

A Revision of *Mnesithea* Kunth (Poaceae) in Thailand

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Abstract.— Recent cluster analysis suggests that the genus *Hackelochloa* Kuntze (Poaceae) should not be included in the genus *Mnesithea* s.l. It is thus an appropriate time to revise the genus *Mnesithea* found in Thailand for the ongoing Flora of Thailand project. The genus is represented in Thailand by seven species (one with two varieties) including *M. striata* var. *pubescens* (Hack.) S.M. Phillips & S.L. Chen, which is newly recorded variety for Thailand. Keys to the species and varieties are provided together with descriptions, distributions, ecological data and specimens examined. Illustrations and a brief summary on the lower glume micromorphology of all species are provided. The characteristics of the lower glumes by SEM can be used to support the species identification.

KEY WORDS: *Hackelochloa*, micromorphology, SEM, taxonomy

INTRODUCTION

Mnesithea is one of the questionable genera in the tribe Andropogoneae (Poaceae). It was described by Kunth in 1829 from *M. laevis* (Retz.) Kunth by the presence of paired sessile spikelets. In contrast, the related genus, *Coelorachis* Brongn. was traditionally delineated on the basis of a free pedicel and the presence of a pedicelled spikelet (Brongnard, 1831). However, these characters are now known to be variable, as the fused pedicel can be found in some species of *Mnesithea* such as in *M. khasiana* (Bixing & Phillips, 2006). Moreover, the pedicelled spikelet varies from well-developed to a minute vestige, but it is absent in *Mnesithea* (Bixing & Phillips, 2006). These overlapping characters led to the expansion of *Mnesithea* (Veldkamp *et al.*, 1986) and a revision of

the genus (Veldkamp *et al.*, 2013), which included other genera in the subtribe Rottboelliinae, i.e. *Coelorachis*, *Hackelochloa* Kuntze, *Heteropholis* C.E. Hubb., *Mnesithea*, *Ratzeburgia* Kunth and *Rottboellia formosa* R.Br. (Veldkamp *et al.*, 1986). In Thailand, the genera *Coelorachis*, *Hackelochloa* and *Mnesithea* have been treated separately in a checklist that enumerated one, two and five species, respectively (Na Nakorn, 1996). However, this treatment lacked a key to the species and the taxonomic descriptions, leading to misidentification and confusion in classification. A few years later, a preliminary taxonomic study was conducted and combined *Coelorachis* into *Mnesithea*, but *Hackelochloa* still remained a separate genus (Traiperm, 2007). More recently, a publication re-evaluating the taxonomic status of *Hackelochloa* similarly excluded



FIGURE 1. A-D. *Mnesithea glandulosa*; A. Habitat; B. Habit; C. Inflorescence; D. Partial raceme; E-F. Partial raceme; E. *M. cancellata*; F. *M. helferi*.

Hackelochloa from *Mnesithea* s.l. (Arthan *et al.*, 2016). Their phenetic analysis based on UPGMA and principal component analysis (PCA) supported a segregation of *Hackelochloa* from *Mnesithea* spp., which confirmed the previous investigation by

Traiperm (2007). The present study therefore set out to provide a complete taxonomic account of Thai *Mnesithea*, which excludes *Hackelochloa*, for the completion of the family Poaceae in the Flora of Thailand.

MATERIALS AND METHODS

A taxonomic revision was conducted mainly on herbarium specimens held at the following herbaria: AAU, BCU, BK, BKF, BM, C, CMU, E, G, K, KKU, L, P, PSU, QBG, SING and TCD. In addition, we consulted the digitised specimens held at LD, LE, LINN, P and SING that are available online. Fresh materials from seven taxa collected from several locations in Thailand were also investigated. Type specimens were compared directly at the herbaria where possible, or from digital images available online. Micromorphological characters of the lower glumes of the sessile spikelet were first examined using Olympus SZX7 stereomicroscope, and high magnification photos were taken by HITACHI S-2500 scanning electron microscope (SEM). The lower glume terminology used follows Sumanon & Traiper (2013), and Ortunez & Cano-Ruiz (2013).

RESULTS

TAXONOMIC TREATMENT

MNESITHEA

- Kunth, Révis. Gramin. 1: 153. 1829. Type: *M. laevis* (Retz.) Kunth.
Coelorachis Brongn. Voy. Monde 2(2): 64, f. 14. 1831. Type: *C. muricata* (Retz.) Brongn. (lectotype), designated by Veldkamp, Koning & Sosef (1986).
Rottboellia sect. *Apogonia* Nutt., Gen. N. Amer. Pl. 1: 83. 1818. Type: *R. rugosa* Nutt.
Diperium Desv., Mém. Soc. Agric. Angers 1: 180, t. 9, f. 3. 1831. Type: *D. cylindricum* Desv. (= *M. laevis*).

Perennial grass, caespitose, often with a young propagule below, plant robust with broad leaf-blades. *Leaf-sheath* nearly tight or loose. *Inflorescence* composed of racemes, terminal and axillary, rarely terminal only in *M. thailandica* and often spatheate, a single cylindrical or flattened dorsiventral raceme, spikelets paired or occasionally in triplets of 2 sessile and 1 pedicelled, usually in three on below. *Sessile spikelet* paired or solitary, callus truncate with central peg. *Glumes*: lower glume ovate, oblong-ovate or triangular, coriaceous, winged or wingless, chartaceous to crustaceous, smooth, areolate or cancellate, 2-keeled, keels winged towards tip; upper glume awnless. *Lower floret* barren, with or without a small palea. *Upper floret* fertile. *Lodicules* present. *Stamens* 3. *Ovary* glabrous. *Styles* free bifid. *Grains* dorsiventrally compressed. *Pedicelled spikelet* well developed or vestigial; pedicel free, clavate or foliaceous, sometimes auriculate at tip or rarely absent. *Pedicels* free from the internode, rarely fused to internode. (Fig. 1)

A genus of seven species (one with two varieties) occurs in Thailand.

Key to the species

1. Pedicelled spikelet absent **4. *M. laevis***
1. Pedicelled spikelet present **2**
2. Lower glume of the sessile spikelet with 4–7 upwardly directed hooks on each lateral side **2. *M. glandulosa***
2. Lower glume of the sessile spikelet entirely devoid of hooks **3**
3. Back of the lower glume of the sessile spikelet glabrous, smooth or continuous slit **4**
3. Back of the lower glume of the sessile spikelet cancellate or hairy **5**
4. Node with a ring of cilia **3. *M. helferi***
4. Node glabrous **6. *M. striata***

5. Lower glume of the sessile spikelet without apical or lateral wings **1. *M. cancellata***
5. Lower glume of the sessile spikelet with apical wings or wings along margins **6**
6. Back of the lower glume of the sessile spikelet with continuous ridge along the length and interrupted by hairs or tubercle-based hairs **5. *M. mollicoma***
6. Back of the lower glume of the sessile spikelet with densely appressed hairs **7. *M. thailandica***

1. *Mnesithea cancellata* (Ridl.) Ridl., Fl. Malay Penin. 5: 206. 1925.— *Rottboellia cancellata* Ridl., J. Malayan Branch Roy. Asiat. Soc. 59: 228. 1911.— *Rottboellia foveolata* Holttum, Gard. Bull. Singapore 11: 297. 1947, nom superfl.— *Coelorachis foveolata* (Holttum) Jansen, Reinwardtia 2(2): 256. 1953.— *Coelorachis cancellata* (Ridl.) Bor, Dansk Bot. Ark. 20: 168. 1962. Type: Malay Peninsula, *H.N. Ridley* 15231 (holotype SING!; isotype K!).

