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A new species of *Marasmius* Sect. *Neosessiles* (Basidiomycota, Agaricales) from the artificial Dipterocarpaceae forest in Indonesia

Atik RETNOWATI[1,*], Jaya Seelan Sathiya SEELAN[2]

1. *Herbarium Bogoriense, Research Center for Biology, The National Research and Innovation Agency, Jalan Raya Jakarta Bogor, Km. 46, Cibinong 16911, Indonesia.* ***2.*** *Mycology and Pathology Laboratory, Institute for Tropical Biology and Conservation (ITBC), Universiti Malaysia Sabah, 88400 Kota Kinabalu, Sabah, Malaysia. *Corresponding author's Phone: +62-21-8765057; Mobile phone: +62-081804954805; Fax: +62-21-8765063; Email: marasjamur@gmail.com*

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ABSTRACT: *Marasmius jasingensis* (Agaricales, Marasmiaceae), is described as a new species from Haurbentes, the artificial Dipterocarpaceae forest in West Java, Indonesia. The new species is distinguished by having a small basidiomata with orbicular, pale orange pileus, distant lamellae, a stipe being absent or rudimentary, *Rotalis*-type cheilocystidia, pleurocystidia, and pileipellis cells. Morphologically, it is similar to *M. sejunctus*, *M. conchiformis*, *M. spaniophyllus* Berk., *M. sessiliaffinis* and *M. griseoroseus*. Comprehensive descriptions, illustrations, and comparisons with similar taxa are presented.

KEY WORDS: Fungal diversity, Java, Marasmiaceae, marasmioid fungi, taxonomy.

INTRODUCTION

The genus *Marasmius* is one of the largest genera in the family Marasmiaceae with about 500 species (Kirk *et al*., 2008) distributed mainly throughout tropical and subtropical areas of the world. The members of the genus can be easily recognized by tough, dry, persistent basidiocarps, tough, subdistant lamellae, with entire, sharp edges, and a cartilaginous stipe. Most of them are saprotrophic, some are parasitic, whereas mycorrhizal association have not yet been confirmed.

Traditionally, the genus consists of 12 sections which are separated on the basis of the structure of the pileipellis, and of tissue and cellular reactions to Melzer's reagent. The sections were *Androsacei*, *Hygrometrici*, *Epiphylli*, *Marasmius*, *Alliacei*, *Globulares*, *Sicci*, *Leveilleani*, *Scotophysini*, *Inaequales*, *Fusicystides*, and *Neosessiles* (Singer, 1986). Many years after Singer (1986), a new concept of the sectional level was suggested by Antonín and Noorderloos (2010). Supported by molecular data, they suggested that section *Globulares* is characterized by forming a hymeniform pileipellis consisting of *Siccus*-type broom cells and/or smooth cells. Furthermore, Desjardin and Petersen (1989) mentioned that *Neosessiles* was an artificial group that shares features with other sections. In order to clearly define the section, more studies using more species are needed. Currently several sections have been elevated to new genera. Antonín (1987) separated section *Androsacei* from the genus *Marasmius*, and proposed a new genus *Setulipes* Antonin which is a member of Omphalotaceae. In addition, the genus *Cryptomarasmius* was proposed to accommodate *Marasmius* section *Hygrometrici* which belongs to the family Physalacriaceae (Jenkinson *et al*., 2014). Wilson and Desjardin (2005) transferred members of *Marasmius* section *Alliacei* to the genus *Mycetinis* which belongs to Omphalotaceae.

Among the 12 sections, *Neosessiles* is one of the smallest and less studied (Oliveira and Capelari, 2012). Singer (1986) mentioned that the section *Neosessiles* was characterized by pleurotoid basidiomata, a hymeniform pileipellis, medium to large basidiospores, a rudimentary, oblique or eccentric stipe, pseudoamyloid (= dextrinoid) or exclusively inamyloid hyphae with or without clamp connections. Eleven species of the section are reported from the Neotropics (Singer, 1976), five species from Africa (Antonin, 2007), three species from Madagascar (Shay *et al*., 2017, Antonín and Buyck, 2006), and one species each from Malaysia (Tan *et al*., 2009), Thailand (Wannathes *et al.*, 2009), Hawaii (Desjardin and Hemmes, 2011), and Sri Lanka (Pegler, 1986), and five species from Brazil (Oliveira *et al.*, 2014).

