

A taxonomic revision of the genus *Eragrostis* in Thailand

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ABSTRACT: A taxonomic account of *Eragrostis* in Thailand is provided, in which 23 species are recognized. An artificial key to species and species descriptions is provided along with distributional and ecological data for all taxa. The taxonomic status of several Thai *Eragrostis* taxa is updated. Four species: *E. alopecuroides*, *E. malayana*, *E. spartinoides*, and *E. zeylanica* are reduced to synonymies of *E. ciliata*, *E. montana*, *E. brownii*, and *E. brownii*, respectively, and three species, *E. ciliaris*, *E. cylindrica*, and *E. tef*, are reported to occur in Thailand for the first time.

KEYWORDS: Eragrostideae, love grass, Poaceae

INTRODUCTION

Eragrostis belongs to the family Poaceae, tribe Eragrostideae¹. It is recognized as the largest genus within the subfamily Chloridoideae² with ca. 420 species³. It is widely distributed in tropical to temperate regions of the world and is found in open habitats and sometimes forests from sea level to high altitudes^{2,4,5}. *Eragrostis* was first published by Wolf in 1776⁶ in “Genera Plantarum” while the type of the generic name was designated by Ross⁷ based on *E. minor* Host. The origin of the name is ambiguous since there is no evidence concerning the generic name when it was first described. However, “eros” is Greek for “loving in an erotic sense” and *Agrostis* is a common genus that superficially resembles some *Eragrostis* species.

The previous taxonomic treatment of *Eragrostis* in Thailand recognized 35 species⁸ but it was confined to only a species list with some synonymies, without providing a thorough taxonomic treatment. The present paper provides a comprehensive taxonomic account of Thai *Eragrostis* for the Flora of Thailand project including an artificial key to species, updated nomenclature, important synonymies, distribution data, ecological information, vernacular names, and notes for each species.

MATERIALS AND METHODS

The treatment in this study was based on newly collected material from the first author’s field work and herbarium specimens housed in the following herbaria: AAU, BK, BKF, BM, C, CMU, E, G, K,

KKU, L, LINN, QBG, and TCD (Herbarium abbreviations following Ref. 9). A large number of mature samples were used to provide species descriptions and key construction. Ecological and distributional data were collected for each species during the field work, and were recorded from the label information of existing vouchers. Measurements were taken using a stereo microscope (Nikon SMZ645) after softening by warm water. Synonyms given were based on close examination of accepted names and synonymy lists in the taxonomic literature of Thailand and neighbouring regions.

RESULTS AND DISCUSSION

Taxonomic treatment

Eragrostis Wolf, Gen. Pl.: 23 (1776). Type species: *Eragrostis minor* Host, **Icon. Descr. Gram. Austriac.**, 4: 15 (1809). Lectotype designated by Ross, **Acta Bot. Neerl.** 15: 157 (1966).

Annual or perennial, sometimes rhizomatous, tufted. Culms erect or geniculately ascending, slightly compressed or terete. Leaf-sheaths loose, coriaceous to membranous. Auricles glabrous or hairy. Ligules membranous or a fringe of long hairs. Collars glabrous or a row of long hairs, sometimes glandular. Leaf-blades apex acute to acuminate or attenuate. Panicles open or contracted or spiciform. Spikelets laterally (all of ours) or dorsally compressed to terete, with many florets, the upper sterile or reduced; breaking up in various ways; rachilla disarticulating or persistent. Lower glumes 1-nerved, 1-keeled. Upper glumes 1-3-nerved, 1-keeled. Florets bisexual.

Lemmas 3-nerved, keeled. *Paleas* boat-shaped, longitudinally bowed-out, 2-nerved, 2-keeled, margins infolded. *Lodicules* 2. *Stamens* 1–3. *Caryopses* with adherent pericarp.

1. *Eragrostis atrovirens* (Desf.) Trin. ex Steud., Nom. Bot. ed. 2, 1: 562 (1840). *Poa atrovirens* Desf., Fl. Atlant. 1: 73 (1798). Type: Algeria, Barberia, in arvis incutis prope La Calle, *Desfontaines 160* (holotype FI, picture K!; isotypes BAA-1006, P).—*E. luzoniensis* Steud., Syn. Pl. Glumac. 1: 266 (1854). Type: Philippines, Luzon, *H. Cuming 1416* (holotype P; isotypes BM!, E!, K, L). Fig. 1a.

Perennial, blue-green, glaucous. *Culms* 30–150 cm tall, erect or geniculately ascending. *Leaf-sheaths* 30–50 cm long, coriaceous with membranous margins, glabrous. *Auricles* bearded with hairs. *Ligules* ciliolate membranous. *Collars* glabrous. *Leaf-blades* 10–25 cm by 5–8 mm, upper surface scabrous, lower surface glabrous. *Panicles* open, oblong or ovate, 30–50 by 8–10 cm, branches glabrous. *Spikelets* 8–10 by 1–1.8 mm, with 8–20 fertile florets, lanceolate-oblong; florets falling from the base of spikelet upwards; rachilla persistent. *Lower glumes* 1–1.5 mm long, caducous, ovate to lanceolate, keel scabrous, apex acute. *Upper glumes* 1.5–1.8 mm long, caducous, lanceolate, 1-nerved, keel scabrous, apex acute. *Lemmas* 2–2.5 mm long, caducous, oblong-elliptic, apex acute to subobtuse. *Paleas* 1.8–2 mm long, caducous, keels scaberulous, apex acute to obtuse. *Stamens* 3; anthers ca. 0.7 mm long. *Caryopses* 0.4–0.6 mm long, ellipsoid, terete, pericarp striate and reticulate, reddish brown.

Distribution.— North and South America, Europe, Africa, Asia, Australasia, and Pacific.

Ecology.— Common in mixed deciduous forest, often in swampy grassland.

Vernacular.— Ya krok khiao.

Notes.— This species is easily recognized by its blue-green and glaucous appearance. Veldkamp¹⁰ accepted *E. luzoniensis* as a species but the isotypes of this species housed in the BM and E matched well with *P. atrovirens* and the name *E. atrovirens* has priority.

Specimens examined.— **Nan:** Doi Phu Kha National Park, 6 September 2008, *W. Chaisongkram 133* (KKU). **Loei:** Phu Kradueng National Park, 1300 m, 18 March 1958, *Th. Sørensen, K. Larsen & B. Hansen 2239* (C); 27 March 2006, *W. Chaisongkram 40* (KKU). **Nakhon Ratchasima:** Bua Luang, 1100 m, 1 February 1964, *B. Hansen, G. Seidenfaden & T. Smitinand 11012* (BKF, C, E). **Chanthaburi:** Makham, 14 June 1963, *K. Larsen 10106* (BKF); 8 November

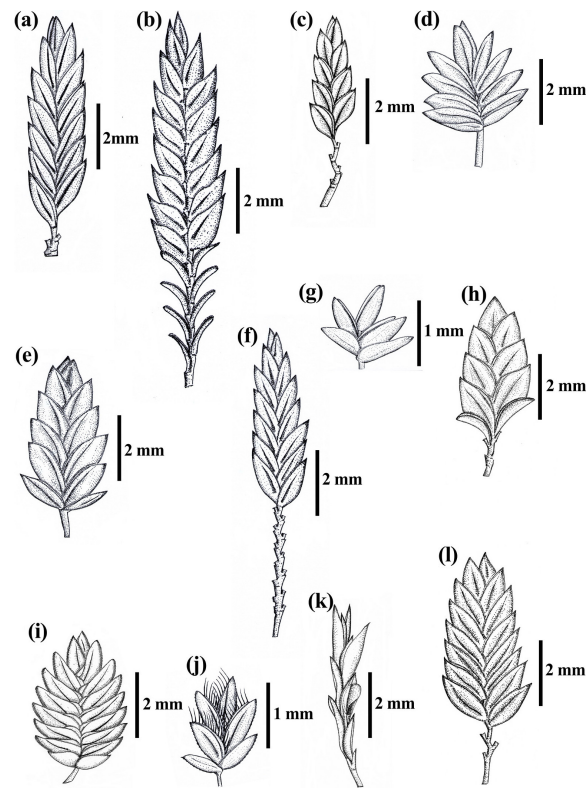


Fig. 1 Spikelet. (a) *E. atrovirens* with caducous paleas (below); (b) *E. brownii* with persistent paleas (below); (c) *E. burmanica* with zig-zag rachilla; (d) *E. capensis*; (e) *E. cilianensis*; (f) *E. gangetica*; (g) *E. japonica* with florets breaking up from above downwards on spikelet; (h) *E. montana* with straight rachilla; (i) *E. superba*; (j) *E. tenella* with tubercle-based hairs on palea keels; (k) *E. tenuifolia* with caryopsis adhering to palea; and (l) *E. unioloides*. All illustrations were drawn by Wanwipha Chaisongkram from *W. Chaisongkram 133* (KKU), *136* (KKU) and *91* (KKU), *Th. Sørensen, K. Larsen & B. Hansen 2244* (BKF) and *4423* (BKF), *W. Chaisongkram 193* (KKU), *106* (KKU) and *178* (KKU), *S.N.* (BKF), *W. Chaisongkram 92* (KKU), *130* (KKU) and *140* (KKU), respectively.

