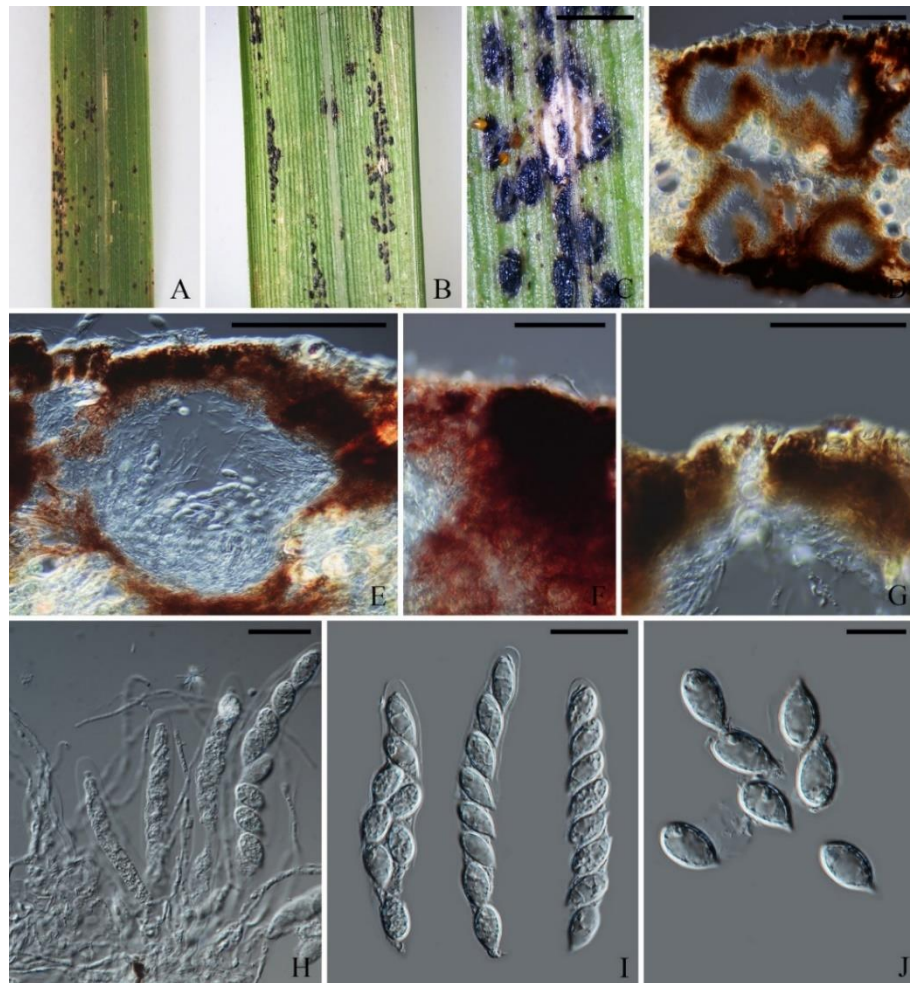


Figure 64. *Phyllachora* sp. on leaf, A-B. Tar spots on upper surface, C-D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Vertical section through ostiolar canal, H. Asci and paraphyses, I. Asci, J. Ascospores. Scale bars: C-D = 5 mm, E = 100 μ m, F = 50 μ m, G = 30 μ m, H = 20 μ m, I = 20 μ m J. = 10 μ m.

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Phyllachora glycinicola

Species examined: CMU_TAR72 collection, Doi Suthep, Chiang Mai, on living leaves of *Monocotyledon*.

Teleomorph: The blackened on living leaves of *Monocotyledon*, Tar spots 0.2–1×0.2–2 mm. on upper and lower leaves surface, as black punctiform spots, globose, shiny, often coalescing adjacent to leaf veins, shallow to strongly domed, often multidomed, occurring singly or gregarious, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial 300–(360–400)–460 µm wide, 120–(150–200)–237 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–3, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 7–10×70–100 µm 8–spored unitunicate, clavate, retraction of plasmalemma. Ascospores, 6–7×7–10 µm. unicellular to globose, ovate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 65.)

Notes: This species is similar *Phyllachora glycinicola* but also in having much smaller and more numerous perithecia, containing contents with a pink tinge.