Currently, about 50 species of the Indonesian *Marasmius* species (*Marasmius*, *Sicci*, *Globulares*) have been reported from Java, Bali and Kalimantan (Desjardin *et al*., 2000, Retnowati, 2008, 2010). In addition, one species of the section *Neosessiles*, *M. tenuissimus*, had been collected by Junghuhn (Singer, 1976). In this paper, another species of sect. *Neosessiles* in the concept of Singer (1986) from Indonesia, namely *M. jasingensis*, is described and illustrated as a new species.

MATERIALS AND METHODS

Specimens of *Marasmius* were collected from Haurbentes forest, Jasinga, Bogor, West Java. Geographically, Haurbentes is located between 6º32'–6º33 South Latitude and 106º26 East Longitude. The total area of the forest is 105.5 ha, and it is dominated by the genus *Shorea* (Dipterocarpaceae). The average rainfall is 4267

mm/year; the climate is categorized as a wet climate (Erizilina *et al.* 2019) (Fig. 1).

Macro- and micromorphological characters are described and illustrated based on fresh and dried fungal specimens. Microscopic observation was made on material mounted in 3% KOH, Congo red and Melzer's reagent. Colour notation was determined using Kornerup and Wanscher (1978). Specimens examined are deposited in Herbarium Bogoriense, Indonesia (BO).

All 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 (x_m); the range of variation in n basidiospores measured (Q); the mean of Q-values in a single specimen (Q_m) (Retnowati *et al*. 2020).

Fig. 1. Sampling site and vegetation type of ***Marasmius jasingensis*** in the Indonesian province of West Java. (https://upload.wikimedia.org/wikipedia/id/d/df/Lokasi_Jawa_Barat_Indonesia.svg. Accessed on 6 July 2021).

TAXONOMIC TREATMENT

Marasmius jasingensis Retn. & Sathiya Seelan, ***sp. nov.*** **Figs. 2–4.**

Mycobank: MB#841420

Type: Indonesia, West Java Province, Jasinga, artificial

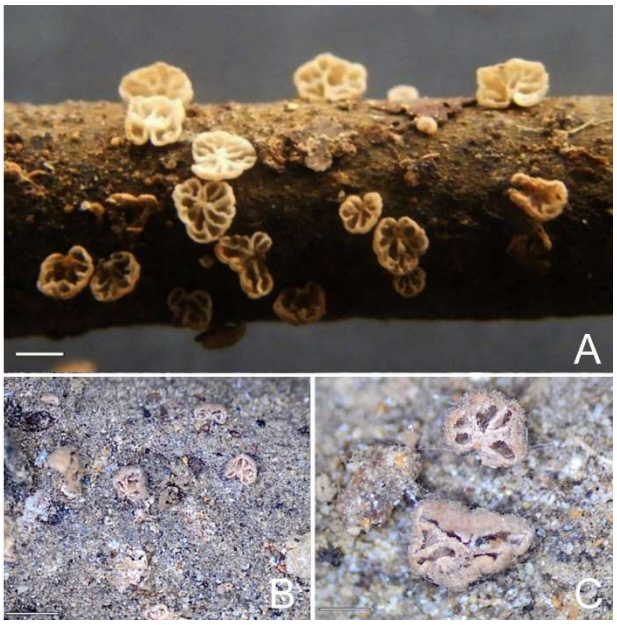

Fig. 2. ***Marasmius jasingensis***: **A**. Fresh fruiting bodies; **B**, **C**. Dried specimens. (Scale bars: A = 2.5 mm; B and C = 1 mm;).

Dipterocarpaceae forest "Haurbentes", Forestry Department, on dicot wood, 4 June 2009, *A. Retnowati 653* (BO).

