NEWLY RECORDED SPECIES OF MARASMIUS (AGARICALES, MARASMIACEAE) TO THE MYCOTA OF INDONESIA

Atik Retnowati¹ & Dennis E. Desjardin²

¹Herbarium Bogoriense, Research Center for Biosystematics and Evolution The National Research and Innovation Agency of Indonesia (BRIN) Jalan Raya Jakarta Bogor, Km. 46, Cibinong 16911, Indonesia
²Dept. of Biology San Francisco State University, 1600 Holloway Avenue, San Francisco, CA 94132, USA
Correspondent author: Atik Retnowati Email: marasjamur@gmail.com

ABSTRAK
Kata kunci: informasi distribusi, jamur marasmioid, taksonomi.

The genus Marasmius, one of the mushroom genera in the family Marasmiaceae, consists of approximately 500 species (Kirk et al., 2008). It is distributed worldwide with high diversity in tropical and subtropical areas. They are commonly encountered and form relatively small marcescent basidiomata with convex to campanulate pileus, adnate to adnexed lamellae that may be collariate, an insitious or non-insitious cartilaginous stipe, white basidiospores, and a hymeniform pileipellis. Most are saprophytic, and some are parasitic and have no mycorrhizal association.

Preliminary research on Marasmius from Indonesia was published by Leveille (1844,1846), Moritzi (1845–1846), Zollinger (1844), Hennings (1900), Overeem & Overeem-de Haas (1922) and Boedijn (1940). The species were mostly reported from Java, and it has become a very important place for the development of mycological research of Indonesia with some type localities of the described species; Cibodas and Bogor Botanical Gardens, Mount Gede Pangrango. The island represents the lowland forest, which includes extensive evergreen rain forest, semi-evergreen rain forest, moist deciduous forest along the northern coast, and a dry deciduous forest.

This study was carried out as part of the Agaricales of Java and Bali Project (1999-2001), and it was expected to provide an overview of the diversity of Marasmius in Indonesia. Desjardin et al. (2000) provided the most comprehensive recent treatment of the genus in Indonesia, reporting 37 species from Java and Bali, including 12 new species from both islands. Fieldwork conducted since
this publication has yielded six additional species of *Marasmius* from Java and reported in this paper as new additional records for Indonesia.

**MATERIALS AND METHODS**

Specimens of *Marasmius* were collected from the Indonesian province of West Java: Bogor Botanical Gardens, Mount Salak, and Mount Halimun. The collections were carried out during the rainy season in January 2000-2001. The specimens of *Marasmius* were collected by Purposive Random Sampling. Notes on important macromorphological features were made in the field soon after collecting. Microscopic observation was made in material mounted in 3% of KOH. Color notation was determined using Kornerup and Wanscher (1978). Examined specimens are deposited in Herbarium Bogoriense (BO), Indonesia and Harry D. Thiers Herbarium (SFSU) at San Francisco State University, USA.

Line drawings of the micro-characters were made with the aid of a camera lucida attached to a compound microscope using 40× or 100× (oil immersion) objectives. Spore range was obtained by measuring 25 mature basidiospores. Basidiospore statistics include: the arithmetic mean of the spore length by spore width (± standard deviation) for n spores measured in a single specimen (x̄), the range of spore means (xs), and the variation in relation to the mean of spore means (± SD) when more than one specimen is available (xm); the quotient of basidiospore length and basidiospore width in any basidiospore, indicated as a range of variation in n basidiospores measured (Q); the mean of Q-values in a single specimen (Qm); the range of Qm-values where more than one specimen is available (Qmn); and the mean of Qmn-values where more than one specimen is available (Qmm) (Retnowati, 2018).

**RESULTS AND DISCUSSION**

During the identification process of the *Marasmius* collections made in 2000-2001, six species with newly distribution records for Indonesia were encountered. Key to sections and complete descriptions of morphological characters of each species are provided.