2008, *W. Chaisongkram 154* (KKU). **Ranong:** Klong Naka, 24 February 1974, *R. Geesink, P. Hipko & C. Charoenphol 7542* (BKF, C).

2. *E. brownii* (Kunth) Nees, Cat. Indian Pl.: 105 (1834). *Poa brownii* Kunth, Révis. Gramin. 1: 112 (1829). Lectotype (designated by Lazarides 1997)¹¹: Australia, Queensland, Port Curtis District, *R. Brown 6284* (BM!).—*E. zeylanica* Nees & Meyen, Gramineae: 72–73 (1841). Type: Sri Lanka, *Macrae s.n.* (holotype picture K; isotype BM!).—*Uniola spicata* Llanos, Fragm. Pl. Filip.: 33 (1851), non L.

Table 1 Key to the species.

1. Spikelet breaking up below glumes and falling as a whole spikelet, palea with winged keels, spikelet broadly elliptic to ovate, 3–4 mm wide	18. <i>E. superba</i>
1. Spikelet breaking up above glumes in various ways and not falling as a whole	
2. Florets falling entire from the top of spikelet downwards	
3. Palea keels ciliate, hairs 0.2–0.5 mm long	
4. Panicle oblong; the lowermost branch, 2–2.5 cm long	12. <i>E. japonica</i>
4. Panicle ovate; the lowermost branch longest, 6–8 cm long	10. <i>E. diplachnoides</i>
3. Palea keels with tubercle-based hairs, hairs 1–1.3 mm long	
5. Pericarp rugulose; panicle open, 2–8 cm wide	
6. Culm with sticky glandular patches below nodes	23. <i>E. viscosa</i>
6. Culm glabrous or scaberulous below nodes	
7. Spikelet lanceolate to oblong, 2–4 mm long	17. <i>E. riparia</i>
7. Spikelet ovate to ovate-oblong, delicate, 1.5–2 mm long	20. <i>E. tenella</i>
5. Pericarp finely striate; panicle spiciform or contracted, 1–2 cm wide	
8. Inflorescence axis plumose	7. <i>E. ciliata</i>
8. Inflorescence axis glabrous or scabrous	6. <i>E. ciliaris</i>
2. Florets falling from the base of spikelet upwards	
9. Caryopsis trigonous to reniform	
10. Glumes subequal	
11. Lemma caducous; spikelet dark purple	14. <i>E. nigra</i>
11. Lemma tardily breaking up; spikelet green	19. <i>E. tef</i>
10. Glumes unequal, lower glume obviously smaller than the upper	
12. Spikelet 3–4 by 0.5–0.8 mm; annuals; anther ca. 0.1 mm long	16. <i>E. pilosa</i>
12. Spikelet 6–10 by 1–1.5 mm; perennials; anther ca. 0.5 mm long	21. <i>E. tenuifolia</i>
9. Caryopsis ellipsoid or orbicular	
13. Lemma and palea falling together or sometimes the palea falling after the lemma	
14. Spikelet 1–1.8 mm wide, lanceolate-oblong, oblong or elliptic	
15. Stamens 3	
16. Spikelet 8–10 mm long; plant blue-green and glaucous	1. <i>E. atrovirens</i>
16. Spikelet 3–8 mm long with long pedicel; plant green	3. <i>E. burmanica</i>
15. Stamens 2	11. <i>E. gangetica</i>
14. Spikelet 2–4 mm wide, ovate or elliptic	
17. Collar glabrous; spikelet normally pinkish	22. <i>E. unioides</i>
17. Collar sparsely or densely pilose; spikelet pale brown sometimes tinged with blackish patches; plant with compacted dead sheaths at the base of culm	4. <i>E. capensis</i>
13. Lemma falling with caryopsis, palea persistent	
18. Plant with crateriform glands	5. <i>E. cilianensis</i>
18. Plant without crateriform glands	
19. Rachilla eventually breaking up from the top of spikelet downwards	
20. Anther 0.4–0.6 mm long; perennials	2. <i>E. brownii</i>
20. Anther 0.1–0.2 mm long; annuals	8. <i>E. cumingii</i>
19. Rachilla persistent	
21. Palea with slightly winged keels; caryopsis sub-globose	9. <i>E. cylindrica</i>
21. Palea keels without wing; caryopsis ellipsoid or orbicular	
22. Caryopsis ellipsoid, terete	13. <i>E. montana</i>
22. Caryopsis orbicular, slightly laterally compressed	15. <i>E. nutans</i>

Sp. Pl.: 71 (1753). Neotype (designated by Veldkamp 2002): Philippines, Luzon, *E.D. Merrill Sp. Blancoan 170* (US; isoneotypes BM!, K!, L!, P).— *E. spartioides* Steud. Syn. Pl. Glumac. 1: 265 (1854). Type: Philippines, Luzon, Laguna, *Cuming 668* (holotype P; isotypes BM!, E!, G!, K!, L). Fig. 1b.

Perennial. Culms 20–45 cm tall, erect to geniculate ascending. Leaf-sheaths 2–4 cm long, margins with tubercle-based hairs. Auricles bearded with long hairs. Ligules a fringe of hairs. Collars with a row of long hairs. Leaf-blades 5–15 cm by 2–4 mm, both surfaces with sparse tubercle-based hairs. Panicles

open, clustered or spiciform, ovate to oblong, 15–30 by 1–5 cm, bearded in axils. *Spikelets* 4–15 by 0.8–1.5 mm, with 10–60 fertile florets, oblong; florets falling from the base of spikelet upwards, but rachilla ultimately breaking up from the top downwards; rachilla straight. *L. glumes* 1.2–1.6 mm long, caducous, lanceolate, keel scabrous, apex acuminate. *Upper glumes* 1.5–1.8 mm long, caducous, lanceolate, 1-nerved, keel scabrous, apex acuminate. *Lemmas* 2.7–3 mm long, caducous, ovate, scaberulous, membranous, apex acuminate. *Paleas* 2–2.2 mm long, persistent, keels ciliate, apex obtuse. *Stamens* 3; anthers 0.4–0.6 mm long. *Caryopses* 0.4–0.6 mm long, orbicular, slightly laterally compressed, pericarp finely reticulate, brown.

Distribution.— Europe, Asia, Australasia, and Pacific.

Ecology.— Common in dry deciduous forest and on open sandy soil.

Vernacular.— Ya wai.

Notes.— *E. brownii* is a variable species, especially in the size and the shape of its inflorescence. It has been confused with the annual species, *E. cumingii*, but it differs by having bigger anthers, 0.4–0.6 mm long. Veldkamp¹⁰ noted that this species has often been called *E. elongata* (Willd.) Jacq., species name which has been applied for the 3-anthered species group in Southeast Asia and some of which are distributed from India to Australia, e.g., *E. brownii*, *E. bulbifera* Steud., *E. cumingii* Steud., *E. pubescens* (R.Br.) Steud., *E. spartinoides* Steud., *E. subsecunda* (Lam.) E. Fourn. and *E. zeylanica* Nees. However, Shouliang and Peterson¹² treated the 2-anthered species as *E. elongata* in the Flora of China. In Thailand, we have never found a specimen with two anthers.

Specimens examined.— **Chiang Mai:** Doi Suthep National Park, 450 m, 12 May 1958, *Th. Sørensen, K. Larsen & B. Hansen* 3375 (BKF, C). **Nong Khai:** Phu Wua Wildlife Sanctuary, 26 October 2008, *W. Chaisongkram* 136 (KKU). **Khon Kaen:** Mueang Phon, 400 m, 23 March 1958, *Th. Sørensen, K. Larsen & B. Hansen* 2468 (BKF, C, E); Khon Kaen University, 22 November 2009, *W. Chaisongkram* 198 (KKU). **Nakhon Ratchasima:** 29 December 1962, *C. Phengkhilai* 655 (BKF, C). **Kanchanaburi:** Chokgrading waterfall, 25 August 2009, *W. Chaisongkram* 189 (KKU). **Saraburi:** 15 km east of Saraburi, 150 m, 12 March 1958, *Th. Sørensen, K. Larsen & B. Hansen* 2073 (C). **Trat:** Ko Chang, 5 m, 19 February 1955, *T. Smitinand* 2242 (BKF). **Chumphon:** Pratew, 23 February 2008, *W. Chaisongkram* 128 (KKU). **Surat Thani:** Kanchanadit, 1.5 m, 1 August 1927, *A.F.G.*

Kerr 13060 (BM, K).

