

The tribe *Centothecae* (Poaceae) in Thailand

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ABSTRACT. Two genera and three species are recognized for the tribe *Centothecae* in Thailand. Keys to the genera and species, together with descriptions and illustrations, are provided.

Tribe *Centothecae* consists of 11 genera and 33 species, all exhibiting a tropical distribution. The tribe was established by Ridley (1907) in subfamily *Pooideae* of the Poaceae. The tribe consists of two genera, *Centotheca* and *Lophatherum*, which are restricted to Southeast Asia. Ridley's work has been accepted by many botanists such as Bor (1960), Gilliland *et al.* (1971) and Koyama (1987). Clayton & Renvoize (1986) placed the tribe in subfamily *Centothecoideae* and considered it to be most close to *Chloridoideae*. Watson & Dallwitz (1992) placed the tribe under the supertribe *Oryzoidae* in *Bambusoideae*. Common characters are cross-nerves in the leaves and pseudopetioles; 1-many flowered spikelets that are bisexual with the upper florets reduced, laterally compressed and disarticulating below the glumes; glumes subequal or unequal, chartaceous, shorter than the spikelet; fertile lemma usually 5–9-nerved, chartaceous, glabrous with bulbous-based bristles near the margins, awnless or with a retrorsely scabrid awn from the tip; palea hyaline, 2-keeled; lodicules 2, cuneate; stamens 2 or 3; and stigmas 2, shortly connate at base.

Two genera and three species are recognized in Thailand.

KEY TO THE GENERA

- 1. Florets 1–3, bisexual, upper lemmas awnless with sub-marginal bulbous-based bristles ***Centotheca***
- 1. Florets more than 3, only the lowest bisexual, the upper reduced and sterile; all lemmas awned and forming a brush-like tuft of awns from apex of spikelet, bristles absent ***Lophatherum***

CENTOTHECA

Desv. in Nouv. Bull. Sci. Soc. Philom. Paris 2: 189. 1810, as '*Centosteca*' orth. cons.

Perennials; culms erect. Leaf blades broadly elliptic to lanceolate. Ligule membranous. Inflorescence an open panicle. Spikelets laterally compressed, with 1–3 florets. Glumes membranous or chartaceous. Lemmas chartaceous, 5–7-nerved, awnless, with sub-marginal retrorse tubercle-based bristles. Paleas boat-shaped, 2-keeled.

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About four species distributed in the old world tropics. Two species in Thailand.

KEY TO THE SPECIES

1. Leaf-blade lanceolate, less than 20 cm long, base oblique; apex acute; lower lemma glabrous or hispidulous, mucronate at the tip **1. *Centotheca lappacea***
1. Leaf-blade linear to narrowly lanceolate, more than 25 cm long, base narrow, symmetric, apex acuminate; lower lemma with sub-marginal tubercle-based bristles, emucronate at the tip **2. *Centotheca longilamina***

1. *Centotheca lappacea* (L.) Desv., *Nouv. Bull. Sci. Soc. Philom. Paris* 2: 189. 1810. Type: "Habitat in India", *Herb. Linn.* No. 1212.15 (neotype **LINN**, not seen).—*Cenchrus lappaceus* L., *Sp. Pl.* 2, 2: 1488. 1763.—*Holcus latifolius* Osb., *Dagb. Ostind. Resa* 247. 1757.—*Centotheca latifolia* Trin., *Fund. Agrost.* 141. 1820, nom. illeg. superfl. Fig 1.

Tufted, perennial rooting at lower nodes. Culms erect, 30–60 cm tall, smooth, glabrous; nodes dark green or purplish. Leaf-sheaths shorter to slightly longer than the internode, glabrous, 5–12 cm long with cilia on the margins. Ligules membranous, ca. 1.5 mm long, rounded at apex. Leaf-blades lanceolate, 10–15 by 2–5 cm; base slightly oblique, glabrous or sparsely strigose with bulbous-based hairs on upper surface, apex acute. Inflorescence an open panicle, elliptic in outline, 10–15 by 5–10 cm; branches patent, mostly single at nodes, some binate, 3–16 cm long, angular, scabrous. Spikelets with pedicels, 1.5 by 1.7 mm long, elliptic, 5–7 by 2–2.5 mm, weakly flattened with 1–3 flowers. Lower glume chartaceous, 2.5–2.7 by 0.5–0.7 mm, 3-nerved, scabrid towards the apex. Upper glume lanceolate, 3–3.5 by 0.5–0.7 mm, 3-nerved, the midnerve protruding to an awnlet. Lower floret bisexual. Lower lemma lanceolate, 4–4.2 by 1–1.2 mm, 7-nerved, glabrous or hispidulous, apex with an awnlet. Palea hyaline, boat-shaped, 3–3.2 mm long, margins ciliate. Stamens 2 or 3. Caryopsis ellipsoid, dark brown, 1–1.2 mm long. Upper floret mostly sterile. Upper lemmas lanceolate, 3–3.2 by 0.3–0.5 mm, 7-nerved, bearing bulbous-based bristles retrorsing at maturity along margins. Palea keeled, boat-shaped, 3–3.2 mm long, hyaline, margins finely ciliate.