Coelorachis clathrata Henrard, Blumea 4(3): 519. 1941. Type: Vietnam, Annam, Quinhon, *Balansa* s.n. (isotype L!).

Culms up to 1 m tall, erect, slender, rather dense tussock, internodes terete, glabrous, nodes with a ring of short ciliate hairs. *Leaf-sheaths* 5–10 cm long, loose, glabrous except for the margins and nodes densely hairy. *Ligules* short membranous with long ciliate margins. *Leaf-blades* 10–40 by 0.5–0.8 mm, adaxial surface slightly hairy, abaxial surface glabrous, margins scabrous, apex acute. *Inflorescence* composed of racemes, 5–7 cm long, racemes, terminal and axillary, subtended by a spatheole, exserted, terete; rachis internodes 3–4 mm long, oblong with cup-shaped transverse tip,

distinctly 6–7-nerved, glabrous; node at base glabrous; spikelets oblong, 4–6 mm long, dorsally compressed, callus glabrous, base oblique with central peg. *Sessile spikelets* 3–4 mm long. *Glumes*: lower glume 3–3.5 by *ca.* 1.5 mm, oblong-ovate, indurate, cancellate on the back, apex wingless, margins entire; upper glume 2.5–3.5 by *ca.* 1 mm, boat-shaped, 3-nerved, glabrous, keeled along the midnerved from base to apex on the back, keeled scabrous, apex acute. *Lower floret*; lemma 2–2.5 mm long, oblong, hyaline, folded; palea absent. *Upper floret*: lemma *ca.* 2 mm long, oblong, hyaline, folded. *Lodicules ca.* 0.7 mm long, cuneate. *Ovary ca.* 0.7 mm long, elliptic. *Anthers* 1.2–1.5 mm long. *Pedicelled spikelet* present, 1.5–2.5 mm long, reduced into 2 asymmetrical glumes. *Pedicels* 2.5–3 mm long, ribbon-like, distinctly 2 green lines, glabrous.

Thailand.— NORTHERN: Chiang Mai [Doi Suthep, Wang Bua Ban, 11 Aug. 1987, *J.F. Maxwell* 87-856 (CMU)]; NORTH-EASTERN: Loei [Phu Kradueng, 23 Mar. 1954, *T. Smitinand* 1792 (BKF, K); 20 Mar. 1958, *Th. Sørensen et al.* 2349 (BKF, C, E, K); 12 Nov. 2004, *P. Traiperm* 161 (BCU, BKF, KKU)]; Phu Ruea, 17 Apr. 1968, *C. Chermisrivathana* 943 (BK); 24 Jul. 2004, *P. Traiperm* 122 (BCU, BKF, KKU); 4 Dec. 2004, *P. Traiperm* 188 (BCU, BKF, KKU); 28 Mar. 2006, *P. Traiperm* 379 (BCU, BKF, KKU)]; Phu Luang, 15 Nov. 1968, *C. Chermisrivathana* 1092 (BK)]; Sakon Nakhon [Phu Phan National Park, 3 Oct. 2005, *P. Traiperm* 202 (BCU, BKF, KKU) & 205 (BCU, BKF, KKU)]; EASTERN: Chaiyaphum [15 km NE of Chaiyaphum, 14 Aug. 1972, *K. Larsen et al.* 31830 (AAU, BKF, K, L)]; Phu Khiao, 27 Nov. 2004, *P. Traiperm* 183 (BCU, BKF, KKU)]; Tat Tone National Park, 1 Jan. 2006, *P. Traiperm* 370 (BCU, BKF, KKU)]; Nakhon Ratchasima

[Huai Thalaeng, 24 Dec. 1928, *Put* 2238 (K)]; Si Sa Ket [Dongrak Range at Chong Bat Lak, Kantharalak, 17 Aug. 1976, *J.F. Maxwell* 76-520 (AAU, BK, L)]; Ubon Ratchathani [Km 81 on road 217 E of Warin Chamrap, 27 Oct. 2001, *S. Laegaard et al.* 21833 (AAU)]; Pha Taem National Park, 23 Oct. 2005, *P. Traiperm* 239 (BCU, BKF, KKU)].

Distribution.— Indo-china, Thailand and Malesia.

Ecology.— In open dry deciduous forest, wet and sandy soil, at 50–1,300 m altitude. Flowering in July to April.

Notes.— *Mnesithea cancellata* is very close to *M. mollicoma*. It differs in the cancellate and wingless at the lower glume of the sessile spikelet, whereas the lower glume of *M. mollicoma* is continuous ridge along the length and interrupted by hairs or tubercle-based hairs and having unequal narrow wings along the margins.

2. *Mnesithea glandulosa* (Trin.) de Koning & Sosef, *Blumea* 31(2): 290. 1986.— *Rottboellia glandulosa* Trin., *Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math.* 2(4): 250. 1832.— *Manisuris glandulosa* (Trin.) Kuntze, *Revis. Gen. Pl.* 2: 780. 1891.— *Coelorachis glandulosa* (Trin.) Stapf ex Ridl., *Fl. Malay Penin.* 5: 204. 1925. Type: Indonesia, Java, *Hb. Trinius* s.n. (holotype LE!).

Rottboellia muricata var. *javanica* Buse ex Miq., *Fl. Ned. Ind.* 3: 407. 1857. Type: Indonesia, Java, *Junghuhn* s.n. (lectotype L!, isolectotype K!), designated by Veldkamp, Koning & Sosef (1986).

Culms up to 1–2 m tall, erect, a large stout tufted with prop roots below, internodes glabrous or glabrescent, nodes with a ring of short ciliate hairs. *Leaf-*

sheaths 8–20 cm long, tight, glabrous. *Ligules* 1–1.5 mm long, membranous with ciliolate hairs. *Leaf-blades* ca. 100 by 1.5–3.5 cm, lanceolate, slightly appressed hairs on both surfaces, margins scabrous, round to a subcordate base, acuminate at the apex. *Inflorescence* composed of racemes, 7–10 cm long, terminal and axillary, subtended by a spatheole, exerted, terete; rachis internodes 3–4 mm long, cupuliform, scabrous, node at base scabrous; spikelets 5–6 mm long, oblong, dorsally compressed, callus scabrous, base truncate with central peg. *Sessile spikelets* 5–5.5 mm long. *Glumes*: lower glume 4–5.5 mm long, oblong-lanceolate to ovate, obscurely 6–7-nerved, glabrous on the back and with 4–7 upwardly directed hooks on each lateral side at the basal part, margins enfolded apex acute with 2-apical wings; upper glume 4–4.5 mm long, boat-shaped, chartaceous, glabrous, keeled along the midnerve from base to apex on the back, keeled scabrous, apex acute. *Lower floret*: lemma 3–3.5 mm long, ovate-acute, 3-nerved, hyaline, ciliolate on margins, enfolded; palea ca. 0.6 mm long. *Upper florets* 2–2.5 mm long, fertile; lemma elliptic, 3-nerved, hyaline; palea ca. 0.7 mm long. *Anthers* 2.5 mm long, purple. *Lodicules* ca. 0.5 mm long, cuneate. *Stigmas* 2. *Pedicelled spikelet* present, reduced to 2 glumes. *Pedicels* 6–6.5 by ca. 1.5 mm, ribbon-shaped, 7-nerved, comprising 2 subequal glumes. *Glumes*: ca. 1.5 mm long, lower glume ovate, winged along one side; upper glume more reduce.