3. *E. burmanica* Bor, *Kew Bull.*: 166 (1951). Type: Myanmar, Prome District, fields, 20 Jul 1948, *U. Thein Lwin* 582 (holotype K!). Fig. 1c.

Perennial. *Culms* 20–40 cm tall, erect or slightly geniculate. *Leaf-sheaths* 4–7 cm long, chartaceous to membranous. *Auricles* bearded with long hairs. *Ligule* a fringe of hairs. *Collars* glabrous. *Leaf-blades* 7–15 cm by 3–6 mm, upper surface sparsely hairy, lower surface glabrous. *Panicles* lax with long pedicels, 20–35 by 8–12 cm, pedicels compressed or triquetrous. *Spikelets* 3–8 by 1–1.5 mm, with 5–15 fertile florets, elliptic; florets falling from the base of spikelet upwards; rachilla persistent. *L. glumes* 0.8–1 mm long, caducous, lanceolate to elliptic, keel scabrous, apex acuminate. *Upper glumes* 1.2–1.5 mm long, caducous, lanceolate, 1-nerved, keel scabrous, apex acuminate. *Lemmas* 1–1.4 mm long, caducous, ovate, scaberulous, membranous, apex acute to acuminate. *Paleas* 0.9–1.2 mm long, caducous, keels scaberulous, apex acute. *Stamens* 3; anthers ca. 0.4 mm long. *Caryopses* 0.4–0.5 mm long, ellipsoid, terete, pericarp finely reticulate, reddish brown.

Distribution.— Myanmar and Thailand.

Ecology.— Common in open areas and on sandy soils.

Vernacular.— Ya krok.

Notes.— This species is characterized by its lax panicle with long pedicels.

Specimens examined.— **Phitsanulok:** Thung Salaeng Luang National Park, 700 m, 21 July 1966, *K. Larsen, T. Smitinand & E. Warncke* 671 (AAU, BKF). **Phetchabun:** Nam Nao National Park, 24 August 2006, *W. Chaisongkram* 91 (KKU). **Chaiyaphum:** Thung Kamang, 850 m, 2 June 1974, *R. Geesink, T. Hattink & C. Phengkhilai* 7140 (BKF).

4. *E. capensis* (Thunb.) Trin., *Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math.* 1(4): 400 (1830). *Briza capensis* Thunb., *Prodr. Pl. Cap.*: 21 (1794). Type: South Africa, Cape Province, *Thunberg s.n.* (holotype UPS). Fig. 1d.

Perennial, rhizomes short, base of culm with compacted dead sheaths. *Culms* 30–60 cm tall, erect or decumbent. *Leaf-sheaths* 7–10 cm long, margins and the lower surface pilose. *Auricles* pilose. *Ligule* a fringe of short hairs. *Collars* sparsely or densely pilose. *Leaf-blades* 10–25 cm by 2–3 mm, both surfaces pilose. *Panicles* open, ovate to elliptic, 20–40 by 3–5 cm, branches glabrous. *Spikelets* 7–12 by 2–4 mm, with 8–14 fertile florets, ovate; florets tardily falling from the base of spikelet upwards, median groove prominent; rachilla persistent. *L. glumes* 1.8–2 mm

long, tardily falling, lanceolate to elliptic, nerve with prominent ridge, keel scabrous, apex acute. *Upper glumes* 2–2.5 mm long, tardily falling, lanceolate to elliptic, 1-nerved with prominent ridge, keel scabrous, apex acute. *Lemmas* 3–4.2 mm long, caducous, ovate to elliptic, scabrous, chartaceous, apex acute. *Paleas* 3–3.5 mm long, tardily falling down, keel fimbriate, apex obtuse. *Stamens* 3; anthers 1.3–1.5 mm long. *Caryopses* 0.3–0.5 mm long, ellipsoid, terete, pericarp reticulate, dark brown.

Distribution.— Africa and Thailand.

Ecology.— In open pine forest and savannah (especially after fire).

Vernacular.— Yak on hep.

Notes.— This species is very similar in appearance to *E. superba* but differs by the absence of a wing on the palea keels and the spikelets do not disarticulate as a unit. It seems to be a rather rare species in Thailand since all collections originate from a single locality in pine forest near Mak Duk cliff at Phu Kradueng National Park, Loei Province.

Specimens examined.— **Loei:** Phu Kradueng National Park, 1300 m, 14, May 1951, *T. Smitinand* 415 (BKF); 18 March 1958, *Th. Sørensen, K. Larsen & B. Hansen* 2244 (BKF, C, E); 26 March 2006, *W. Chaisongkram* 39 (KKU).

5. *E. cilianensis* (All.) Vignolo ex Janch., Mitt. Naturwiss. Vereins Univ. Wien 5: 110 (1907). *P. cilianensis* All., Fl. Pedem. 2: 246 (1785). Lectotype (designated by Vignolo 1904)¹³: Italy, agro patrio Ciliana, *C.A.L. Bellardi s.n.* (TO; isotype picture K!). Fig. 1e.

Annual. *Culms* 40–70 cm long, erect or geniculately ascending. *Leaf-sheaths* 5–7 cm long with crateriform glands. *Auricles* bearded with long hairs. *Ligules* a fringe of hairs. *Collars* glabrous. *Leaf-blades* 5–20 cm by 2–10 mm, margins and midrib glandular. *Panicles* open, ovate to elliptic, 20–30 by 8–12 cm, branches bearded in axils, sparse crateriform glands. *Spikelets* 3–15 by 1.5–2 mm, with 8–18 fertile florets, oblong to ovate; florets falling from the base of spikelet upwards; rachilla persistent. *L. glumes* 1.8–2.3 mm long, caducous, ovate to elliptic, keel scabrous, apex acute. *Upper glumes* 2.2–2.5 mm long, caducous, ovate to elliptic, 3-nerved with lateral nerves reaching to margins, keel scabrous, apex acute. *Lemmas* 2.5–3 mm long, caducous, ovate, scaberulous, chartaceous, apex emarginate or acute. *Paleas* 2–2.5 mm long, persistent, keels ciliate, apex acute or bidentate. *Stamens* 3; anthers ca. 0.3 mm long. *Caryopses* 0.5–0.6 mm long, orbicular to subglobose, slightly laterally compressed, pericarp finely

reticulate, reddish brown.

Distribution.— North and South America, Europe, Africa, Asia, Australasia, and Pacific.

Ecology.— In dry evergreen and deciduous forests.

Vernacular.— Ya khai hep yai.

Notes.— This species is easily recognized by having glands in most parts and its 3-nerved upper glume.

Specimens examined.— **Chiang Mai:** Doi Suthep National Park, 1100 m, 25 July 1958, *Th. Sørensen, K. Larsen & B. Hansen* 4423 (BKF, C).

6. *E. ciliaris* (L.) R. Br., Congo: 478 (1818). *P. ciliaris* L. Syst. Nat. ed. 10, 2: 875 (1759). Lectotype (designated by Hitchcock 1908)¹⁴: Jamaica, Herb. Linn. No. 87.66, *Browne s.n.* (LINN!).

Annual. *Culms* 5–10 cm tall, geniculately ascending. *Leaf-sheaths* 2–3 cm long, with tubercle-based hairs, margins ciliate. *Auricles* bearded with long hairs. *Ligules* a fringe of long hairs. *Collars* glabrous. *Leaf-blades* 3–5 cm by 1–2 mm, both surfaces scabrous. *Panicles* spiciform to contracted, oblong, 12–14 by 1.5–2 cm, branches glabrous in axils. *Spikelets* 3–4 by 1.5–2 mm, with 6–10 fertile florets, ovate to oblong; florets falling entire from the top of spikelet downwards; rachilla fragile. *L. glumes* 1.3–1.6 mm long, persistent, lanceolate to ovate, keel scabrous, margins ciliate, apex acuminate. *Upper glumes* 1.8–2 mm long, persistent, ovate to elliptic, 1-nerved, keel scabrous, apex acuminate. *Lemmas* 1.6–1.8 mm long, elliptic to ovate, scaberulous, membranous, apex obtuse to apiculate. *Paleas* 1.3–1.5 mm long, keel with tubercle-based hairs, apex obtuse. *Stamens* 2; anthers ca. 0.2 mm long. *Caryopses* 0.3–0.4 mm long, ellipsoid, terete, pericarp finely striate, dark brown.

Distribution.— North and South America, Africa, Asia, Australasia, and Pacific.

Ecology.— Naturalised in Queen Sirikit Botanical Garden.

Vernacular.— Ya khai hao Muang.

Notes.— This is the first report of this species in Thailand. All specimens previously collected from Thailand were misidentified as *E. ciliata* which has a very similar appearance, but the latter has a hairy inflorescence axis.

Specimens examined.— **Chiang Mai:** Queen Sirikit Botanical Garden, 800 m, 24 May 1999, *H. Hemadhulin* 71 (QBG, E); East of nursery of Queen Sirikit Botanical Garden, 7 October 2001, *S. Laegaard* 21681 (AAU).