Key to sections, subsections and species of *Marasmius* from Java

1a. Collarium present; stipe insititious ................................................................. sect. *Marasmius* 2
1b. Collarium absent; stipe non-insititious ................................................................. sect. *Sicci* 4

2a. Pileipellis composed of *Rotalis*-type broom cells, Pileus greyish orange to brownish orange lacking a papilla; lamellae subdistant; stipe 30 mm long <, lacking rhizomorph ....................................... subsect. *Marasmius* 1. *M. tubulatus*
2b. Pileipellis composed of *Siccus*-type broom cells, Pileus reddish brown, lamellae distant, stipe up to 60 mm, rhizomorph present or absent ................................................................. subsect. *Sicciiformis* 3

3a. Pileus with or without a central dark black spot, stipe length up to 25 mm, stipe width up to 0.01 mm ........................................................................................................... 2. *M. aff. subruforotula*
3b. Pileus with a central dark spot, stipe length up to 60 mm .......................... 3. *M. nigrobrunneus* f. *cinnamomeus*
4a. Pleurocystidia absent, caulocystidia present ................................................. ser. *Atrorubentes* 4. *M. xestocephalus*
4b. Pleurocystidia present, caulocystidia absent to uncommon ............................. ser. *Haematocephalus* 5
5a. Pileus reddish brown when dried; lamellae adnexed, distant to remote, marginate; basidiospores 22.4-25 mm long ......................................................... 5. *M. grandisetulosus*
5b. Pileus with distinctive colour change form olivaceous to brown; lamellae narrowly adnate to adnate, close to crowded, non-marginate; basidiospores (11.2)12-15.2(16) mm long .......... 6. *M. olaecephalus*

*Marasmius* Fries, Fl. Scan.: 339. 1835 (nom.cons.)

**Sect. *Marasmius*, subsect. *Marasmius***


    Fig. 1-2.
Type: SRILANKA, Peradeniya, on dead leaves and twigs, 1 November 1914, Petch 4243 (K).

Pileus 2.5–7 mm diam, flattened-conical to subcylindrical with an umbilicate disc, striate to sulcate, dull, dry, glabrous; umbilicus pallid cream to cream-brown, with a darker central spot (no papilla); most of pileus greyish orange (5B4–5) to brownish orange (6C4–6). Lamellae adnate to a collarium, subdistant, broad, off-white to pale yellowish white, non-marginate. Stipe 30–90 × 0.1 mm, central, wiry, tough, insititious, glabrous, black; typically lacking rhizomorphs, rarely branched.
Basidiospores 9–11(-12) × 4–5(-6) mm \( [x_{m} = 9.86 \pm 0.86 \times 4.54 \pm 0.45 \text{ mm}, \quad Q = 1.83–2.50, \quad Q_{m} = 2.18 \pm 0.2, \quad n = 25 \text{ spores per one specimen}) \), ellipsoid, smooth, hyaline, inamyloid, thin-walled. Basidia 20–24 × 7–9 mm, clavate, 4-spored. Basidioles clavate to fusoid. Cheilocystidia abundant, composed of \textit{Rotalis}-type broom cells; main body 8–21 × 8–14 mm, clavate to broadly clavate, turbinate, subglobose or irregular in outline, hyaline, thin-walled; divergent setulae 0.8 × 0.8 mm, conical to narrowly cylindrical, obtuse, crowded, thin-walled. Pleurocystidia absent. Pileipellis hymeniform, mottled, composed of \textit{Rotalis}-type broom cells; main body 12–24 × 10–12 mm, clavate to broadly clavate, subglobose or irregular in outline, hyaline, thin- to thick-walled; divergent setulae 1.6–2 × 0.8 mm, narrowly cylindrical to conical, obtuse, crowded. Stipe tissue monomitic; cortical hyphae 3–6 mm diam, parallel, cylindrical, yellowish brown, smooth, thin-walled, dextrinoid; medullary hyphae 3–4 mm diam, parallel, cylindrical, hyaline, thin-walled, dextrinoid. Stipe vesture absent. Clamp connections present.

**Habitat:** on undetermined leaves in primary forest, elevation ca. 1000 m.

**Known distribution:** Indonesia, Sri Lanka (type) (Petch, 1948; Pegler, 1986) and Malaysia (Tan et al., 2009).

**Material examined:** INDONESIA. West Java, Mt. Halimun National Park, trail from Cikaniki, elevation ca. 1000 m, solitary to scattered on undetermined leaves in primary forest 9 January 2001, leg. A. Retnowati (D.E.D 7208, BO!, SFSU).