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Figure 65. *Phyllachora glycinicola* on leaf, A-C. Tar spots on upper surface, D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Asci and paraphyses H. Asci, I. Ascospores. Scale bars: D = 5 mm, E = 150 μ m, F = 30 μ m, G = 20 μ m, H = 20 μ m, I = 20 μ m.

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Phyllachora glyriana

Species examined: CMU_TAR73 collection, Maekalngluang, Chom Tong, Chiang Mai, on living leaves of *Monocotyledon*.

Teleomorph: The blackened on living leaves of *Monocotyledon*, Tar spots 0.2–1×0.2–2 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata, halo yellow. Stromata, uni-multiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial, 85–(120–175)–220 µm wide, 120–(150–180)–200 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–4, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 5–7×95 µm 8-spored unitunicate, clavate, overlapping uniseriate. Ascospores, 3–5×15–25 µm. unicellular to fusiform, one pole often more acute than the other, often inaequilateral, hyaline, surrounded by mucilaginous sheath. (Figure 66.)

Notes: This species seems to be a close relative of *Phyllachora gloriana* but has rather smaller ascospores.

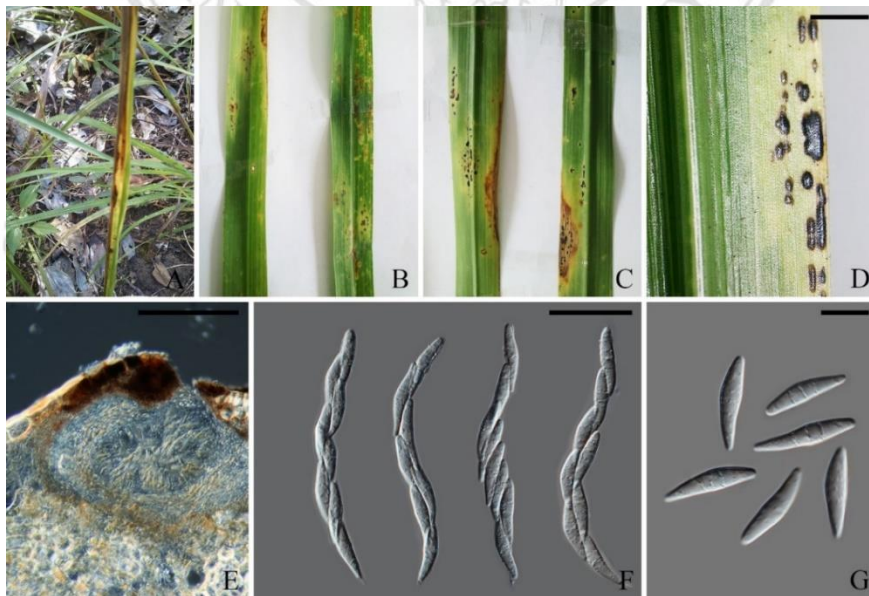


Figure 66. *Phyllachora glyriana* on leaf, A. Tar spots on upper surface, B. Close up of tar spots on leaf, C. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, D. Vertical section through peridium, E. Vertical section through ostiolar canal, F. Asci, G. Ascospores. Scale bars: B = 5 mm, C = 150 µm, D = 50 µm, E = 20 µm, F = 10 µm, G = 10 µm.

***Phyllachora* sp.**

Species examined: CMU_TAR74 collection, Doi Suthep, Chiang Mai, on living leaves of *Monocotyledon*.

Teleomorph: The blackened on living leaves of *Monocotyledon*, Tar spots 0.2–0.5×0.2–1 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, roughly circular to irregular, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial, 200–(260–350)–450 µm wide, 100–(135–160)–180 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–3, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 10–15×65–112 µm 8-spored unitunicate, clavate, overlapping uniseriate, refractive subapical ring. Ascospores, 5–7×10–15 µm. unicellular to ellipsoidal, oval, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 67.)

Notes: The holotype is parasitized by hyaline hyphae of an unknown fuhgus.