Thailand.— NORTHERN: Chiang Mai [Doi Suthep, 22 Jul. 1911, *A.F.G. Kerr* 1912 (BM, K); 14 Sept. 1958, *Th. Sørensen et al.* 4989 (BKF, C, K); HuaiKaew, 8 Dec. 1980, *Y. Paisooksantivatthana* y470-80 (BK)]; NORTH-EASTERN: Phetchabun [Nam Nao National Park, 17 Nov. 2005, *P. Traiperm* 279 (BCU, BKF, KKU)]; Khon Kaen

[Mancha Khiri, 24 Aug. 2005, *P. Traiperm* 210 (BCU, BKF, KKU)]; EASTERN: Chaityaphum [Tat Tone Waterfalls, 9 Oct. 1965, *S. Sutheesorn* 573 (BK)]; SOUTH-WESTERN: Kanchanaburi [Ban Din So, 16 Jul. 1926, *Put* 144 (BK, BM, K); King Sayok, 17 Jul. 1946, *A. Kostermans* 1141 (P)]; CENTRAL: Saraburi [Sam Lan Waterfalls, 15 Jun. 1974, *J.F. Maxwell* 74-596 (AAU, BK, L); *C. Chermisrivathana* 622 (BK); 5 Nov. 2005, *P. Traiperm* 274 (BCU, BKF, KKU)]; Nakhon Nayok [27 Jul. 1950, *K. Suvathabhandhu* 448 (BK); Nang Rong, 29 Jul. 1959, *T. Smitinand* 6086 (BKF); Wang Takrai, 27 Sept. 1969, *C. Chermisrivathana* 1562 (BK, L)]; Krung Thep Maha Nakhon [25 Jul. 1920, *A.F.G. Kerr* 4360 (C, K)]; SOUTH-EASTERN: Sa Kao [Aranyaprathet, 9 Aug. 1930, *A.F.G. Kerr* 19603 (BK, BM, K); Klong Nam Sai, 18 Nov. 1964, *S. Sutheesorn* 173 (BK)]; Prachin Buri [Ban Bung Hills, 17 Jul. 1963, *K. Larsen* 10639 (C, K); Khao Yai National Park, 10 Jul. 1966, *K. Larsen et al.* 246 (AAU, K)]; Chon Buri [Bang Saen, 22 May 1919, *Nur* 4247 (K)]; Chanthaburi [Ban Thale, Pong Nam Ron, 28 Nov. 1956, *T. Smitinand* 3667 (BKF)]; PENINSULAR: Chumphon [Khao Lard, Mueang, 1 Jan. 1974, *S. Sutheesorn* 2757 (BK)]; Surat Thani [Ban Ta Por, Ta U Tae, 2 Feb. 1987, *P. Tepuarin* 350 (PSU)]; Phangnga [Khlung Nang Yon, 28 Apr. 1973, *R. Geesink & T. Santisuk* 5004 (AAU)]; Nakhon Si Thammarat [Kiriwong, Tap Chang, 28 Aug. 1951, *T. Smitinand* 765 (K)]; Phatthalung [Khao Pu Khao Ya National Park, 21 Oct. 2004, *P. Traiperm* 139 (BCU, BKF, KKU)]; Trang [Khao Chong, 9 Oct. 1970, *Ch. Charoenphol et al.* 3507 (AAU, BKF, K)]; Ton The Waterfalls, 14 Nov. 1990, *K. Larsen et al.* 41374 (AAU, BKF, PSU)]; Satun [Tarutao National Park, Malacca Creek to Talo Oo Dang, 13 Dec. 1979, *G.*

Congdon 253 (AAU, PSU); 27 Jan. 1980, *G. Congdon* 289 (AAU, PSU); 31 Jul. 1980, *G. Congdon* 819 (AAU, PSU)]; Songkhla [2 Dec. 1975, *A. Yiamudom* 18 (PSU)]; Suan Toon Waterfalls, 16 Nov. 1984, *J.F. Maxwell* 84-439 (BKF, PSU); Mueang, 8 Oct. 1990, *B. Aksorn* 30 (PSU); Ton Pliew near Ton Nga Chang, 13 Oct. 1991, *K. Larsen et al.* 42369 (AAU); Khao Chum Sak at Hat Yai, 12 Aug. 1995, *K. Larsen et al.* 45494 (AAU); Khao Koh Hong, 18 Oct. 2004, *P. Traiperm* 134 (BCU, BKF, KKU)]; Pattani [Sai Buri, 4 Aug. 1970, *S. Sutheesorn* 1820 (BK)]; Narathiwat [Bacho, 10 Jan. 1969, *P. sankhachand* 1677 (BK)].

Distribution.— Indo-china, Thailand and Malasia.

Ecology.— Common on sandy bank by stream or edge of deciduous forest, up to 1,100 m altitude. Flowering in May to January.

Vernacular.— Yakhao pa (หญ้าข้าวป่า) (Kanchanaburi).

Notes.— This species is easily recognised by hooks on each lateral side in the basal part of the lower glume of the sessile spikelet.

3. *Mnesithea helferi* (Hook. f.) de Koning & Sosef, *Blumea* 31(2): 291. 1986.— *Rottboellia helferi* Hook. f., *Fl. Brit. India* 7(21): 158. 1896.— *Coelorachis helferi* (Hook. f.) Henrard, *Blumea* 4(3): 518. 1941. Type: India, *Helfer* 913 (holotype K!).

Mnesithea rupincola Ridl., *J. Straits Branch Roy. Asiat. Soc.* 57: 116. 1911. Type: Malay Peninsula, Perak, *H.N. Ridley* 14357 (holotype SING!; isotypes BM!, K!).

Culms 50–100 cm tall, erect, internodes glabrous to pilose, nodes pubescent. *Leaf-sheaths* 6–10 cm long, tight, glabrous to pilose. *Ligules* 0.5–0.8 mm long,

membranous. *Leaf-blades* 15–50 by 0.8–1.5 cm, glabrous to pubescent on both surfaces, margins scabrous and pilose, acuminate at apex. *Inflorescence* composed of racemes, 9–12 cm long, terminal and axillary, subtended by a spatheole, rachis internodes cupuliform on upper part, basal part cuneate, glabrous, node at base with a ring of cilia; spikelets in pairs or triplets, 1–2 sessile spikelets and 1 pedicelled spikelet, callus long pilose, base truncate with central peg. *Sessile spikelets* dorsally compressed. *Glumes*: lower glume 3–3.5 by 1–1.2 mm, ovate, indurate, glabrous on the back, sometimes pilose on the lower part, apex bifid with oblique, 2 apical wings, wing unequal, the biggest wing usually along the apex to the base, margins entire; upper glume 2.5–3 by ca. 1 mm, ovate, 3-nerved, keeled along the midnerve from base to the apex, glabrous on the back, apex acute. *Lower floret* ca. 2 by 0.8 mm, lemma ovate, hyaline, folded; palea absent. *Upper floret* ca. 2.5 by 1.5 mm, lemma ovate, hyaline. *Lodicules* ca. 0.5 mm long, cuneate. *Anthers* ca. 2 mm long. *Pedicelled spikelet* present, 0.5–0.8 mm long, oblong, reduced into 2 asymmetrical glumes. *Pedicels* ca. 3 by 0.5 mm, ribbon-like, distinctly 2 green lines, glabrous, apex truncate and curved.