Figure 1. \textit{Marasmius tubulatus} Petch. A. Fruiting bodies; B. Branched stipe; C. Dark central spot at pileus; and D. Insititious stipe. From D.E. Desjardin 7208. (Photo A: D.E.Desjardin; B-D: A. Retnowati). Scale bars: A= 0.75 cm.

Figure 2. Micro-morphological features of \textit{Marasmius tubulatus} Petch.: A. Basidiospores; B. Basidia-basidioles; C. Cheilocystidia; and D. Pileipellis (Drawn by A. Retnowati from D.E. Desjardin 7208).
Notes. *Marasmius tubulatus* is characterized by a greyish orange to brownish orange or light brown pileus with a darker central spot (no papilla), col- lariate lamellae with or without light brown edges, a dark brown to black, wiry insitious stipe, and broadly ellipsoid basidiospores. The Indonesian specimen differs only subtly from material reported from Sri Lanka (Petch 1948; Pegler, 1986) and Malaysia (Tan *et al.*, 2009) in forming a longer stipe (up to 90 mm) and slightly larger basidiospores (mean 9.8 × 4.5 µm versus 9.3 × 4.0 µm).

Type species: *Marasmius curreyi* Berk. & Broome = subsect. *Penicillati* Singer sensu Singer, Fl. Neotropica Monogr. 121. 1976
[Type species: *Marasmius graminum* (Lib.) Berk. Sensu Singer].

2. *Marasmius* aff. *subruforotula* Singer (1964: 339), Fig. 3-4.
Type: ZAIRE, Forestier Central, 20 km N. E. of Yambao, alt. 470 m, 19 June 1939, Louis 15235 (BR).

Pileus 2.5–5 mm diam, convex to plano-convex, umbilicate or plano-conical umbilicate, plicate, with or without papilla, with or without a central black spot, dull, dry, glabrous, minutely granulose, deep reddish brown (8–9D–E7–8) fading to brownish red (8C6–8) on margin in age with a slightly paler umbilicus. Lamellae adnate to a collarium, distant (8–13 reaching stipe) with no lamellulae, broad, concave, white to cream buff, non-marginate or edges spotted reddish brown. Stipe 7–25 × 0.1 mm, central, wiry, glabrous, shiny, dry, insitious, black; attached to substrate, with or without wiry black rhizomorphs.

Basidiospores 8–9.6 (–10.4) × (3.2–)4–4.8 [x_{mr} = 8.5–8.9 × 4.0–4.4 µm, x_{mm} = 8.74 ± 0.27 x 4.19 ± 0.27 µm, Q = 1.7–2.5, Q_{mr} = 2.05 – 2.15, Q_{mm} = 2.10 ± 0.07, n = 25 spores per 2 specimens], ellipsoid, smooth, hyaline, inamylloid, thin-walled. Basidia 20–22 × 5–6 mm, clavate, 4-spored. Basidioles clavate to fusoid. Cheilocystidia common, composed of Siccus-type broom cells; main body 4–17 × 3–10 mm, clavate to broadly clavate or irregular in outline, hyaline to yellowish brown, thin-walled; apical setulae 3–8 × 0.8–2 mm, cylindrical to conical in outline, hyaline to yellowish brown, thin-walled. Pleurocystidia absent. Pileipellis hymeniform, mottled to weakly mottled, composed of Siccus-type broom cells; main body 8–25 × 4–14 mm, clavate to broadly clavate or irregular in outline, yellowish brown to brown, thin- to thick-walled, often branched apically; apical setulae 2–8 × 0.8–2 mm, cylindrical to conical or irregular in outline, obtuse to subacute, thin-walled. Stipe tissue monomitic; cortical hyphae 2–6 mm diam, parallel, cylindrical, brown, dextrinoid, thin to thick-walled; medullary hyphae 2–7 mm diam, parallel, cylindrical, hyaline, weakly dextrinoid, thin-walled. Stipe vesture absent. Clamp connections present.

Figure 3. Fruiting bodies of *Marasmius* aff. *subruforotula* Singer. From D.E. Desjardin 7050. (Photo: D.E. Desjardin). Scale bar = 0.6 cm.
Habitat: On grass stems, fern rachis, rattan palm debris or rotten dicot leaves.