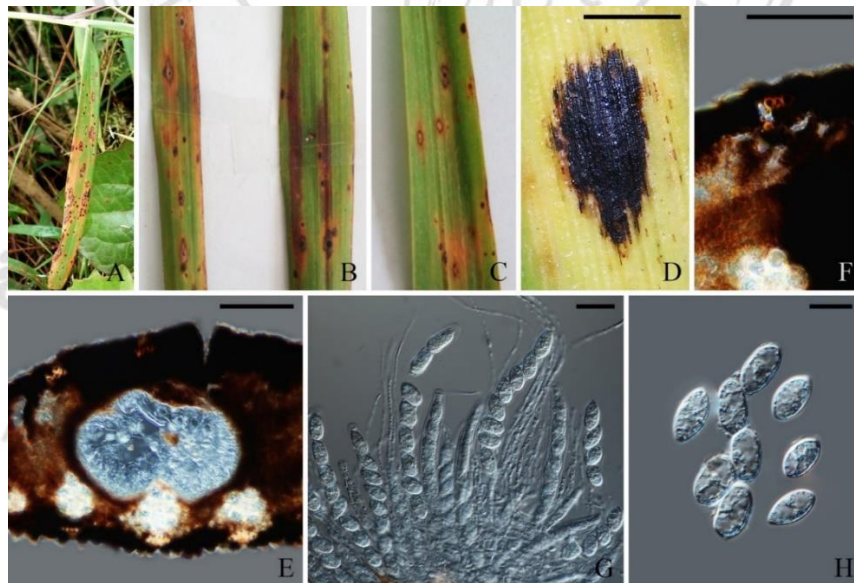


Figure 67. *Phyllachora* sp. on leaf, A-C. Tar spots on upper surface, D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Asci and paraphyses, H. Ascospores. Scale bars: D = 2 mm, E = 150 µm, F = 30 µm, G = 30 µm, H = 10 µm, I = 20 µm.

***Phyllachora fimdristylidis* on *Brachiaria reptans*:** 3 isolate were compared morphologically in Table 12.

Table 12 Comparison of *Phyllachora* sp. on *Vetiveria zizanioides*.

Isolate	Host	Location	Leaf spot (mm)	Asci (μm)	Ascospores (μm)
CMU_TAR77	<i>Vetiveria</i>	Queensirikit	0.2–	12–	6–8×20–
	<i>zizanioides</i>	garden	0.5×0.1–	15×70–	(25–30)
			0.5	(80–115)–	
CMU_TAR78	<i>Vetiveria</i>	Royal Project	0.2–	12–(15–	6–9×25–
	<i>zizanioides</i>	Foundation of	1×0.5–	17)–	(28–32)
		Nonghoy	0.2–1	20×75–	
				(90–105)–	
CMU_TAR79	<i>Vetiveria</i>	Ongkhong	0.2–	10–	6–9×23–35
	<i>zizanioides</i>		0.5×0.1–1	20×65–	
				125	

Phyllachora fimbristylidis

Species examined: CMU_TAR77 collection, Queensirikit garden, Chiang Mai, on living leaves of *Vetiveria zizanioides*.

Teleomorph: The blackened on living leaves of *Vetiveria zizanioides*, Tar spots 0.2–0.5×0.1–0.5 mm. on upper leaves surface, black punctiform spots, oglobose to irregular, shiny, low to moderately domed, with the raised glossy black clypeus covering the ascomata. Sexual morph: Stromata uni-multiloculate, 137–(167–212)–250 µm high, 155–(170–210)–245 µm diam., globose to irregular, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial 115–(145–192)–245 µm high, 132–(182–215) µm diam., flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses filiform, unbranched, septate. Asci, 12.5–15×70–122 µm ascospores increase in size and become biseriate, Ascospores, 6–8×20–(26–30) µm. unicellular to papillate to turbinate, clavate, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 68.)

Notes: This species is rather similar to *Phyllachora fimbristylidis*, but the ascospores are 6–8×20–(26–30) µm in size, papillate to turbinate, clavate in shape.

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Figure 68. *Phyllachora fimbristylidis* on leaf, A-B. Tar spots on upper surface, C. Close up of tar spots on leaf, D. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, E. Vertical section through ostiolar canal, F. Vertical section through peridium, G. Asci and paraphyses H. Asci, I. Ascospores. Scale bars: C = 5 mm, D = 100 μ m, E = 30 μ m, F = 20 μ m, F = 20 μ m, G = 30 μ m H. = 30 μ m.

Phyllachora fimdristylidis

Species examined: CMU_TAR78 collection, Royal Project Foundation of Nonghoy, Chiang Mai, on living leaves of *Vetiveria zizanioides*.