Description: Basidiomata small. Pileus 1–2.5 mm diameter, orbicular, sulcate, non-striate, margin straight to slightly incurved; surface dull, dry; pale orange. Context thin, pale orange. Lamellae adnate, subdistant (5–7 attached lamellae), 0–1 series of lamellulae, non-anastomosing, non-marginate, concolorous with pileus. Stipe absent or rudimentary, without mycelial pad. Odor and flavor not distinctive.

Basidiospores (6.5)7–9.3(9.9) × (3.4)3.6–4.6(5.4) µm [x_m= 7.91 ± 1.04 × 4.09 ± 0.58; Q = 1.63–2.22; Q_m = 1.94 ± 0.16; n = 25 spores from 1 specimen], ellipsoid, thin-walled, smooth, hyaline, inamyloid. Basidia 18.7–23.4 × 5.9 µm, 2–4-spored, clavate. Basidioles clavate, fusoid with tapering apex. Cheilocystidia common, *Rotalis*-type broom cells; main body 10–21 × 9–13 µm, clavate to broadly clavate, or subglobose, hyaline, thin-walled; setulae 0.7–1.8 × 0.21–0.84 µm, conical to narrowly conical, obtuse, some with very crowded apical setulae up to the upper half of the cells. Pleurocystidia common, *Rotalis*-type broom cells; main body 8.8–23 × 8.4–17 µm, clavate to broadly clavate, subglobose or irregular in outline, hyaline, thin- to thick-walled; setulae 0.6–2 × 0.5 µm, narrowly cylindrical to conical, obtuse, crowded, thin- to thick-walled, hyaline. Pileipellis hymeniform, composed of *Rotalis*-type broom cells; main body 21–38.4 × 10–15.8 µm, clavate to broadly clavate, hyaline, non- dextrinoid, thin to thick-walled; setulae 1.5–2 × 0.2–0.3 µm, narrowly cylindrical to conical, obtuse. Pileal trama composed of interwoven hyphae being 3–11 µm wide, thin to thick-walled, inamyloid. Clamp connections present.