Known distribution: Indonesia, Thailand (Wannathes et al., 2009) and Príncipe (Grace et al., 2019).


Notes. The distinctive characters of *M. subraforotala* are convex to plano-convex, umbilicate, papillate pileus that is deep reddish brown to brownish red; distant, white to cream buff collariate lamellae with or without reddish edges; a reddish brown to black insititious stipe with white apex; basidiospores in the range 8–10 × 4–5 µm; *Siccus*-type broom cells; and no caulocystidia. This set of features probably represents a complex of species. Material from Thailand (Wannathes et al., 2009) and Príncipe (Grace et al., 2019) are identical in morphology but have distinct ITS sequences and do not belong in a single monophyletic clade, indicating that they represent distinct species. Our material matches the morphology for *M. subraforotala* and is tentatively identified as such until molecular data are available.

3. *Marasmius nigrobrunneus* forma *cinnamomeus* Wannathes, Desjardin & Lumyong (2009: 233). Fig. 5-6.

Type: -

Pileus 2–8 mm diam, flattened-conical to convex or flattened-convex, umbilicate, plicate, with or without a small dark papilla or with a dark central spot, dull, dry, glabrous to minutely granulose, reddish brown (8D–E7–8) to reddish orange (7D–E7–8), margin fading to brownish orange (6C–D7–8), sometimes slightly paler in umbilicus, or dark grey to nearly black overall when young, fading to dark greyish brown to grey (7F3–4) to (7D–E2) in age but drying darker, or dark reddish brown (8E6–8) to deep brownish orange (7C7–8; ferruginous), fading in age to greyish red (7B5–6). Lamellae adnate to a collarium, distant to subdistant (9–14) with 0 series of lamellulae, concave, broad, white to pale yellowish white (4A2) with white to greyish brown or reddish brown edges. Stipe 15–60 × 0.1–0.3 mm, central, wiry, shiny, cylindrical, glabrous, insititious, dark brown to black, attached to substrate or directly arising from rhizomorphs.

Basidiospores (8–)8.8–10.4(–11.2) × (4–)4.8–5.6 [x_{mr} = 8.9–9.5 × 4.9–5.0 µm, x_{mm} = 9.30 ± 0.4 × 4.96 ± 0.1 µm, Q = 1.6–2.2, Q_{mr} = 1.83–1.93]
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$Q_{mm} = 1.88 \pm 0.1$, $n = 25$ spores per 3 specimens], ellipsoid, smooth, hyaline, inamyloid, thin-walled. Basidia 19–32 × 6 mm, clavate, 4-spored. Cheilocystidia clavate. Cheilocystidia common, composed of Siccus-type broom cells; main body 10–26 × 4–11 mm, cylindrical to clavate, broadly clavate or irregular in outline, hyaline, thin-walled; apical setulae 2–8 × 0.8–2 mm, cylindrical to conical or irregular in outline, yellowish brown, thin to thick-walled. Pleurocystidia absent. Pileipellis hymeniform, mottled, composed of Siccus-type broom cells; main body 10–27 × 5–18 mm, clavate to broadly clavate or irregular in outline, hyaline to weakly yellowish brown, thin- to thick-walled; apical setulae 2–6 × 0.8 mm, cylindrical to conical or irregular in outline, brown, thick-walled (up to 0.8 mm). Stipe tissue monomitic; cortical hyphae 3–7 mm diam, parallel, cylindrical brown, dextrinoid, thin-walled; medullary hyphae 2–10 mm diam, parallel, cylindrical, hyaline, weakly dextrinoid, thin- to thick-walled. Stipe vesture absent. Clamp connections present.

Habitat: Scattered to gregarious on bamboo debris (Schizostachyum sp.) in botanical garden, or on stems of banana in montane rain forest.

Known distribution: Indonesia, Thailand (Wannathes et al., 2009).