7. *E. ciliata* (Roxb.) Nees, Fl. Bras. Enum. Pl. 2(1): 512 (1829). *P. ciliata* Roxb. Fl. Ind., ed. 1820, 1: 336 (1820). Type: India Orientalis, *Heyne Benjamin 5015* (isotype BM!).— *E. alopecuroides* Balansa, J. Bot. (Morot) 4(9): 168 (1890). Type: Vietnam, Port de Cameran, 10 December 1886, *Balansa s.n.* (holotype L!, picture K!).

Perennial. *Culms* 15–70 cm tall, erect or geniculate. *Leaf-sheaths* 2–7 cm long, margins with tubercle-based hairs. *Auricles* bearded with long hairs. *Ligules* a fringe of long hairs. *Collars* hairy. *Leaf-blades* 10–15 cm by 1–2 mm, both surfaces with tubercle-based hairs. *Panicles* spiciform, cylindrical or oblong, plumose, 2–8 by 1–1.5 cm, branches bearded in axils, axis hairy. *Spikelets* 5–7 by 1–1.5 mm, with 7–8 fertile florets, ovate; florets falling entire from the top of spikelet downwards; rachilla fragile. *L. glumes* 1.5–2.3 mm long, persistent, lanceolate, 1-nerved, 1-keeled, keel scabrous, apex acuminate. *Upper glumes* 2–2.5 mm long, persistent, lanceolate, 1-nerved, 1-keeled, keel scabrous, apex acuminate. *Lemmas* 2.5–3 mm long, elliptic or oblong, scaberulous, membranous, apex apiculate. *Paleas* 1.3–2 mm long, keel with tubercle-based hairs, apex acute. *Stamens* 2; anthers ca. 0.25 mm long. *Caryopses* 0.4–0.5 mm long, orbicular, slightly laterally compressed, finely striate, dark brown.

Distribution.— Temperate and tropical Asia.

Ecology.— Common on sandy soil, sometimes on the beach.

Vernacular.— Ya khai hao.

Notes.— The distinctive characters of *E. ciliata* are its spiciform panicle and the inflorescence axis with long hairs.

Specimens examined.— **Nakhon Ratchasima:** 23 December 1923, *A.F.G. Kerr 8086* (BK, BM, TCD). **Chon Buri:** *A. Marcan 1371* (BM); Sattahip, 29 March 1971, *J.F. Maxwell 71-202* (AAU, BK).

8. *E. cumingii* Steud., Syn. Pl. Glumac. 1: 266 (1854). Lectotype (designated by Lazarides, 1997): Philippines, Luzon, *Cuming 1104* (K!; isotypes BM!, E!, G!, L!).— *E. distans* Hack., Publ. Bur. Sci. Gov. Lab. 35: 81 (1906). Type: Philippines, Kias, Luzon, June 1904, *A.D.E. Elmer 6608* (holotype W, picture K!).

Annual. *Culms* 15–40 cm tall, erect or geniculate. *Leaf-sheaths* 5–10 cm long, glabrous. *Auricles* bearded with long hairs. *Ligule* a fringe of hairs. *Collars* glabrous. *Leaf-blades* 5–15 cm by 2–3 mm, both surfaces with sparsely tubercle-based hairs. *Panicles* open, narrowly ovate to lanceolate, 15–30 by 6–8 cm, branches contracted or dense, bearded in

axils. *Spikelets* 4–15 by 1–1.5 mm, with 14–20 fertile florets, oblong; florets falling from the base of spikelet upwards, but rachilla fragile or ultimately breaking up from the top downwards; rachilla straight. *L. glumes* 1–1.3 mm long, caducous, lanceolate, keel scabrous, apex acuminate. *Upper glumes* 1–1.5 mm long, caducous, lanceolate to narrowly ovate, 1-nerved, keel scabrous, apex acuminate. *Lemmas* 1.6–2 mm long, caducous, elliptic to ovate, scaberulous to glabrous, membranous, apex acute to acuminate. *Paleas* 1–1.2 mm long, persistent, keel ciliate, apex acute. *Stamens* 3; anthers 0.1–0.2 mm long. *Caryopses* 0.3–0.5 mm long, ovoid or orbicular, slightly laterally compressed, pericarp finely reticulate, reddish brown.

Distribution.— America, Asia, and Australasia.

Ecology.— Common in open areas and on sandy soils.

Vernacular.— Ya Philippines.

Notes.— This species is very similar in appearance to *E. brownii*. See also the note under *E. brownii*.

Specimens examined.— **Loei:** Phu Ruea National Park, 22 November 2009, *W. Chaisongkram 199* (KKU). **Chanthaburi:** Makhm, 50 m, 13 June 1963, *K. Larsen 10058* (C). **Ranong:** Klong Naka, 4 February 1979, *T. Koyama, C. Phengkhilai, P.J. O'Connor & C. Niyomdham 15232* (AAU).

9. *E. cylindrica* (Roxb.) Nees ex Hook. & Arn., Bot. Beechey Voy.: 251 (1838). *P. cylindrica* Roxb., Fl. Ind., ed. 1820, 1: 335 (1820). Type: China, *Anonymous* (holotype K!).

Perennial. *Culms* 20–40 cm tall, geniculately ascending. *Leaf-sheaths* 2–4 cm long, margins glabrous to densely hairy. *Auricles* bearded with long hairs. *Ligules* a fringe of hairs. *Collars* with a row of long hairs. *Leaf-blades* 3–10 cm by 4–7 mm, both surfaces scabrous. *Panicles* spiciform panicles, cylindrical, 15–25 by 1.5–2 cm. *Spikelets* 5–6.5 by 1–1.5 mm, with 6–13 fertile florets, oblong; florets falling from the base of spikelet upwards; rachilla straight, persistent. *L. glumes* 1.2–1.4 mm long, caducous, ovate, keel scabrous, apex acute. *Upper glumes* 2–2.2 mm long, caducous, lanceolate to elliptic, 1-nerved, keel scabrous, apex acute or apiculate. *Lemmas* 2.2–2.5 mm long, caducous, ovate to elliptic, scaberulous, membranous, apex apiculate. *Paleas* 2–2.2 mm long, persistent, keels ciliolate to ciliate, slightly winged, apex obtuse. *Stamens* 3; anthers 0.4–0.5 mm long. *Caryopses* 0.3–0.4 mm long, sub-globose, pericarp striate to reticulate, brown.

Distribution.— China, Taiwan, Thailand and Japan.

Ecology.— Small tufts in open areas.

Vernacular.— Ya krabok.

Notes.— This species is recognized by its spiciform panicle and the palea which has slightly winged keels.

Specimens examined.— **Loei:** Phu Kradueng National Park, 300 m, 22 March 1958, *Th. Sørensen, K. Larsen & B. Hansen 2419* (BKF, C). **Nong Bua Lam Phu:** Mueang, Ban Prao, 13 March 2010, *W. Chaisongkram 193* (KKU).

10. *E. diplachnoides* Steud., Syn. Pl. Glumac. 1: 268 (1854). Type: Sudan, *Kotschy 346* (holotype UPS; isotypes K!, L!).

Perennial, with short rhizomes. *Culms* 50–100 cm tall, erect or slightly geniculate. *Leaf-sheaths* 20–30 cm long, margins glabrous. *Auricles* glabrous. *Ligules* a fringe of hairs. *Collars* glabrous. *Leaf-blades* 10–25 cm by 3–5 mm, both surfaces scabrous. *Panicles* open, lanceolate, 30–50 by 12–16 cm, branches sub-digitate with the lowermost branch longest, the lowermost branch 6–8 cm long. *Spikelets* 2–3 by 1–1.5 mm, with 4–6 fertile florets, elliptic; florets falling entire from the top of spikelet downwards; rachilla fragile. *L. glumes* 0.4–0.5 mm long, persistent, ovate, keel glabrous to scaberulous, apex acute. *Upper glumes* 0.6–0.7 mm long, persistent, broadly ovate, 1-nerved, keel glabrous, apex acute. *Lemmas* 0.8–1 mm long, broadly ovate, glabrous, membranous, apex acute. *Paleas* 0.8–0.9 mm long, keels ciliate, apex acute. *Stamens* 2; anthers ca. 0.2 mm long. *Caryopses* 0.4–0.5 mm long, ellipsoid, terete, pericarp smooth to finely striate and reticulate, brown.

Distribution.— Tropical and subtropical Africa and Asia.

Ecology.— Common in swampy areas or paddy fields.

Vernacular.— Ya khai pu.

Notes.— This species is distinctive sub-digitate branches of which the lowest one is the longest. It is easily confused with *E. japonica*, a species with an oblong panicle.

