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# A revision of *Mnesithea* (*Gramineae – Rottboelliinae*) in Malesia and Thailand

J.F. Veldkamp[1], M.E.B. van den Boogaart, J. Heidweiller, M.A.F. van der Klaauw, R. de Koning, A.R. Kraaijeveld, M.S.M. Sosef, R.C.W. Strucker

**Key words**

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*Gramineae*
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*Poaceae*
*Rottboelliinae*
Thailand

**Abstract** A revision of *Mnesithea* (*Gramineae – Rottboelliinae*) in Malesia and Thailand showed that 11 species and 2 varieties occur. The suggestion that there would be a drought plant refuge in SE Borneo near Banjarmasin is supported.

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## INTRODUCTION

Back in the 1980s, initial studies in the *Rottboelliinae* J.Presl (*Gramineae*) were started during courses in Plant Taxonomy at the Rijksherbarium, now Naturalis Biodiversity Center, section Botany. These led to papers on the generic delimitations in the subtribe (Veldkamp et al. 1986) and revisions of *Thaumastochloa* C.E.Hubb. and *Heteropholis* C.E.Hubb. (De Koning et al. 1983). The various analyses indicated that the generic differences between *Coelorachis* Brongn., *Hackelochloa* Kuntze, *Heteropholis*, *Mnesithea* Kunth, *Ratzeburgia* Kunth and *Rottboellia formosa* R.Br. were artificial and a much expanded *Mnesithea*, the oldest generic name, was proposed (Veldkamp et al. 1986). This then now contains about 33 species worldwide, of which 11 occur in Malesia and Thailand.

Veldkamp et al. (1986) provided an extensive discussion on the morphology of the spikelets. In *Mnesithea* the spikelets are in pairs or triads: a sessile and a pedicelled spikelet or two sessile and one pedicelled ones. The latter condition seems exceptional in the *Andropogoneae* (e.g. also in *Polytrias* Hack.), but as inflorescences in some species are mixed in various degrees it is not an apomorphic generic character for this alliance.

The sexuality of the lower floret of the sessile spikelet turned out to be of importance in the generic delimitation which was a rather surprising observation.

In the *Panicoideae – Andropogoneae* to which *Mnesithea* belongs the spikelets are 2-flowered, with a lower and an upper floret. The lower one shows a range in reduction running from bisexual (the presumed plesiomorphic state, but now rare) to male, to sterile, to loss of the lower palea and exceptionally to the total absence of a lower floret (e.g. in *Microstegium* Nees). In general, the various stages of reductions can be observed within a genus, within a single species, or sometimes even in spikelets in the same inflorescence; each depending on the taxonomic circumstances. As with all evaluations of taxonomic characters this must be viewed at an ad hoc basis and that differences in reduction might be of generic significance in some place may not a priori be ruled out.

And so it was concluded that the only remaining difference between a much expanded *Mnesithea* and reduced *Rottboellia* L.f. was “the presence of a sterile lower floret in the sessile spikelet of the first genus against a male floret in the second one” (Veldkamp et. al. 1986: 289, 297, 298, (key 4b), 302, 305).

In view of the cline in reduction elsewhere, this conclusion appeared too good to be true, but during the present study when more material could be studied in depth it was observed again that it is constant and the only character that seems to separate *Mnesithea* from *Rottboellia*.

*Mnesithea geminata* is one of a number of grass species that have a more or less wide distribution, but are rare in Borneo, often only found around Banjarmasin, where they were already collected by Motley between 1854–1859. Some other species showing this type of distribution are:

*Apocopis collinus* Balansa (Thailand to S Vietnam, Aceh, Sabah, C Kalimantan and Banjarmasin);
*Cynodon radiatus* Roth ex Roem. & Schult. (Old World incl. Malesia, in Borneo only Banjarmasin);
*Echinochloa stagnina* (Retz.) P.Beauv. (Old World, here and there in Malesia, in Borneo only Banjarmasin);
*Eragrostis japonica* (Thunb.) Trin. (widespread, in Borneo only Sabah, Banjarmasin);
*Eragrostis montana* Balansa (Burma to S Vietnam, Malay Peninsula, Singapore, S Sumatra, Sarawak, Banjarmasin),
*Eragrostis pilosa* (L.) P.Beauv. (Old World, scattered in Malesia, in Borneo from Sarawak, Sabah, Banjarmasin);
*Eriochloa procera* (Retz.) C.E.Hubb. (Old World, scattered in Malesia, in Borneo from Brunei, Sabah, Banjarmasin);
*Hemarthria compressa* (L.f.) R.Br. (Asia, N Thailand, Kedah, Sabah, Banjarmasin);
*Hemarthria longiflora* (Hook.f.) A.Camus (India, E Thailand, Kedah, Kelantan, Banjarmasin);

[1] Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands; corresponding author e-mail: jef.veldkamp@naturalis.nl.

*Leptochloa malayana* (C.E.Hubb.) Jansen ex Veldk. (SE, E, Peninsular Thailand, Kedah, Banjarmasin);
*Panicum humile* Nees ex Steud. (Old World, a few places in Malesia, in Borneo only Banjarmasin),
*Perotis indica* (L.) Kuntze (a drought plant from India to E China to Queensland; widely spread in Thailand (N, SW, SE, E, Peninsular) and Malesia, but in Borneo only from Sabah and Banjarmasin);
*Setaria barbata* (Lam.) Kunth (thought to originate from W Africa, in Malesia becoming a pest, in Borneo only in Banjarmasin, collected in 1858, *Motley 210*, K);
*Setaria clivalis* (Ridl.) Veldk. (Malesian endemic, rare outside Java and the Lesser Sunda Isl., in Borneo only from Banjarmasin);
*Setaria punctata* (Burm.f.) Veldk. (Old World, Thailand (apparently rare, e.g. C: Bangkok), here and there in Malesia, in Borneo from Sarawak and Banjarmasin);
*Zoysia matrella* (L.) Merr. (a sandy beach species of the Indian Ocean and Chinese Sea, but also cultivated for lawns and greens; widespread, but in Borneo only from Sarawak, Sabah and Banjarmasin).

Many of these are drought indicators. As research in Malesian grasses continues more examples are expected, especially among the *Andropogoneae*, which are prominent in dry areas. These examples hint at the presence of an ancient drought refuge in the Banjarmasin area as was also suggested by Van Steenis (1979). No doubt there will be more examples in other families.

Many species of the *Rottboelliineae* and the apparently unrelated *Chionachninae* Clayton have a remnant of the vascular bundle at the base of each joint. Beumée (1927) has observed that ants readily carried away the joints of *M. mollicoma* (‘*M. pubescens*’) and *Polytoca macrophylla* Benth. after they had inspected the knobs, thus assisting in the dispersal of the diaspores. Apparently they were attracted by the presence of cells that contain large drops of oil. He therefore regarded this knob as an elaiosome, a term we have adopted here for this structure. A considerable amount of oil was also present in the elaiosomes of *Sclerachne punctata* R.Br., a variable amount possibly due to the state of maturity in those of *Polytoca bracteata* R.Br., and only some oil in those of *M. glandulosa*, *M. laevis*, *Ophiuros exaltatus* (L.) Kuntze, *Rottboellia cochinchinensis* (Lour.) Clayton (*R. exaltata* L.f.). This may be present in other species as well and would be an interesting subject for study. Collect both the ant and the grass!

### *Mnesithea*

*Mnesithea* Kunth (1829) 153; Veldk. et al. (1986) 281. — *Thyridostachyum* Nees (1836) 379, nom. superfl. — *Rottboellia* L.f. sect. *Mnesithea* Hook.f. (1896) 158. — Type: *Mnesithea laevis* (Retz.) Kunth.
*Rottboellia* L.f. sect. *Apogonia* Nutt. (1818) 83. — *Apogonia* (Nutt.) Fourn. (1886) 63. — Type: *Rottboellia rugosa* Nutt. [= *Mnesithea rugosa* (Nutt.) de Koning & Sosef].
*Coelorachis* Brongn. (1831) 64, t. 14. — *Rottboellia* L.f. subg. *Coelorachis* Hack. (1889) 293, nom. superfl. — *Rottboellia* L.f. sect. *Coelorachis* Pilg. (1940) 139; Roberty (1960) 74 (‘*Coelorrhachis*’), isonym. — Type: The plate, ‘*Coelorhachis’ glandulosa* Brongn. (= *Mnesithea glandulosa* Trin.).
*Diperium* Desv. (1831a) 180, t. 9, f. 3; (1831b) 76. — Type: *Diperium cylindricum* Desv. (= *Mnesithea laevis* Retz.).
[*Rytilix* Raf. (1830) 219, nomen]. — *Hackelochloa* Kuntze (1891) 776. — *Rytilix* Raf. ex Hitchc. (1920) 279, nom. superfl. — *Rottboellia* L.f. sect. *Hackelochloa* (Kuntze) Roberty (1960) 79. — Type: *Hackelochloa granularis* (L.) Kuntze [= *Mnesithea granularis* (L.) de Koning & Sosef].
*Ratzeburgia* Kunth (1831) 487. — *Rottboellia* L.f. sect. *Ratzeburgia* (Kunth) Roberty (1960) 85. — Type: *Ratzeburgia pulcherrima* Kunth [= *Mnesithea pulcherrima* (Kunth) de Koning & Sosef].
[*Aikinia* Wall. (1832) 46, t. 273, nom. inval., non A.DC. (1830). — Type: *Aikinia elegans* Wall., nom. inval., not accepted by author [= *Mnesithea pulcherrima* (Kunth) de Koning & Sosef].
*Rottboellia* L.f. subg. *Rottboelliastrum* Hack. (1883) 310. — [*Cycloteria* C.E.Hubb. (1931a) 459, nom. inval., in syn.; (1931b) 546, in nota]. — Syntypes: *Mnesithea selloana* Hack., *Mnesithea loricata* Trin.
*Heteropholis* C.E.Hubb. (1956) t. 3548; de Koning et al. (1983) 137. — Type: *Heteropholis sulcata* (Stapf) C.E.Hubb. [= *Mnesithea sulcata* (Stapf) de Koning & Sosef].
*Rottboellia* auct non L.f.

Annuals or perennials. *Culms* solid. *Ligule* collar-shaped, membranous. Inflorescence a compound, leafy panicle of spatheate spikes. *Peduncles* not articulating at base. Inflorescence axes articulating in joints, with 1–2 sessile spikelets and 1 pedicelled one; joints at base with a remnant of a vascular bundle (‘knob’ or ‘elaiosome’) which fits into a cavity in the top of the joint below. *Spikelets* paired (1 sessile, 1 pedicelled and the topmost a triad: 1 sessile, 2 pedicelled) or in triads (2 sessile, 1 pedicelled, but in the topmost one 1 sessile and 2 pedicelled). *Sessile spikelets* more or less immersed in cavities in the joints, 2-flowered, awnless, the lower floret epaleate or paleate and sterile, the upper one bisexual. Lower glume indurated, smooth or sculptured, 4–13-nerved, apex winged or not; upper glume chartaceous, 3–15-nerved. Lower lemma membranous, upper one even thinner. *Pedicel* free or adnate to the joint. *Pedicelled spikelets* dorso-ventrally flattened, varying from a single small scale to 2-flowered with the upper floret bisexual (*M. glandulosa*, *M. granularis*, *M. rottboellioides*). × = 7 (*R. granularis* (L.) Roberty), 9, 10.

Distribution — Pantropical with about 32 species, of which 10 species and 1 variety in Malesia and Thailand.

Eponymy — Named after the Greek herbalist, Mnesitheus Cyzicenus (from Cyzicus in Mysia, Turkey, c. 300 BC), but the work cited (περι ’εδεστων, On Diet) is by Mnesitheus Atheniensis (of Athens, Greece, c. 400 BC).

### KEY TO THE TAXA IN MALESIA AND THAILAND

NB: Unless otherwise stated, spikelet parts refer to those of the sessile spikelet.

1. Callus silvery, rarely golden setose. Lower glume surface invisible because of the dense, silvery or rarely golden indument. Glumes of pedicelled spikelets winged at base. — Plants annual, cataphylls absent. Sessile spikelet 3–3.2 mm long; lower glume 9–11-nerved, apex rounded, not winged. Pedicel completely adnate to the joint. Pedicelled spikelets 3.6–5.4 mm long, consisting of 2 laterally flattened thin glumes. Lesser Sunda Islands, New Guinea . . . . . 2. *M. formosa*
1. Callus glabrous to puberulous. Lower glume glabrous to hairy but surface visible, smooth, or lower part of keels with small appendages, or sculptured. Glumes of pedicelled spikelets not winged at base . . . . . 2
2. Lower glume sculptured (sometimes with small slits at base in *M. striata*) . . . . . 3
2. Lower glume smooth (sometimes with lines of small dots in var. *cochinchinensis*), lower part of keels with or without small appendages . . . . . 7
3. Plants annual, cataphylls absent. Ligule margin ciliolate. Joints 1.4–2.6 mm long. Sessile spikelet 1.5–2.6 mm long (incl. callus); lower glume suborbicular, pusticulate; upper glume 1.4–1.8 mm long; first lemma 1.4–1.7 mm long; second palea 0.8–1.1 mm long; anthers 0.4–0.9 mm long. Pedicel 1.6–2.4 mm long . . . . . 5. *M. granularis*
3. Plants perennial, cataphylls present. Ligule glabrous or margin setose. Joints 3.6–6.5 mm long. Sessile spikelet 4.3–6.8 mm long (incl. callus); lower glume ovate to ovate-oblong, with lines of small slits or cancellate; upper glume 3.3–6.1 mm long; first lemma 2.5–5.9 mm long; second palea 2.3–3 mm long; anthers 1.2–2.1 mm long. Pedicel 3.7–6.4 mm long . . . . . 4