Material examined: INDONESIA. West Java, Bogor, Botanical Garden, scattered on debris of bamboo (Schizostachyum sp.), 8 January 2000, leg. D.E. Desjardin and E. Horak (DED 7059, BO!, SFSU); ibid, scattered on bamboo debris, 8 January 2000, leg. E. & A. Horak (DED 7076, BO!, SFSU); East slope of Mt. Salak, scattered to gregarious on stems of bamboo in montane rain forest, 11 January 2000, leg. (DED 7105, BO!, SFSU).

Figure 5. Fruiting bodies of Marasmius nigrobrunneus forma cinnamomeus Wannathes, Desjardin & Lumyong. From D.E. Desjardin 7076. (Photo: D.E.Desjardin). Scale bar= 0.75 cm.
Figure 6. Micro-morphological features of *Marasmius nigrobrunneus* forma *cinnamomeus* Wannathes, Desjardin & Lumyong: A. Basidiospores; B. Basidioles; C. Cheilocystidia; and D. Pileipellis (Drawn by A. Retnowati from D.E. Desjardin 7059).

Notes. *Marasmius nigrobrunneus* forma *cinnamomeus* was described provisionally from material collected in Thailand (Wannathes et al., 2009). The species is characterized by a rather broad range of pileus coloration, from dark grey to brownish grey (*f. nigrobrunneus*) to brownish orange or reddish orange (*f. cinnamomeus*); white, collariate, distant to subdistant lamellae; a long (up to 60 mm), institious, wiry stipe that usually arises directly from rhizomorphs; ellipsoid basidiospores in the range 8–11 × 4–6 μm; and growth on monocots.


Type: CONGO, Yangambi, Louis 14938 (BR, holotype).

Pileus 10–17 mm diam, convex to plano-convex, sometimes depressed, rugulose-striate to the wrinkled disc, dull, dry, hygrophanous, glabrous, cream (4A3) to whitish buff, or pale greyish orange (5B3) tones in age, often spotted brownish. Context very thin. Lamellae adnate, subdistant (12-14 reaching stipe) with 2-3 series of lamellulæ, often forked or anastomosing, narrow (-2 mm), concave, cream buff. Stipe 20–35 × 0.5–1 mm, central to slightly eccentric, cylindrical, tough, pruinose, dry, non-insitious; apex buff to cream, base reddish brown (8D5–8).

Basidiospores (9–) 10–11 (~12) × 3–4 mm [\( x_m = 10.30 \pm 0.74 \times 3.62 \pm 0.41 \) mm, \( Q = 2.40–3.50 \), \( Q_m = 2.88 \pm 0.31 \), \( n = 25 \) spores per 1 specimen], ellipsoid, smooth, hyaline, inamyloid, thin-walled. Basidia 22–24 × 6 mm, clavate, 4-spored. Basidioles clavate. Cheilocystidia composed of *Siccus*-type broom cells; main body 12–18 × 5–8 mm, cylindrical to clavate, broadly clavate or irregular in outline, rarely lobed, yellowish brown to hyaline, thin- to thick-walled; apical setulae 3–8 × 0.8–1.6 mm, cylindrical to conical, sometimes obtuse to subacute, hyaline to pale brown, thin- to thick-walled. Pleurocystidia absent. Pileipellis hymeniform, not-mottled, composed of *Siccus*-type broom cells; main body 10–18 × 4–9 mm, cylindrical to clavate, subglobose or irregular in outline, yellowish brown, thin- to thick-walled; apical setulae 6–12 × 0.8–1.6 mm, cylindrical to conical,
usually smooth or wavy in outline, thin- to thick-walled. Stipe tissue monomitic; cortical hyphae 4–6 mm diam, parallel, cylindrical, hyaline, strongly dextrinoid, thick-walled (up to 0.8 mm); medullary hyphae 5–10 mm diam, parallel, hyaline, dextrinoid. Stipe vesture of numerous scattered or clustered caulocystidia 8–52 × 4–6 mm, polymorphic, subcylindrical to clavate or irregular in outline, obtuse, often forked, hyaline, weakly dextrinoid, thin-walled. Clamp connections present.

Habitat: on bamboo leaves in botanical garden.

Known distribution: Indonesia, Africa (Pegler, 1977; Antonín, 2007), Thailand (Wannathes et al., 2009).


Figure 7. Fruiting bodies of *Marasmius xestocephalus* Singer. From D.E. Desjardin 7060. (Photo: D.E. Desjardin). Scale bar = 0.6 cm.