Thailand.— NORTH-EASTERN: Loei [Phu Rueda, 23 Apr. 2005, *P. Traiperm* 201 (BCU, BKF, KKU)]; Nong Khai [Chet Si Falls, Phu Wua Wildlife Sanctuary, 26 Aug. 2001, *R. Pooma et al.* 2718 (L)]; Sakon Nakhon [Phu Phan National Park, 29 Aug. 2004, *P. Traiperm* 123 (BCU, BKF, KKU)]; 6 Nov. 2004, *P. Traiperm* 153 (BCU, BKF, KKU)]; 3 Oct. 2005, *P. Traiperm* 203 (BCU, BKF, KKU)]; Khon Kaen [Mancha Khiri, 24 Aug. 2005, *P. Traiperm* 209 (BCU, BKF, KKU)]; EASTERN: Chaiyaphum [Phu Khiao, 19 Oct. 2005, *P. Traiperm* 225 (BCU, BKF, KKU)]; Si Sa Ket [Dongrak Range, 31 Dec.

2005, *P. Traiperm* 363 (BCU, BKF, KKU)]; Phu La-or Waterfalls, 31 Dec. 2005, *P. Traiperm* 364 (BCU, BKF, KKU)]; Ubon Ratchathani [Km 10, 2112 road to Khong Chiam, 23 Oct. 2005, *P. Traiperm* 252 (BCU, BKF, KKU)]; SOUTH-WESTERN: Kanchanaburi [Sai Yok, 1 Aug. 1928, *A. Marcan* 2367 (BM, K)]; Prachuap Khiri Khan [Huai Yang, 2 Jul. 1924, *A.F.G. Kerr* 10745 (BK, K)]; CENTRAL: Saraburi [Sam Lan Forest, Mueang, 15 Jun. 1974, *J.F. Maxwell* 74-586 (AAU, BK, L)]; SOUTH-EASTERN: Chanthaburi [Plain of Makham, 22 Aug. 1966, *K. Larsen et al.* 1682 (AAU)]; PENINSULAR: Songkhla [Hat Yai, 18 Oct. 2004, *P. Traiperm* 132 (BCU, BKF, KKU)]; Ton Lad Waterfalls, 19 Oct. 2004, *P. Traiperm* 136 (BCU, BKF, KKU)]; Ton Tad Pha Waterfalls, *P. Traiperm* 137 (BCU, BKF, KKU)].

Distribution.— Indo-china, Thailand and Malesia.

Ecology.— Tufted grass in evergreen, deciduous forests or swampy areas at 25–200 m altitude. Flowering in April to December.

Notes.— The collection of *A.F.G. Kerr* 10745 has glabrous rachis nodes, which is different from other specimens.

4. *Mnesithea laevis* (Retz.) Kunth, Révis. Gramin. 1: 154. 1829.— *Rottboellia laevis* Retz., *Observ. Bot.* 3: 11. 1783. Type: India, Tamil Nadu *Koenig* s.n. (holotype LD!; fragm. K!).

Mnesithea laevis var. *hirta* Jansen, *Reinwardtia* 2(2): 308. 1953. Type: Indonesia, Sulawesi: Saloe Karadjoe, *P.J. Eyma* 361 (holotype BO; isotype L!).

Culms 30–100 cm long, slender, erect, terete, glabrous. *Leaf-sheath* 4–7 cm long, glabrous, upper part with long ciliate hairs at margins. *Ligules* ca. 0.5 mm long, eciliate

membrane. *Leaf-blade* 15–70 by 0.2–0.5 cm, linear, incurved, glabrous on both surfaces, abruptly acute. *Inflorescence* 7–21 cm long, racemes, terminal or axillary; rachis internodes 3.5–4 mm long, cuneate, apex crateriform; spikelets sunken, arranged in two or three, usually in three on below. *Sessile spikelets* paired or solitary, oblong, dorsally compressed. *Glumes*: lower glume 3–3.5 by ca. 1 mm, oblong-ovate, coriaceous, glabrous, apex obtuse, wingless, margins entire; upper glume ca. 3 by 1 mm, oblong, membranous, slightly enfolded, obtuse at apex. *Lower floret*: lemma lanceolate, 2.5–2.8 mm long, hyaline; palea absent. *Upper floret* ca. 2.8 mm long; lemma lanceolate, hyaline; palea absent. *Pedicelled spikelet* absent. *Pedicels* fused to internode, united wholly.

Thailand.– NORTHERN: Chiang Mai [Doi Inthanon, ca. 5 km from Chom Thong, 3 Oct. 2001, *S. Laegaard & M. Norsangsri* 21657 (AAU, K, L), 15 Oct. 2001, *S. Laegaard & M. Norsangsri* 21713 (AAU); 24 Nov. 2005, *P. Traiperm* 307 (BCU, BKF, KKU); along road; Op Luang tableland, 12 Jun. 1968, *C.F. van Beusekom & C. Phengklai* 1192 (C, E, K, L, P)]; Sukhothai [N Sukhothai, between Tak and Ban Dan Lan Hoi, 24 Jul. 1973, *G. Murata et al.* 16988 (L)]; Kamphaeng Phet [20 Jul. 1959, *T. Smitinand* 5960 (BKF, K)]; Nakhon Sawan [10 km NW of Nakhon Sawan, 21 Jul. 1973, *G. Murata et al.* T-16580 (BKF, L, P)]; NORTH-EASTERN: Loei [Phu Kradueng, Ban Na Noi To Na Noi station, 26 Aug. 1988, *H. Koyama* T-61335 (BKF)]; Nong Khai [Dong Sichompu, 22 Jun. 1963, *Adisai* 550 (BK)]; Khon Kaen [Ban Nawng Khuean, 7 Jul. 1967, *T. Smitinand* 10406 (BKF)]; EASTERN: Chaiyaphum [Nong Bua Daeng, 15 Aug. 1972, *K. Larsen et al.* 31888 (AAU, L)]; Nakhon Ratchasima

[Huai Thalaeng, 24 Dec. 1828, *Put* 2239 (K); 20 Aug. 2001, *R. Pooma et al.* 2119 (L)]; Buri Ram [40 km S of Buriram, 4 Oct. 1984, *G. Murata et al.* T-37457 (BKF, L)]; Surin [Kap Choeng, 20 May 1965, *S. Sutheesorn* 305 (BK)]; Thung Kula Rong Hai, Chumphon Buri, 7 Sept. 1972, *S. Sutheesorn* 2117(BK)]; SOUTH-WESTERN: Kanchanaburi [Khao Tawng, 31 Aug. 1930, *A.F.G. Kerr* 19649 (BK, BM, K)]; Prachuap Khiri Khan [Khao Yai, 8 Nov. 1927, *A.F.G. Kerr* 13508 (BK, BM, K)]; Klong Wan, 21 Oct. 1964, *C. Chermisrivathana* 120 (BK)]; SOUTH-EASTERN: Sa Kao [Aranyaprathet, 9 Aug. 1930, *A.F.G. Kerr* 19584 (BK, BM, K)]; Chon Buri [Khao Khiao, 26 Apr. 1975, *J.F. Maxwell* 75-433 (AAU, BK, L)]; PENINSULAR: Surat Thani [Kanchanadit, 1 Aug. 1927, *A.F.G. Kerr* 13085 (BK, BM, K)]; Phatthalung [30 Apr. 1930, *A.F.G. Kerr* 19253 (BK, BM, K)]; Songkhla [Thepa, 23 Mar. 1928, *A.F.G. Kerr* 14720 (BM, K)]; 4 Dec. 1975, *A. Yiamudom* 27 (PSU); Songkhla-Pattani road, 55 km from Songkhla, 31 Oct. 1990, *K. Larsen et al.* 41021 (AAU, PSU); Highway 4, near Pru village, 8 Aug. 1994, *J.F. Maxwell* 84-8 (PSU); 23 km E of Chana, 21 Aug. 1995, *K. Larsen et al.* 45821 (AAU, L); Suan Toon Waterfalls, 11 Oct. 1984, *J.F. Maxwell* 84-306 (BKF, PSU); 1 Nov. 1993, *K. Larsen et al.* 44202 (AAU); Khao Chum Sak at Hat Yai, 12 Aug. 1995, *K. Larsen et al.* 45502 (AAU, L)]; Narathiwat [Rueso, 10 Nov. 1970, *S. Sutheesorn* 1843 (BK)].