4. Culms 1.5–2.5 m long. Lower glume with lines of small slits; upper glume 5.2–6.1 mm long; first lemma 4.8–5.9 mm long. — Thailand . . . . . 10. *M. striata*
4. Culms 0.2–1.1 m long. Lower glume cancellate; upper glume 3.3–5.1 mm long; first lemma 2.5–4.4 mm long 5
5. Callus and lower glume glabrous; second palea 2.8–3 mm long. — Lower glume greenish yellow to margins purplish; anthers 1.5–1.7 mm long. NE-, E-, Peninsular Thailand, Bangka. . . . . 1. *M. cancellata*
5. Sessile spikelet callus puberulous; lower glume hairy; second palea 1.6–2.8 mm long. . . . . 6
6. Lower glume yellowish; upper glume nerves not anastomosing; second palea ovate-oblong, 2.6–2.8 mm long; anthers 1.2–1.4 mm long. — Pahang, SE Kalimantan . . . . . 3. *M. geminata*
6. Lower glume greenish yellow or margins purplish; upper glume nerves anastomosing; second palea ovate-lanceolate, 2.3–2.5 mm long; anthers 1.6–2.1 mm long. — N Thailand, Johor, E Sumatra, W Java, Palawan . . . . . 8. *M. mollicoma*
7. Pedicel adnate to the joint. Pedicelled spikelets reduced to a small scale, 0.2–0.8 mm long. — Sessile spikelets 4–5.6 mm long, shorter than the joint . . . . . 8
7. Pedicel free from the joint (rarely more or less adnate in forms of *M. striata*, but there sessile spikelets 5.8–6.8 mm long, longer than the joint). Pedicelled spikelets varying from a single glume 0.8–more mm long to well-developed with 2 glumes and a bisexual floret . . . . . 9
8. Blade margins at base glabrous. Spikelets usually in triads, at least at the base of the rhachis (see note under the species). Lower glume of sessile spikelet 4–5-nerved. Anthers 1.7–3.5 mm long. Pedicelled spikelets 0.2–0.4 mm long. Culms 0.2–1.2 m long. Thailand, Java, Madura, Bali, Celebes . . . . . 7a. *M. laevis* var. *laevis*
8. Blade margins at base pectinate. Spikelets paired. Lower glume of sessile spikelet 7-nerved. Anthers 1.5–1.75 mm long. Pedicelled spikelets 0.6–0.8 mm long. Culms 0.2–0.5 m long. Thailand, Philippines, Buru . . . . . 7b. *M. laevis* var. *cochinchinensis*
9. Cataphylls and callus glabrous. — Cataphylls 6–9 mm wide. Joints 2–3.4 mm long. Lower glume smooth, lower part of keels without small appendages, greenish yellow to margins purple; first lemma epaleate; second palea ovate-oblong, 2.1–2.7 mm long. Anthers 1.2–1.7 mm long. Malesia: Philippines, Lesser Sunda Isl., New Guinea . . . . . 9. *M. rottboellioides*
9. Cataphylls puberulous or ciliate along the margin. Callus ciliolate to puberulous . . . . . 10
10. Lower glume in lower part of keels with small appendages. — Joints 2.7–5.5 mm long. Callus ciliolate to hairy; second palea ovate-oblong to ovate-lanceolate, 1.6–3.1 mm long . . . . . 11
10. Lower glume in lower part of keels without small appendages (rarely with some in *M. striata*). — Cataphylls 1.5–4 mm wide. First palea (when present) ovate-oblong . . 12
11. Cataphylls 4.5–6 mm wide. First lemma epaleate; second palea ovate-lanceolate to linear-lanceolate; second palea 2.1–3.1 mm long. Culms 0.6–1.9 m long, glabrous to pilose with scattered bulbous-based bristles. Cataphylls apex acute, acuminate, mucronate or rarely retuse. Sessile spikelets shorter to longer than the joint; lower glume glabrous to hairy, yellowish to greenish yellow with purplish margins; upper glume glabrous to ciliolate along the margin, 3–7-nerved, nerves anastomosing or not; lemmas ovate to ovate-oblong, glabrous to ciliolate along the margin, apex rounded to acute; second paleas glabrous to margin ciliolate. Pedicel glabrous to pubescent. Pedicelled spikelets reduced to a glume to well-developed with a bisexual floret, laterally to dorso-ventrally flattened, 0.8–1.9 mm long; lower glume glabrous to margins ciliolate. Widespread . . . . . 4. *M. glandulosa*
11. Cataphylls 2.5–3.8 mm wide. First lemma paleate; first palea ovate-oblong; second palea 1.6–2.2 mm long. Culms 0.4–0.8 m long, glabrous. Cataphylls apex acute. Sessile spikelets longer than the joint; lower glume glabrous to minutely puberulous, greenish yellow; upper glume ciliolate along the margin, 3–4-nerved, nerves not anastomosing; lemmas ovate-oblong, ciliolate along the margin, apex acute; paleas glabrous. Pedicel pubescent. Pedicelled spikelets virtually absent or reduced to 2 glumes, laterally flattened, up to 1 mm long; lower glume margins ciliolate. Thailand, Malay Peninsula . . . . . 6. *M. helferi*
12. Joints 4.2–5.4 mm long. Sessile spikelets first lemma epaleate. — Sessile spikelets yellowish; second palea ovate-oblong, 2.6–2.8 mm long. Malesia: Pahang, SE Kalimantan . . . . . 3. *M. geminata*
12. Joints 2.5–4 mm long. Sessile spikelets first lemma paleate. . . . . 13
13. Ligule 0.7–2.7 mm long, margin setose. Joints 3.2–4 mm long. Sessile spikelet upper glume 3.7–5 mm long, ciliolate along the margin. Anthers 1.3–1.5 mm long. Culms 0.4–0.8 m long. Sessile spikelets greenish yellow. Thailand, Malay Peninsula. . . . . 6. *M. helferi*
13. Ligule c. 0.5 mm long, margin ciliolate. Joints 2–2.5 mm long. Sessile spikelet upper glume c. 3 mm long, hairy along the keel. Anthers c. 1 mm long. Culms c. 0.25 m long. Thailand . . . . . 11. *M. thailandica*

**1. *Mnesithea cancellata*** (Ridl.) Ridl. — Fig. 1

*Mnesithea cancellata* (Ridl.) Ridl. (1925) 206. — *Rottboellia cancellata* Ridl. (1911b) 228. — *Rottboellia foveolata* Holttum (1947) 297, nom. superfl. — *Coelorachis foveolata* (Holttum) Jansen (1953) 256, nom superfl. — *Coelorachis cancellata* (Ridl.) Bor (1962) 168. — Type: *Ridley 15231* (holo SING; K, sh. no. 290024), see note.

[*Rottboellia striata* auct. non Nees: Balansa (1890) 110. — *Coelorachis striata* auct. non A.Camus: A.Camus (1922) 383, quoad *Balansa s.n.* — *Coelorachis clathrata* Henrard (1941) 519, t., nom. inval, sine Lat. — Voucher: *Balansa s.n.* ('holo' L, sh. no. 908.94-1206, -1207, -1208; P, sh. no. 953.347-274)].

Plants perennial. *Culms* 0.4–1.1 m long, glabrous to pilose. *Cataphylls* ovate to ovate-oblong, (3–)6–17(–27) by 0.8–3.5 mm, puberulous to pilose to ciliate along the margin, apex acute to acuminate. Nodes puberulous to setose. *Sheaths* glabrous to setose, margin pilose to ciliate. *Ligule* 0.2–1.5 mm long, margin setose. Contra-ligule absent. *Blades* flat to folded, (13–)27–37(–41) cm by 3–9 mm, margins at base glabrous to pectinate, glabrous to hairy on both sides or hairy below to glabrescent, glabrous to setose behind the ligule, smooth. *Peduncles* solitary or paired, glabrous to hairy. Spatheoles 5.5–16 cm long. Spikes 2.5–12 cm by 2–2.8 mm. *Spikelets* paired. Joints 4.5–5.8 mm long, glabrous, smooth. *Sessile spikelets* 4.3–5.8 mm long (incl. callus), shorter to longer than the joint. Callus glabrous. Lower glume convex, ovate to ovate-oblong, glabrous, apex rounded, winged or not, coriaceous, cancellate, greenish yellow, sometimes with purplish margins, 6–7-nerved, lower part at keel smooth; upper glume boat-shaped, ovate to ovate-oblong, 3.3–5.1 mm long, glabrous, margin infolded, apex acute, 3-nerved, nerves anastomosing or not. Lemmas ovate to ovate-oblong, 2.8–4.4 mm long, glabrous, apex acute; first lemma epaleate or paleate, 3.1–4.4 mm long, 3–4-nerved. Second lemma 3-nerved. Paleas 2–3-nerved, glabrous; first palea (when present) ovate-oblong, 0–3.2 mm long; second palea ovate-oblong to -lanceolate, 2.8–3 mm long. Anthers

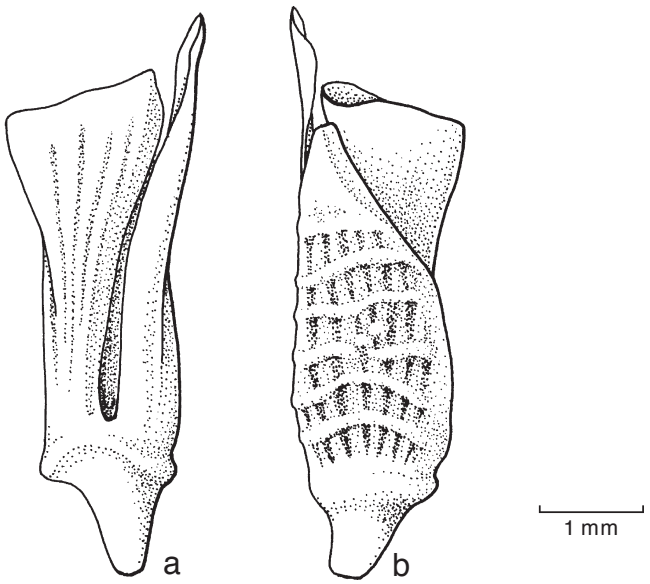


**Fig. 1** *Mnesithea cancellata* (Ridl.) Ridl. a. Joint and pedicel; b. sessile spikelet (all: *Larsen et al. 31830*, L).

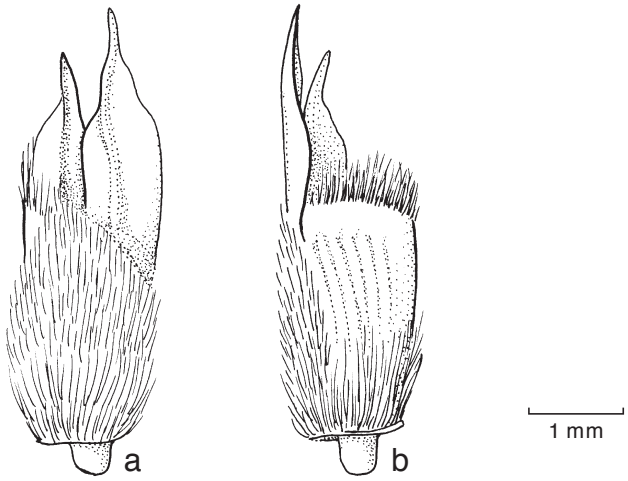


**Fig. 2** *Mnesithea formosa* (R.Br.) de Koning & Sosef. a. Sessile spikelet; b. joint and pedicel (all: *Pullen 6751*, L).

1.5–1.7 mm long. *Pedicel* free from the joint, 3.7–5.5 mm long, glabrous, smooth. *Pedicelled spikelets* reduced to 2 glumes, laterally flattened, 1.1–2.1 mm long. Lower glume apex obtuse to winged, chartaceous, glabrous to margins ciliolate. 2n = ?

Distribution — Thailand (NE: Loei; E: Chaiyaphum, Si Sa Ket; Peninsular: Satun Prov.), S Vietnam (Dalat, Kiên Giang, Nhatrang Prov.), Malesia: Bangka.

Habitat — Open grassy pine, dry dipterocarp, *Tectona* forests, on sand, roadsides, 120–1400 m altitude.

Notes — Distinct because of the glabrous callus, sessile spikelet 4.3–5.8 mm long (incl. callus), glabrous and cancellate lower glume and the 1.1–2.1 mm long pedicelled spikelets.

*Rottboellia cancellata* and derivatives were based on the collection in SING, while *R. foveolata* etc. was based on the isotype in K and thus the names are not strictly homotypic, but Art. 9 Note 2 makes them superfluous.

Differs from the Malesian / Thai congeners in: Culms 0.4–1.1 m long. Cataphylls puberulous, pilose, or ciliate along the margin. Sessile spikelet 4.3–5.79 mm long (incl. glabrous callus); lower glume of sessile spikelet glabrous, sculptured. Pedicelled spikelets 1.1–2.1 mm long.

Most similar is *M. glandulosa*:

1. Sessile spikelet callus glabrous. Lower glume of sessile spikelet glabrous, greenish yellow, margins purplish . . . . . *M. cancellata*
1. Sessile spikelet callus puberulous. Lower glume of sessile spikelet hairy, yellowish . . . . . *M. glandulosa*

### 2. *Mnesithea formosa* (R.Br.) de Koning & Sosef — Fig. 2

*Mnesithea formosa* (R.Br.) de Koning & Sosef in Veldkamp et al. (1986) 288. — *Rottboellia formosa* R.Br. (1810) 206. — *Manisuris formosa* (R.Br.) Kuntze (1891) 779. — [*Rottboellia formosa* var. *typica* Domin (1915) 261, nom. inval.]. — Type: *R. Brown 6157* (holo BM; photo BRI, K; K, MEL, NSW).

*Rottboellia formosa* R.Br. var. *pilosissima* Domin (1915) 261. — Type: *Domin II 1910* (holo PR; photo BRI; K, L, NSW), W Queensland, Cloncurry.

*Rottboellia formosa* R.Br. forma *subglabra* Domin (1915) 261. — Type: *Domin I 1910* (holo PR; photo BRI; K), Queensland, Townsville, Castle Hill.

Plants annual. *Culms* 0.4–0.8 m long, glabrous to pilose or with scattered bulbous-based bristles. *Cataphylls* absent. Nodes glabrous to setose. *Sheaths* hairy to setose, margin pilose to ciliate. *Ligule* 0.8–2 mm long, margin ciliolate to setose. Contra-ligule absent. *Blades* flat to folded, 7–18 cm by 2–4 mm, margins pectinate at base, hairy on both sides, setose behind the ligule, smooth. *Peduncles* solitary or paired, glabrous to hairy. Spatheoles 4–7 cm long. Spikes 2–4 cm by 1.8–3 mm. *Spikelets* paired. Joints 3.2–3.6 mm long, hairy all over. *Sessile spikelets* 3–3.2 mm long (incl. callus), shorter to about as long as the joint. Callus hairy. Lower glume convex, ovate to ovate-oblong, hairy, apex rounded, not winged, coriaceous, smooth, yellowish to greenish yellow, 9–11-nerved, lower part at keel smooth; upper glume concave, ovate to ovate-oblong, 2.8–3 mm long, glabrous to ciliolate along the infolded margin, 4–6-nerved, nerves anastomosing, apex acute. Lemmas ovate to ovate-oblong, 2.1–2.6 mm long, apex rounded, ciliolate along the margin; first lemma epaleate, 2.4–2.6 mm long, 3–4-nerved; second lemma 3-nerved. Second palea ovate-oblong, 1.8–2.1 mm long, 2–3-nerved, margin ciliolate. Anthers 1.2–1.4 mm long. *Pedicel* completely adnate to the joint. *Pedicelled spikelets* reduced to 2 glumes, laterally flattened, 3.6–5.4 mm long. Glumes chartaceous to coriaceous, margins ciliolate, base winged, apex caudate. 2n = ?

Distribution — Malesia: Lesser Sunda Isl. (Kissar, Wetar), New Guinea: Aru Isl., Papua New Guinea (Western, Central); Australia (Queensland, Northern Territory, W Australia).

Habitat — Eucalypt savannahs, dry grasslands, open forest edges, roadside in degraded mixed forest, red sand, clay soils, heavy brown soil, laterite, granite, up to 200 m altitude; a locally common inconspicuous grass of straggling habit.

Notes — For Queensland Domin (1915) distinguished between a var. *typica* with a forma *subglabra* and a var. *pilosissima* based on the density of the pubescence of the plant. This turned out to be a very variable feature and these taxa cannot be maintained.

Differs from the Malesian / Thai congeners by the unique silvery (rarely golden) setose indument of the sessile spikelet.

### 3. *Mnesithea geminata* (Hack.) Ridl. — Fig. 3

*Mnesithea geminata* (Hack.) Ridl. (1907) 163. — *Rottboellia geminata* Hack. (1891) 48. — [*Rottboellia corymbosa* L.f. subvar. *geminata* (Hack.) Roberty (1960) 65, comb. inval.]. — *Coelorachis geminata* (Hack.) Clayton (1981) 814. — Type: *Ridley 11* (holo W; K, SING, fragment in L).