Thailand.—NORTHERN: Chiang Mai [Doi Suthep, 30 Oct. 1909, *Kerr* 868 (**K**); Pong Nam Ron, Fang district, 17 April 1953, *Kasin* 395 (**BK**); Doi Suthep, 4 Oct. 1958, *Sørensen et al.* 5426 (**K**); Hua Kutun, 30 Jan. 1970, *Sutheesorn* 1520 (**BK**)]; Lampang [Chae Son National Park, 21 Oct. 1995, *Maxwell* 95–943 (**BKF**)]; Phrae [Mae Ram village, Tao Poon, Song district, 27 Nov. 1986, *Paisooksantivatana* s.n. (**BK**)]; Nakhon Sawan [Takhli, 26 Nov. 1928, *Put* 2133 (**BK, K**)]; NORTHEASTERN: Phetchabun [Phu Miang, 20 Oct. 1967, *Shimizu et al.* T-11408 (**BKF**)]; Loei [Phu Kradueng National Park, 16 Oct. 1954, *Smitinand* 2033 (**BKF**); 15 Nov. 1979, *Shimizu et al.* T-22756 (**BKF**); 30 Oct. 1984, *Murata et al.* T-42088 (**BKF**); 13 Sept. 1990, *Chantaranothai et al.* 90/193 (**K**)]; Nong Khai [Phon Pisai, 19 Nov. 1963, *Pradit* 209 (**BK**)]; Sakon Nakhon [Nakum, 28 Nov. 1962, *Adisai* 176 (**BK**)]; Kalasin [Phu Phan National Park, 12 Nov. 1965, *G. Murata et al.* T-50674 (**BKF**)]; Khon Kaen [Pha Nok Khao, 26 Nov. 1965, *M. Murata* T-324 (**AAU, BKF, K**)]; EASTERN: Ubon Ratchathani [Sae Waterfall, 12 Dec. 1954, *Phengnaren* s.n. (**BKF**)]; SOUTHWESTERN: Uthai Thani [To Tone Waterfall, Huai Kha Khaeng, Lan Sak district, 12 Nov. 1979, *Shimizu et al.* T-22558 (**BKF**)]; Kanchanaburi