Specimens examined.— **Nakhon Sawan:** south of Nakhon Sawan, 100 m, 15 March 1958, *Th. Sørensen, K. Larsen & B. Hansen 1939* (BKF, C, E). **Khon Kaen:** 29 October 2001, *S. Laegaard & M. Norsaengsri 21868* (AAU, QBG, K). **Nakhon Ratchasima:** 20 December 1923, *A.F.G. Kerr 8083* (BM, K, TCD). **Kanchanaburi:** 12 July 1930, *A.F.G. Kerr 19542* (BK, BM). **Songkhla:** Khao Rak Kiat, 25 m, 9 December 1986, *J.F. Maxwell 86-1043* (AAU, BKF).

11. *E. gangetica* (Roxb.) Steud., Syn. Pl. Glumac. 1: 266 (1854). *P. gangetica* Roxb., Fl. Ind. ed. 1820, 1: 341 (1820). Type: India, *Roxburgh s.n.* (holotype K; isotype BM!).— *E. stenophylla* Hochst. ex Miq., Anal. Bot. Ind. 2: 27 (1851). Type: India, prope urbem Mangalor, *Metz 664* (holotype L; isotype G!). Fig. 1f.

Annual. *Culms* 40–80 cm tall, geniculately ascending. *Leaf-sheaths* 5–10 cm long, glabrous. *Auricles* bearded with hairs. *Ligules* ciliolate membranous. *Collars* glabrous. *Leaf-blades* 10–25 cm by 5–8 mm, upper surface sparsely hairy. *Panicles* open, ovate, 15–30 by 6–8 cm. *Spikelets* 6–12 by 1–1.5 mm, with 15–26 fertile florets, oblong; florets falling from the base of spikelet upwards, often pale green; rachilla persistent. *L. glumes* 1–1.2 mm long, caducous, lanceolate, keel scaberulous, apex acute. *Upper glumes* 1.5–1.8 mm long, caducous, elliptic to ovate, 1-nerved, keel scaberulous to scabrous, apex acute. *Lemmas* 1.3–1.8 mm long, caducous, elliptic, glabrous, membranous, apex acute. *Paleas* 1–1.2 mm long, tardily falling, keels scabrous, apex acute to obtuse. *Stamens* 2; anthers 0.2–0.3 mm long. *Caryopses* 0.4–0.6 mm long, orbicular, slightly laterally compressed, pericarp striate and reticulate, dark brown.

Distribution.— North and South America, Africa and Tropical Asia.

Ecology.— On sandy soils and at roadsides.

Vernacular.— Ya krok lek.

Notes.— The appearance of this species is similar to *E. atrovirens* but it is normally smaller and its palea ultimately disarticulates. It was treated by Stapf¹⁵ of *E. stenophylla* which matches the type of *P. gangetica* housed in BM, but the name *E. gangetica* has priority. Veldkamp¹⁰ noted that *E. gangetica* is very similar to *E. nutans*, a perennial species with three stamens.

Specimens examined.— **Chiang Mai:** Doi Suthep National Park, 1100 m, 12 July 1912, *A.F.G. Kerr 2623* (BM, K, TCD). **Loei:** 16° 52' N 101° 52' E, 1300 m, 23 December 1971, *C.F. van Beusekom, R. Geesink, C. Phengkhlai & B. Wongwan 4511* (BKF, C). **Ubon Ratchathani:** Sirindhon, Khun Rai, 7 October 2009, *W. Chaisongkram 180* (KKU). **Surat Thani:** 1 August 1927, *A.F.G. Kerr 13060* (BM).

12. *E. japonica* (Thunb.) Trin., Mém. Acad. Imp. Sci. St.-Petersbourg, Sér. 6, Sci. Math. 1(4): 405 (1830). *P. japonica* Thunb., Fl. Jap.: 51 (1784). Type: Japan, *Herb. Thunberg 2252* (holotype UPS, photo K!).— *E. aurea* Steud., Syn. Pl. Glumac. 1: 267 (1854). Type: Philippines, Laguna, *Cuming 545* (holotype P; isotypes BM!, G!-3 sheets, L). Fig. 1g.

Annual. Culms 40–70 cm tall, erect. Leaf-sheaths 10–30 cm long, margins glabrous. Auricles glabrous. Ligules frimbriate membranous. Collars glabrous. Leaf-blades 10–20 cm by 2–4 mm, both surfaces scabrous. Panicles contracted to open, oblong, 30–50 by 4–5 cm, branches whorled, the lowermost branch 2–2.5 cm long, axis scabrous. Spikelets 1–3 by 0.8–1 mm, with 4–6 fertile florets, ovate; florets falling entire from the top of spikelet downwards; rachilla fragile. *L. glumes* 0.6–0.8 mm long, persistent, ovate to lanceolate, keel scabrous to scaberulous, apex acute. *Upper glumes* 0.8–1 mm long, persistent, broadly ovate, 1-nerved, keel scaberulous, apex acute. *Lemmas* 0.5–0.7 mm long, broadly ovate, scaberulous, membranous, apex obtuse. *Paleas* 0.4–0.6 mm long, keels ciliate, apex obtuse. *Stamens* 2; anthers ca. 0.2 mm long. *Caryopses* 0.2–0.3 mm long, ellipsoid, terete, pericarp rugulose, dark brown.

Distribution.— America, Europe, Africa, and Asia.

Ecology.— Tufted, common in paddy fields and on muddy ground.

Vernacular.— Ya khai pu lek.

Notes.— This species is distinct from other species by virtue of its whorled or sub-digitate panicles and oblong inflorescences.

Specimens examined.— **Chiang Mai:** Doi Inthanon National Park, 500 m, 19 January 1969, *H.P. Nootboom, B. Tantisewie & C. Phengkhilai* 767 (BKF). **Uttaradit:** Den Chai, 27 January 2007, *W. Chaisongkram* 106 (KKU). **Sakon Nakhon:** Phu Phan National Park, 16 November 1962, *P. Suvarnakoses* 1901 (BKF, C, E). **Kanchanaburi:** Sai Yok, 170 m, 29 December 1961, *K. Larsen* 9035 (C). **Sa Kaeo:** 16 October 1928, *Put* 1975 (BK, BM).

13. *E. montana* Balansa, *J. Bot. (Morot)* 4(8): 168 (1890). Type: Cambodia, Pusat Mt., *F.F. Godefroy* 487 (holotype L!).— *E. malayana* Stapf, *Fl. Brit. India* 7(22): 317 (1896). Lectotype (designated by Veldkamp 2002): India, Perak, *Wray* 773 (K!). Fig. 1h.

Annual. Culms 20–50 cm tall, erect to decumbent. Leaf-sheaths 2–8 cm long, glabrous. Auricles bearded with long hairs. Ligules a fringe of long hairs. Collars glabrous. Leaf-blades 3–15 cm by 1–3 mm, upper surface sparsely hairy, lower surface glabrous. Panicles open to contracted, ovate to oblong, 5–25 by 1.5–5 cm, bearded in axils. Spikelets 3–10 by 1.5–2 mm, with 7–30 fertile florets, oblong to elliptic; florets falling from the base of spikelet upwards; rachilla straight, persistent. *L. glumes* 0.7–1 mm long, caducous, ovate, keel scabrous, apex acute. *Upper*

glumes 0.8–1.8 mm long, caducous, broadly ovate, 1-nerved, keel scabrous, apex acute. *Lemmas* 1–2 mm long, caducous, broadly ovate, glabrous to scaberulous, membranous, apex acute. *Paleas* 1–1.4 mm long, persistent, glabrous, apex acute. *Stamens* 3; anthers ca. 0.3 mm long. *Caryopses* 0.4–0.5 mm long, ellipsoid, terete, pericarp smooth to finely reticulate, reddish brown.

Distribution.— Temperate and Tropical Asia.

Ecology.— Common in dry deciduous forest.

Vernacular.— Ya langka.

Notes.— *E. montana* is similar to *E. brownii* but differs by its continuous and persistent rachilla.

Specimens examined.— **Chiang Mai:** Doi Inthanon National Park, 800 m, 12 December 1969, *C.F. van Beusekom & C. Phengkhilai* 2488 (AAU, C). **Loei:** Phu Kradueng National Park, 27 March 2006, *W. Chaisongkram* 52 (KKU). **Nakhon Ratchasima:** 28 July 2008, *M. Norsaengsri* 3987 (QBG). **Ubon Ratchathani:** Soi Sawan waterfall, 10 July 2009, *W. Chaisongkram* 178 (KKU). **Kanchanaburi:** 31 December 1924, *A.F.G. Kerr* 9803 (BM). **Phetchaburi:** Cha-am, 8 April 1924, *A. Marcan* 1686 (BM); Thung Luang, 10 November 1931, *A.F.G. Kerr* 20628 (BM). **Prachuap Khiri Khan:** 6 November 1927, *A.F.G. Kerr* 13455 (BM); 25 m, 12 August 1966, *K. Larsen, T. Smitinand & E. Warncke* 1516 (AAU). **Saraburi:** Sam Lahn, 100 m, 16 June 1974, *J.F. Maxwell* 74-606 (AAU, L). **Chanthaburi:** Makhm, 15 m, 8 November 2008, *W. Chaisongkram* 155 (KKU); 16 February 2009, *M. Norsaengsri* 4915 (QBG). **Narathiwat:** Tak Bai, near sea level, 6 February 1988, *C. Niyomdham* 1655 (AAU, C, E, L).