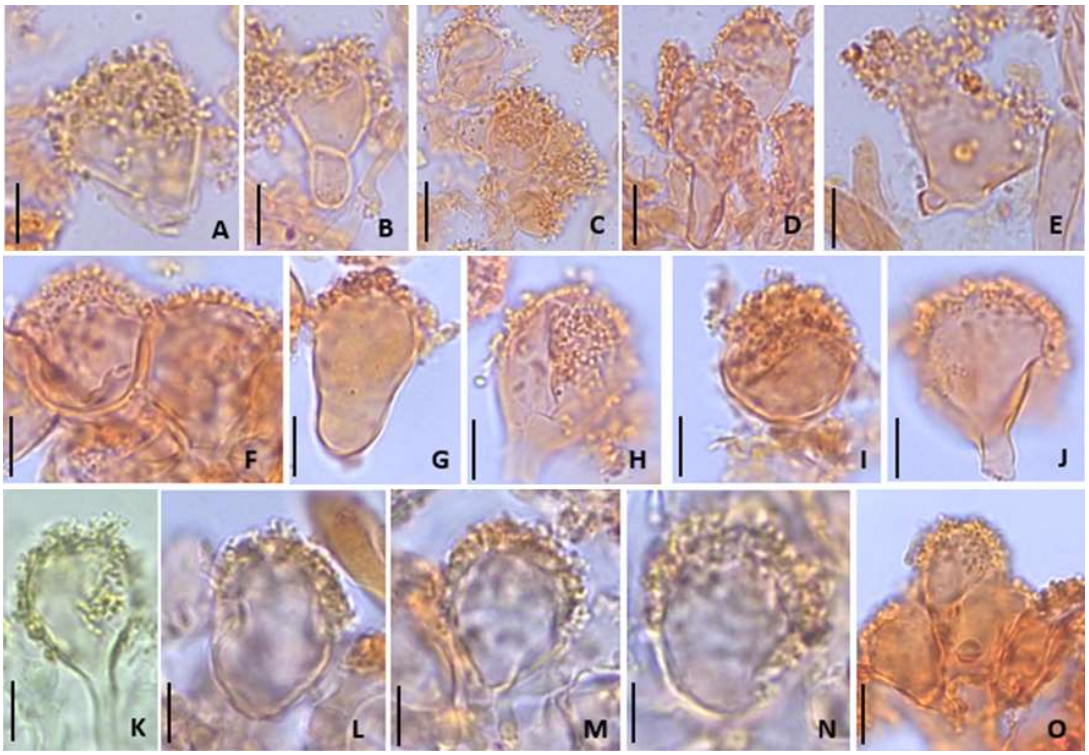

Fig. 3. *Rotalis*-type broom cells of ***M. jasingensis***. **A–E**: Pleurocystidia; **F–J**: Cheilocystidia; and **K–O**: Pileipelis. Scale bars: = 7 μm (A–J); 10 μm (K–O).

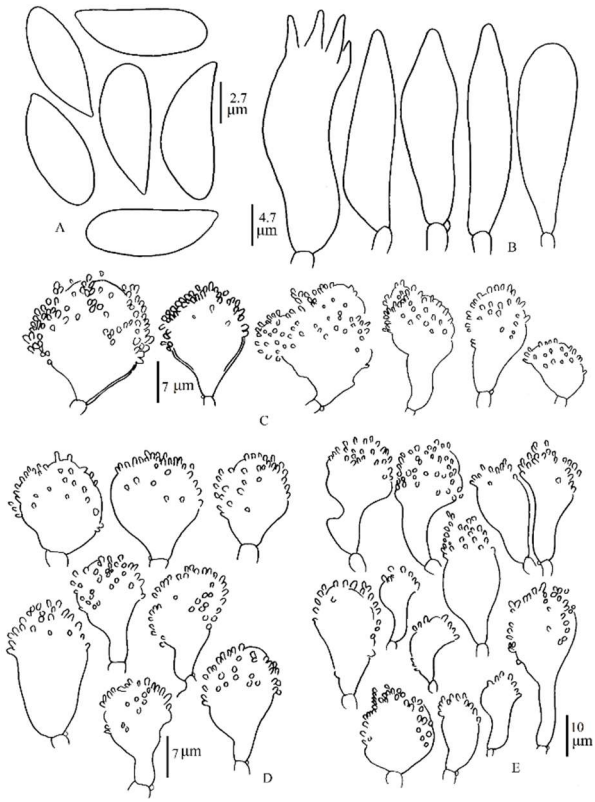

Fig. 4. ***Marasmius jasingensis***: **A**. Basidiospores; **B**. Basidia-basidioles; **C**. Pleurocystidia; **D**. Cheilocystidia, and **E**. Pileipellis. (drawn by A. Retnowati from *A. Retnowati 653*).

Etymology: The epithet *jasingensis* refers to Jasinga, the name of the district where Haurbentes forest is located.

Distribution: Indonesia (Java).

Habit and habitat: Pleurotoid, gregarious on undetermined dicot wood.

Notes: *Marasmius jasingensis* is considered a member of the *Marasmius* sect. *Neosessiles* because of pleurotoid habit, forming a hymeniform pileipellis and the absence of a stipe. This new species is characterized by having small basidiomata, an orbicular, pale orange pileus, distant lamellae, *Rotalis*-type of cheilocystidia, pleurocystidia, and pileipellis cells. The presence of *Rotalis*-type broom cells is different from most of the described species of *Marasmius* sect. *Neosessiles* mostly having *Siccus*-type broom cells.