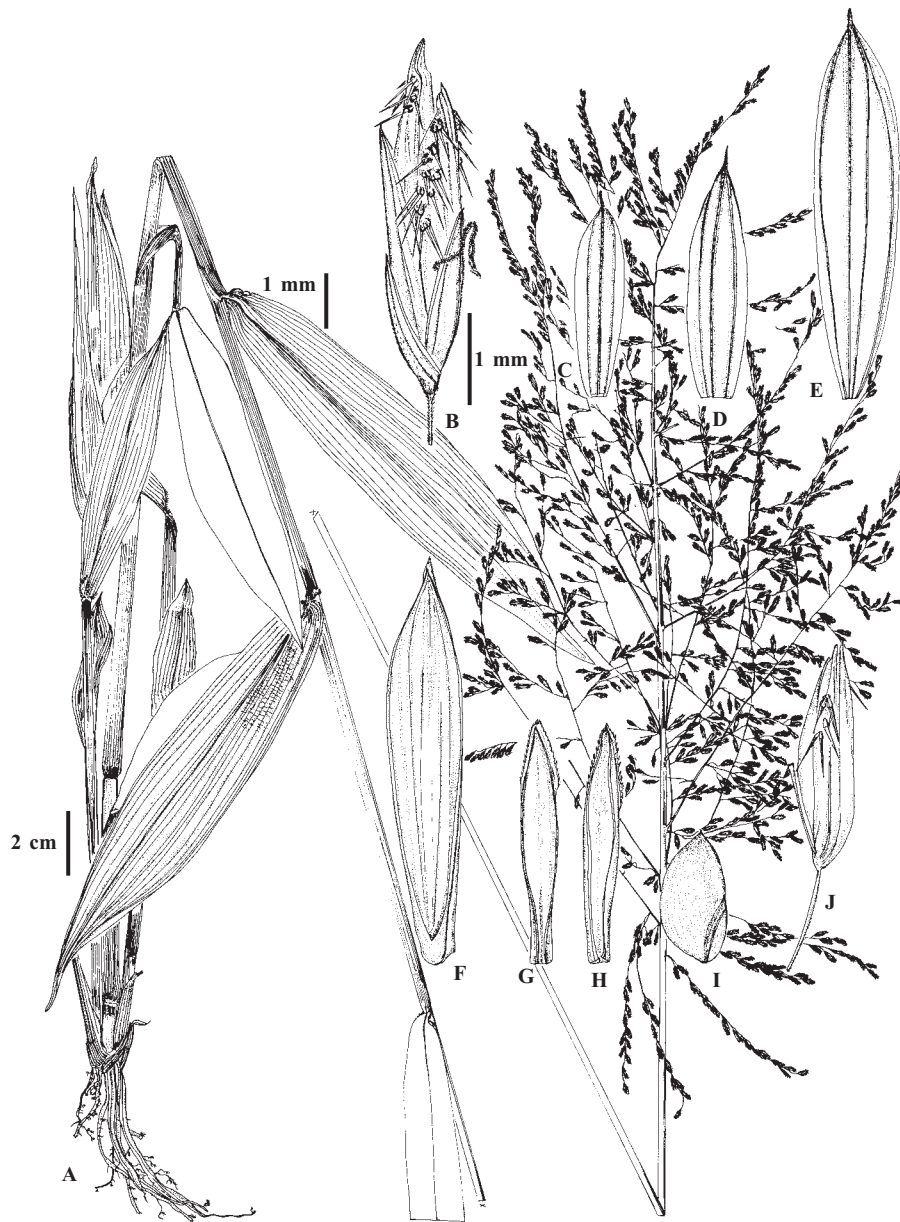


Figure 1. *Centotheca lappacea* (L.) Desv., A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E, F. Lower lemma; G, H. Palea; I. Caryopsis; J. Upper floret. Drawn by M. Norsaeangri.