14. *E. nigra* Nees ex Steud., *Syn. Pl. Glumac.* 1: 267 (1854). Lectotype (designated by Veldkamp 2002): Peninsular India Orientalis, *Herb. Wight proper.* 1782 (LE; isotypes G!, K!).— *E. atropurpurea* Hochst. ex Steud., *Syn. Pl. Glumac.* 1: 267 (1854). Type: India, Tamil Nadu, Coimbatore, Nilgiri, *R.F. Hohenacker* 938 (isotypes BM!, E!, G!-2 sheets).

Perennial. Culms 15–40 cm tall, erect, glabrous. Leaf-sheaths 2–4 cm long, margins and adjacent zones with tubercle-based hairs. Auricles bearded with long hairs. Ligule a fringe of hairs. Collars with a row of long hairs. Leaf-blades 5–15 cm by 3–6 mm, upper surface sparsely hairy, lower surface scabrous. Panicles open, 20–30 by 6–8 cm, peduncle and axis glabrous, branches glabrous. Spikelets 4–6 by 1.5–2 mm, with 4–6 (-7) fertile florets, ovate, dark purple; florets falling from the base of spikelet upwards; rachilla zig-zag, persistent. *L. glumes* 1.2–1.5 mm long, caducous, lanceolate, keel glabrous, apex acumi-

nate. *Upper glumes* 1.8–2.2 mm long, caducous, lanceolate, 1-nerved, keel scabrous, apex acuminate. *Lemmas* 1.6–2.0 mm long, caducous, ovate to elliptic, scaberulous, membranous and hyaline near the apex, apex obtuse to acute. *Paleas* 1.5–1.7 mm long, persistent, keels glabrous, apex bidentate. *Stamens* 3; anthers ca. 0.6 mm long. *Caryopses* 0.5–0.6 mm long, trigonous to reniform, pericarp striate and reticulate, dark brown.

Distribution.— Tropical and Temperate Asia.

Ecology.— Common along roadsides.

Vernacular.— Ya khai mang da.

Notes.— This species is recognized by its dark purple and strongly imbricate spikelets.

Specimens examined.— **Chiang Mai:** Doi Khun Huai Pong, 1800 m, 5 March 1968, *B. Hansen & T. Smitinand* 12831 (AAU, BKF, C, E, L); at the summit of Doi Inthanon National Park, 3 September 2008, *W. Chaisongkram* 141 (KKU).

15. *E. nutans* (Retz.) Nees ex Steud., Nomencl. Bot., ed. 2, 1: 563 (1840). *P. nutans* Retz., Observ. Bot. 4: 19 (1786). Lectotype (designated by Bor 1959)¹⁶: India, Tranquebaria, *Koenig s.n.* (LD, isotypes C!-2 sheets.).

Perennial. *Culms* 25–40 cm tall, geniculately ascending. *Leaf-sheaths* 2–5 cm long, margins glabrous. *Auricles* glabrous to sparsely hairy. *Ligules* a fringe of hairs. *Collars* glabrous. *Leaf-blades* 7–12 cm by 5–10 mm, lanceolate to oblong, upper surface hairy, lower surface scaberulous. *Panicles* contracted, oblong to narrowly elliptic, 15–20 by 3–4 cm. *Spikelets* 5–20 by 2–2.5 mm, with 6–25 fertile florets, oblong; florets falling from the base of spikelet upwards; rachilla straight, persistent. *L. glumes* 1.5–1.8 mm long, caducous, lanceolate, keel scabrous, apex acute. *Upper glumes* 1.8–2 mm long, caducous, elliptic, 1-nerved, keel scabrous, apex acute. *Lemmas* 2–2.2 mm long, caducous, elliptic, scaberulous, membranous, apex acute to acuminate. *Paleas* 1.5–1.8 mm long, persistent, keels ciliolate, apex bidentate. *Stamens* 3; anthers 0.5–0.6 mm long. *Caryopses* 0.4–0.5 mm long, orbicular, slightly laterally compressed, reticulate, brown.

Distribution.— North America, Africa, and Asia.

Ecology.— In open areas and moist locations.

Vernacular.— Ya khaem.

Notes.— This species is recognized by having very long oblong spikelets and contracted panicles.

Specimens examined.— **Kanchanaburi:** 1030 m, Thong Pha Phum, 25 January 2006, *W. Chaisongkram* 83 (KKU). **Chanthaburi:** Makham, 30 March 2006, *W. Chaisongkram* 53 (KKU); 16

February 2009, *M. Norsaengsri* 4907 (QBG).

16. *E. pilosa* (L.) P. Beauv., Ess. Agrostogr.: 162 (1812). *P. pilosa* L., Sp. Pl. 1: 68 (1753). Epitype (designated by Scholz 2000)¹⁷: Italy, an Wegen zwischen den Reisfeldern von Oldenico unweit Vercelli in Oberitalien, *Kneucker* 344 (B; isoeotype L!).

Annual. *Culms* 8–30 cm tall, erect or geniculate. *Leaf-sheaths* 1–3 cm long, margins glabrous. *Auricles* bearded with long hairs. *Ligules* a fringe of hairs. *Collars* glabrous. *Leaf-blades* 2–15 cm by 2–3 mm, upper surface scabrous, lower surface striate. *Panicles* open to contracted, lanceolate to ovate, 3–25 by 5–7 cm, branches flexuous, bearded in axils or glabrous, sub-digitate at lower nodes. *Spikelets* 3–4 by 0.5–0.8 mm, with 3–9 fertile florets, ovate to narrowly lanceolate; florets falling from the base of spikelet upwards; rachilla zig-zag, persistent. *L. glumes* 0.5–0.8 mm long, caducous, narrowly lanceolate, keel obscure, apex apiculate. *Upper glumes* 1–1.5 mm long, caducous, lanceolate, 1-nerved, keel scaberulous, apex acuminate. *Lemmas* 1.2–1.5 mm long, caducous, ovate to elliptic, scaberulous, membranous, apex acute. *Paleas* tardily falling, 1.1–1.3 mm long, keels scaberulous. *Stamens* 3; anthers ca. 0.1 mm long. *Caryopses* 0.3–0.5 mm long, reniform, terete, pericarp smooth to finely reticulate, dark brown.

Distribution.— America, Europe, Africa, Asia, Australia, and Pacific.

Ecology.— Common along roadsides.

Vernacular.— Ya ko.

Notes.— This species has narrow spikelets and it is very similar to *E. tenuifolia* in the shape of its spikelets (but its spikelets are smaller).

Specimens examined.— **Chiang Mai:** Chom Thong, Ban Huai Nam Kow, Yahng Krahm subdistrict, 350 m, 3 October 1991, *J.F. Maxwell* 91-838 (E, L). **Nong Bua Lam Phu:** Mueang, Ban Prao, *W. Chaisongkram* 93 (KKU). **Chanthaburi:** Makham, 8 November 2008, *W. Chaisongkram* 151 (KKU). **Nakhon Si Thammarat:** Ko Chum Thung, 50 m, 30 January 1928, *A.F.G. Kerr* 14349 (BM, K, TCD).

17. *E. riparia* (Willd.) P. Beauv., Ess. Agrostogr.: 162 (1812). *P. riparia* Willd., Ges. Naturf. Freunde Berlin Neue Schriften 4: 185 (1803). Type: India, Madras, *Rottler s.n.* in Herb. Willdenow 1940/2 (holotype B, fragm. K!).

Annual or perennial. *Culms* 20–30 cm tall, geniculately ascending. *Leaf-sheaths* 2–4 cm long, margins glabrous sometimes ciliate or sparsely pilose in the uppermost part. *Auricles* bearded with long hairs. *Ligules* a fringe of hairs. *Collars* pilose. *Leaf-blades* 3–8 cm long, both surfaces scaberulous. *Panicles* open

with compact branches, ovate to lanceolate, 4–8 by 2–2.5 cm, branches bearded in axils. *Spikelets* 2–4 by 1–1.5 mm, with 5–10 fertile florets, lanceolate to oblong; florets falling entire from the top of spikelet downwards; rachilla fragile. *L. glumes* 0.8–1.5 mm long, ultimately falling, ovate to lanceolate, keel scabrous, apex acute. *Upper glumes* 1.2–1.5 mm long, ultimately falling, lanceolate to ovate, 1-nerved, keel scabrous, apex acute. *Lemmas* 1.3–1.5 mm long, ovate to elliptic, scaberulous, membranous, apex obtuse to acute. *Paleas* 1.2–1.5 mm long, keel with tubercle-based hairs, apex obtuse. *Stamens* 3; anthers ca. 0.4 mm long. *Caryopses* 0.3–0.4 mm long, ellipsoid, terete, pericarp rugulose, dark brown.