Figure 8. Micro-morphological features of *Marasmius xestocephalus* Singer. A. Basidiospores; B. Basidia and basidioles; C. Cheilocystidia; d. Pileipellis; e. Stipe vesture. (Drawn by A. Retnowati from D.E. Desjardin 7060).
Notes. Material from Java, tentatively recognized here as *Marasmius xestocephalus* sensu Wannathes et al. (2009) is characterized by a relatively large, convex to plano-convex, rugulose-striate, whitish buff pileus with a wrinkled disc and pale greyish orange (5B3) tones in age; subdistant lamellae; and a pruinose stipe with numerous scattered or clustered caulocystidia. *Marasmius xestocephalus* was reported from Africa (Pegler, 1977; Antonín, 2007) and Thailand (Wannathes et al., 2009). The Thai material differs from the African material reported by Antonín (2007) in having narrower basidiospores (3–4 µm versus 4.5–5.5, µm, respectively), and the Indonesian specimen differs from the Thai material (Wannathes et al., 2009) in having fewer lamellae (12–14 versus 15–18) and shorter basidiospores (10–11 µm versus 11–14 µm).

**Sect. Sicci Singer**


Type species: *Marasmius haematocephalus* (Mont.) Fr.


Fig. 9-10.

Type: ZAIRE, Lake Edward, and Kivu District, Panzi, alt. 1650 m, November 1948, Goossens-Fontana 5076 (BR).

Pileus 7-22 mm diam, campanulate, sulcate to plicate, glabrous, dull, dry; dull greyish red (8–9C3–4) overall, darkening with moisture loss to brown (7E5), drying dark reddish brown (8F6–8). Lamellae adnexed, ascending, distant (11–13 reaching stipe) with 0–1 series of lamellulae, broad, off-white to dingy pinkish white with red to reddish brown edges. Stipe 20–50 × 0.5–1 mm, central, terete, wiry, tough, glabrous, non-insitious with white mycelium, dark reddish brown overall.

Basidiospores 22.4–25 × 4–5 mm \[x_m = 23.55 \pm 0.87 \times 4.03 \pm 0.28 \text{ mm}, Q = 4.67 – 7.25, Q_m = 5.87 \pm 0.45, n = 25 \text{ spores per one specimen}\], clavate to slender fusoid or suballontoid, smooth, hyaline, inamyloid, thin-walled. Basidia unobserved. Basidioles clavate. Cheilocystidia common, composed of *Siccus*-type broom cells; main body 10–18 × 4–11 mm, subcylindrical to clavate, broadly clavate, subglobose or irregular in outline, hyaline, thin-walled; apical setulae 2–10 × 0.8 mm, cylindrical to conical or wavy, obtuse to subacute, hyaline to yellowish brown, thin-walled. Stipe tissue monomitic; cortical and medullary hyphae indistinguishable, parallel, cylindrical, hyaline, dextrinoid, thin-walled. Stipe vesture absent. Clamp connections present.

Habitat: On leaves of bamboo in garden area. Known distribution: Indonesia, West Africa (Grace et al., 2019).


Figure 9. Fruiting bodies of *Marasmius grandisetulosus* Singer. From D.E. Desjardin 7243. (Photo: D.E. Desjardin). Scale bar = 1 cm.
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Figure 10. Micro-morphological features of *Marasmius grandisetulosus* Singer. A. Basidiospores; B. Basidioles; C. Cheilocystidia; D. Pleurocystidia; and E. Pileipellis. (Drawn by A. Retnowati from D.E. Desjardin 7243).

Notes. Indonesian material determined here as *Marasmius grandisetulosus* is characterized by a greyish red to brown pileus that dries dark reddish brown, distant lamellae with reddish brown edges, a glabrous, non-insinitious stipe, conspicuous pleurocystidia, and clavate basidiospores in the range 22.4–25 × 4–5 mm. Material reported from São Tomé, West Africa, differs in forming shorter basidiospores (x̄m = 20.9 µm) and growing on dicot wood and leaves rather than bamboo (Grace *et al.*, 2019).


Fig. 11–12.