[Sai Yok, 5 Dec. 1961, *Larsen* 8529 (**K**), 9 Nov. 1971, *van Beusekom et al.* 3609 (**K**); Erawan National Park, Sri Sawat district, 3 Nov. 1979, *Shimizu et al.* T-21527 (**BKF**); Sai Yok National Park, 5 Nov. 1979, *Shimizu* T-21667 (**BKF**); Tham Than Lot National Park, 7 Nov. 1979, *Shimizu et al.* T-21991 (**BKF**); Phachuap Khiri Khan [3 July 1920, *Kerr* 10771 (**K**); Hin Sang, 3 July 1926, *Kerr* 10771 (**BK**); CENTRAL: Chai Nat [10 Jan. 1930, *Put* 2670 (**K**) & *Put* 4371 (**BK**); Saraburi [Sam Lan, Muang, 2 Nov. 1974, *Maxwell* 74–962 (**BK**); 7 Dec. 1974, *Maxwell* 74–1015 (**BK**); Nakhon Nayok [Salica Waterfall, 11 Nov. 1964, *Sutheesorn* 38 (**BK**); Khao Yai National Park, 8 Oct. 1979, *Shimizu et al.* 19536 (**BKF**); Bangkok [31 Dec. 1922, *Kerr* 6715 (**K**); 4 Nov. 1923, *Kerr* 7936 (**K**); Nov. 1923, *Kerr* 10771 (**K**); Bangkok, 20 Nov. 1952, *Kasin* 347 (**BK**); SOUTHEASTERN: Chon Buri [Sriracha, Kong Nam Khieo, 1 Dec. 1927, *Collins* 1899A (**K**) & s.n. (**BK**); Pong Nam Ron, Ban Tasara, 28 Nov. 1956, *Smitinand* 3651 (**BKF**); Sriracha, Khao Khieo, 5 Dec. 1975, *Maxwell* 75–1103 (**BK**); Rayong [Ban Phe, 28 Oct. 1923, *Kerr* 7936 (**BK**); Ban Phe, 4 Nov. 1923, *Kerr* 7936A (**BK**); Phe Arboretum, 23 Nov. 1979, *Shimizu* T-23311 (**BKF**); Chanthaburi [Ban Thalu, Pong Nam Ron, 28 Nov. 1956, *Smitinand* 3651 (**K**); 14 km N of Chanthaburi, 25 Nov. 1970, *Lazarides* 7482 (**K**) & 7483 (**K**); Khao Soi Dao, Khao Soi Dao wildlife sanctuary, Pong Nam Ron district, 26 Nov. 1979, *Shimizu* T-23657 (**BKF**); PENINSULAR: Chumphon [Khao Noi, Muang, 29 Dec. 1973, *Sutheesorn* 2770 (**BK**); Ranong [La-un, 3 Jan. 1929, *Kerr* 16512 (**BK**, **K**); Kamphum & Kapur, 18 Nov. 1959, *Smitinand* 6154 (**K**); Hot Spring Park, 6 Dec. 1979, *Shimizu* T-26204 (**BKF**); Klong Naka wildlife sanctuary, Kaper district, 8 Dec. 1979, *Shimizu et al.* T-26488 (**BKF**); Khao Pawta Luang Kaeo, Kaper district, 9 Dec. 1979, *Shimizu* T-26629 (**BKF**); Khao Pawta Luang Kaeo, Kaper district, 11 Dec. 1979, *Shimizu et al.* T-26990 (**BKF**); Surat Thani [Ko Lao, 2 Jan. 1927, *Kerr* 11233 (**BK**, **K**); Kran Po, 1 Jan. 1928, *Kerr* 13806 (**BK**); 16 March 1950, *Smitinand* 5597 (**K**); Ko Samui, Feb. 1995, *Ryves* 95/030 (**K**); Tha Phet, 16 March 1959, *Smitinand* 5597 (**BKF**); Phuket [Ka Tu waterfall, Ka Tu district, 14 Dec. 1979, *Shimizu et al.* T-27320 (**BKF**); Nakhon Si Thammarat [Khao Chong, 25 Jan. 1966, *Iwatsuki & Fukuoka* T-5505 (**BKF**); Na Bon, 21 Jan. 1971, *Umpai* 416 (**BK**); Trang [Khao Chong, Klong Non Si, 26 Sept. 1924, *Kerr* 9314 (**BK**); Kaecha Wang, Feb 1950, *Williams* 17243 (**K**); Khao Chong, 16 Jan. 1968, *Sangkhachand* 1548 (**K**); Khao Chong, 17 Nov. 1969, *Sangkhachand* 2164 (**BK**); Khao Chong, 16 Nov. 1969, *Sangkhachand* 2158 (**BK**); Khao Chong Station, 28 Nov. 1970, *Sadakorn* 203 (**BK**); Satun [Khuan Kalong, 8 May 1967, *Phengnarun*, 494 (**BKF**); Songkhla [Khao Maew, Feb. 1950, *Williams* 17274 (**K**); Boriphat waterfall, Rattaphum district, 18 Dec. 1979, *Shimizu et al.* T-27664 (**BKF**); Hat Yai, Khao Ko Hong hill, 25 Jan. 1986, *Maxwell* 86–53 (**BKF**); Yala [Bannang Sata, 20 Dec. 1966, *Sangkhachand* 1453 (**BKF**, **K**); Narathiwat [Ra Ngao, 18 Dec. 1961, *Sangkhachand* 938 (**K**); Bacho district, 8 Jan. 1969, *Sangkhachand* 1745 (**BK**)].

Distribution.— Africa, India, Indo-China, Malesia, Polynesia.

Ecology.— Scattered by trails, in open forest, deciduous forest and margins of evergreen forest, alt. 0–2000 m.

Vernacular.— Ya i niao (หญ้าอีเหินยา) (Chai Nat); niao ma (เหินยาหม่า) (Ranong), lek phai (เหล็กไฟ) (Surat Thani).

Note.— *C. lappacea* is easily recognized by the glabrous lower lemma. Only the upper lemmas have bulbous-based bristles which are retrorse at maturity, along the sub-marginal nerves.

2. *Centotheca longilamina* Ohwi, Bull. Tokyo Sci. Mus. 18.(10). 1947. Type: Indonesia, Java, Batavia, Pasir-Kiara Djing kang, 8 June 1924, *Bakhuizen van der Brink* 3312 (isotype **K!**).— *Centotheca lappacea* (L.) Desv. var. *longilamina* (Ohwi) Bor, Grass Burm. Ceyl. Ind. & Pak. 459. 1960. Fig 2.