Plants perennial. *Culms* 0.2–0.4 m long, glabrous to pilose or with scattered bulbous-based bristles. *Cataphylls* ovate to ovate-oblong, (1.5–)5–15(–56) by 1.5–4 mm, puberulous to ciliate along the margin, apex acute to acuminate or mucronate. Nodes setose. *Sheaths* hairy to setose, margin pilose

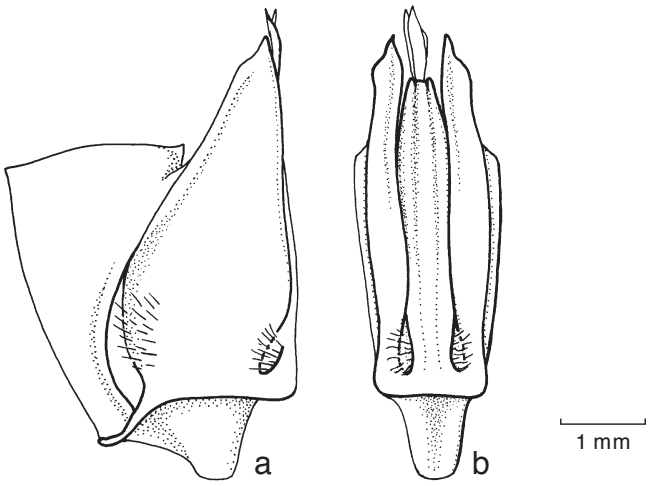


**Fig. 3** *Mnesithea geminata* (Hack.) Ridl. a. Sessile spikelet and joint; b. paired sessile spikelet and pedicel (all: *Ridley 11* (type), L).

to ciliate. *Ligule* 1–1.2 mm long, margin setose. Contra-ligule absent. *Blades* flat to folded, 8–22 cm by 2.5–10 mm, margins glabrous to pectinate at base, hairy to glabrescent on both sides, setose behind the ligule, smooth. *Peduncles* solitary, glabrous to hairy. Spatheoles 5–11 cm long. Spikes 2–3.5 by 1.8–3 mm. *Spikelets* in the lower part in triads, upwards paired. Joints 4.2–5.4 mm long, glabrous to hairy above. *Sessile spikelets* 4.8–5.4 mm long (incl. callus), about as long as to longer than the joint. Callus hairy. Lower glume convex, ovate-oblong, hairy to setose, smooth to cancellate, yellowish, 7-nerved, apex winged, lower part at keel smooth; upper glume boat-shaped, ovate-oblong, 3.6–3.9 mm long, 3–4-nerved, nerves not anastomosing, glabrous to ciliolate along the infolded margin, apex acute. Lemmas ovate-oblong, 2.8–3.4 mm long, coriaceous, glabrous to ciliolate along the margin, acute. First lemma epaleate, 2–3-nerved; second lemma 3-nerved. Second palea ovate-oblong, 2.6–2.8 mm long, 2-nerved, glabrous to margin ciliolate. Anthers 1.2–1.4 mm long. *Pedicel* free from the joint, 3.8–4.6 mm long, glabrous to pubescent, smooth. *Pedicelled spikelets* reduced to 2 glumes, laterally flattened, 0.8–1.6 mm long. Lower glume chartaceous, margins ciliolate to pubescent, apex winged. 2n = ?

Distribution — Malesia: Malay Peninsula (Pahang) and SE Kalimantan (*Motley 446*: Banjarmasin).

Habitat — Sandy soil at sea level, coconut groove.

Notes — The above account is based on four collections only, all in K: *Ridley 11*, the type, *Ridley 15229*, *Motley 446* and *SF 29882 (Corner)*. Gilliland (1971: 267) mentioned Thailand, but no specimens were seen.

The first two have joints with two sessile and one pedicelled spikelets (see plate 34a in Gilliland 1971). *Motley 446* from SE Kalimantan has some joints with four sessile and two pedicelled spikelets.

This distribution would seem to be one of the indicators of a drought pocket near Banjarmasin.

Differs from the Malesian / Thai congeners in: Culms 0.2–0.4 m long. Joints 4.2–5.4 mm long. Sessile spikelet callus puberulous; lower glume yellowish.

Most similar is *M. glandulosa*:

1. Culms 0.2–0.4 m long. Sessile spikelet callus puberulous, lower glume laterally without small appendages . . . . . *M. geminata*
1. Culms 0.6–1.9 m long. Sessile spikelet callus ciliolate, lower glume laterally with small appendages . . . . *M. glandulosa*

**4. *Mnesithea glandulosa*** (Trin.) de Koning & Sosef — Fig. 4

*Mnesithea glandulosa* (Trin.) de Koning & Sosef in Veldkamp et al. (1986) 290. — *Rottboellia glandulosa* Trin. (1832) 250. — *Manisuris glandulosa* (Trin.) Kuntze (1891) 780. — *Coelorachis glandulosa* (Trin.) Stapf ex Ridl. (1925) 204. — Type: *Anon. in Herb. Trinius 113.1* 'Java' (holo LE, microfiche IDC BT-16/1; ? L, fragm. ex Herb. Hackel, W).

[*Rottboellia muricata* Retz. [var. α] Buse (preprint Feb. 1854) 15; (Aug. 1854) 355]. — *Rottboellia muricata* Retz. var. *javanica* Buse ex Miq. (1857) 407. — Lectotype: *Junghuhn s.n.* (holo L, sh. 903.342-444), here designated.

*Rottboellia muricata* Retz. var. *bandanensis* Buse (1856) 102. — *Coelorachis glandulosa* Ridl. var. *bandanensis* (Buse) Henrard (1941) 517. — Type: *Reinwardt 171* (holo L) (see note).

[*Rottboellia mutica* Llanos (1858) 497, nomen; Fern.-Vill. (1880) 99, 108; corrected to *R. muricata* by Fern.-Vill. (1882) 314 (differently paged paper in same work) (see note)].

[*Coelorachis muricata* auct. non Brongn.: Brongn. (1831) 64, pro t. 14, descr.]. — [*Rottboellia cylindrica* (Michx.) Torr. var. *muricata* auct. non Roberty: Roberty (1960) 75, nom. inval.]. — Voucher: *Ventenat s.n.* (P). [Roberty's combination belongs to *Eremochloa muricata* (Retz.) Hack.].

*Rottboellia muricata* auct. non Retz.: Moritzi (1846) 99. — *Ophiuros muricatulus* Steud. ((June 1854) 57, nomen) (July 1854) 360. — [*Rottboellia rottboellioides* (R.Br.) Druce var. *muricata* Roberty (1960) 75, comb. inval.]. — Type: *Zollinger 352* (holo P; BM, K).

Plants perennial. *Culms* 0.6–1.9 m long, glabrous to pilose with scattered bulbous-based bristles. *Cataphylls* ovate-oblong, (2–)10–27(–48) by (1–)4.5–6(–10) mm, margin puberulous to ciliate, apex acute to acuminate or mucronate, rarely retuse. Nodes glabrous to setose. *Sheaths* glabrous to hairy, margin glabrous to ciliate. *Ligule* 0.6–5 mm long, glabrous or margin ciliolate to setose. Contra-ligule absent. *Blades* flat to folded, (4.5–)11–60(–110) cm by 4–24 mm, margins glabrous to pectinate at base, hairy on one or both sides, glabrescent to glabrous, glabrous to setose behind the ligule, smooth. *Peduncles* solitary or paired, glabrous. Spatheoles (2–)6.5–12.5(–18) cm long. Spikes (2–)5–9(–12) cm by 1.5–3.5 mm. *Spikelets* paired. Joints 2.7–5.5 mm long, glabrous to ciliolate at base, smooth. *Sessile spikelets* 3.8–5.5 mm long (incl. callus), shorter to longer than the joint. Callus ciliolate to hairy. Lower glume flat to convex, ovate-oblong, glabrous to hairy, coriaceous, smooth, yellowish or greenish yellow, sometimes with purplish margins, 6–9-nerved, apex winged, lower part of keels with small appendages; upper glume boat-shaped, ovate-oblong, 2.8–4.9 mm long, 3–7-nerved, nerves anastomosing or not, infolded margin glabrous or ciliolate, apex acute. Lemmas ovate to ovate-oblong, 2.5–3.9 mm long, glabrous to margin ciliolate, apex rounded to acute. First lemma epaleate or paleate, 2.5–3.7 mm long, 2–4-nerved; second lemma 3-nerved. Paleas 2-nerved, glabrous to margin ciliolate; first palea (when present) ovate-lanceolate to linear-lanceolate, 1.8–2.8 mm long; second palea ovate-oblong to ovate-lanceolate, 2.1–3.1 mm long. Anthers 1.2–2.1 mm long. *Pedicel* free from the joint, 3.3–5.5 mm long, glabrous to pubescent, smooth. *Pedicelled spikelets* reduced to 1 glume to well-developed with bisexual upper floret and dorso-ventrally flattened, (0.6–)0.8–1.9(–4.5) mm long. Lower glume chartaceous, glabrous to margins ciliolate, apex winged. Anthers 0.9–1.8 mm long. 2n = 54.

Distribution — Nicobars (Car), Burma (Prome), Thailand (N: Chiang Mai; C: Saraburi, Nakhon Nayok; SW: Kanchanaburi; SE: Prachin Buri; Peninsular: Nakhon si Thammarat, Songkhla), Cambodia (Kratie), S Vietnam (common, fide Schmid 1958: 194), Malesia: Malay Peninsula (widespread, but rare), Singapore, Sumatra (widespread), Mentawei Isl., P. Enggano, Bangka, Java (all over), Anambas Isl., Borneo (widespread), Celebes (widespread), Talaud, Philippines (see note; Antique, Balabac, Bohol, Busuanga, Cagayan de Sulu, Camiguin, Culion, Guimaras, Jolo, Luzon (Benguet: once *Elmer 5823*), Mindanao, Mindoro, Palawan, Panay, Siargao, Tawitawi), Lesser Sunda Isles (Flores, Sumbawa), Moluccas (Ambon, Bacan,

Banda, Ceram, Halmaheira, Nusa Laut), New Guinea: Aru, Waigeo. The record for Australia (e.g. Merrill 1921) probably is based on a Von Mueller collection cited as *R. muricata* by Bentham (1878), type of *R. ophiuroides* Benth. var. *commutata* Hack., a synonym of *R. rottboellioides*, q.v.

Habitat — Sunny, grassy places, fired grasslands, savannahs, disturbed forests, teak forests, along roads, railroads, rivers (? rheophyte), up to 1525 m altitude; locally common.

Ecology — Beumée (1927) reported the presence of myrmecochory.

Uses — Yields a considerable amount of leaf, but the old ones and the culms are very hard. According to analyses the nutritional value is also low.

Notes — *Rottboellia mutica* was mentioned in a list of names with various literature references, e.g. to Sprengel's Systema vegetabilium, but this one without any, suggesting that it was a new species. It is stated to grow in sugarcane fields. Fernandez-Villar (1882: 314) 'corrected' it to *Rottboellia muricata*, a name often misapplied to *Mnesithea glandulosa*. The 'true' *R. muricata* (*Eremochloa muricata* (Retz.) Hack.) does not occur in the Philippines, while *M. glandulosa* has not been reported for sugarcane fields (f. Backer 1928). The identity of *R. mutica* can therefore not be established.

Buse (1854) distinguished a form from Java with the pedicelled spikelets reduced to two glumes which was formally named var. *javanica* Buse by Miquel (1857), who cited besides the Junghuhn specimen referred to by Buse also *Zollinger (352)*, the type.

The var. *bandanensis* would be distinct by the presence of a stronger indument on the lower glume of the sessile spikelets. Similar hairy glumes were observed in *Jacobs 5645* (Brunei) (but also some nearly glabrous), *Alston 13411* (W Kalimantan), *SAN 33502* (Meijer) (Sabah), *Buwalda 6032* (Ceram) and *Van Royen 5558* (New Guinea, Vogelkop). In view of the fact that within the material there seems to be a more or less continuous cline from subglabrous to pubescent glumes, being sometimes variable within a single inflorescence (see *Jacobs 5645* mentioned above) and that such specimens occur within at least a considerable part of the range, it must be concluded that this variety should not be maintained.

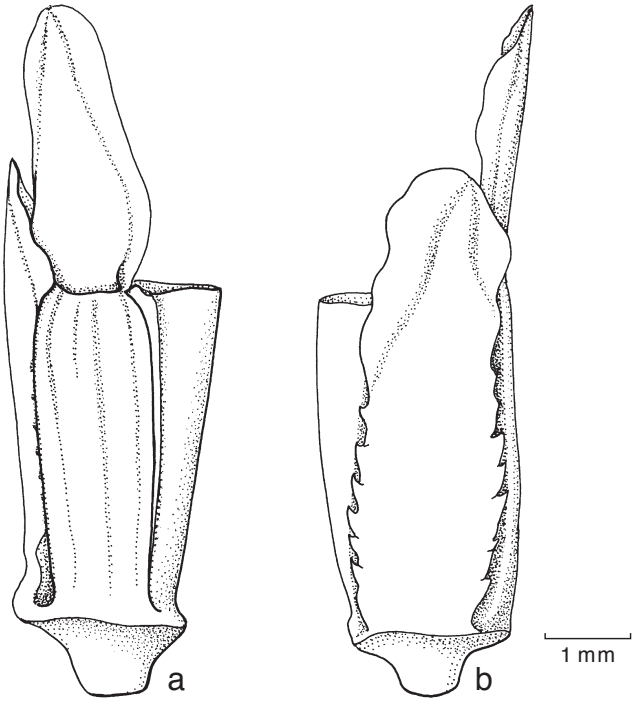


**Fig. 4** *Mnesithea glandulosa* (Trin.) de Koning & Sosef. a. Pedicelled spikelet; b. sessile spikelet (all: *Winckel 1392*, L).

Bulbous-based hairs occasionally occur, e.g. on the culms (*Backer 6858*, Java; *Bünnemeijer 6469*, Sumatra; *Endert 2101*, Borneo; *Hallier f. 649c*, Java; *Kostermans 21728*, Borneo; *Lörzing 13008*, Sumatra), or on the upper side of the blades (*Backer 5828*, *17108*, *18838*, Java).

*Backer 6858*, *Dorgelo 109*, *Koorders 42425* and *De Wit 4282* (Java) have blades pubescent on both sides.

*Van Steenis 7530* (Java) has a single joint with two sessile and one pedicelled spikelet. *Danser 6981* (Java), *Kato B-4431* (Borneo), *Kostermans 1141* (Thailand) and *Lütjeharms 5394* (Sumatra) have several joints with two sessile and two pedicelled spikelets. *De Wit 4217* (Java) has some joints alternatingly without any or with five (three sessile and two pedicelled) spikelets.

*Dorgelo 109*, *PNH 38767* (*Kondo & Edaño*) and *Reinwardt 171* have sessile spikelets without or with a minute first palea.

In the Philippines the species is restricted to the southern and central Philippines and has not been found in the north-east, except for a single collection from Benguet, Luzon.

The species is easily recognized by the small appendages along the edges of the lower glume of the sessile spikelet. These are also sometimes found in *M. helferi*, which otherwise differs only slightly. See the key.