Teleomorph: The blackened on living leaves of *Vetiveria zizanioides*, Tar spots 0.2–0.5×0.1–0.5 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uniloculate, 195–(240–290)–350 µm wide, 165–(250–320)–430 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 150–(195–245)–290 µm. wide, 125–(162–225)–280 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 12–17×54–(75–100)–132 µm, 8-spored unitunicate, clavate to cylindrical, overlapping un-biseriate. Ascospores, 6–9×25–32 µm. unicellular to fusiform with attenuated poles, navicular, sometimes slightly ovoid or slightly inaequilateral, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 69.)

Notes: CMU_TAR78 is similar CMU_TAR77, but which has rather larger stromata and ascospores in size.

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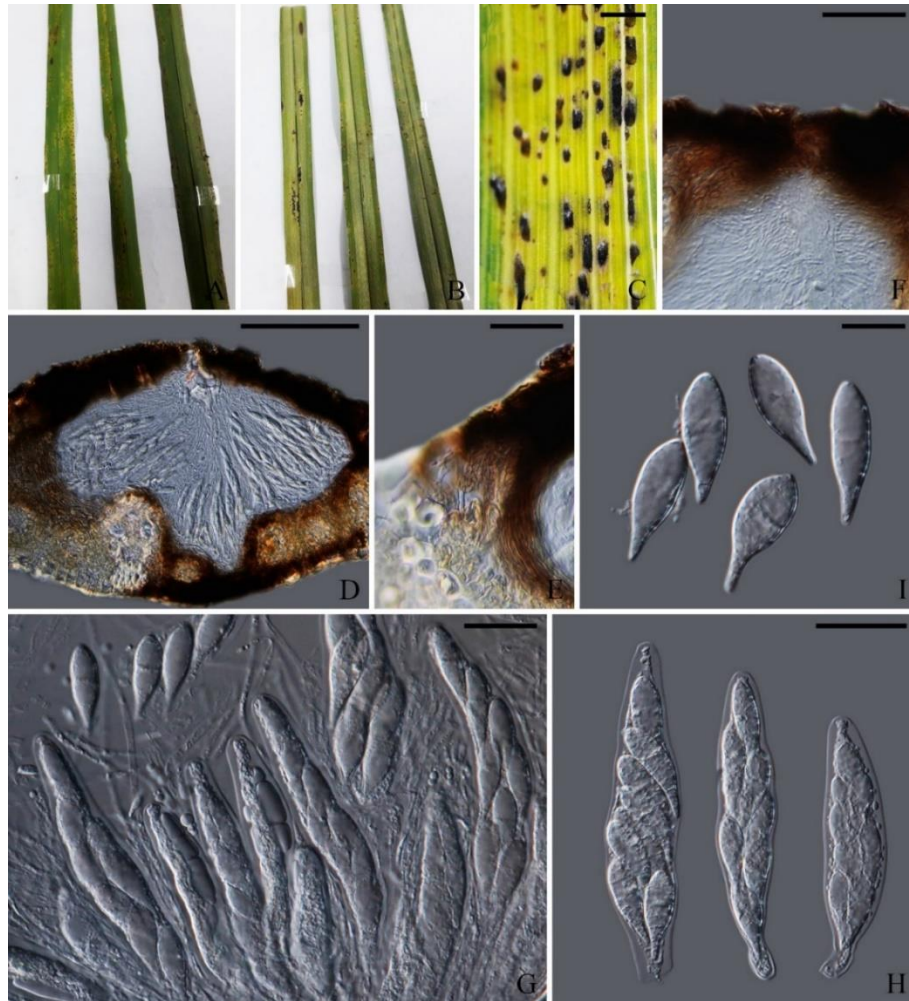


Figure 69. *Phyllachora fimdristylidis* on leaf, A-B. Tar spots on upper surface, C. Close up of tar spots on leaf, D. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, E. Vertical section through peridium, F. Vertical section through ostiolar canal, G. Asci and paraphyses, H. Asci, I. Ascospores. Scale bars: C = 5 mm, D = 100 μ m, E = 30 μ m, F = 30 μ m, G = 20, H. = 20 μ m, I = 20 μ m.

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Phyllachora fimdristylidis

Species examined: CMU_TAR79 collection, Ongkhong, Chiang Mai, on living leaves of *Vetiveria zizanioides*.