Type: ZAIRE, District Forestier Central, Yangambi, on leaf litter, alt. 470 m, 18 May 1939, Louis 14875 (BR, Holotype).

Pileus 6-16(–20) mm diam, convex to broadly convex or campanulate, expanding to plano-convex with or without small umbo, smooth, striate to even or faintly striatulate (not sulcate nor plicate) dull, dry, glabrous to subvelutinus, dark olivaceous brown (5E4–5) when young, losing olive tones and becoming yellow brown (5D5–6) to light brown (6D4–5; ‘hazel’) or brown orange (6C4–6) in age (colour change from olivaceous to brown orange distinctive). Lamellae narrowly adnate to adnate, close to crowded (17–22 reaching stipe) with 2–4 series of lamellulae, narrow to moderately broad, convex, white, off-white to cream or pale orangish white (4A2), non-marginate. Stipe 22–60 × 0.75–1 mm, central, cylindrical, terete, tough or pliant, glabrous, dry, non-insinitious, with orange to orangish brown or cream strigose mycelium; apex white to pale yellowish brown (4A2), base brownish orange to reddish brown.

Basidiospores (11.2–12–15.2(–16) × (3.2–3.6)–5.6, [x̄m = 12.8–14.5 × 3.9–4.6 µm, x̄mm = 13.60 ± 0.8 × 4.27 ± 0.4 µm, Q = 2.6–4.0, Q̄m = 3.16–3.29, Q̄mm = 3.22 ± 0.1, n = 25 spores per 2 specimens and 17 spores per one specimen], ellipsoid, smooth, hyaline, inamyloid, thin-walled. Basidia 20–24 × 6–8 mm, clavate, 4-spored. Basidioles clavate to fusoid. Cheilocystidia common, of *Siccus*-type broom cells; main body 7–21 × 5–10 mm, clavate to subclavate, cylindrical or irregular in outline, hyaline, thin- to thick-walled; apical setulae 2–8 × 0.8 mm, crowded, cylindrical to conical or irregular in outline, thin-walled. Pleurocystidia common, 27–44 × 5–10 mm, fusoid to clavate, usually attenuated and strangulate at the apex, hyaline, refractive, thin-walled. Pileipellis hymeniform, weakly mottled, composed of *Siccus*-type
broom cells; main body 8–18 × 3–8 mm, clavate to subclavate, cylindrical or irregular in outline, yellowish brown, thin-walled; apical setulae 2–8 × 0.8 mm, crowded, cylindrical to conical or irregular in outline, obtuse to subacute, thin-walled. Stipe tissue monomitic; cortical hyphae 2–7 mm diam, parallel, cylindrical, yellowish brown, dextrinoid, thin-walled; medullary hyphae 3–7 mm diam, parallel, cylindrical, hyaline, thin-walled. Caulocystidia rare on stipe apex, composed of 1) cylindrical to subclavate cells 6–12 × 2–5 mm, hyaline, smooth, thin-walled; or 2) Siccus-type broom cells; main body 3–4 × 2–4 mm, cylindrical to conical, slightly wavy in outline, hyaline, thin-walled. Clamp connections present.

Habitat: On dicot leaf mulch or on Diptercarpus leaves or other hardwood leaves in botanical garden. Known distribution: Indonesia, Africa (Singer 1964, Antonín 2007, Grace et al., 2019).

Figure 11. Fruiting bodies of *Marasmius elaeoccephalus* Singer. From D.E. Desjardin 7072. (Photo: D.E. Desjardin). Scale bar = 1 cm.

Figure 12. Micro-morphological features of *Marasmius elaeoccephalus* Singer. A. Basidiospores; B. Basidia and basidioles; C. Cheilocystidia; D. Pleurocystidia; and E. Pileipellis. (Drawn by A. Retnowati from D.E. Desjardin 7083).

Notes. The dark olive-brown pileus, close to crowded lamellae, elongate-ellipsoid basidiospores, conspicuous pleurocystidia and growth on dicot debris is distinctive for *M. elaeocephalus*. The Indonesian material differs from that described from Africa (Singer, 1964; Antonín, 2007; Grace et al., 2019) in forming slightly longer basidiospores with mean 13.6 × 4.3 µm versus 11.1 × 3.9 µm, respectively.

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