Differs from the Malesian / Thai congeners by: Sessile spikelet 3.8–5.5 mm long (incl. ciliolate callus). Lower glume spikelet smooth, laterally with small appendages.

Most similar is *M. helferi* (see key).

### 5. *Mnesithea granularis* (L.) de Koning & Sosef — Fig. 5

*Mnesithea granularis* (L.) de Koning & Sosef in Veldkamp (1986) 295. — *Cenchrus granularis* L. (1771) 575. — *Manisuris granularis* Naezén (1779) 40, t. 1, f. 4–7; L. (1790) 40, t. 1, f. 1–7; Sw. (1788) 25, isonym. — *Tripsacum granulare* Raspail (1825) 306. — *Hackelochloa granularis* Kuntze (1891) 776. — [*Manularis granularis* R.Baron (1906) 838, sphalm. for *Manisuris*]. — *Rytilix granularis* Raf. ((1830) 219, comb. not made!)) ex Skeels (1913) 20. — *Rottboellia granularis* Roberty (1960) 79. — Type: *Herb. Linn, 1217-12* (LINN, microfiche IDC).

[*Gramen cyperoides polystachion*, *spicis ad nodos ex foliorum alis prodeuntibus* Sloane (1696) 36; (1707) 120, t. 80, nom. inval. — Voucher: the plate, specimen perhaps in Herb. Sloane, BM].

[*Rytilix glandulosa* Raf. (1830) 219, nomen, error for *granularis*?].

*Manisuris porifera* Hack. (1891) 48. — *Hackelochloa porifera* (Hack.) Rhind (1945) 77. — Type: *C.B. Clarke 9752-B* (holo W; K).

Plants annual. *Culms* 0.2–1 m long. *Cataphylls* absent. Nodes glabrous, puberulous, or setose. *Sheaths* hairy to setose, margin pilose to ciliate. *Ligule* 0.6–2 mm long, margin ciliolate. Contra-ligule absent. *Blades* flat, 2.5–31 cm by 2.5–12 mm, margins pectinate at base, hairy on both sides, glabrous behind the ligule, smooth. *Peduncles* solitary or paired, glabrous to hairy. Spatheoles 1–3 cm long. Spikes 0.6–3.6 cm by 1.5–2.8 mm. *Spikelets* paired. Joints 1.4–2.6 mm long, glabrous, smooth. *Sessile spikelets* 1.5–2.6 mm long (incl. callus), about as long as to longer than the joint. Callus glabrous. Lower glume convex, suborbicular, glabrous, coriaceous, pusticulate, yellowish to greenish yellow, 5–6-nerved, apex rounded, not winged; upper glume concave, ovate-oblong, 1.4–1.8 mm long, glabrous, nerves 3, not anastomosing, margin infolded, apex acute. Lemmas ovate to ovate-oblong, glabrous, apex acute; first lemma epaleate, 1.4–1.7 mm long, 2–3-nerved; second lemma 2-nerved. Paleas 2-nerved, glabrous; second palea ovate-oblong to ovate-lanceolate, 0.8–1.1 mm long. Anthers 0.4–0.9 mm long. *Pedicel* adnate to the joint, 1.6–2.4 mm long, glabrous. *Pedicelled spikelets* varying from 2 glumes to well-developed with a bisexual floret, laterally to dorso-ventrally

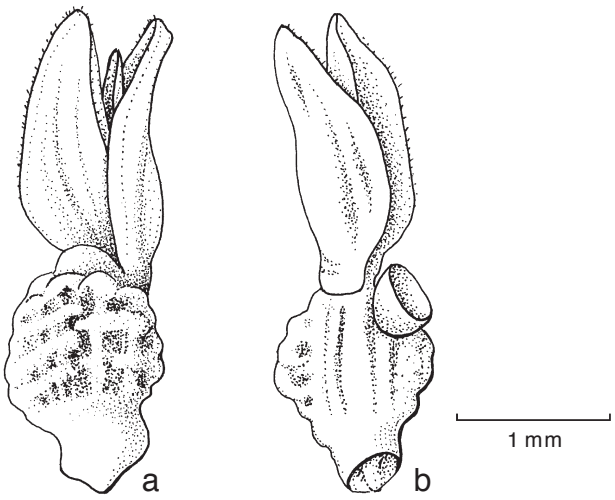


**Fig. 5** *Mnesithea granularis* (L.) de Koning & Sosef. a. Sessile and pedicelled spikelets; b. joint and pedicelled spikelet (all: *Verboom 37*, L).

flattened, 2.2–4 mm long. Lower glume chartaceous, margins ciliolate, apex winged. Anthers 1.4–1.7 mm long. 2n = 14.

Distribution — Sikkim, Bhutan, India, Sri Lanka to N Vietnam, not yet seen from Cambodia, Laos; Thailand (N: Chiang Mai, Chiang Rai, Lampang, Lamphun, Mae Hong Son; NE: Loei, Nong Khai; SE: Chon Buri), China (Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Yunnan, Zhejiang), Taiwan; Malesia: Sumatra (widespread), Malay Peninsula (Pahang, once), Singapore (once), Java (all over), Borneo (Sabah, W-, SE Kalimantan), Celebes (Buton, Kendari, Masamba, Muna, Palu, Tondano, Tukang Besi), Philippines (Cebu, Guimaras, Luzon, Mindanao, Mindoro, Negros Oriental), Lesser Sunda Isl. (Alor, Bali, Flores, Sumba, Sumbawa, Timor, Wetar), Moluccas (Ambon, Buru, Tanimbar, Ternate), New Guinea (Irian Jaya: Jayapura, Vogelkop; Papua New Guinea: Central, Milne Bay, Morobe, New Ireland, E. Highland Prov.).

Habitat — In open place at mountain ridge, open and fire-induced grassland, weed on sandy soil, near the road side, partly shaded areas among bamboo, somewhat disturbed place in the deciduous dipterocarp oak forest, common in evergreen forest, swampy ground, granite bedrock, 0–1450 m altitude.

Notes — Easily recognized by the small, subglobose, pusticulate sessile spikelets, and therefore also generally regarded as representing the distinct genus *Hackelochloa*, see Veldkamp et al. (1986: 294–295).

Noltie (2000) regarded *H. porifera* as distinct from *H. granularis*:

1. Lower glume of sessile spikelet to 1.7 mm, shallowly pitted, ribs between pits broad, rounded. Stipe inconspicuous, under 0.5 mm, much narrower than upper part. Racemes to 12.5 mm long . . . . . *H. granularis*
1. Lower glume of sessile spikelet over 2 mm, deeply pitted, ribs between pits narrow, sharp. Stipe conspicuous, c. 0.7 mm, almost as broad as upper part, smooth. Racemes over 20 mm long . . . . . *H. porifera*

However, when viewed over the whole range these characters appear to break down (Veldkamp et al. 1986: 294).

Differs from all congeners by the suborbicular, cancellate lower glume of the 1.5–2.6 mm long sessile spikelet and the 2.2–4 mm long pedicelled spikelet.

### 6. *Mnesithea helferi* (Hook.f.) de Koning & Sosef — Fig. 6

*Mnesithea helferi* (Hook.f.) de Koning & Sosef in Veldkamp et al. (1986) 291. — *Rottboellia helferi* Hook.f. (1896) 158. — *Coelorachis helferi* (Hook.f.) Henrard (1941) 518. — [*Rottboellia corymbosa* L.f. subvar. *helferi* (Hook.f.) Roberty (1960) 65, comb. inval.]. — Type: *Helfer 913* (holo K).

*Mnesithea rupincola* Ridl. (1911a) 116. — [*Rottboellia corymbosa* L.f. subvar. *rupincola* (Ridl.) Roberty (1960) 65, comb. inval.]. — Type: *Ridley 14351* (holo SING; BM, K). Roberty erroneously cited *Ridley 372* as the type.

Plants perennial. *Culms* 0.4–0.8 m long, glabrous. *Cataphylls* ovate-oblong, (2.5–)11–26(–35) by (1.5–)2.5–3.8(–5.2) mm, puberulous to ciliate along the margins, apex acute. Nodes puberulous to setose. *Sheaths* sparsely hairy to hairy, margin pilose to ciliate. *Ligule* 0.7–2.7 mm long, margin setose. Contraligule absent. *Blades* flat to folded, (14–)22–36(–48) cm by 5–13 mm, margins pectinate at base, glabrous to hairy on both sides or glabrescent, glabrous to setose behind the ligule, smooth. *Peduncles* solitary or paired, glabrous. Spatheoles 5.5–14 cm long. Spikes (3–)5.5–7.5(–10) cm by 1.5–3 mm. *Spikelets* paired, rarely in triads (see note). Joints 3.2–4 mm long, ciliolate to hairy at base. *Sessile spikelets* 4.8–5.5 mm long (incl. callus), longer than the joint. Callus ciliolate. Lower glume flat to convex, ovate-oblong, glabrous or minutely puberulous, chartaceous to coriaceous, smooth, greenish yellow, 5–7-nerved, lower part with or without small appendages, apex winged; upper glume boat-shaped, ovate-oblong, 3.7–5 mm long, 3–4-nerved, nerves not anastomosing, ciliolate along the infolded margin, apex acute. Lemmas ovate-oblong, 2.8–3.6 mm long, ciliolate along the margin, apex acute; first lemma paleate, 3.2–3.6 mm long, 3-nerved; second lemma 3-nerved. Paleas 2-nerved, glabrous; first palea ovate-oblong, 2.2–2.7 mm long; second palea ovate-lanceolate, 1.6–2.2 mm long. Anthers 1.3–1.5 mm long. *Pedicel* free from the joint, 3–4.8 mm long, pubescent. *Pedicelled spikelets* from virtually absent to 1 mm long and reduced to 2 glumes, laterally flattened. Lower glume chartaceous, margins ciliolate, apex winged.

Distribution — Burma (Tenasserim), Thailand (NE: Nong Khai; SE: Chanthaburi; C: Saraburi), Cambodia (Kratie), S Vietnam (Biên Hoa), Malesia: Malay Peninsula (Kedah, Penang, Perak).

Habitat — Rocks in river, shaded more or less dense evergreen forest, c. 150 m altitude.

Notes — The differences with *M. glandulosa* are but slight (see key). Future research will have to show whether two taxa can be maintained.

*Nguyen Van Khiem 148* (L), Vietnam (Biên Hoa), may represent the form mentioned by Schmid (1958: 191) as *Rottboellia 5*. It has joints with two sessile and one pedicelled spikelets as are also present in the type *Helfer 913*. *Poilane 19 Jul 1932* (L, P) also from Biên Hoa, was ‘normal’.

Differs from the Malesian / Thai congeners in: Culms 0.4–0.8 m long. Sessile spikelet 4.8–5.5 mm long (incl. ciliolate callus).

Most similar is *M. glandulosa* (see key).

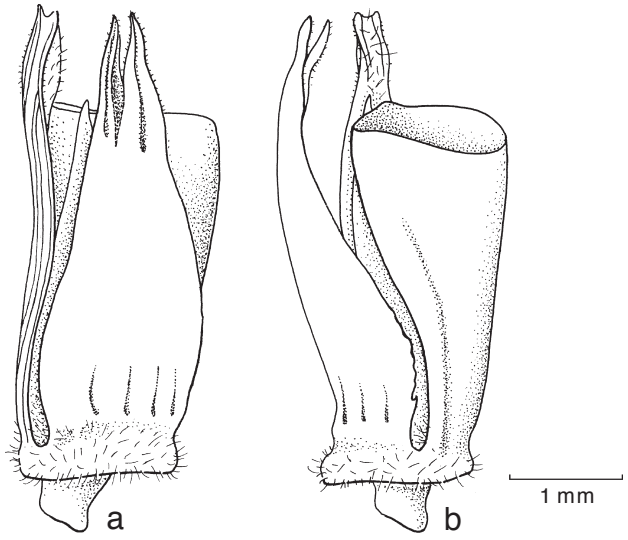


**Fig. 6** *Mnesithea helferi* (Hook.f.) de Koning & Sosef. a. Sessile spikelet; b. sessile spikelet and joint (all: *Maxwell 74-586*, L).

### 7. *Mnesithea laevis* (Retz.) Kunth

For the synonymy see under the varieties.

Plants perennial. *Culms* 0.2–1.2 m long. *Cataphylls* ovate to ovate-oblong, 2–15 by 0.6–2.5 mm, glabrous, apex acute. Nodes glabrous to setose. *Sheaths* glabrous to sparsely hairy, margin glabrous to pilose. *Ligule* 0.2–1.8 mm long, margin setose. Contra-ligule absent. *Blades* flat to folded, 9–35 cm by 0.6–4.8 mm, margins at base glabrous or pectinate, glabrous to hairy above, glabrous to setose behind the ligule, smooth. *Peduncles* 1–4 together, glabrous to hairy. Spatheoles 3.5–6.5 cm long, blade present. Spikes 2.5–10 cm by 1.5–3 mm. *Spikelets* in pairs or triads. Joints 4.4–6.5 mm long, glabrous, smooth. *Sessile spikelets*: spikelet 4–5.6 mm long (incl. the glabrous callus), shorter than the joint; lower glume flat to convex, ovate-oblong, glabrous, coriaceous, smooth, laterally without small appendages or sculptured, with longitudinal lines of minute dots, greenish yellow, 4–7-nerved, apex rounded, winged or not; upper glume boat-shaped to concave, ovate-oblong, 3.9–5.1 mm long, glabrous, 2–4-nerved, nerves not anastomosing, margin infolded, apex obtuse to acute; lemmas ovate-oblong, glabrous, apex rounded to acute; first lemma epaleate, 3.8–4.2 mm long, 3–4-nerved; second lemma 2–3-nerved; paleas 2–3-nerved, glabrous; second palea ovate-oblong to ovate-lanceolate, 2.7–3.6 mm long; anthers 1.6–2.5 mm long. *Pedicel* adnate to the joint, 4.4–5.8 mm long, glabrous. *Pedicelled spikelets* reduced to 1 small scale, laterally flattened, 0.2–0.8 mm long.

#### a. var. *laevis* — Fig. 7

*Mnesithea laevis* (Retz.) Kunth (1829) 154. — *Rottboellia laevis* Retz. (1783) 11. — [*Thyridostachyum laeve* (Retz.) Nees ex Steud. (1841) 474, 685, nom. inval.]. — *Ophiuros laevis* (Retz.) Benth. (1881) 69. — [*Rottboellia corymbosa* L.f. subvar. *laevis* (Retz.) Roberty (1960) 65 ('var.'), 68, comb. inval.]. — Type: *Koenig s.n.* (holo LD; fragm. K).

*Rottboellia perforata* Roxb. (1798) 43, t. 182. — *Hemarthria perforata* (Roxb.) Kunth (1829) 153. — *Ophiuros perforatus* (Roxb.) Trin. (1824) 19, t. 1, f. 2, 3; (1832) 246. — *Mnesithea perforata* (Roxb.) Haines (1924) 1060, nom. superfl. — Type: *Herb. Roxburgh s.n.* (holo BM; Icon. Ined. 862, CAL, K ≡ Roxb. (1798) t. 182; *Wallich 8873-A*, K (microfiche IDC 7394)).

*Diperium cylindricum* Desv. (1831a) 180, t. 9, f. 3; (1831b) 76, t. 8, f. 3. — Type: *Herb. Desvaux* (holo P; perhaps in ANG, FI, G, M, PC).