Teleomorph: The blackened on living leaves of *Vetiveria zizanioides*, Tar spots 0.2–0.5×0.1–1 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata unimultiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecia, 100–(142–220)–280 wide, 100–(130–162)–175 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–3, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, branched, septate, not construct at septate. Asci, 10–20×65–125 µm, 8-spored unitunicate, clavate to cylindrical, overlapping unbiseriate. Ascospores, 6–9×26–35 µm. unicellular to fusiform to club-shape, sometimes slightly ovoid or slightly inaequilateral, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 70.)

Notes: CMU_TAR79 is similar to CMU_TAR78, but which has rather larger stromata and ascospores in size.

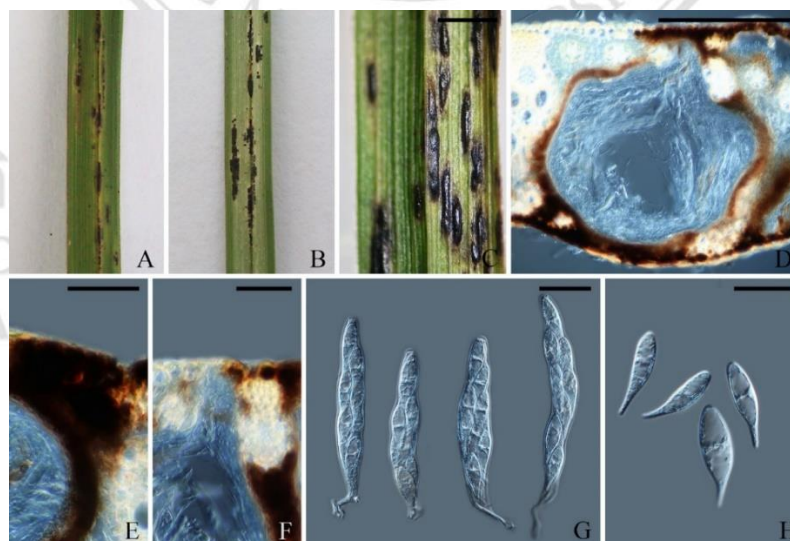


Figure 70. *Phyllachora fimdristylidis* on leaf, A-B. Tar spots on upper surface, C. Close up of tar spots on leaf, D. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, E. Vertical section through peridium, F. Vertical section through ostiolar canal, G. Asci, H. Ascospores. Scale bars: C = 5 mm, D = 150 µm, E = 30 µm, F = 20 µm, G = 30 µm, H = 15 µm.

Ophiodothella syzygii

Species examined: CMU_TAR19 collection, Mae Hia, Chom Thong, Chiang Mai, on living leaves of *Cyperus pilossus*.

Teleomorph: The blackened on living leaves of *Cyperus pilossus*, Tar spots 2–5×2–10 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, 420–(520–660)–840 µm wide, 150–(175–212)–280 µm high, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial 77–(152–182)–225 µm wide, 87–(127–175)–195 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 7–10×57–(67–75) µm 8-spored unitunicate, clavate, overlapping uniseriate. Ascospores, 5–6×9–11 µm. unicellular, smooth, hyaline, filiform, aseptate, with apical swellings at each end containing a mucilaginous. (Figure 71.)

Notes: This species is similar *Ophiodothella syzygii* Pearce and Hyde (1993), but which has smaller asci and ascospore.