Perennial, tufted. Culms solid, terete, erect, up to 1.5 m tall, glabrous. Leaf-sheaths 5–10 cm long, chartaceous, glabrous except tomentose along margins. Ligules 1.8–2.2 mm long, membranous, glabrous, rounded at apex. Leaf-blade linear, 25–35 by 2–3.5 cm, pale green above, nerve obscure above, mid-nerve thick, cross-nerves distinct below; collar dark purplish, tomentose, base narrow, symmetric, with bulbous-based hairs along lower margins, apex acuminate. Inflorescence an open panicle; elliptic in outline, 20–30 by 15–25 cm; peduncles glabrous, terete; main axis glabrous, 20–30 cm long, glabrous; branchlets alternate, hirsute at base; capillaries and pedicels hispidulous. Spikelets solitary, slightly terete, ovate-oblong, 3.5–6 mm long, greenish but turning to dark brown during maturation. Lower glume 2–2.5 mm long, boat-shaped or elliptic, 3-nerved, membranous-chartaceous, hispidulous especially on the mid-nerve, apex acute. Upper glume 2.5–2.6 mm long, lanceolate, 5-nerved, membranous-chartaceous, dark green, apex acute. Lower floret with lemma 2.2–4.5 mm long, oblong, 5–7-nerved, chartaceous, bulbous-based bristles along upper margins, apex emucronate. Palea 2–2.3 mm long, oblanceolate, hyaline, 2-nerved, apex acute. Lodicules 2, cuneate. Stamens 2, yellow, ca 1 mm long. Caryopsis dark grey, ovoid-oblong.

Thailand.— EASTERN: Nakhon Ratchasima [Khao Saming, 27 Jan. 1927, *Put* 569 (**K**); PENINSULAR: Ranong [Klong Nakha, *Geesink* 7581 (**K**); Khao Pawta Chang Dang, 21 Jan. 1929, *Kerr* 16789 (**K**); Phangnga [Khao Phota Luang Kaeo, 29 Nov. 1974, *Geesink* 7720 (**K**); Trang [Klong Non Si, Khao Chang, 26 Sept. 1924, *Kerr* 9314 (**K**)].

Distribution.— India, Myanmar, Indo-China, Malay Peninsula and Indonesia.

Ecology.— Along trails in the deep shade of evergreen forest, alt. 0–800 m.

Note.— *C. longilamina* is recognized by its thickly chartaceous and lanceolate leaf-blade. The lower lemma has sparse bulbous-base bristles and an emucronate apex.

LOPHATHERUM

Brongn. in Duperr., Voy. Coq. Bot. Phan. 49. 1831.

Perennial, caespitose grasses. Leaf-blades broadly linear to lanceolate with a pseudopetiole. Ligules membranous or ciliolate. Inflorescence a panicle of a few racemose branches. Spikelets comprising several florets, the lowest bisexual, the following empty and sterile. Glumes unequal, chartaceous. Lemmas few to many with prominent, retrorsely scabrid awns an apical tuft. Palea 2-keeled, boat-shaped, hyaline.

Two species, distributed from tropical and subtropical Asia to Australia and Madagascar. One species in Thailand.

Lophatherum gracile Brongn. in Duperr., Voy. Coq. Bot. Phan. 50, t.8. 1831. Type: Indonesia, Ambon, *Dumont d'Urville* s.n. (holotype **P**, not seen). Fig. 3.



Figure 2. *Centotheca longilamina* Ohwi, A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. Lower lemma; F. Palea; G. Pistil; H. Upper floret. Drawn by M. Norsaeagsri.

Perennial loosely tufted with short rhizomes or fusiform tuberoid roots. Culms erect or weakly geniculate at base, 40–80 cm tall, smooth, glabrous, clothed at base with 2 to 4 pale-brownish cataphylls. Leaf-sheaths 6–12 cm long, usually longer than the internode, mid-nerve prominent, pale green, glabrous or pubescent on lower part and margins. Ligules membranous, 0.5–0.7 mm long, truncate, ciliolate at the margins. Leaf-blades 8–25 by 1.5–5 cm, ovate-lanceolate, pseudo-petiole, 5–12 mm long, chartaceous, glabrous, with prominent cross nerves, light green, base round gradually tapering above to a short-acuminate apex. Inflorescence a loose panicle, 15–30 by 6–10 cm, elliptic in outline, of narrowly racemose branches, 10–20 cm long. Spikelets 7–10 by 1.2–1.5 mm, bottle-shaped or ovate-lanceolate in outline, erect-patent, lanceolate, weakly laterally flattened, greenish, glabrous or sparsely haired, bearing 1 fertile and 3–7 sterile florets; pedicels short, 0.5–1 mm, with a tuft of hairs at the tip. Lower glume oblong, 3–3.5 mm long, 5-nerved, with a few cross-nerves, coriaceous, glabrous or pilose margin membranous, apex emucronate. Upper glume oblong, 4.7–5 mm long, 7-nerved, apex obtuse. Lower floret bisexual. Lower lemma oblong, 7–7.5 mm long, 7-nerved, chartaceous, apex with a retrorsely scabrid awn, margins ciliolate towards apex. Palea as long as the lemma, membranous, 2-keeled; keel narrowly winged above the middle part. Lodicules 2, cuneate. Ovary ovoid; stigmas plumose yellow or dark purple. Stamens 2. Upper florets reduced and sterile. Upper lemmas successively clasping, the awns, 1–1.5 mm long, retrorsely scabrid, forming a small tuft.