Distribution.– India, China, Indo-china and Thailand.

Ecology.– Dry deciduous, dipterocarp, bamboo or pine forests, up to 400 m altitude. Flowering in July to May.

Notes.— *A.F.G. Kerr* 13508 has a longitudinal slit on the back of the lower glume of the sessile spikelet.

5. *Mnesithea mollicoma* (Hance) A. Camus, Bull. Mus. Natl. Hist. Nat. 25(1): 57. 1919.— *Rottboellia mollicoma* Hance, J. Bot. 9: 134. 1871.— *Coelorachis mollicoma* (Hance) Bor, Dansk Bot. Ark. 20: 168. 1962. Type: China, Guangdong, *Hance* 7558 (lectotype G, isolectotypes K!, BM!), designated by Roberty (1960).

Mnesithea pubescens Ridl., J. Straits Branch Roy. Asiat. Soc. 44: 207. 1905. Type: Malay Peninsula, *H.N. Ridley* 11017 (holotype K!).

Culms 30–100 cm tall, erect, internodes pilose with appressed hairs, nodes pubescent. *Leaf-sheaths* 6–10 cm long, loose, pubescent. *Ligules* 1–1.5 mm long, membranous with long ciliate margins. *Leaf-blades* 20–60 by 0.8–1.8 cm, pubescent on both surfaces, apex acute. *Inflorescence* composed of racemes, 8–14 cm long, terminal and axillary, subtended by a spatheole; rachis internodes cupuliform on upper part, basal part cuneate, glabrous, nodes with a ring of ciliate hairs; spikelets in pairs or triplets, callus pubescent. *Sessile spikelets*: lower glume 3.5–4.5 by 1.8–2 mm, oblong-ovate, indurate, subequal narrow winged along margins, continuous ridge along the length and interrupted by hairs or tubercle-based hairs on the back, margins entire; upper glume *ca.* 3.5 by 1 mm, ovate or boat-shaped, 3-nerved, keeled along the upper back, glabrous, apex acute. *Lower floret*: lemma *ca.* 2.5 by 1 mm, ovate, hyaline, folded; palea absent. *Upper floret*: lemma *ca.* 3 by 2 mm, ovate, 3-nerved, hyaline; palea *ca.* 2.8 by 1 mm, ovate, hyaline. *Lodicules* 0.5 mm long, cuneate. *Anthers ca.* 2 mm long. *Pedicelled spikelet*

present, 0.5–1.5 mm long, ovate, reduced into 2 asymmetrical glumes. *Pedicels* 3–4.5 by 0.5–0.8 mm, oblong or ribbon-like, with distinctly 2 green lines, glabrous, apex truncate, curved.

Thailand.— NORTHERN: Chiang Mai [Along the highway between Mae Sariang and Chom Thong, 19 Sept. 1967, *K. Iwatsuki & N. Fukuoka* T-10393 (BKF, E, L); Doi Suthep, 23 Jul. 1958, *Th. Sørensen et al.* 4377 (C, E, K); 27 Jul. 1958, *Th. Sørensen et al.* 4494 (C, K); 30 Aug. 1958, *Th. Sørensen et al.* 4629 (C, K); 10 May 1958, *Th. Sørensen et al.* 5463 (C); 9 Dec. 1965, *T. Smitinand* 10006 (BKF); 18 Sept. 1967, *T. Shimizu et al.* T-10473 (BKF, L); 22 Aug. 1987, *J.F. Maxwell* 87-856 (BKF, L), 87-1020 (BKF, CMU, L), 88-1106 (BKF, CMU, L), 92-622 (L, P) & 93-19 (L, P); Nam Mae Klang, Doi Inthanon, 3 Aug. 1988, *H. Koyama* T-61213 (BKF, L), T-61248 (BKF), T-61625 (AAU, BKF, L); 3 Aug. 1988, *S. Tsugaru* T-61849 (AAU, BKF, L); 14 Jun. 2004, *P. Traiperm* 112 (BCU, BKF, KKU) & 113 (BCU, BKF, KKU); 22 Nov. 2005, *P. Traiperm* 296 (BCU, BKF, KKU); 24 Nov. 2005, *P. Traiperm* 305 (BCU, BKF, KKU); Forest above Training Center of Queen Sirikit Botanical Garden, 9 Oct. 2001, *S. Laegaard & M. Norsaengsri* 21688 (AAU, L); Lamphun [En route from Ban Khun Tan to Doi Khun Tan, 9 Apr. 1967, *M. Tagawa et al.* T-9205 (BKF); Mae Tah, 28 Jul. 1994, *J.F. Maxwell* 94-808 (L)]; Lampang [Khun Tan, 4 Dec. 2005, *P. Traiperm* 320 (BCU, BKF, KKU)]; NORTH-EASTERN: Phetchabun [Nam Nao National Park, 17 Nov. 2005, *P. Traiperm* 280 (BCU, BKF, KKU)]; Loei [Phu Ruea, 24 Jul. 2004, *P. Traiperm* 117; 28 Mar. 2005, *P. Traiperm* 378 (BCU, BKF, KKU)]; EASTERN: Chaiyaphum [Phu Khiao, 27 Nov. 2004, *P. Traiperm* 182 (BCU, BKF, KKU)]; Phu

Lanka, 1 Jan. 2006, *P. Traiperm* 368 (BCU, BKF, KKU)]; Nakhon Ratchasima [Huai Thalaeng, 12 Dec. 1928, *Put* 2238 (BK, BM)]; SOUTH-EASTERN: Chanthaburi [Makham, 4 Aug. 1954, *T. Smitinand* 1827 (BKF, K); 22 Aug. 1966, *K. Larsen et al.* s.n. (BKF); 19 Nov. 2005, *P. Traiperm* 290 (BCU, BKF, KKU)]; PENINSULAR: Surat Thani [6 Jan. 1927, *A.F.G. Kerr* 11282 (BK, BM, K); Kanchanadit, 1 Aug. 1927, *A.F.G. Kerr* 13074 (BK, K)]; Trang [Thung Kai, 22 Oct. 2004, *P. Traiperm* 141 (BCU, BKF, KKU)]; Songkhla [Koh Hong, Hat Yai, 18 May 1960, *C. Chantaraprasong* 25 (BK); 11 Aug. 1984, *J.F. Maxwell* 84-33 (BKF, PSU); Hat Yai, 18 Oct. 2004, *P. Traiperm* 131 (BCU, BKF, KKU); 23 km E of Chana, 21 Aug. 1995, *K. Larsen et al.* 45819 (AAU, L)].