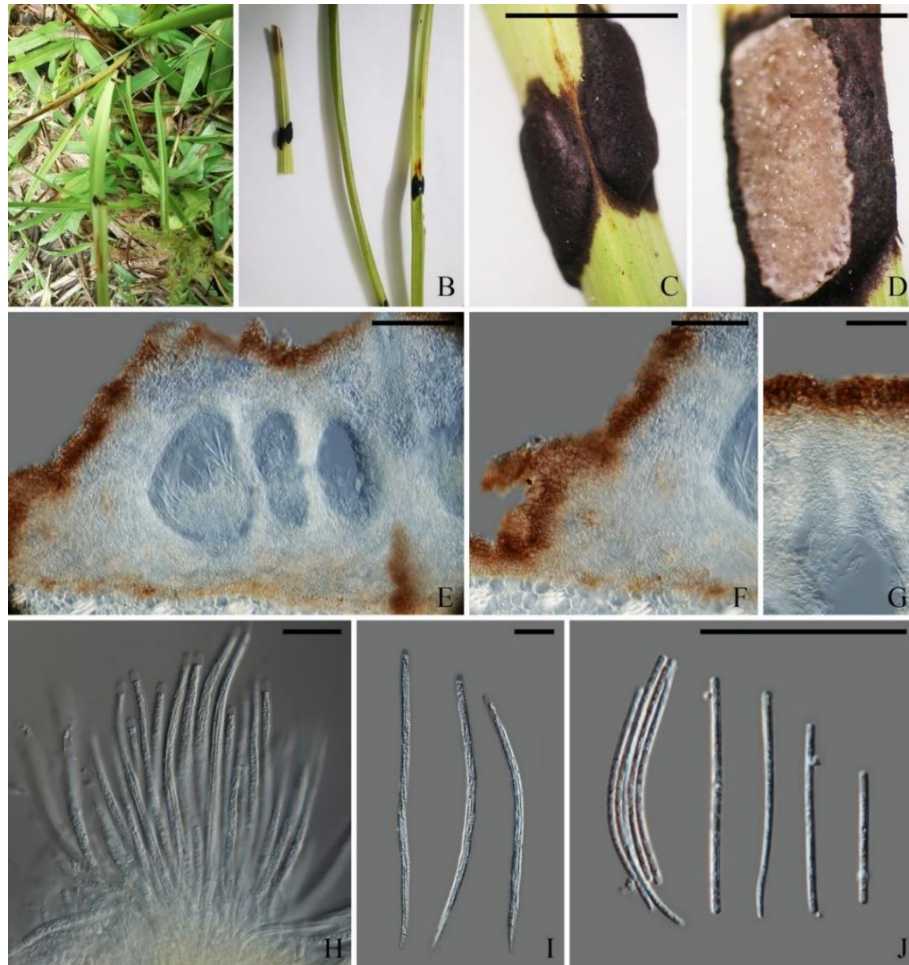


Figure 71. *Ophiodothella syzygii*. on leaf, A-B. Tar spots on upper surface, C-D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Vertical section through ostiolar canal, H. Asci and paraphyses, I = Asci, J. Ascospores. Scale bars: C = 5 mm, D = 10 mm, E = 20 μ m, F = 30 μ m, G = 30 μ m, H = 20 μ m, I = 10 μ m.

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Guignardia

Species examined: CMU_TAR30 collection, Queensirikit gerdem, Chom Thong, Chiang Mai, on living leaves of *Musa sapientum*.

Teleomorph: The blackened on living leaves of *Musa sapientum*, Tar spots 0.1–0.3×0.1–0.2 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Ascoma, uniloculate, 150–(175–182)–225 µm wide, 125–(145–170)–137. µm high, perithecioid pseudothecium, solitary to aggregated, immersed in host tissues or erumpent; pseudothecia dark brown, globose to subglobose, ostiolate, with otiole papilla or neck. Ascomal wall relatively thick, exterior composed of thick-walled pseudoparenchyma cells, interior cells thin-walled and hyaline. Centrum pseudoparenchymatous. Asci, 15–27×45–(55–77) µm., bitunicate, clavate to cylindrical, with short stalk, 8-spored. Ascospores, 6–8×15–18 µm., hyaline, 1-celled, straight or curved, ovoid, ellipsoidal or rhomboidal, guttulate, usually widest in middle, with distinct mucilaginous appendages at one or both ends. (Figure 72.)

Notes: Thai species. was originally described by Hanlin (1990), which is similar to *Guignardia*, but which has smaller asci and ascospore.



Figure 72. *Guignardia* on leaf, A. Close up of tar spots on leaf, B. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, C. Vertical section through peridium, D. Asci, E. Ascospores. Scale bars: A = 5 mm, B = 100 μ m, C = 20 μ m, D = 30 μ m, E = 10 μ m.

Rehmiodothis osbeckiae

Species examined: CMU_TAR63 collection, Maekalngluang, Chom Thong, Chiang Mai, on living leaves of *Dicotyledon*.