*Mnesithea laevis* (Retz.) Kunth var. *hirta* Jansen (1953) 308. — Type: *Eyma 361* (holo BO; L).

*Heteropholis cochinchinensis* auct. non Clayton var. *cochinchinensis*.

*Culms* 0.2–1.2 m long. *Cataphylls* ovate to ovate-oblong, 2–15 by 1.3–3 mm. Nodes glabrous to setose. *Sheaths* glabrous to sparsely hairy, margin glabrous to pilose. *Ligule* 0.2–1.8 mm long. *Blades* 11–35 cm by 1–4.5 mm, margins at base glabrous, glabrous to hairy above, glabrous to setose behind the ligule. *Peduncles* glabrous to hairy. Spatheoles 4.5–6.5 cm long. Spikes 2.5–10 cm by 1.5–3 mm. *Spikelets* usually in triads or paired (upwards, in depauperate specimens only the most basal group a triad, or, very rarely, all paired). Joints 4.4–6.5 mm long. Sessile spikelet 4–5.6 mm long (incl. callus); lower glumes flat to convex, smooth, greenish yellow, 4–5-nerved, apex rounded, winged or not; upper glume of boat-shaped to concave, 3.9–5.1 mm long, 2–3-nerved, apex obtuse to acute; first lemma 3.8–4.2 mm long, 3–4-nerved; paleas 2-nerved; second palea ovate-oblong to ovate-lanceolate, 2.9–3.6 mm long. Anthers 1.8–2.5 mm long. *Pedicel* 4.4–5.8 mm long. *Pedicelled spikelets* 0.2–0.4 mm long. 2n = 18.

Distribution — Pakistan to Sri Lanka, Burma, Thailand (N: Chiang Mai, Sukhothai, Nakhon Sawan, Kamphaeng Phet; E: Chaiyaphum, Nakhon Ratchasima, Buri Ram; SE: Chon Buri, Kanchanaburi; Peninsular: Songkhla), Laos (Champasak, Saravan), Malesia: Java (Ceribon, Surabaya, Besuki), Madura, Celebes (Rapang), Bali. The variety has been recorded for Laos, Cambodia and S Vietnam, but material from these countries as far as we have seen it all belonged to var. *cochinchinensis*. The genus was not recorded for Afghanistan by Bor (1970) although it is a country cited for this species and where it possibly may occur.

Habitat — On rather open grassy slope, dry savannah forest, sunny places, in a dipterocarp-savannah area, along the road, stony soil, up to 1500 m altitude.

Ecology — Beumée (1927: 419) reported the presence of myrmecochory.

Uses — Readily eaten by cattle, at least when young. Little valued by the Javanese because of its relative little yield of rather tough leaves mixed with tough culms. Analyses showed a very little nutritional value with an excess of fibre (Backer 1950: 177, sub *M. laevis*).

Notes — The species is distinct by the smooth, unappendaged lower glume of the sessile spikelets, the adnate pedicel, and the much reduced, small pedicelled spikelets.

Jansen (1953) described a var. *hirta* on a Celebes collection which notably differed from the generally glabrous Java material by its rather dense bulbous-based bristly indument of the blades and peduncles. Specimens variable in this feature have been seen from Sri Lanka (*Clayton 5845*, *Davidse 7598*, *Lazarides 7262*), while others from Thailand (*Van Beusekom & Phengkhlai 1192*, *Maxwell 75-433*) were intermediary. It therefore seems to us that a taxonomic distinction for such hairy specimens cannot be maintained.

According to the general literature *M. laevis* would have spikelets in triads. In fact this is not always so. Within the same spike both triads and paired spikelets occur, with a general tendency for the triads to be present at its base and the pairs more upwards. Sometimes the most basal spikelets are paired, followed by triads, and distally again paired. This basal grouplet usually persists after the spike has broken up, and, when consisting of paired spikelets, may cause confusion in identification. In poorly developed specimens the triads may be very few to even totally absent (cf. *Kievits 1543*, see the discussion by Veldkamp et al. (1986) 284). The distinction against the var. *cochinchinensis* then becomes very difficult. The var. *laevis* seems to be distinct by being more robust (60–170 cm tall against up to 50 cm in var. *cochinchinensis*), while it grows in less disturbed places.

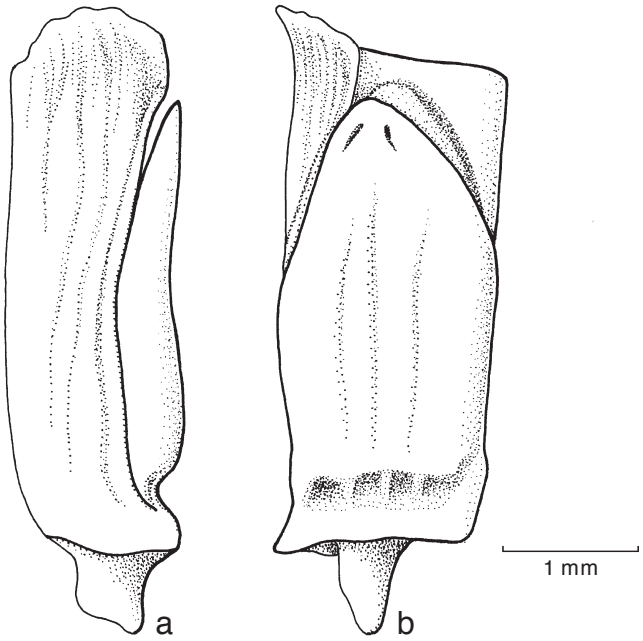


**Fig. 7** *Mnesithea laevis* (Retz.) Kunth var. *laevis*. a. Sessile spikelets and pedicelled one; b. joint (all: *Backer 20193*, L).

The general distribution is also different (see map in Veldkamp et al. 1986: 285).

In *Van Steenis 6648* and *7532* from Ceribon the terminal joints have one sessile and two pedicelled spikelets, the more 'normal' type of triad often found in the *Andropogoneae*. The first collection, moreover, has doubly pedicelled spikelets, i.e. there is an additional internode between the pedicel and the spikelet, which then reaches to 0.5–0.67th of the next higher joint fitting into a shallow excavation there.

Differs from the Malesian / Thai congeners in: Culms 0.2–1.2 m long. Sheaths glabrous to sparsely hairy. Blades margins at base glabrous. Pedicelled spikelets reduced to 1 small scale, 0.2–0.4 mm long.

Most similar is var. *cochinchinensis* (see key).

**b.** var. ***cochinchinensis*** (Lour.) de Koning & Sosef — Fig. 8

*Mnesithea laevis* (Retz.) Kunth var. *cochinchinensis* (Lour.) de Koning & Sosef in Veldkamp et al. (20 June 1986) 286; C.E.Hubb. ex Santos (no date 1986) 94, isonym inval., sine basion. — *Phleum cochinchinense* Lour. (1790) 48. — [*Rottboellia corymbosa* L.f. subvar. *cochinchinensis* (Lour.) Roberty (1960) 65, comb. inval.]. — *Heteropholis cochinchinensis* (Lour.) Clayton (1981) 816. — Type: *Loureiro s.n.* (holo BM).

*Ophiuros monostachyus* J.Presl (1830) 330. — *Rottboellia monostachya* Schmid (1958) 193, nom. inval. — Type: *Haenke s.n.* (holo PR; *Herb. Trinius 133.1*, microfiche IDC BT-16/1).

*Ophiurus undatus* Nees (1850) 100; Steud. (1854) 360 ('*undulatus*'). — Type: *Cuming 1339* (holo CGE; BM, GOET, K, L, P, W).

*Culms* 0.2–0.5 m long. *Cataphylls* ovate-oblong, 3–9 by 0.6–2.5 mm. Nodes glabrous. *Sheaths* glabrous, margin glabrous. *Ligule* 0.2–0.8 mm long. *Blades* 9–22 cm by 0.6–4.8 mm, margins at base pectinate, glabrous behind the ligule. *Peduncles* glabrous. Spatheoles 3.5–5.5 cm long. Spikes 4.5–8.5 cm by 1.8–2.2 mm wide. *Spikelets* in triads. Joints 5.2–5.4 mm long. Sessile spikelet 4.8–5.1 mm long (incl. callus); lower glumes convex, smooth, smooth or with longitudinal lines of minute dots, greenish yellow, 7-nerved, apex winged; upper glume boat-shaped, 4.2 mm long, 3–4-nerved, apex acute; first lemma 3.9–4.2 mm long, 4-nerved; paleas 2–3-nerved; second palea ovate-oblong, 2.7–3.6 mm long. Anthers 1.6–2.2 mm long. *Pedicel* 5–5.4 mm long. *Pedicelled spikelets* 0.6–0.8 mm long. 2n = 36.

Distribution — Thailand (N: Sukhotai, Nakhon Sawan; SW: Ratchaburi), Laos (Saravan), Cambodia (Kratie), Vietnam, S China (Fujian, Guangdong, Guangxi, Hainan), Taiwan, Ryu Kyu Isl., Pacific (Carolines (Palau, Jap), Marianas), Malesia: Philippines (Luzon, Mindanao), Buru.

Habitat — Savannahs, disturbed places, e.g. roadsides, bunds of rice fields, grass fields, 20–600 m altitude.

Notes — The records for India and Java cited and depicted by De Koning et al. (1983) refer to var. *laevis* (Veldkamp et al. 1986).

Differs from the Malesian / Thai congeners in: Nodes glabrous. Margins of the blades at base pectinate. Lower glume of sessile spikelet 7-nerved. Pedicelled spikelets reduced to 1 small scale.

Most similar is var. *laevis* (see key).

**8. *Mnesithea mollicoma*** (Hance) A.Camus — Fig. 9

*Mnesithea mollicoma* (Hance) A.Camus (1919) 57. — *Rottboellia mollicoma* Hance (1871) 134. — *Manisuris mollicoma* (Hance) Kuntze (1891) 780. — [*Rottboellia corymbosa* L.f. subvar. *mollicoma* (Hance) Roberty (1960) 65, comb. inval.]. — *Coelorachis mollicoma* (Hance) Bor (1962) 169. — Lectotype: *Hance 7558* (holo G; K, fragm. L, W), designated by Roberty (1960: 66) (see note).

*Mnesithea pubescens* Ridl. (1905) 207. — Type: *Ridley 11017* (holo K).

*Rottboellia triflora* F.T.Hubb. (1914) 257. — *Mnesithea triflora* (F.T.Hubb.) Jansen (1953) 309. — [*Manisuris triflora* (F.T.Hubb.) Chase & Niles (1962) 230, comb. inval. (see note)]. — Type: *Ledesma s.n.* (holo BH; A, US, W).

?*Rottboellia sp. 4:* Schmid (1958) 193.

Plants perennial. *Culms* 0.4–0.9 m long, pilose with scattered bulbous-based bristles. *Cataphylls* ovate to ovate-oblong, (4–)14–24(–32) by 2.5–5.5 mm, puberulous to pilose, apex acute to acuminate or mucronate. Nodes setose. *Sheaths* setose, margin pilose to ciliate. *Ligule* 1–3 mm long, margin setose. Contra-ligule absent. *Blades* flat, (9–)26–35(–47) cm by 6–12 mm, margins pectinate at base, hairy on both sides, setose behind the ligule, smooth. *Peduncles* solitary or paired, hairy. Spatheoles 8–16 cm long. Spikes 3.5–8 cm by 1.8–2.5 mm. *Spikelets* in the lower part with triads or all paired. Joints 3.6–5.2 mm long, glabrous to ciliolate at base, smooth. *Sessile spikelets* 4.4–6.2 mm long (incl. callus), longer than the joint. Callus hairy. Lower glume convex, ovate-oblong, hairy, coriaceous, cancellate, greenish yellow, sometimes with purplish margins, 6–7-nerved, lower part at keel smooth, apex winged; upper glume boat-shaped to concave, ovate-oblong, 3.3–5 mm long, 4–5-nerved, nerves anastomosing or not, ciliolate along the infolded margin, apex acute. Lemmas ovate-oblong, 2.8–4.1 mm long, glabrous to ciliolate along the margin, acute. First lemma epaleate or paleate, 2.5–3.8 mm long, 3–4-nerved; second lemma 3-nerved. Paleas 2-nerved, margin ciliolate; first palea ovate-lanceolate, 2.3–2.7 mm long; second palea ovate-lanceolate, 2.3–2.5 mm long. Anthers 1.6–2.1 mm long.

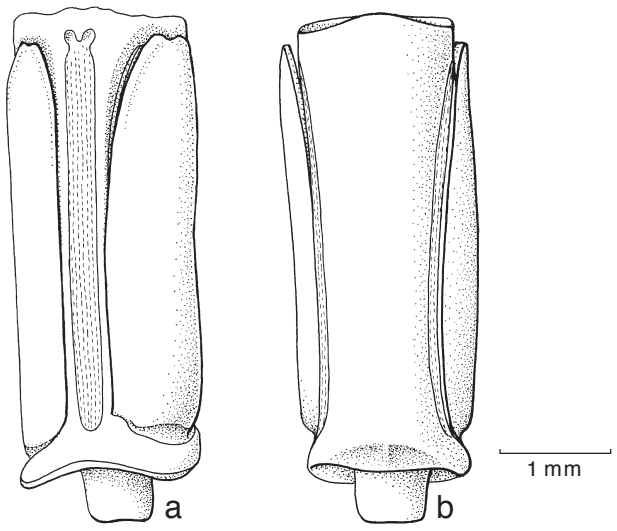


**Fig. 8** *Mnesithea laevis* (Retz.) Kunth var. *cochinchinensis* (Lour.) de Koning & Sosef. a. Joint; b. sessile spikelet (all: *Kneucker 789* (*Merrill & Robinson*), L).

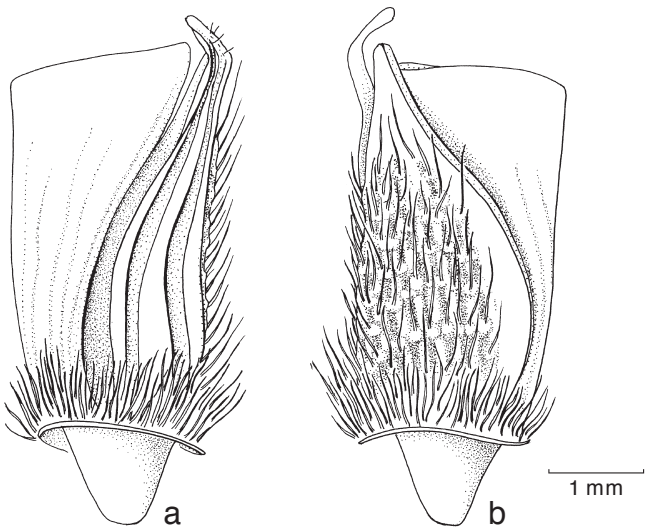


**Fig. 9** *Mnesithea mollicoma* (Hance) A.Camus. a. Joint and pedicel; b. sessile spikelet (all: *Shimizu et al. T. 10473*, L).

*Pedicel* free from the joint, 4.2–6.4 mm long, glabrous, smooth. *Pedicelled spikelets* reduced to 2 glumes, laterally flattened, 0.6–0.9 mm long. Lower glume chartaceous, glabrous to margin ciliolate, apex winged. 2n = 18.