Distribution.— Tropical Asia.

Ecology.— Common in open areas on a range of soil types.

Vernacular.— Ya khai hao.

Notes.— *E. riparia* is very similar to *E. tenella* but differs by having open panicle and compact branches.

Specimens examined.— **Sakon Nakhon:** 25 August 2007, *W. Chaisongkram 114* (KKU). **Prachuap Khiri Khan:** 7 August 1966, *K. Larsen, T. Smitinand & E. Warncke 1199* (TCD); *K. Larsen, T. Smitinand & E. Warncke 1247* (AAU, K).

18. *E. superba* Peyr., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl. 38: 584 (1860). Type: Angola, Benguela, *Wawra 244* (holotype W). Fig. 1i.

Perennial, *Culms* 40–60 cm tall, geniculate. *Leaf-sheaths* 5–8 cm long, loose, margins glabrous. *Auricles* bearded with long hairs. *Ligules* a fringe of long hairs. *Collars* glabrous. *Leaf-blades* 10–30 cm by 4–8 mm, upper surface hairy, lower surface glabrous. *Panicles* loose, irregular, 10–20 by 2–3 cm, branches glabrous or bearded in axils. *Spikelets* 7–12 by 3–4(–5) mm, with 4–12 fertile florets, broadly elliptic to ovate, breaking up below the glumes and fallen down as a whole. *L. glumes* 2.5–3 mm long, persistent, ovate, keel scabrous, apex obtuse. *Upper glumes* 3–4 mm long, persistent, ovate, 1-nerved, keel scabrous, apex obtuse. *Lemmas* 3–5 mm long, lanceolate to ovate, scaberulous, membranous, apex obtuse. *Paleas* 2–4.5 mm long, keel winged, ciliolate on wings, margins glabrous, apex obtuse. *Stamens* 3; anthers 1.6–1.8 mm long. *Caryopses* 0.5–0.7 mm long, reniform, terete, pericarp reticulate, brown.

Distribution.— North and South America, Africa, Asia, Australasia, and Pacific.

Ecology.— Introduced from India for fodder as a pasture species.

Vernacular.— Ya yung ram phan.

Notes.— The species can be easily recognized by its rather large spikelets that are up to 5 mm wide and its strongly imbricate florets. Moreover, the wings on palea keels are prominently seen in lateral view.

Specimens examined.— **Nakhon Ratchasima:** Pak Chong, April 1969, *S.N.* (BKF).

19. *E. tef* (Zucc.) Trotter, Boll. Soc. Bot. Ital.: 62 (1918). *P. tef* Zucc. Diss. Ditef. (1775). Type: Cultivated in Florence from seed collected in Ethiopia, *Anonymous* (holotype FI).

Perennial, rhizomes short. *Culms* 20–60 cm tall, erect or geniculate. *Leaf-sheaths* 3–10 cm long, margins glabrous. *Auricles* bearded with long hairs. *Ligules* a fringe of hairs. *Collars* glabrous. *Leaf-blades* 10–20 cm by 2–4 mm, both surfaces scabrous. *Panicles* open, lanceolate to ovate, 25–40 by 3–6 cm, branches flexuous, bearded in axils or glabrous, whorled at lower nodes. *Spikelets* 5–8 by 1–1.2 mm, with 4–6 fertile florets, lanceolate, green; florets tardily falling from the base of spikelet upwards; rachilla zig-zag, persistent. *L. glumes* 1.5–1.8 mm long, tardily falling, lanceolate, keel scabrous, apex acuminate. *Upper glumes* 2–2.5 mm long, tardily falling, lanceolate, 1-nerved, keel scabrous, apex acuminate. *Lemmas* 2.2–2.7 mm long, tardily falling, elliptic to lanceolate, scabrous, slightly membranous to scarious, apex acute. *Paleas* 1.8–2 mm long, persistent, keels scaberulous, apex acute. *Stamens* 3; anthers 0.3–0.4 mm long. *Caryopses* 0.9–1 mm long, reniform, terete, pericarp finely striate and reticulate, dark brown.

Distribution.— North and South America, Europe, Africa, Asia, Australasia, and Pacific.

Ecology.— Cultivated species.

Vernacular.— Ya teff.

Notes.— *E. tef* is a staple cereal in Africa. It was introduced to Thailand in 1929. The label note from the only specimen collected from Thailand indicates that it was “introduced two years ago”.

Specimens examined.— **Nakhon Ratchasima:** Pak Chong, 1–200 m, 18 May 1931, *A.F.G. Kerr s.n.* (BM).

20. *E. tenella* (L.) P. Beauv. ex Roem. et Schult. Syst. Veg. 2: 576 (1817). *P. tenella* L. Sp. Pl. 1: 69 (1753). Lectotype (designated by Mitra & Jain 1980)¹⁸: India, Herb. Linn. No. 87.33, *Anonymous* (LINN!).— *E. amabilis* (L.) Wight & Arn. ex Nees, Bot. Beechey Voy.: 251 (1838). *P. amabilis* L. Sp. Pl. 1: 68 (1753). Lectotype (designated by Veldkamp 2000): Sri Lanka, Herb. Hermann 2: 59, no. 46, *Anonymous* (BM!). Fig. 1j.

Small annual. *Culms* 10–30 cm tall, erect or geniculate, slightly compressed or terete. *Leaf-sheaths* 5–15 cm long, glabrous or hairy near the blade, margins with tubercle-based hairs. *Auricles* bearded with long hairs. *Ligules* a fringe of long hairs. *Collars* with a row of long hairs. *Leaf-blades* 7–15 cm by 8–12 mm, upper surface scabrous, lower surface glabrous. *Panicles* open, lanceolate to ovate, 7–20 by 3–8 cm, axis scabrous, branches with long hairs in axils, branchlet and pedicel glandular. *Spikelets* 1.5–2 by 0.8–1 mm, with 4–7 fertile florets, delicate, ovate to ovate-oblong; florets falling entire from the top of spikelet downwards; rachilla fragile. *L. glumes* 0.4–0.5 mm long, persistent, narrowly lanceolate, keel scaberulous, apex acute. *Upper glumes* 0.5–0.7 mm long, persistent, elliptic, 1-nerved, keel scaberulous, apex acute. *Lemmas* 1.5–2 mm long, broadly ovate or oblong, scaberulous, membranous, apex mucronulate, acute or muticous. *Paleas* 0.8–0.9 mm long, keels with tubercle-based hairs, apex obtuse. *Stamens* 3; anthers ca. 0.2 mm long. *Caryopses* 0.3–0.4 mm long, ellipsoid, terete, pericarp finely rugulose, brown.

Distribution.— North and South America, Africa, Asia, Australasia, and Pacific.

Ecology.— Widespread and common in lowlands in elevations from sea-level to 2000 m, often in shady sites, grasslands and dry forests.

Vernacular.— Ya khai hep lek.

Notes.— *E. tenella* is one of the commonest grasses in Thailand and can be recognized by its delicate spikelets that are often pinkish, and by the presence of tubercle-based hairs on its palea keels. Following Jansen¹⁹, who discussed the names *E. amabilis* and *E. tenella*, we have accepted the name *E. tenella* since it was chosen by Stapf¹⁵ who first united.

Specimens examined.— **Chiang Mai:** Tham Chiang Dao, 350 m, 17 February 1958, *Th. Sørensen, K. Larsen & B. Hansen 1211* (C); 1221 (BKF, C, E). **Nong Bua Lam Phu:** Ban Prao, 15 September 2006, *W. Chaisongkram 92* (KKU). **Prachuap Khiri Khan:** Khao Chong Krachock, 18 August 1967, *T. Shimizu, N. Pukuoka & A. Nalamphun T7610* (BKF); 25 December 2007, *W. Chaisongkram 125* (KKU). **Krung Thep Maha Nakhon:** Paved path, 15 October 1922, *A. Marcan 1022* (BM). **Narathiwat:** Tak Bai, near sea level, 18 September 1987, *C. Niyomdham & D. Sriboonma 1628* (AAU, BKF, E).

21. *E. tenuifolia* (A. Rich.) Hochst. ex Steud., Syn. Pl. Glumac. 1: 268 (1854). *P. tenuifolia* A. Rich., Tent. Fl. Abyss. 2: 425 (1851). Lectotype (designated by Phillips 1995)²⁰: Ethiopia, in locis incultis Vallium

prope Adoam, *Schimper 92* (P; isotypes K!, G!, L).— *E. parviglumis* Hochst. ex Steud., Syn. Pl. Glumac. 1: 267 (1854). Type: India, Tamil Nadu, Coimbatore, in montibus Nilagiri, *Metz 936* (isotypes G!-2 sheets). Fig. 1k.