Distribution.— China, Indo-china, Thailand and Malasia.

Ecology.— Common in mixed deciduous forest, at sea level to 1,200 m altitude. Flowering throughout the year.

6. *Mnesithea striata* (Nees ex Steud.) de Koning & Sosef, *Blumea* 31(2): 292. 1986.—*Rottboellia striata* Nees ex Steud., *Syn. Pl. Glumac.* 1: 361. 1854.—*Coelorachis striata* (Nees ex Steud.) A. Camus *Ann. Soc. Linn. Lyon*, sér. 2 (68): 197. 1922. Type: *Wall. Cat. no.* 8877-C (lectotype K-W!; isolectotypes K!, P!), designated by Veldkamp, Koning & Sosef (1986).

Mnesithea merguensis (Hook. f.) A. Camus, *Bull. Mus. Natl. Hist. Nat.* 25: 59. 1919.—*Rottboellia merguensis* Hook. f., *Fl. Brit. India* 7(21): 158. 1896. Type: Burma, Tenasserim, Mergui, *J.W. Helfer* 457 (lectotype K!; isolectotypes L!, G), designated by Roberty (1960).

Key to the varieties

1. Leaf-blades glabrous on both surfaces; lower glume of the sessile spikelet glabrous or nearly smooth on the back **a. var. *striata***
1. Leaf-blades pilose or pubescent on both surfaces; lower glume of the sessile spikelet with continuous ridges along the length and interrupted by tubercles or tubercle-based hairs, margins glabrous **b. var. *pubescens***

a. var. *striata*

Culms up to 2 m tall, erect, terete, internodes glabrous, nodes slightly hairy or glabrescent. *Leaf-sheaths* 5–12 cm long, nearly tight, glabrous, margins pilose. *Ligules* 1.5–2 mm long, membranous with ciliate margins. *Leaf-blades* 30–60 by 1–2 cm, glabrous on both surfaces, margins scabrous and pilose, apex acute. *Inflorescence* composed of many racemes, 8–12 cm long, terminal and axillary, subtended by a spatheole; rachis internodes 4–6.5 by ca. 1 mm, oblong, flattened at base swollen at the upper part, glabrous, nodes glabrous; spikelets in pairs or triplets, callus glabrous. *Sessile spikelets* dorsally compressed. *Glumes*: lower glume 3.5–5 by 1–1.5 mm, oblong-ovate, indurate, glabrous or nearly smooth on the back, apex with 2 small apical wings, margins entire; upper glume 3–4 by 1–1.5 mm, boat-shaped, acute, keeled on the back, on the upper part, glabrous. *Lower floret*: lemma ca. 2.8 by 0.8 mm, ovate-acute, 3-nerved, hyaline, glabrous; palea ca. 2 by 0.5 mm, lanceolate, hyaline, glabrous. *Upper floret*: lemma ca. 2.8 by 0.8 mm, ovate-acute, hyaline, glabrous; palea ca. 2.5 by 0.5 mm, boat-shaped, hyaline, glabrous, apex acute. *Lodicules* ca. 0.5 mm long, cuneate. *Anthers*

1.8–2 mm long. *Pedicelled spikelet* present, 1–2.5 mm long, oblong or ovate, reduced into 2 asymmetrical glumes, glumes dissimilar, winged at the apex, slightly folded, glabrous. *Pedicels* 3.5–4.5 by ca. 1 mm, oblong or ribbon-like with distinct 2 green lines, glabrous, apex concave.

Thailand.— NORTHERN: Chiang Mai [Mae Sa Valley, *J.K. Jackson* 6165 (BKF); Doi Suthep, 22 Jun. 1958, *Th. Sørensen et al.* 3689 (C, K); 7 Jan. 1993, *J.F. Maxwell* 93-18 (L, P); 22 Nov. 2005, *P. Traiperm* 298 (BCU, BKF, KKU); Doi Pui, 24 Mar. 1965, *C.H. & B.S.* 305 (BKF); Pangboh, Hill E of Camp, 3 Nov. 1965, *T. Smitinand* 8715 (BKF); 15 Oct. 1992, *J.F. Maxwell* 92-622 (P); Wang Tao, N of Chiang Mai, 13 Feb. 1958, *Th. Sørensen et al.* 1080 (K); Doi Inthanon, en route from Pha Mon (Ban Yang) to the camp, 10 Feb. 1971, *G. Murata et al.* T-15870 (BKF); along Nam Mae Klang, 3 Aug. 1988, *H. Koyama* T-61213 (L); 30 Jul. 1988, *H. Koyama* T-61625 (AAU, L); 3 Aug. 1988, *S. Tsugaru* T-61849 (AAU, L); Tham Chiang Dao, 16 Feb. 1958, *Th. Sørensen et al.* 1161 (C); Doi Chiang Dao, 1 Jun. 1966, *M. Tagawa et al.* T-4416 (BKF); Wieng Pa Pao, Doi Luang National Park, 26 Oct. 1997, *J.F. Maxwell* 97-1223 (BKF, L); above Training Center of Queen Sirikit Botanical Garden, 24 Sept. 2001, *S. Laegaard* 21613 (AAU); 5 Oct. 2001, *S. Laegaard* 21677 (AAU)]; Lamphun [Mae Tah, 24 Sept. 1993, *J.F. Maxwell* 93-1081 (BKF, L)]; Lampang [Chae Son National Park, 20 Oct. 1995, *J.F. Maxwell* 95-924 (BKF, L); Khun Tan, 4 Dec. 2005, *P. Traiperm* 325 (BCU, BKF, KKU)]; Tak [Doi Musoe, 12 Sept. 1960, *T. Smitinand* 7081 (BKF)]; Sukhothai [Khao Luang, 17 Dec. 2005, *P. Traiperm* 343 (BCU, BKF, KKU), 344 (BCU, BKF, KKU), 345 (BCU, BKF, KKU)]; NORTH-EASTERN: Phetchabun [Nam Nao, 20 Aug.

2004, *P. Traiperm* 121 (BCU, BKF, KKU); 20 Nov. 2004, *P. Traiperm* 172 (BCU, BKF, KKU) & 173 (BCU, BKF, KKU); Phu Khiao, 19 Oct. 2005, *P. Traiperm* 211 (BCU, BKF, KKU), 223 (BCU, BKF, KKU)]; Loei [Phu Kradueng, 12 Nov. 2004, *P. Traiperm* 156 (BCU, BKF, KKU)]; Khon Kaen [Phu Khiao, ca. 80 km E of Phetchabun, 11 Jul. 1984, *G. Murata et al.* T-41627 (BKF)]; EASTERN: Nakhon Ratchasima [Huai Thalaeng, 12 Dec. 1928, *Put* 2238 (BK, BM)]; SOUTH-WESTERN: Kanchanaburi [Huai Bankau, 9 Nov. 1971, *C.F. van Beusekom et al.* 3597 (BKF, P)]; PENINSULAR: Phangnga [Khao Phra Mi, 9 Jan. 1966, *B. Hansen & T. Smitinand* 11868 (BKF, C, K); Khlong Nang Yon, 28 Apr. 1973, *R. Geesink & T. Santisuk* 5004 (BKF, P)].

Distribution.— China, India, Indo-china and Thailand.

Ecology.— On sunny slope, edge of dipterocarp forest or in evergreen forest, up to 1,225 m altitude. Flowering in June to February.