Distribution — Vietnam (widespread, fide Schmid 1958: 194), Thailand (N: Chiang Mai; E: Chaiyaphum; SE: Chanthanaburi) to S China (Guangdong, Guangxi, Hainan); Malesia: Malay Peninsula (Johor), ? Singapore (*Wallich 8876*, but never found there again), Sumatra (E Coast, fide Jansen 1953), Java (Priangan, Cianjur, see note), Palawan.

Habitat — Partly shaded, disturbed and overgrown places, sunny, dry places, in hedges and thickets, light deciduous (oak-dipterocarp) forest, along roads, granite bedrock, 400–1200 m altitude ('low altitudes' in Palawan).

Ecology — Beumée (1927: 419) reported the presence of myrmecochory (sub *M. pubescens*).

Uses — Backer (1950: 176, sub *M. pubescens*) noted that a large amount of soft leaf was produced which was well-liked by cattle. Analyses showed a very satisfactory nutrition value. The yield was much lower than that of *Panicum maximum* Jacq., however, and did not increase after manuring.

Notes — The type of *Rottboellia mollicoma* is represented in K by two sheets. One has no original label, but is annotated '1862' and bears a note by C.B. Clarke "This is the type". Hance said he had collected the species first in October 1861. The other sheet has an original label which bears the date August 1869. Roberty with an exclamation mark following Clarke's selection designated the G duplicate as the lectotype ('type'). However, if a specimen with the date October 1861 does exist that should take precedence as the lectotype.

*Mnesithea mollicoma* differs mainly from *M. cancellata* by the pubescence of the spikelet and the shorter pedicelled spikelets.

*Msesithea mollicoma* is usually densely hairy, but some exceptions were observed:

*Backer s.n.* (1918) from Java has the lower glumes of the sessile spikelets almost glabrous to nearly so with hardly excurrent nerves. This is the only specimen seen from Java. Beumée (1927) and Backer (1950) have suggested that it was imported, e.g. with rubber seeds from Malaya; in 1918 it had locally become quite common in Imperata-fields. More recent collections are lacking.

*Ledesma s.n.*, the type of *Rottboellia triflora*, has nearly glabrous culms and blades, but the nodes are hairy. The upper glume is flatter than usually seen, slightly keeled with ciliolate margins. The dimensions of the width of the blade, the length of the glumes, lemmas, paleas are all rather small. This form seems to be linked to the more 'normal' representatives of *M. mollicoma* by *Smitinand 1827* from Thailand which has nearly glabrous culms, nodes and blades. Moreover, the leaves of this collection are exceptionally narrow (4–7 mm) and the plant is only 40 cm tall. Because of this transitional form, albeit with quite a different provenance, *Rottboellia triflora* has been included in this species. More material from Palawan is required to see how variable that population is and whether or not it should have a separate status after all.

Chase & Niles (1962) is an off-set of a card system prepared at the Smithsonian Institution, Washington (D.C.). Although there is no disclaimer in the introduction, one should regard any new combination or lectotypification made there as not having been validly published (Art. 34.1.a), being personal notes and not officially published in subsequent publications. See also Ramella et al. (2011).

Differs from the Malesian / Thai congeners in: Sheaths setose. Sessile spikelet callus puberulous; lower glume cancellate, hairy.

Most similar is *M. glandulosa*:

1. Sheaths glabrous to hairy. Peduncles glabrous. Sessile spikelet callus ciliolate; lower glume smooth, laterally with small appendages . . . . . *M. glandulosa*
1. Sheaths setose. Peduncles hairy. Sessile spikelet callus puberulous; lower glume cancellate . . . . . *M. mollicoma*

**9. *Mnesithea rottboellioides*** (R.Br.) de Koning & Sosef — Fig. 10

*Mnesithea rottboellioides* (R.Br.) de Koning & Sosef in Veldkamp et al. (1986) 291. — *Ischaemum rottboellioides* R.Br. (1810) 205. — *Andropogon rottboellioides* (R.Br.) R.Br. ex Steud. (1854) 382. — *Rottboellia ophiuroides* Benth. (1878) 514, nom. superfl.; Hack. (1889) 303 (incl. var. *genuina* Hack., nom. inval.). — *Manisuris rottboellioides* (R.Br.) Kuntze (1891) 779. — *Rottboellia rottboellioides* (R.Br.) Druce (1917) 644; Reeder (1948) 354, isonym. — *Coelorachis rottboellioides* (R.Br.) A.Camus (1921) 197. — Type: *R. Brown 6156* (holo BM (photo BRI); CANB (?), MEL (photo BRI), NSW (photo BRI)).

*Rottboellia ophiuroides* Benth. var. *commutata* Hack. (1889) 304. — *Coelorachis rottboellioides* (R.Br.) A.Camus var. *commutata* (Hack.) Henrard (1941) 519. — Type: *F. v. Mueller s.n.* (holo W, fragm. & photo in BRI; photo K, MELB; iso BRI).

*Rottboellia ophiuroides* Benth. var. *vestita* Domin (1915) 261. — Type: *Domin I 1910* (holo PR, photo BRI), Queensland, Yarraba, savannah forests.

*Rottboellia ophiuroides* Benth. var. *intermedia* Hack. (1906) 265. — *Coelorachis rottboellioides* (R.Br.) A.Camus var. *intermedia* (Hack.) Jansen (1953) 255. — Lectotype: *Elmer 6393* (BO, K, PNH lost, W), designated here.

*Coelorachis rottboellioides* (R.Br.) A.Camus var. *hirsuta* Jansen (1953) 255. — Lectotype: *Carr 11134* (holo L), here designated.

Plants perennial. *Culms* (0.6–)1.6–2.5(–3) m long, glabrous. *Cataphylls* ovate-oblong, (2–)18–26(–48) mm by (1.5–)6–9(–16) mm, glabrous, apex acuminate to mucronate. Nodes glabrous. *Sheaths* glabrous to hairy, margin glabrous to ciliate. *Ligule* 1.5–5 mm long, glabrous or margin ciliolate to setose. Contra-ligule glabrous to pubescent. *Blades* flat to folded, (13–)23–38(–95) cm by 2–27 mm, margins glabrous at base, hairy on both sides to glabrescent, glabrous to setose behind the ligule, smooth. *Peduncles* solitary or paired, glabrous. Spatheoles 2.5–7.5 cm long. Spikes 2–10.5 cm by 1–3 mm. *Spikelets* paired. Joints 2–3.4 mm long, glabrous, smooth. *Sessile spikelets* 2.5–4.2 mm long (incl. callus), longer than the joint. Callus glabrous. Lower glume flat, ovate-oblong, glabrous, chartaceous, smooth, greenish yellow to margins purplish, 6–8-nerved, lower part at keel smooth, apex winged; upper glume boat-shaped, ovate-oblong, 3–3.8 mm long, glabrous, 3–4-nerved, nerves not anastomosing, margin infolded, apex acute. Lemmas ovate-oblong, 2.4–3.2 mm long, glabrous, apex acute; first lemma epaleate, 2.7–3.2 mm long, 3-nerved; second lemma 2–3-nerved. Second palea ovate-oblong, 2.1–2.7 mm long, 2-nerved, glabrous. Anthers 1.2–2.1 mm long. *Pedicel* free from the joint, 1.8–3.8 mm long, glabrous, smooth. *Pedicelled spikelets* well-developed with a male or bisexual floret, dorso-ventrally flattened, 3–3.8 mm long. Lower glume chartaceous, glabrous, winged. Anthers 1.2–1.7 mm long. 2n = ?

Distribution — Malesia: Philippines (Bohol, Cebu, Guimaras, Luzon, Mindanao, Panay, Siargao), Lesser Sunda Isl. (Flores, Sawu, Tanimbar, Timor, Wetar), New Guinea: Irian Jaya: Jayapura, Merauke; Papua New Guinea: Central, Madang, Milne Bay, Morobe, Northern, Western Prov.; Australia (Queensland, Northern Territory, W Australia) and ? Polynesia (fide Warburg 1890: 260), but not in e.g. Fosberg et al. (1987: 19).

Habitat — Sunny, grassy places, burned grasslands, savannahs, swampy areas, roadsides, along railroads, Eucalyptus forests, up to 2320 m altitude; locally dominant.

Vernacular name — Baron river tussock grass (E).

Uses — An analysis showed nutritional value to be considerably below the average (Backer 1950: 176, as *R. ophiuroides*). In Goodenough Island widely used for thatching (Burcham 1948: 414, t. 2, 3).

Notes — The species is easily recognized by the smooth lower glume of the sessile spikelets apically with distinct auricles.

The var. *commutata* would be distinct by bulbous-based bristles on the lower glume of the sessile spikelets. This feature is variable within a single spike and therefore there seems to be no other reason to maintain this taxon.

A form described as var. *vestita* by Domin from Australia and as var. *hirsuta* by Jansen from New Guinea would be distinct by the presence of densely hairy sheaths (especially the upper ones) and blades (e.g. *Carr 11134*, lectotype of the second), but *Hoogland 4690* and *NGF 22056 (Gillison)* have glabrous sheaths and hairy blades. Many specimens have blades that are pubescent on the upper surface only, and several have completely glabrous blades. It seems therefore impossible to maintain this variety.

In the Philippine var. *intermedia* the lower glume of the sessile spikelet is only shortly winged above the middle. The expression of this feature, however, is quite variable, and insufficient to base a taxon on.

*Van Borssum Waalkes 3156* (Tanimbar) and *Höft 3230* (Morobe Prov.) (L) have joints with two sessile and two pedicelled spikelets.

Differs from the Malesian / Thai congeners in: Cataphylls glabrous. Sessile spikelet callus glabrous; lower glume chartaceous. Pedicelled spikelets composed of 2 glumes and 1 male or bisexual floret.

Most similar is *M. glandulosa*:

1. Cataphylls puberulous to ciliate along the margin. Sessile spikelet callus ciliolate; lower glume coriaceous, laterally with small appendages . . . . . *M. glandulosa*
1. Cataphylls glabrous. Sessile spikelet callus glabrous; lower glume chartaceous, laterally without small appendages . . . . . *M. rottboellioides*

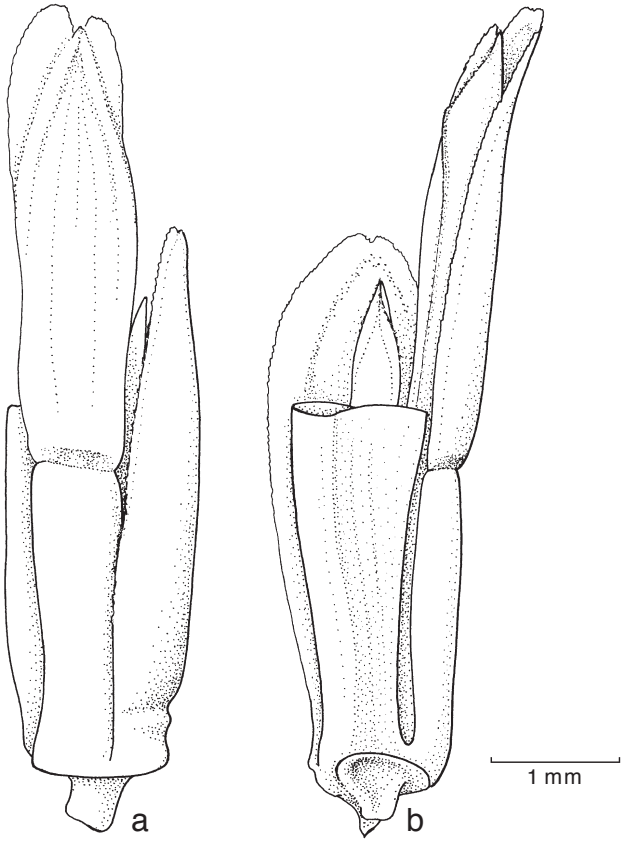


**Fig. 10** *Mnesithea rottboellioides* (R.Br.) de Koning & Sosef. a. Pedicelled spikelet; b. joint and pedicelled spikelet (all: *Van Steenis 18081*, L).

**10. *Mnesithea striata*** (Nees ex Steud.) de Koning & Sosef — Fig. 11

*Mnesithea striata* (Nees ex Steud.) de Koning & Sosef in Veldkamp et al. (1986) 292. — *Rottboellia striata* Nees ex Steud. (1854) 361; Hack. (1889) 302 (incl. ssp. *genuina* Hack., nom. inval., var. *glabrior* Hack., nom. inval.). — *Coelorachis striata* (Nees ex Steud.) A.Camus (1921) 197, pro comb. — *Manisuris striata* (Nees ex Steud.) Kuntze (1891) 779. — [*Rottboellia rottboellioides* (R.Br.) Druce var. *striata* (Nees ex Steud.) Roberty (1960) 76, comb. inval.]. — Lectotype: *Wallich 8877-C* (Gomez) (holo P; K, W), designated by Veldkamp et al. (1986: 292).

*Rottboellia striata* Nees ex Steud. var. *pubescens* Hack. (1889) 302. — *Coelorachis striata* (Nees ex Steud.) A.Camus var. *pubescens* (Hack.) Henrard (1941) 519; Bor (1960) 121, isonym. — Type: *Hook.f. & T. Thomson s.n.* (holo W; K, L).

*Rottboellia merguensis* Hook.f. (1896) 158. — *Mnesithea merguensis* (Hook.f.) A.Camus (1919) 59. — [*Rottboellia corymbosa* L.f. subvar. *merguensis* (Hook.f.) Roberty (1960) 65, comb. inval.]. — Lectotype: *Helfer 457* (holo K, fragm. in L; G), designated by Roberty (1960, '437'), holotype designated here.

*Coelorachis striata* (Nees ex Steud.) A.Camus var. *laevis* Stapf ex Bor (1960) 121. — Type: *Wallich 8877-A* (holo K), erroneously cited as '*8877-D*' by Bor.