Perennial. *Culms* 30–70 cm tall, erect or geniculate, slightly compressed, lateral branches lacking. *Leaf-sheaths* 5–15 cm long, coriaceous to membranous, margins with tubercle-based hairs. *Auricles* bearded with long hairs. *Ligules* a fringe of long hairs. *Collars* glabrous. *Leaf-blades* 10–25 cm by 2–3 mm, upper surface scabrous, lower surface glabrous. *Panicles* open, lanceolate to ovate, 20–40 by 8–10 cm, branches bearded in axils. *Spikelets* 6–10 by 1–1.5 mm, with 8–15 fertile florets lanceolate; florets falling from the base of spikelet upwards; rachilla zig-zag, persistent. *L. glumes* 0.5–0.8 mm long, caducous sometimes tardily falling, narrowly ovate, keel scaberulous, apex acute. *Upper glumes* 1–2 mm long, caducous sometimes tardily falling, ovate to lanceolate, 1-nerved, keel scabrous, apex acute. *Lemmas* 2–2.5 mm long, caducous, ovate to oblong, scaberulous, membranous, apex acute. *Paleas* 1. 8–2 mm long, persistent, keel ciliolate, apex bidentate. *Stamens* 2–3; anthers ca. 0.5 mm long. *Caryopses* 0.5–0.6 mm long, trigonous, pericarp finely reticulate, reddish brown, adhered to palea.

Distribution.— North and South America, Europe, Africa, Asia, Australasia, and Pacific.

Ecology.— In open areas at 600–2560 m.

Vernacular.— Ya khamao.

Notes.— This species commonly exhibits dark green spikelets and is similar to *E. nigra* but differs by having more narrowly lanceolate spikelets and caryopses that adhere to the palea after lemma shedding.

Specimens examined.— **Chiang Mai:** Doi Suthep National Park, 1575 m, 22 May 1988, *J.F. Maxwell 88-670* (AAU, BKF, L); Doi Inthanon National Park, 3 September 2008, *W. Chaisongkram 130* (KKU). **Tak:** Um Phang, 14 November 2008, *W. Chaisongkram 161* (KKU). **Loei:** Phu Ruea National Park, 21 November 2009, *W. Chaisongkram 203* (KKU).

22. *E. unioides* (Retz.) Nees ex Steud., Syn. Pl. Glumac. 1: 264 (1854). *P. unioides* Retz., Observ. Bot. 5: 19 (1788). Type: India, 1776, *Koenig s.n.* (holotype LD, picture K!, fragment K!; isotypes BM!, K). Fig. 1l.

Annual or perennial, sometimes rhizomatous. *Culms* 10–50 cm tall, erect or geniculate, internodes glabrous, sometimes rooted at lower nodes. *Leaf-sheaths* 2–5 cm long, margins hyaline, glabrous. *Au-*

ricles bearded with long hairs. *Ligules* a fringe of hairs. *Collars* glabrous. *Leaf-blades* 5–20 cm by 1–8 mm, upper surface sparsely hairy, lower surface striate. *Panicles* open, ovate, obovate to elliptic, 5–35 by 6–8 cm, branches glabrous. *Spikelets* 5–12 by 2.5–4 (–5) mm, normally pinkish, with 3–30 fertile florets, ovate; florets falling from the base of spikelet upwards; rachilla persistent. *L. glumes* 1.8–2.3 mm long, caducous, narrowly lanceolate, keel scaberulous, apex acuminate. *Upper glumes* 2–2.4 mm long, caducous, lanceolate, 1-nerved, keel scaberulous, apex acuminate. *Lemmas* 1.5–2.5 mm long, caducous, ovate, scaberulous to scabrous, membranous, apex acute. *Paleas* 1.5–2.2 mm long, caducous, keels ciliolate, apex bidentate. *Stamens* 2–3; anthers ca. 0.3 mm long. *Caryopses* 0.5–0.6 mm long, orbicular, laterally compressed, pericarp reticulate, dark brown.

Distribution.— North and South America, Africa, Asia, and Australasia.

Ecology.— Common on sandy soil and in open area in dipterocarp forest, often found on wet soils.

Vernacular.— Ya krok.

Notes.— This species is recognized by its broadly elliptic or slightly ovate spikelets. The spikelet width is up to 5 mm and they are commonly pinkish.

Specimens examined.— **Mae Hong Son:** 500 m, 9 September 1974, *K. Larsen & S.S. Larsen 34315* (AAU, BKF, C, E). **Chiang Mai:** Pha Mon, Doi Inthanon National Park, 4 September 2008, *W. Chaisongkram 140* (KKU). **Loei:** Phu Kradueng National Park, 1300 m, 29 November 1958, *Th. Sørensen, K. Larsen & B. Hansen 6318* (C, K). **Kanchanaburi:** Sai Yok, 25 November 1971, *C.F. van Beusekom, R. Geesink, C. Phengkhlai & B. Wongwan 3948* (BKF, C). **Nakhon Nayok:** Khao Yai National Park, 350 m, 20 November 2002, *J.F. Maxwell 02-433* (BKF). **Prachin Buri:** Krabin, 8 November 1930, *A. Marcan 2530* (BM, L); 10 November 1930, *A. Marcan 2592* (BM, K). **Narathiwat:** 6 February 1988, *C. Niyomdham 1655* (AAU, BKF, C, E, L).

23. *E. viscosa* (Retz.) Trin., *Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math.* 1(4): 397 (1830). *P. viscosa* Retz., *Observ. Bot.*: 20 (1786). Type: India, *Koenig in Herb. Retzian s.n.* (holotype LD, fragment K!; isotype BM!).

Annual. *Culms* 20–45 cm tall, erect or geniculate, with sticky glandular patches below the nodes. *Leaf-sheaths* 3–6 cm long, glabrous or sparsely hairy. *Auricles* glabrous. *Ligule* a fringe of hairs. *Collars* hairy. *Leaf-blades* 6–20 cm by 3–8 mm, both surfaces glabrous. *Panicles* open, oblong to ovate, 15–25 by 5–8 cm, glabrous or pilose in axils, branchlet and

pedicel with pale brown glands. *Spikelets* 2.5–4.5 by 0.8–1 mm, with 3–10 fertile florets, oblong to ovate; florets falling entire from the top of spikelet downwards; rachilla fragile. *L. glumes* 0.6–0.8 mm long, persistent, ovate, keel scaberulous, apex acute. *Upper glumes* 0.7–0.9 mm long, persistent, ovate, 1-nerved, keel scaberulous, apex acute. *Lemmas* 1.1–1.3 mm long, elliptic, scaberulous, membranous, apex obtuse. *Paleas* 0.9–1.2 mm long, keels with tubercle-based hairs, apex truncate. *Stamens* 3; anthers ca. 0.2 mm long. *Caryopses* 0.4–0.5 mm long, ellipsoid, terete, pericarp finely rugulose, reddish brown.

Distribution.— North and South America, Africa, and Asia.

Ecology.— In open and dry grassland.

Vernacular.— Ya kho niao.

Notes.— This species is very similar to *E. tenella* but differs by having sticky glandular patches below the culm nodes. Veldkamp¹⁰ treated this name under *E. amabilis* which is placed here as a synonymy of *E. tenella*.

Specimens examined.— **Khon Kaen:** Khon Kaen University, Sa Plastic, 12 November 2008, *W. Chaisongkram 153* (KKU). **Chon Buri:** Thung Brong, 13 February 1971, *J.F. Maxwell 71-83* (AAU).

CONCLUSIONS

This paper provides an updated taxonomic account of *Eragrostis* in Thailand. A total of 23 species are recognized in Thailand including two species which are introduced, *E. superba* and *E. tef*. The majority of species occur widely in open areas and on sandy soils from low altitudes up to 2500 m, except *E. capensis* that is strictly distributed in Phu Kradueng National Park, Loei Province. Twelve species which were previously mentioned⁸ to exist in Thailand: *E. chlorome-las*, *E. curvula*, *E. elongata*, *E. inamoena*, *E. kerrii*, *E. macilenta*, *E. minor*, *E. multicaulis*, *E. pubescens*, *E. subsecunda*, *E. trichodes*, and *E. udawensis* were excluded. There is no specimen under these names deposited in any herbarium in Thailand or overseas. They might be wrong determinations. Comments on some nomenclatural decisions are given in the notes under each species description. The identification key constructed for Thai *Eragrostis* was based mainly on the spikelet disarticulation and the shape of the caryopsis, and it can be divided into 4 informal groups: the disarticulation occurring below the glumes, the disarticulation occurring from the top of the spikelet downwards, the disarticulation occurring from the base of the spikelet upwards and trigonous to reniform caryopsis, and the disarticulation occurring from the base of the spikelet upwards and ellipsoid or orbic-

ular caryopsis. However, these characters, although useful for key construction, are artificial and should be used carefully for phylogenetic interpretation at infrageneric level.

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