Teleomorph: The blackened on living leaves of *Dicotyledon*, Tar spots 0.2–1×0.2–0.5 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial 390–(460–580)–610 μ m wide, 100–(125–150)–220 μ m high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 7–15×42–75 μ m 8–spored unitunicate, clavate, overlapping uniseriate. Ascospores, 4×11–12 μ m. unicellular bicelled, ellipsoidal to ovoid, sometimes oblong, with a smaller apical cell, occasionally slightly constricted at the septa, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 73.)

Notes: This species is similar *Rehmiodothis osbeckiae* Theiss and Syd (1914), but which has smaller asci and ascospore.

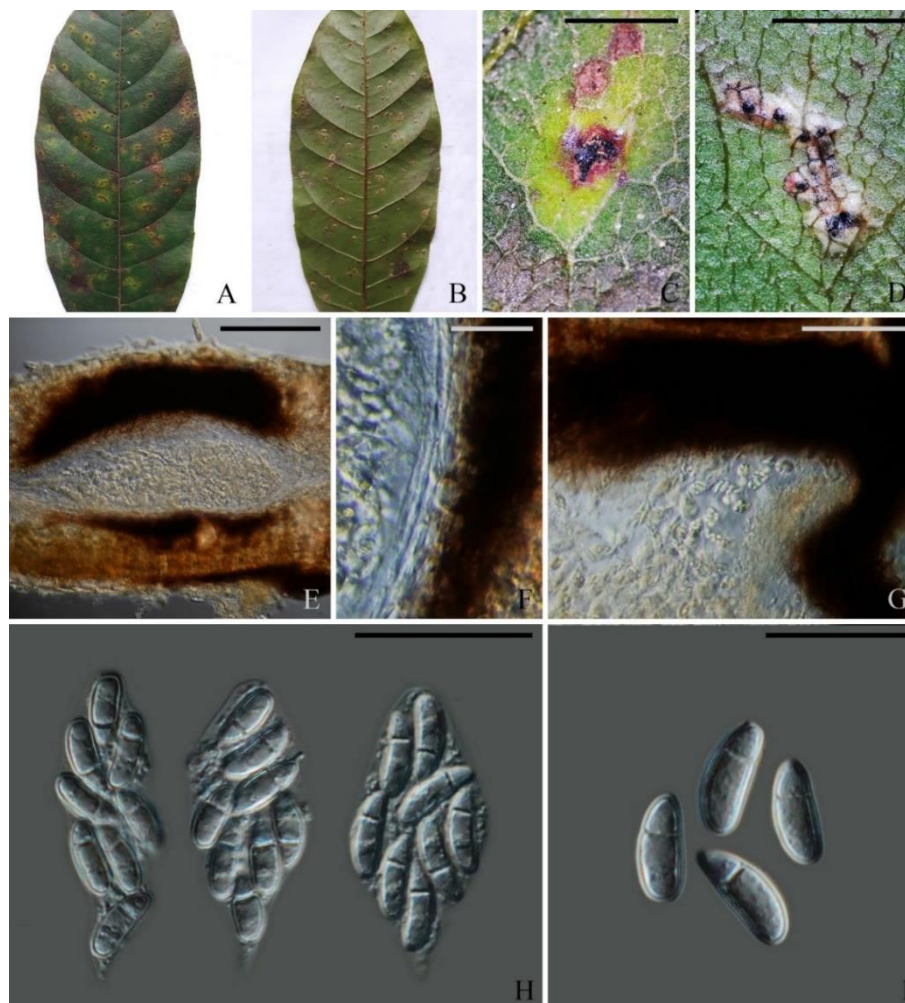


Figure 73. *Rehmiodothis osbeckiae* on leaf, A-B. Tar spots on upper surface, C-D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Vertical section through ostiolar canal, H. Asci, I. Ascospores. Scale bars: C-D = 5 mm, E = 100 μ m, F = 30 μ m, G = 30 μ m, H = 20 μ m, I = 10 μ m.

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Rehmiodothis osbeckiae

Species examined: CMU_TAR64 collection, Maekalnguang, Chom Thong, Chiang Mai, on living leaves of *Dicotyledon*.