*Marasm*ius *jasingensis* is similar to few other described species with a pleurotoid habit and the presence of *Rotalis*-type cells of *Marasmius* sect. *Neosessiles* viz *M. sejunctus* Singer, *M. conchiformis* J.S. Oliveira & Capelari, and *M. spaniophyllus* Berk., *M. sessiliaffinis* Singer, and *M. griseoroseus* (Mont.) Singer, but it can be distinguished from them by several characters (Table 1). *Marasmius sejunctus* differs in having reddish-brown pileus when dried, the presence of a stipe, *Siccus*-type broom cells in the pileipellis with transition to *Rotalis*-type broom cells, the presence of *Siccus*-type cheilocystidia and caulocystidia, and fusoid pleurocystidia (Singer 1976). *Marasmius conchiformis* from Brazil differs in having larger basidiomata, higher

Table 1. Morphological characters ***M. jasingensis*** and other similar species of *Marasmius* sect. *Neosessiles*.

	M. jasingensis	*M. sejunctus*	*M. conchiformis*	*M. spaniophyllus*	*M. sessiliaffinis*	*M. griseoroseus*
Pileus						
Size	1–2.5 mm diam.	2–3.5 mm diam.	1–4.5 mm diam.	5–7 mm diam.	2-14 mm diam	0.8–6 mm diam
Shape	Orbicular	Reniform	Convex, orbicular to semicircular, reniform or shell-shaped	Reniform	reniform	Semicircular to flabeliform or irregular, shell-shaped
Colour	Pale orange	Dried collection reddish-brown	Buff orange	Brown	light brown to pale yellowish fuscous	white or whitish cream, becoming pale orangy beige
Lamellae						
Size	5–7	3–4 then 8–10 attached	7–8	3–6	4–7	4–8
Series of lamellulae	Present, 0–1 series	Present, -	Present, 3 series	-	1–2	1–2
Spaces	Subdistant	Subclose when mature	Subdistant	Subdistant	subdistant	subdistant to distant
Anastomoses	Anastomoses absent	A few anastomoses when mature	-	With smooth interlamellar spaces	sometimes present	present
Stipe						
Presence of stipe	Absent /rudimentary	Present	Absent or short	Present	present	none or rudimentary
Basidiospores	(6.5) 7–9.3(9.9) × (3.4)3.6–4.6 (5.4) µm	7–10 × 3–6 µm	8–11.8 × 3–5 µm	10.5–12.3 × 5.3–6 µm	7.8–9.7 × (4-)4.7–5.5 µm	(9)10–14.4×2.3–4 µm
Cheilocystidia	*Rotalis*-type	*Siccus*-type	*Siccus*-type	*Siccus*-type	*Siccus*-type	*Siccus*-type broom cells in transition to *Rotalis*-type
Pleurocystidia	*Rotalis*-type	Fusoid, often subrostrate	Cylindrical-clavate	-		
Pileipellis	*Rotalis*-type	Transition *Siccus*-*Rotalis*-type	Hymeniform of *Siccus*-type broom cells, appearing transitional to *Rotalis*-type broom cells	Broom cells tending to be *Rotalis*-type	*Siccus*-type	*Siccus*-type broom cells in transition to *Rotalis*-type
Caulocystidia	-	*Siccus*-type broom cells		-		-
Clamp Connection	present	present	present	present	present	present

number of lamellae and lamellulae, larger basidiospores, cylindrical-clavate pleurocystidia, cheilocystidia in the form of *Siccus*-type broom cells, and pileipellis cells of the *Siccus*-type with transients to the *Rotalis*-type (Oliveira *et al.*, 2014). *Marasmius spaniophyllus*, described also from Brazil differs from *M. jasingensis* by having a large pileus, the presence of a stipe, larger basidiospores, pileipellis composed of *Siccus*-type broom cells which tend to be *Rotalis*-type broom cells (Singer 1976). The new species is also similar to *M. sessiliaffinis*. However, *M. sessiliaffinis* is sharply distinct from the new species by pileus colour (light brown to pale yellowish fuscous vs. pale orange), size of pileus (2–14 mm vs. 1–2.5 mm diam.), and type of pileipellis (*Siccus* vs. *Rotalis*-type broom cells) (Singer 1976). *Marasmius griseoroseus* differs from the new species in having larger basidiospores, *Siccus*-type broom cells in transition to *Rotalis*-type of cheilocystidia and pileipellis (Oliveira *et al.*, 2014).

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