Plants perennial. *Culms* 1.5–2.5 m long. *Cataphylls* ovate to ovate-oblong, 5–24 by 2–9.5 mm, glabrous to puberulous, apex acute to acuminate. Nodes glabrous to puberulous. *Sheaths* glabrous to hairy, margin glabrous to pilose. *Ligule* 1–4.5 mm long, glabrous or margin setose. Contra-ligule absent or present, glabrous. *Blades* flat to folded, 15–43 cm by 6–35 mm, margins glabrous to pectinate at base, glabrous to hairy on both sides, glabrous behind the ligule, smooth. *Peduncles* solitary or paired, glabrous to hairy. Spatheoles 3–5.5 cm long. Spikes 2.5–4 cm by 1.8–2.2 mm. *Spikelets* in the lower part in triads, or all paired. Joints 5.5–6.5 mm long, glabrous, smooth to ciliolate at base. Callus glabrous to ciliolate. Sessile spikelet 5.8–6.8 mm long (incl. callus), longer than the joint. Lower glume convex, ovate-oblong, glabrous, coriaceous, with lines of small slits, yellowish with purplish margins, 7-nerved, apex winged. Upper glume boat-shaped, ovate-oblong, 5.2–6.1 mm long, glabrous, 3–4-nerved, not anastomosing, margin infolded, apex obtuse to acute. Lemmas ovate-oblong, glabrous to ciliolate along the margin, apex rounded to acute; first lemma paleate, 4.8–5.9 mm long, 2–3-nerved; second lemma 3-nerved. Paleas 2-nerved, glabrous or with ciliolate margin; first palea ovate-lanceolate, 2.9–3.4 mm long; second palea ovate-oblong, 2.3–2.8 mm long. Anthers 1.4–1.6 mm long. *Pedicel* free to

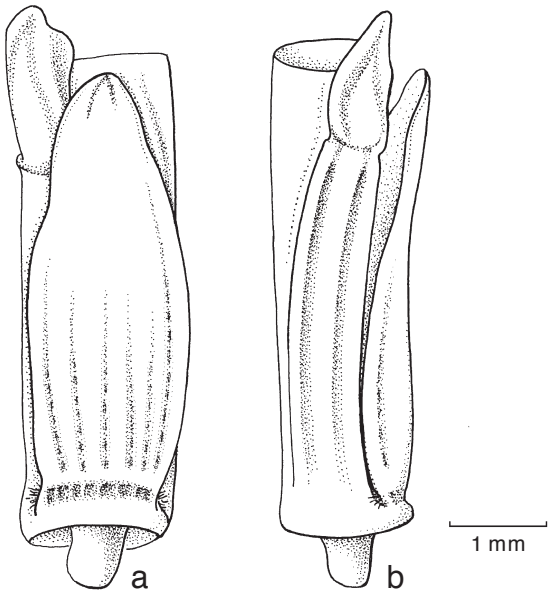


**Fig. 11** *Mnesithea striata* (Nees ex Steud.) de Koning & Sosef. a. Sessile spikelet; b. pedicelled spikelet (all: *Van Beusekom et al. 3597*, L).

adnate to the joint, 5.4–5.8 mm long, glabrous to pubescent. *Pedicelled spikelets* reduced to 2 glumes, laterally to dorsoventrally flattened, 1–2 mm long. Lower glume chartaceous, glabrous to margins ciliolate, apex winged. 2n = 36.

Distribution — Burma (Mergui) to S Vietnam and S China (S Yunnan); Thailand (N: Chiang Mai, Chiang Rai, Lamphun; NE: Khonkaen; SW: Kanchanaburi; Peninsular: Phangnga). Mentioned for Singapore by Wallich and so cited by others, but *Wallich 8876* is *M. mollicoma*. It is erroneously cited as the type of *M. striata* by Roberty (1960).

Noltie (2000: 829, t. 62k) reported the species for 'Terai', an area along the S border of Bhutan with Assam.

Habitat — Sunny places, old clearings, in the area between the deciduous dipterocarp oak-forest and a bamboo hardwood zone, moist savannah on clay, dry evergreen or mixed (*Quercus*) forest, along the road, granite bedrock, 25–1325 m altitude, locally common.

Notes — The species is best recognized by the glabrous lower glume of the sessile spikelets without appendages and

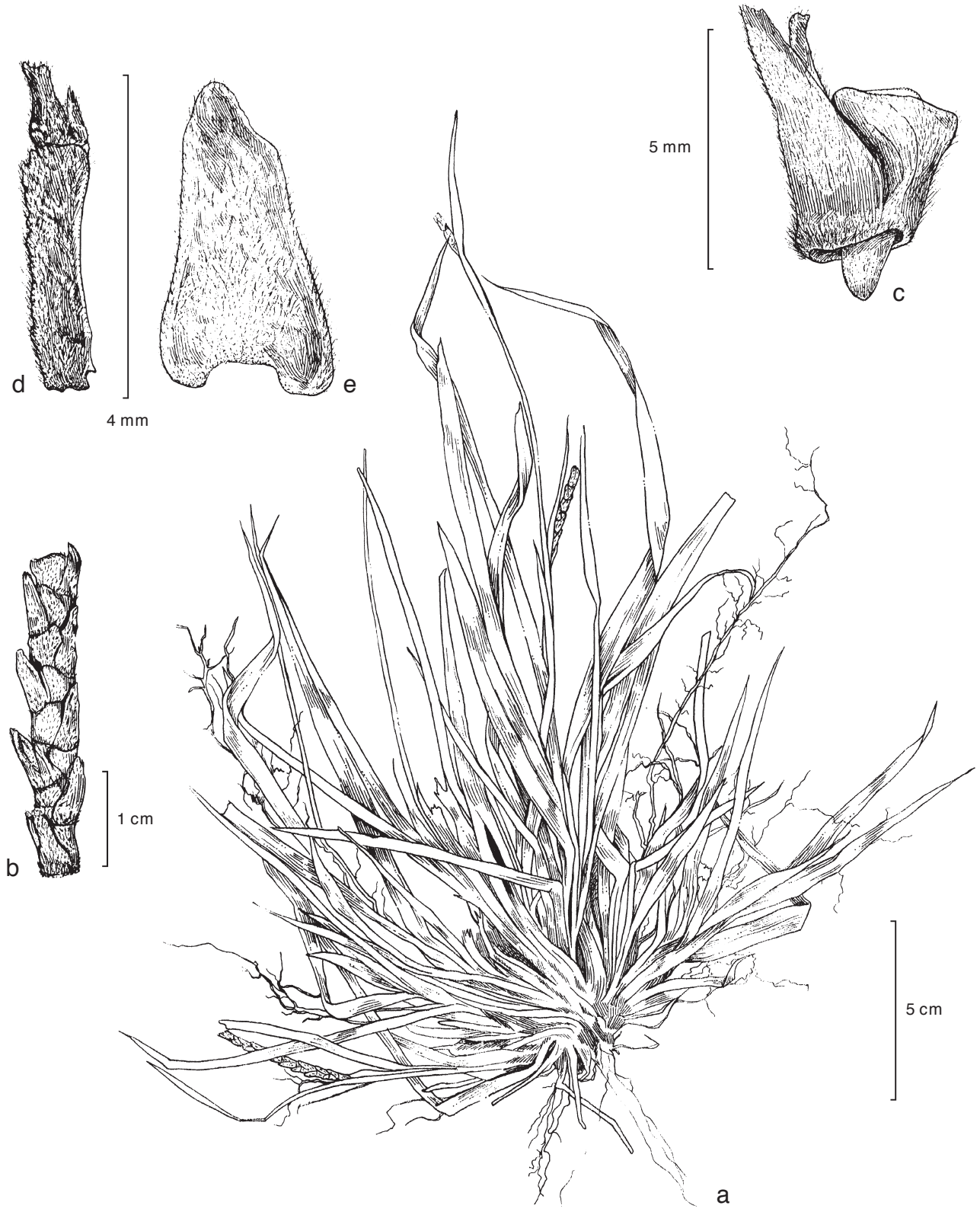


**Fig. 12** *Mnesithea thailandica* Traiperm & Boonkerd. a. Habit; b. part of inflorescence; c. spikelet pair; d. pedicelled spikelet with pedicel; e. lower glume of sessile spikelet. — Reproduced with the kind permission of the Director and the Board of Trustees, Royal Botanic Gardens, Kew from Kew Bulletin 65 (2010) 342.

with lines of small slits (which, however, are nearly absent in var. *laevis* Bor). For differences with *M. helferi*, see there.

The reasons for the lectotypification of *M. striata* and the reduction of the varieties has been discussed by Veldkamp et al. (1986: 292).

Part of *Helfer 457* (syntype of *M. merguensis*) has pedicelled spikelets on two-jointed pedicels. One joint had four sessile and two pedicelled spikelets. Some other joints had two sessile and one pedicelled spikelets. The lower glumes have some pusticules with hairs.

Two collections from Thailand (*Van Beusekom et al. 3597* (L, P) and *Iwatsuki et al. T-10929* (L) have the pedicel fused to the joint in the lower part to completely so, while in the other specimens seen they were usually completely free.

*Geesink & Santisuk 5004* (L, P) has lower glumes with pusticules on the keels. *Tran Van Hing 196* has some joints with three sessile and two pedicelled spikelets. This specimen has hairy culms, sheaths and blades. It is the only collection seen from Vietnam, all other references seem to refer to *M. cancellata* (q.v.).

Differs from the Malesian / Thai congeners in: Culms 1.5–2.5 m long. Sessile spikelet 5.8–6.8 mm long (incl. callus); upper glume 5.2–6.1 mm long.

Most similar are *M. cancellata* and *M. glandulosa*:

1. Culms 0.4–1.1 m long. Sessile spikelet 4.3–5.8 mm long (incl. callus); lower glume cancellate; upper glume 3.3–5.1 mm long . . . . . *M. cancellata*
1. Culms 1.5–2.5 m long. Sessile spikelet 5.8–6.8 mm long (incl. callus); lower glume with longitudinal lines of small slits; upper glume 5.2–6.1 mm long . . . . . *M. striata*
2. Sessile spikelet 3.8–5.5 mm long (incl. callus); lower glume smooth, laterally with small appendages; upper glume 2.8–4.9 mm long . . . . . *M. glandulosa*
2. Sessile spikelet 5.8–6.8 mm long (incl. callus); lower glume smooth, laterally without small appendages and with lines of small slits; upper glume 5.2–6.1 mm long . . . . *M. striata*

### 11. *Mnesithea thailandica* Traiperm & Boonkerd — Fig. 12

*Mnesithea thailandica* Traiperm & Boonkerd (in Traiperm et al. 2010) 341, t. 1. — Type: *Paisooksantivathana & S. Suutheesorn y1048-82* (holo BK).

Description based on Traiperm & Boonkerd (in Traiperm et al. 2010).

Plants perennial (cataphylls probably present). *Culms* 0.26 m long. Nodes puberulous. *Sheaths* hairy. *Ligule* 0.5 mm long, margin ciliolate. *Blades* flat, 5–20 cm long, 4–8 mm wide, hairy on both sides. *Peduncles* solitary. Spikes 6 cm long. *Spikelets* paired. Joints 2–2.5 mm long, hairy in the lower half. Sessile spikelet callus puberulous. Sessile spikelet 4–5 mm long (incl. callus); spikelets longer than the joint. Lower glume convex, ovate-oblong, hairy, smooth, laterally without small appendages, apex winged. Upper glume boat-shaped, ovate-oblong, 3 mm long, hairy along the keel. First lemma paleate. Anthers 1 mm long. *Pedicel* free from the joint, 3 mm long, pubescent. *Pedicelled spikelets* reduced to 2 glumes, dorso-ventrally flattened.

Distribution — Thailand. Northeast: Roi Et (formerly Saket Nakhon): Suwanaphoom District, Nayai, Ban Hang Hoey.

Habitat — Common in rice fields, c. 100 m altitude.

Notes — Only known from the type collection. A request to BK (24 Jan. 2012) for additional data or a loan remained unanswered.

The description above had to be summarised from the publication and is not congruent with the other ones given here. A later visit by the authors to the area showed that it had been converted to industrial development.

Differs from the Malesian / Thai congeners in: Ligule 0.5 mm long. Joints 2–2.5 mm long, hairy in the lower half. Upper glume of sessile spikelet hairy along the keel.

Most similar is *M. laevis* var. *laevis*:

1. Sheaths glabrous to sparsely hairy; blades glabrous or hairy above. Joints 4.4–6.5 mm long. Upper glume of sessile spikelet 3.9–5.1 mm long. Pedicel 4.4–5.8 mm long . . . . . *M. laevis* var. *laevis*
1. Sheaths hairy; blades hairy on both sides. Joints 2–2.5 mm long. Upper glume of sessile spikelet 3 mm long. Pedicel 3 mm long . . . . . *M. thailandica*

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## INDEX TO COLLECTIONS FROM MALESIA AND THAILAND

References between brackets have not been seen.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| can | = | *M. cancellata* | hel | = | *M. helferi* | str | = | *M. striata* |
| for | = | *M. formosa* | lae | = | *M. laevis* var. *laevis* | tha | = | *M. thailandica* |
| gem | = | *M. geminata* | lco | = | *M. laevis* var. *cochinchinensis* | (ST) | = | syntype material |
| gla | = | *M. glandulosa* | mol | = | *M. mollicoma* | (T) | = | Type material |
| gra | = | *M. granularis* | rot | = | *M. rottboellioides* | ? | = | det. dub. |

A 2558 (Kadir): gla – Adj. Landbouw Pamekasan: lae – Allen 6 Aug 1947: gla – Alston 13411: gla – Ambri et al. 1391: gla; 1497: gla – Ambriansyah & Meijer 1365: gla – Anang 116: gra – Anta 435: can – Atasrip 245: gra.

Backer 21 Jan 1904: gra; Jul 1904: gra; Dec 1910: gla; 2 Apr 1920: lae; 9 Jun 1927: lae; 616-B: gla; 635: gla; 804: gra; 902: lae; 932: gla; 1020: gla; 1048: gra; 1196: gla; 1918: mol; 1933: gla; 2988: gla; 4036: gla; 5162: gla; 5820: gra; 5828: gla; 6374: gla; 6493: gra; 6510: gra; 6555: gla; 6566: gla; 6858: gla; 8672: gla; 9941: gla; 9979: gla; 10595: gla; 11581: gra; 13934: gla; 14381: gla; 17108: gla; 18838: gla; 19905: lae; 20058: lae; 20193: lae; 20256: gra; 20418: gra; 20491: gra; 20732: lae; 20865: lae; 20972: gra; 21131: ? lae; 22407: gla; 22812: gla; 23542: mol; 23546: gla; 24046: gra; 24063: gla; 25461: gla; 25712: gla; 26541: lae; 26606: lae; 26725: lae; 27042: gra; 28629: gra; 30380: ? lae; 30797: lae; 36023: gra; 36276: lae; 37483: gla – Bakhuizen v.d. Brink 12 Dec 1886 (T): can; 16 Nov 1886: gla; 741: gla; 1020: gla; 2988: gla; 5162: gla; 6374: gla; 6493: gra; 6566: gla – Balansa 16 Nov 1886: gla – Beccari BP-3741: gla; PB-518: gla – Beguin 29: gra; 190: gra; 2048: gla – Bermejos 1538: gra – Bernstein 346: (gla) – Beumée A-3: lae; A-266: gla; A-890: lae; II: lae; 640: gla; 759: gla; 842: gla; 864: gla; 920: gra; 963: gla; 986: gla; 1146: gla; 1196: gla; 1362: gla; 1815: gla; 1862: gla; 1991: gla; 2619: gla; 2661: gla; 2839: gra; 3725: gla; 4146: gla; 4838: gla; 4885: gla; 5034: gla; 5480: gla; 5602: lae – BF 16213 (Curran et al.): rot; 31501 (Franco): rot – Bicknell 601: gra – BKF 51880 (Smitinand 11645): gra – Bloembergen 3164: gra; 3732: gra; 3888: for; 3891: gra – Boerlage 20 Sep 1888: gla; 533: gra; 666: gra – Boschproefstation 18: lae – Brass 3701: gra; 3702 (ST): rot; 5310: rot; 6254: rot; 8254: rot; 22015: rot; 22108: gra; 24379: rot; 24451: rot; 29327: gra – Bremekamp 9 Apr 1917: lae – Brooke 9737: gla – Brown F.H. 177: rot – BS 491 (Mangubat): gla; 1336 (Mangubat): gra; 1406 (Ramos): gra; 3094 (Merrill): gra; 4470 (Merrill): gra; 4691 (Merrill): rot; 4981 (Ramos): ?rot; 11656 (Merrill): rot; 12229 (Ramos): gra; 14436 (Ramos & Edaño): gra; 19181 (Reillo): gra; 26136 (Fénix): rot; 30073 (Fénix): rot; 31477 (Ramos & Edaño): gla; 32582 (McGregor): rot; 32781 (Ramos): lco; 34988 (Ramos & Pascasio): rot; 36805 (Ramos & Edaño): rot; 39203 (Ramos & Edaño): lco; 40211 (Ramos & Edaño): rot; 44227 (Ramos & Edaño): gla; 44347 (Ramos & Edaño): gla; 44436 (Ramos & Edaño): gra; 80358 (Ramos): gra – Bünnemeijer 1319a: gra; 1584: gla; 2287: gla; 3717: gra; 6061: gla; 6469: gla; 7828: gla; 8348: gra; 10845: gla – Busse 1339: lae; 2797: gla; 4014: gra; 4049: rot; 5531: gla; 6032: gla; 6671: gla; 7410: gra; 7435: gra – Buwalda 2797: gla; 4014: gra; 4049: rot; 5331 ('5531'): gla; 6032: gla; 6671: gla; 7410: gra; 7435: gra – BW 4821 (Versteegh): rot; 6397 (Kalkman): gra; 11753: gra.