Teleomorph: The blackened on living leaves of *Dicotyledon*, Tar spots 0.2–2×0.2–0.1 mm. on upper and lower leaves surface, as black punctiform spots, ovoid, shiny, with the raised glossy black clypeus covering the ascomata. Stromata uni-multiloculate, ovoid to globose, on the upper leaves surface, the stroma immersed with the upper wall of the ascoma, black thick-walled completely occluded by melanins. Ascomata, perithecial 240–(380–480)–500 µm wide, 110–(150–180)–250 µm high, flask-shaped, bowl-shaped, solitary or forming groups of 1–2, globose, the ostiole inconspicuous, not or only weakly papillate. Peridium composed of thin, dark brown. Paraphyses longer than mature asci, filiform, unbranched, septate, not construct at septate. Asci, 10–12×40–50 µm 8-spored unitunicate, clavate, overlapping uniseriate. Ascospores, 4–5×12–14 µm. unicellular bicelled, ellipsoidal to ovoid, sometimes oblong, with a smaller apical cell, occasionally slightly constricted at the septa, smooth, hyaline, surrounded by mucilaginous sheath. (Figure 74.)

Notes: CMU_TAR64 is similar CMU_TAR63 in having slightly larger asci and ascospores.

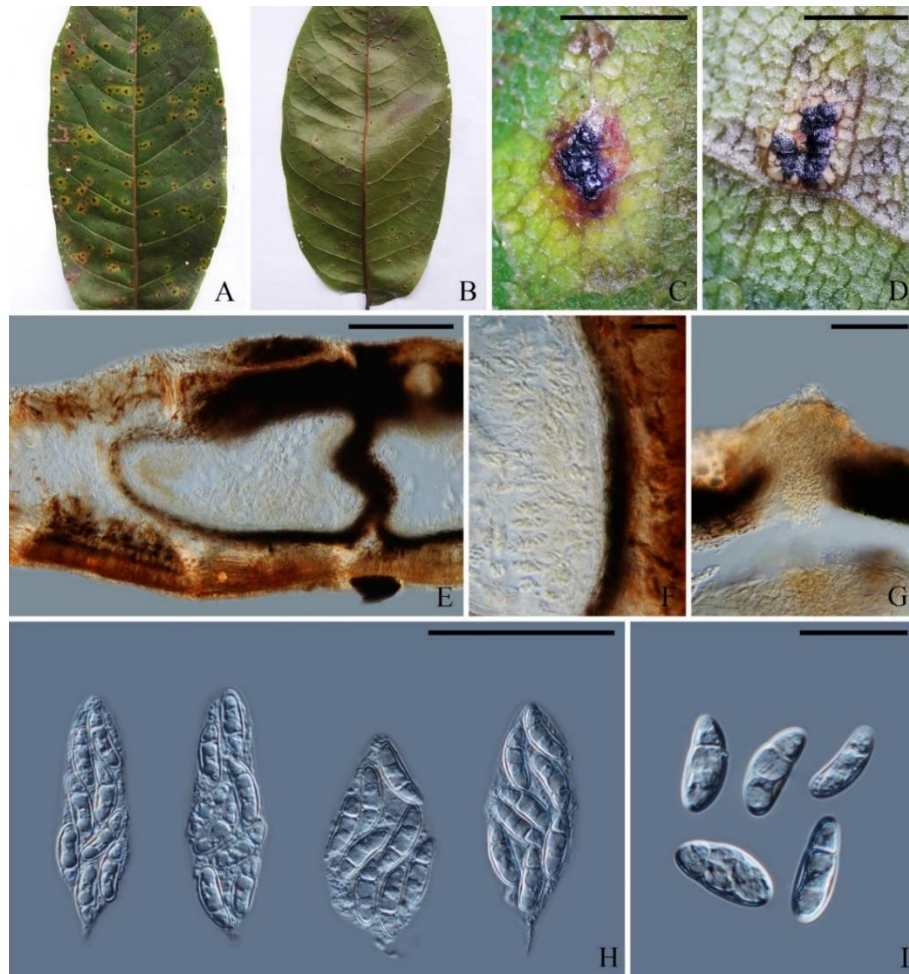


Figure 74. *Rehmiadothis osbeckiae* on leaf, A-B. Tar spots on upper surface, C-D. Close up of tar spots on leaf, E. Vertical section through tar spot illustrating central ostiole, peridium and position in host tissues, F. Vertical section through peridium, G. Vertical section through ostiolar canal, H. Asci, I. Ascospores. Scale bars: C-D = 5 mm, E = 200 μ m, F = 30 μ m, G = 50 μ m, H = 20 μ m, I = 10 μ m.

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