Thailand.— NORTHEASTERN: Loei [Phu Luang Wildlife Sanctuary, 29 Aug. 1968, *Bunchuai* 1732 (K); Phu Luang Wildlife Sanctuary, 16 Nov. 1968, *Chermsiriwatthana* 1110 (BK); Phu Kradueng, 13 Sept. 1990, *Chantaranothai et al.* 90/194 (K)]; Nong Khai [Phon Pisai, 19 Nov. 1963, *Pradit* 716 (BK)]; EASTERN: Chaiyaphum [Chulaporn Dam, 5 Aug. 1972, *Larsen* 31465 (K)]; Nakhon Ratchasima [Katok, 30 Dec. 1923, *Kerr* 8167 (BK); Lat Bao Khao, 7 Nov. 1931, *Put* 4318 (K); Khao Yai National Park, 30 Oct. 1970, *Larsen* 4274 (K); 22 Oct. 1971, *van Beusekom et al.* 3863 (K); Khao Yai National Park, 12 Aug 1974, *Maxwell* 74–802 (BK)]; SOUTHEASTERN: Prachin Buri, Arun Pratet, 17 Oct. 1928, *Put* 1990 (BK, K)]; Chon Buri [Khao Khieo, 20 July 1963, *Larsen* 10662 (K); Khao Khieo, Sriracha, 29 Aug. 1976, *Maxwell* 76–623 (BK)]; Chanthaburi [Chanthaburi, 20 Dec. 1924, *Kerr* 9722 (BK, K)]; Trat [Ko Chang, 26 Sept. 1924, *Kerr* 9191 (BK)]; PENINSULAR: Ranong [Khao Pawta Luang Kao, 2 Feb. 1929, *Kerr* 16964 (BK, K)]; Surat Thani [Kanchanadit, 1 Aug. 1927, *Kerr* 13097 (BK, K)]; Nakhon Si Thammarat [Lan Saka, 18 May 1971, *Sadakorn* 253 (BK)]; Trang [Khao Soi Dao, 28 April 1930, *Kerr* 19178 (BK, K); Thale Song Hong, 27 Jan. 1958, *Sørensen et al.* 736 (K)]; Satun [Kuan Kalong, 15 Oct. 1970, *Charoenphol et al.* 3288 (K)]; Songkhla [Khao Khieo, 27 July 1918, *Kerr* 16005 (K)]; Narathiwat [Bacho district, 18 Dec. 1968, *Sangkhachand* 1584 (BK); Tak Bai, Ku Chum, 14 Sept. 1987, *Niyomdham & Sriboonma* 1603 (K)].

Distribution.— India, Sri Lanka, China, Japan, Myanmar, Indo-China and Malesia.

Ecology.— Shady understory of dry evergreen and bamboo forests and river bank.

Use.— This species is used as a fodder plant.

Vernacular.— Phai pen lek (ไผ่เป็นเหล็ก) (Trang); ai lek mai phai (ไผ่เหล็กไม้ไผ่), ya phai (หญ้าไผ่) (Peninsular); ya khui mai phai (หญ้าขี้ไผ่).

Note.— *L. gracile* is a remarkable grass with one fertile and several sterile florets which are prominent with tufted, retrorsely scabrid awns that serve as dispersal agents.



Figure 3. *Lophatherum gracile* Brongn., A. Habit; B. Inflorescence; C. Spikelet; D,E. Lower glume; F,G. Upper glume; H. Palea; I,J. Lower lemma; K. Lodicule; L. Pistil; M. Upper lemma. Drawn by M. Norsaeagsri.

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