Carr 11134 (T): rot; 11753: gra – Chantaranothai & Parnell 90/779: gra – Chermsirivathana 1562: gla – Cinatti 57: rot – Clason 47 B: gra – Clemens 6235: gla; 9799: gla; 18224: lco; 21884: gla; 27474: gla; 30277: gla – CNA 1752 (Voogd): lae – Congdon 819: gla – Conklin & Buwaya 1 Jan 1963: rot – Conklin & Rosario 37: gra – Coode 5804: gla – Cuming 1339 (T): lae; 1832: gla; 1889: gra – Curtis 1913: gla; 3336: gla.

Danser 6281: gla; 6865: gla; 6981: gla – Darbyshire 697: gra – De Vogel C.J. A° 1915: gra – De Voogd 1517: gra; 1752: lae; 2748: gra – De Wilde & De Wilde-Duyfjes 18949: gra – De Wilde & Vervoort 415B: rot – De Wit 4217: gla; 4282: gla – Demoulin 5756: rot – Docters van Leeuwen 3779: gla – Dorgelo 109: gla; 400: lae; 416: gra – Dransfield et al. 1010: gla; 1276: gla – Duistermaat S 177: gla.

Ebalo 789: gla; 1348: gla – Edeling Mar 1865: gla – Elbert 2520: gra; 2895: gra; 4537: rot; 4575: rot – Elmer 5688: rot; 5823: rot; 6393 (T): rot; 10317: rot; 10409: gra; 11039: gra; 18237: gra – Elmer et al. 789: lae – Endert 2101: gla – Eyma 361 (T); 1220: gra.

Farinas 31 Oct 1953: rot – FB 16213 (Curran et al.): rot – Fénix Jul 1916: rot – Floyd & Hoogland 3811: rot – FMS 10170 (Henderson) gla; 55171 (Angian): gra – Forster 31: gla; 125: gra – FRI 53126 (Yao et al.): gla; 53160 (Yao et al.): gla; 63647 (Chew et al.): lae.

Geesink & Santisuk 5004: str – Gianno 186: gla – Gib 2702: gla – Gilliland 28 Jun 1964: gla – Gjellerup 1059: gra – Goetghebeur & Coppejans 3487: rot – Grutterink 3259: gra.

Hallier f. 15 Mar 1893: gla; 649c: gla; 728: gra; 4087: gra – Handel 5327: gra – Hansen & Smitinand 11868: str – Hartley 10269: gra – Helfer 457 (T): str; 913 (T): hel – Hellenpo 1059: gra – Hellwig 15: rot – Henty 195: gra – Heyligers 1236: for – Holttum 22 Oct 1946: gla; 26 Oct 1946: hel – Hoogland 4677: rot; 4690: rot – Hose 34: gla.

Iboet 63: gra; 463: gla – Iwatsuki & Fukuoka T-10393: mol; T-10929: str; T-11135: gra – Iwatsuki et al. T-9458: gra.

Jaag 60: rot; 697: gra – Jaco 323: gra; 4623: gra; 5645: gla – Jaheri 110: gla – Jermy 4412: gra – Jochems 22 Jan 1924: gra; 3031: gra; 3085: gla – Jones 395: gla – Jumali 28 Jun 1964: gla.

Kartawinata 1469A: gla – Kassim Aug 1959: gla – Kato et al. B-4431: gla – Keng & Jumali 803: gla – Kerr 1601B: str; 1912: gla; 2213: gra; 4360: gla; 4360bis: str; 10745: gla; 11282: mol; 13074: mol; 13085: lae; 13508: lae; 14720: lae; 19253: lae; 19584: lae; 19603: gla; 19649: lae – Kessler et al. 1796: gla – Kievits 1543: lae – King's Coll. 1027: rot; 2567: gla – Kjellberg 8: gra; 683: gla; 820: gra – Kleinhoonte 159: gra – Kneucker Gram. Exsicc. 789 (Merrill & Robinson): lae – Koorders 17281: gla; 17282: gla; 22094: gla; 23115: gra; 27763: gra; 31394: gla; 41177: gla; 42425: gla – Kooy 405: gra; 687: gra – Kornassi 1348: gla – Kostermans 1141: gla; 18632: gla; 21728: gla – Kostermans & Anta 435: can – Koyama, H. T-61037: gra; T-61213: mol; T-61379: gra; T-61625: mol – Koyama, T. et al. 15423: str.

LAE 50200 (Stevens): rot – Laegaard 21613: can – Lam 2620: gla – Larsen 8581: str; 10639: gla – Larsen et al. 246: gla; 31830: can; 31888: lae; 45502: lae; 45819: lco; 45821: lae; 46828: gra – Lauterbach 1296: gra – Leach & Dunlop 3751: (rot); 3760: (for); 3803: (gra) – Leefmans 7 Apr 1924: gra – Lenart 17: gla – Lindhard 1-1904: lae – Loher 1849: rot; 1850: rot; 1851: rot; 1852: rot; 1853: rot; 1854: lco; 1868: gra; 1869: gra; 1881: gra; 7166: gra; 7168: rot – Lörzing 964: gra; 3118: gra; 3580: gla; 4059: gla; 4500: gla; 4516: gra; 4823: gla; 4825: gla; 4882: gra; 5356: gla; 6713: gra; 9000: can; 9020: gra; 9113: gla; 9616: gla; 12497: gra; 12660: gla; 13008: gla; 13284: gra; 13587: gra; 14339: gla; 14454: gla – Lugas 1588: gla – Lütjeharms 5394: gla.

Marcan 2367: gla; 2593: str – Maxwell 74-586: hel; 74-596: gla; 75-433: lae; 75-983: gra; 76-520: can; 86-1056: gra; 87-856: mol; 87-1020: mol; 87-1277: gra; 88-1066: gra; 88-1106: mol; 90-1032: gra; 90-1033: str; 92-432: gra; 92-622: mol; 93-18: str; 93-19: mol; 93-1081: str; 94-808: mol; 95-881: str; 95-924: str; 96-1478-B: gra; 97-904: gra; 97-952: gra; 97-1223: str; 00-316: gra; 01-627: str; 06-625: str; 06-820: hel – McKee 1691: rot – Meijer 10201: gra – Mendoza & Buwaya 746: gra – Merrill 505: gla; 989: ? rot; 2041: rot; 3094: gra; 3629: rot; 4667 (T): rot; Philip. Pl. 1375: gla; 2041: rot – Metzner 112: rot; 182: rot – Mogea 3683: gla – Monod de Froideville 902: gla; 1492: rot; 1561: gra; 1848: gra; 1941: gra; 2015: gra – Motley 80: gla; 236: gla; 446: gem; 457: gra – Murata et al. T-15609: gra; T-16580: lae; T-16988: lae; T-37457: lae; T-39457: lae; T-41627: str.

Nedi 124: gla – Nedi & Idjan 17: gla – NGF 3305a (Womersley): gra; 3615 (Fryar): gra; 3643 (Fryar): gra; 4618 (Womersley): rot; 4649 (Womersley): rot; 14325 (Henty): gra; 17566 (Galero): gra; 22056 (Gillison): rot; 22183 (Gillison): gra; 30992 (Kairo & Emos): gra; 38801 (Henty & Katik): for; 42914 (Henty & Katik): gra; 45423 (Streimann & Kairo): gra; 49714 (Henty): for.

Paisooksantivathana & S. Suutheesorn y1048-82 (T): (tha) – Palee 237: gra; 400: gra – Phusomsaeng & Bunchuai 23: gra – Pleyte 112: gra – PNH 4798 (Fox): rot; 16884 (Sulit & Conklin): lae; 33808 (Taleon): gla; 38767 (Kondo & Edaño): gla; 42666 (Conklin & del Rosario): gra; 58767 (Kondo & Edaño): gla; 78735 (Conklin & Buwaya): rot; 82031 (Mendoza): rot – Pooma et al. 2119: lae; 2718: hel – Posthumus 1091: gla; 2089: gla – PPI 16293 (Snow & Sagcal): gla; 16323 (Snow & Sagcal): mol; 16336 (Snow & Sagcal): mol; 29713 (Romero & Majaducon): gla – Proppe 1 Jun 1924: rot; 21: rot – Pullen 6692: for; 6751: for; 6775: rot; 6950: for; 7596: gra – Put 144: gla; 2238: str; 2239: lae; 3989: gra.

Raap 3 Sep 1896: gla – Rahmat si Boeea 5883: gla; 6282 gla; 6284: gra; 6425: (gla); 8441: gla – Rahmat si Toroes 180: lae; 1218: gra; 1758: lae; 2575: lae; 3466: lae; 3896: lae – Ramos Philip. Pl. 2041: rot – Rant 67: gra; 764: gra; 767: gra; 955: gla; 956: gla – Rappard 242: gra – Raynal 16645: gra – Reeder 809: rot – Reinwardt 171 (T): gla – Ridley 26 May 1890: gla; 1 Feb 1919: gla; 8: gla; 11 (T): gem; 12: gla; 15: gla; 56: gla; 80: gla; 136: gla; 183: gla; 2134: gra; 2828: gla; 5025: gla; 6988: gla; 9411: gla; 9792: gla; 11017 (T): mol; 11681: gla; 12331: gla; 14351 (T): hel; 14728: gla; 15229: mol; 15231 (T): can; 15437: gla – Rifai 6488: rot – Robinson Nov 1916: mol – Roesil 336: gra; 557: can / gla – Rutten-Kooistra 64: gla.

S 48742 (Dayang & Paie): gla – SAN 10688 (Angian): gra; 33502 (Meijer): gla; 41130 (Meijer): gla; 41139 (Meijer): gla – Santos J.V. 4055: lae; 4708: gla; 4791: gra; 4978: rot; 4986: lae; 5127: rot; 5632: rot; 5894: rot; 6161: rot; 6166: rot; 6277: lae; 6285: lae; 6339: rot; 6442: gra; 6490: gla; 6516:

gla; 6535: gra; 6548: gla; 6579: rot; 6713: str; 6764: rot; 6821: gra; 6835: rot; 6921: rot; 6937: rot; 6954: lae; 7443: gla; 7557: gra; 7594: gra; 7596: gra; 7695: gra; 7772: rot; 7791: gla; 7862: rot; 8017: rot; 8037: rot; 8094: gla; 8131: gra; 8133: gla; 8146: rot; 8176: rot; 8230: gla – Saunders 7: rot; 81: rot – Sauveur & Sinke 2501: rot – Schmutz 2002: gra; 2050A: rot; 4967: rot; 5033: gra; 5054: gra; 5069: gla; 5078: gra; 5341: gla; 5494: gla; 5887: gra – Schodde 2821: rot – Seimund 469: gla – SF 4247 (Nur): gla; 7380 (Nur): gla; 10789 (Sinclair): gla; 13103 (Burkill & Haniff): gla; 14725 (Boden Kloss): gla; 18241 (Henderson): gla; 18440 (Henderson): gla; 18830 (Nur): gla; 19575 (Henderson): gla; 19993 (Nur): gla; 20238 (Henderson): gla; 20284 (Henderson): gla; 24774 (Holttum): gla; 25905 (Corner): gla; 28405 (Holttum): mol; 28405A (Holttum): hel; 28527 (Corner): gla; 29796 (Corner): gla; 29882 (Corner): gem; 36015 (Spare): gla; 37495 (Corner): gla; 38093 (Nauen): gla; 38285 (Holttum): gla; 38385 (Sinclair): gla; 38600 (Sinclair): gra – Shimizu T-10596: gra – Shimizu et al. T-10473: mol – Simaga 37: gra – Simpson 14: gla – Sinclair 28 Aug 1949: gra; 5640: gla; 10789: gla – Sinclair et al. 9239: gra – Sirimongkol 59: str – Smitinand 765: gla; 1792: can; 1827: mol; 1989: gra; 2973: str; 5960: lae; 11645: gra – Smitinand & Abbe 6168: str – Soderstrom & Sunarko 1378: gla – Sohns 12: gra – Sørensen et al. 1080: str; 2349: can; 3689: str; 4377: mol; 4378: gra; 4494: mol; 4629: mol; 4989: gla; 5038: gra – Sosrodihardjo 20: gra – Stevens 21 Jun 1970: gra – Stone & Mahmud 12290: gla – Stone & Sidek 12290: gla – Street & Manner 52: gra – Sulit 21 Nov 1954: gra – Sun 9758: gla – Surbeck 461: gla – Szemian 11: gla.

't Hart & Van Leeuwen H.8: rot – Taylor 2492c: gla – Toxopeus 523: gra – Tsugaru T-61739: gra; T-61849: mol.

UPNG 319 (Gebo): for; 1338 (—): gra – UT 37 (Simaga): gra.

Van Balgooy & Mamesah 6312: gla; 6337: for – Van Beusekom & Phengkhlai 1192: lae – Van Beusekom et al. 3597: str; 4291A: mol – Van Borssum Waalkes 3156: rot – Van Leeuwen GE-9: rot; KAB 5: gla – Van Leeuwen & Ree 16/23 May 1958: gra – Van Loenen 12: gra – Van Royen 4118: gra; 5558: gla – Van Slooten 2317: lae – Van Steenis 18 Dec 1953: rot; 30 Nov 1953: rot; 843: gla; 885: gla; 6648: lae; 7494: lae; 7530: gla; 7532: lae; 7602: lae; 7741: gra; 8858: gra; 11425: lae; 17912: ? rot; 18018: rot – Van Wijk 37: gla – Vanoverbergh 608: rot – Verboom 37: gra; 42: gla – Verheijen 3689: rot – Versteeg 1929: rot – Vidal 4004: gra; 4014: rot – Villamil 357: gla.

Wallich 8873B (T): lae; 8876: mol; 8877A (T): str; 8877B: str; 8877C (T): str – Walsh 33: rot – Wehner 41: gra – Weinland 287: ? rot – Wichmann 212: gra – Widjaja & Hamzah 2972: rot – Wight 1722: lae – Williams 133: gra; 1167: rot; 2922: gra – Winckel 1392: gla – Winkler Hub. 2979: gla – Wisse 153: gla; 688: gla – Wray 798: gla.

Yapp 135: gla – Yates 22: gla; 1145: gra.

Zollinger 352 (T): gla; 967: gra – Zwaardemaker 84: gla.