Vernacular.— Yakhon (หญ้างาม) (Nakhon Ratchasima).

b. var. *pubescens* (Hack.) S.M. Phillips & S.L. Chen, *Novon* 15(3): 470. 2005.— *Rottboellia striata* var. *pubescens* Hack., *Monogr. Phan.* 6: 302. 1889.— *Coelorachis striata* var. *pubescens* (Hack.) Bor, *Grass. Burma, Ceylon, India & Pakistan*: 121. 1960. Type: India, Khasia, Meghalaya, *J.D. Hooker & T. Thomson* s.n. (holotype K!, isotype L!).

Culms up to 1.5 m tall, erect, terete, internodes glabrous, nodes slightly hairy to pubescent. *Leaf-sheaths* 6.5–15 cm long, tight, glabrous to pilose, if glabrous usually pilose at margins. *Ligules* membranous with

ciliate margins. *Leaf-blades* up to 70 by 1–2.5 cm, pilose or pubescent on both surfaces, margins scabrous and pilose, apex acute. *Inflorescence* composed of many racemes, 7–11 cm long, terminal and axillary, subtended by a spatheole; rachis internodes 3.5–4.5 by 1–1.5 mm, clavate, swollen at the upper part, glabrous, nodes glabrous; spikelets in pairs or triplets, callus glabrous. *Sessile spikelets* dorsally compressed. *Glumes*: lower glume 4.5–5 ca. 1.5 mm, oblong-ovate, indurate, continuous ridge along the length and interrupted by tubercles, or tubercle-based hairs, apex with 2 apical wings, margins entire; upper glume ca. 3.5 by 1 mm, boat-shaped, keeled on the back, on the upper part, glabrous, apex acute. *Lower floret*: lemma ca. 2.8 by 0.8 mm, ovate-acuminate, hyaline, glabrous, slightly folded; palea ca. 2 by 0.3 mm, lanceolate, hyaline, muticous. *Upper floret*: lemma ca. 2 by 0.3 mm, lanceolate, hyaline, glabrous; palea ca. 2.5 by 0.8 mm, boat-shaped, hyaline, glabrous, apex acute. *Lodicules* ca. 0.5 mm long, cuneate. *Anthers* 2–2.5 mm long. *Pedicelled spikelet* present, 0.5–2 mm long, oblong, reduced into 2 asymmetrical glumes, glumes dissimilar, winged at apex, slightly folded, glabrous. *Pedicels* 3.5–4.5 by 0.8–1 mm, oblong or ribbon-like, with distinct 2 green lines, glabrous, apex concave.

Thailand.— NORTHERN: Mae Hong Son [Huai He, Mueang, 22 Dec. 2005, *P. Traiperm* 349 (BCU, BKF, KKU)]; Chiang Mai [Doi Suthep, 11 Nov. 1911, *A.F.G. Kerr* 1601B (BM, E, K); 25 Nov. 1920, *J.F. Rock* 187 (P); 8 Feb. 1958, *Th. Sørensen et al.* 878 (BKF, C); 20 Apr. 1958, *Th. Sørensen et al.* 2923 (C); 27 Sept. 1958, *Th. Sørensen et al.* 5280 (C); 21 Nov. 2005, *P. Traiperm* 295 (BCU, BKF, KKU)]; Doi Inthanon, 24 Nov. 2005, *P. Traiperm* 306 (BCU, BKF, KKU); Doi Chiang Dao, 22

Sept. 1990, *J.F. Maxwell* 90-1033 (AAU, CMU, L); 10 Oct. 1995, *J.F. Maxwell* 95-881 (BKF, L); Queen Sirikit Botanical Garden, 26 Nov. 2005, *P. Traiperm* 313 (BCU, BKF, KKU), 314 (BCU, BKF, KKU) & 315 (BCU, BKF, KKU); Mae Sao, 18 Dec. 2005, *P. Traiperm* 346 (BCU, BKF, KKU); Hill between Thoen & Lee, 29 Nov. 1959, *T. Smitinand & E.C. Abbe* 6168 (K); Chiang Rai [Doi Tung: en route from Ban Huai Khrai to Wat Doi Tung, 24 Sept. 1967, *K. Iwatsuki et al.* T-10929 (BKF, E)]; Lampang [Khun Tan, 4 Dec. 2005, *P. Traiperm* 322 (BCU, BKF, KKU), 324 (BCU, BKF, KKU)]; NORTH-EASTERN: Phetchabun [Nam Nao, 20 Nov. 2004, *P. Traiperm* 168 (BCU, BKF, KKU), 169 (BCU, BKF, KKU) & 174 (BCU, BKF, KKU); 17 Nov. 2005, *P. Traiperm* 281 (BCU, BKF, KKU); 7 Jan. 2006, *P. Traiperm* 373 (BCU, BKF, KKU)]; Thung Salaeng Luang, 17 Nov. 2005, *P. Traiperm* 283 (BCU, BKF, KKU) & 286 (BCU, BKF, KKU)]; Loei [Phu Ruea, 6 Dec. 2004, *P. Traiperm* 198; 23 Apr. 2005, *P. Traiperm* 200 (BCU, BKF, KKU); 15 Nov. 2005, *P. Traiperm* 326 (BCU, BKF, KKU)]; Phu Kradueng, 31 Oct. 2005, *P. Traiperm* 272 (BCU, BKF, KKU)]; Khon Kaen [Khok Phu Taka, 9 Sept. 2004, *P. Traiperm* 126 (BCU, BKF, KKU)]; EASTERN: Chaiphum [Phu Khiao, 27 Nov. 2004, *P. Traiperm* 184 (BCU, BKF, KKU) & 185 (BCU, BKF, KKU); 19 Oct. 2005, *P. Traiperm* 224 (BCU, BKF, KKU), 227 (BCU, BKF, KKU) & 228 (BCU, BKF, KKU)]; SOUTH-WESTERN: Kanchanaburi [Sai Yok, 7 Dec. 1961, *K. Larsen* 8581 (C, K)]; PENINSULAR: Phangnga [Khao Phra Mi, 9 Jan. 1966, *B. Hansen & T. Smitinand* 11868 (BKF, K); Khlong Nang Yon, 28 Apr. 1973, *R. Geesink & T. Santisuk* 5004 (BKF, C, E, P)].

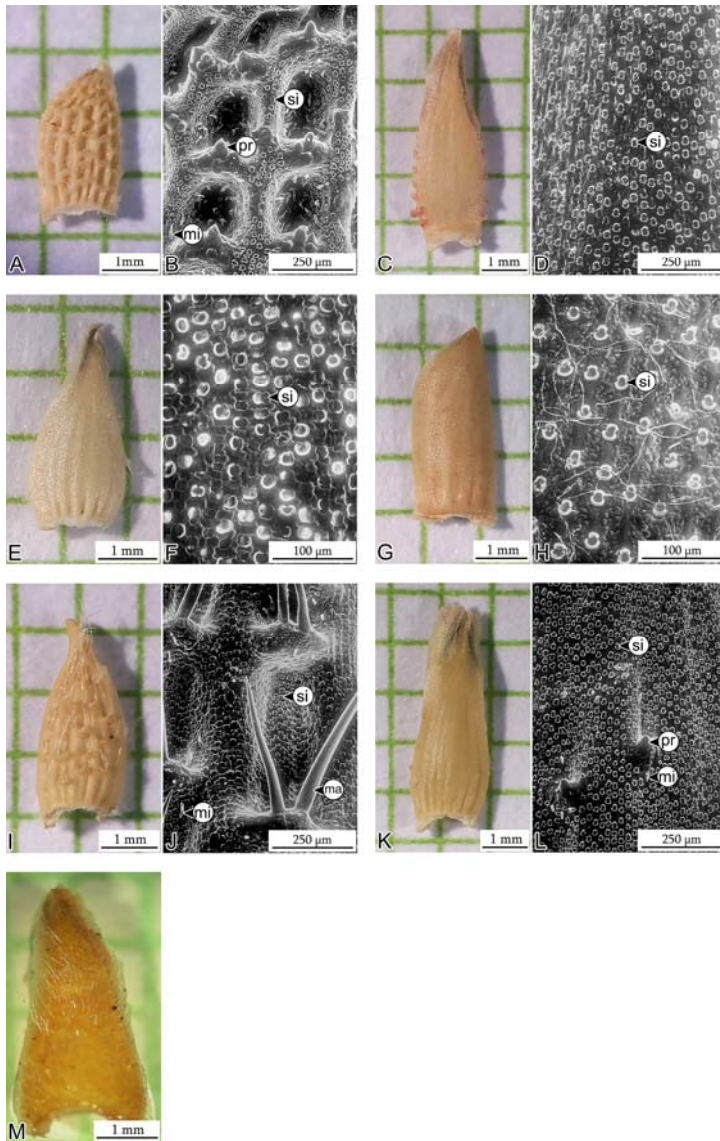


FIGURE 2. Epidermal features of the lower glume of the sessile spikelet; A, C, E, G, I, K and M from stereomicroscope; B, D, F, H, J and L from SEM. **A-B.** *M. cancellata*; **C-D.** *M. glandulosa*; **E-F.** *M. helferi*; **G-H.** *M. laevis*; **I-J.** *M. mollicoma*; **K-L.** *M. striata* var. *striata*; **M.** *M. thailandica*. Abbreviations: ma, macro-hairs; mi, micro-hairs; pr, prickles; si, silica bodies.

Distribution.– China, India, Indo-china and Thailand.

Ecology.– Common in moist localities in mixed deciduous forest, at 100–2,200 m altitude. Flowering in September to April.

Notes.– This variety is newly recorded for the country.

TABLE 1. The epidermal features of the lower glume of the sessile spikelet in *Mnesithea* species (followed Sumanon and Traiperm (2013), and Ortunez and Cano-Ruiz (2013)).

Characters	Species		
	<i>M. cancellata</i>	<i>M. glandulosa</i>	<i>M. helferi</i>
Sculpture on lower glume surface	prominent cancellate ridge	smooth	continuous slits
Shaped of silica bodies	dumbbell shaped	dumbbell shaped	saddle-shaped
Silica bodies arrangement	vertical	vertical	horizontal
Presence of bi-cellular micro-hairs	present abundantly (>10 hairs/250x)	absent	absent
Presence of unicellular macro-hairs	absent	absent	absent
Presence of prickle-hairs	present	absent	absent

* No data available for *M. thailandica* due to dense hairs covered the entire lower glume

7. *Mnesithea thailandica* Traiperm & Boonkerd, Kew Bull. 65(2): 341. 2010. Type: Thailand, Roi Et, Nayai, *Y. Paisooksantivathana* & *S. Suthesorn* y1048-82 (holotype, BK!).

Culms 26 cm tall, erect, slender, internodes pilose to pubescent, nodes dense ciliate hairs. *Leaf-sheaths* 2.5–6 cm long, loose, pilose. *Ligules* ca. 0.5 mm long, membranous with ciliate margins. *Leaf-blades* 5–20 by 0.4–0.8 mm, pilose on both surfaces, apex acute. *Inflorescence* composed of racemes, ca. 6 cm long, terminal, subtended by a spatheole; rachis internodes 2–2.5 mm long, cupuliform, with densely appressed hairs, nodes pubescent; spikelets in pairs, callus pubescent. *Sessile spikelets* dorsally compressed. *Glumes*: lower glume ca. 4 by 2 mm, triangular, indurate, smooth and densely appressed

hairs on the back, apex with 2 narrow wings, margins folded; upper glume ca. 3 by 1.3 mm, ovate or boat-shaped, keeled on the back and pilose along keel. *Lower floret*: barren, with small palea. *Stamens* 3; anthers ca. 1 mm long, yellow; stigmas 2, plumose. *Pedicelled spikelet* present, ca. 1 mm long, oblong, reduced into 2 asymmetrical glumes, keeled along the margins, with densely appressed hairs on surface. *Pedicels* ca. 3 by 0.6 mm, oblong or ribbon-like with densely appressed hairs.

Thailand.— EASTERN: Roi Et [Suwannaphum, Nayai, Ban Hang Hoei, 10 June 1982, *Y. Paisooksantivathana* & *S. Suthesorn* y1048-82 (BK)].

Distribution.— Endemic to Thailand.

Ecology.— Common in paddy field, at 100 m altitude. Flowering in June.

TABLE 1. continued.

Species			
<i>M. laevis</i>	<i>M. mollicoma</i>	<i>M. striata</i>	<i>M. thailandica</i>
smooth	prominent cancellate ridge	continuous slits	smooth
dumbbell shaped	dumbbell shaped	dumbbell shaped	N/A*
vertical	horizontal	vertical	N/A*
absent	present rarely (≤10 hairs/250x)	present rarely (≤10 hairs/250x)	N/A*
absent	present	absent	present
absent	absent	present	N/A*

Note.— *Mnesithea thailandica* is distinguished by the appressed hairs on the inflorescence. It is similar to a Malaysian species, *M. geminata* but differs in having a small erect and slender culm, ca. 26 cm tall. The species has pubescent hairs on the back of the triangular lower glume, rachis nodes, pedicels and rachis internode, while lanceolate and hirsute below and glabrous on rachis nodes, pedicels and rachis internode in *M. geminata*.

EPIDERMAL FEATURES OF THE LOWER GLUME OF THE SESSILE SPIKELET

The general character found on epidermal cells of the lower glumes of the sessile spikelet was silica bodies, while micro-hairs, macro-hairs and prickle-hairs were present in some species. There are two types of lower glume, a prominent cancellate ridge in *M.*

cancellata and *M. mollicoma* (Figs. 2A, B, I, J), and smooth or continuous slit surface in the remaining species (Figs. 2C-H, K-M). Silica bodies were commonly found in all species; two types of silica body shapes were noted: saddle-shaped in *M. helferi*, and dumbbell-shaped in all other species (Fig. 2F). The silica bodies were arranged symmetrically in a row. In *M. cancellata*, *M. glandulosa*, *M. laevis* and *M. striata*, they are arranged vertically, and horizontally in *M. helferi* and *M. mollicoma*. Bi-cellular micro-hairs with pointed distal cells and parallel basal cells are found. This character is more abundant on the edge of the ridge and the furrow of *M. cancellata* (> 10 hairs in the observing field at 250 μm magnification of SEM) (Fig. 2B), but rarely found on *M. mollicoma* and *M. striata* surfaces (≤10 hairs) (Figs. 2J, L). Unicellular macro-hairs are present in the horizontal ridge of *M.*

mollicoma (Fig. 2J), while in *M. thailandica* they cover the entire lower glume (Fig. 2M). Prickle unicellular hairs with pointed tips were found in *M. cancellata* and *M. striata* (Figs. 2B, K). All the characters described above are summarized in Table 1.

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