

# The Genera *Dyschoriste*, *Eranthemum* and *Phaulopsis* (Acanthaceae) from Thailand

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**ABSTRACT.** – The synopsis of three genera, *Dyschoriste*, *Eranthemum* and *Phaulopsis* of the family Acanthaceae in Thailand is presented. One species each for *Dyschoriste* and *Phaulopsis* is recorded such as *Dy. nagchana* and *P. dorsiflora*. Five species in *Eranthemum*, namely *E. burmanicum*, *E. ciliatum*, *E. decumbens*, *E. macrophyllum* and *E. tetragonum* are enumerated. *Eranthemum burmanicum* and *E. macrophyllum* are new records from Thailand. *Eranthemum obovatum* is presently reduced as synonymy under *E. tetragonum*. *Daedalacanthus parishii*, *D. ciliatus*, *E. macrophyllum*, *E. obovatum* and *E. tetragonum* are lectotypified.

**KEYWORDS:** distribution, identification, floristic, typification, taxonomy

## INTRODUCTION

*Dyschoriste*, *Eranthemum* and *Phaulopsis* are genera of the family Acanthaceae which were formerly classified as belonging to the subtribe Ruelliinae by having left-contorted aestivation, filament curtain and jaculators (Watson & Dallwitz, 1992; Scotland & Vollesen, 2000; Olmstead, 2005). However, based on the present taxonomic treatment *Dyschoriste* is placed into the subtribe Petalidiinae, and *Eranthemum* and *Phaulopsis* are proposed as an individual subtribe namely Erantheminae and Phaulopsidinae (Tripp et al., 2021). These genera are distributed in pantropical Asia, Africa and America and ca 65 species, 30 species and 22 species are known for *Dyschoriste*, *Eranthemum* and *Phaulopsis*, respectively (Kobuski, 1928; Manktelow, 1996; Mabberley, 2008; Christenhusz et al., 2017). In Thailand, one species each for *Dyschoriste* and *Phaulopsis*, *Dy. erecta* (Burm. f.) Kuntze and *P. dorsiflora* (Retz.) Santapau and four species in *Eranthemum*, *E. ciliatum* (Craib) Benoist, *E. obovatum* J.B. Imlay, *E. pulchellum* Andrews and *E. tetragonum* Wall. ex Nees were enumerated (Benoist, 1935; Hosseus, 1907; Imlay, 1939; Hansen, 1985; Manktelow, 1996; Pooma & Suddee, 2014). Furthermore, a new species of *Eranthemum*, *E. decumbens* Kladwong & Chantar. and a key to species of this genus in Thailand were reported (Kladwong & Chantaranoethai, 2021).

Ongoing preparation of the account of these genera for the Flora of Thailand, many misidentified specimens and also through the misapplication of names are recognized. The nomenclatural circumscription is determined. We found that the records of *Dy. erecta* and *E. pulchellum* in Thailand are misidentified. Moreover, two species of *Eranthemum*, *E. burmanicum* N.P. Balakr. and *E. macrophyllum* Wall. ex Nees are newly recorded in Thailand, and one species, *E. obovatum* is

treated as a new synonym. The lectotypes of Thai *Eranthemum* species are designated. The description of two new recorded species is presented, including a revised key to species of *Eranthemum* in Thailand. The distribution, habitat and phenology are provided as well as distribution maps, conservation assessments, photographs, vernacular names and taxonomic notes.

## MATERIALS AND METHODS

Extensive field investigation and careful examination of specimens from Thai and abroad herbaria: AAU, BK, BKF, BM, C, CMU, CMUB, E, G, GZU, K, KCU, KYO, K-W, L, LD, M, P, PSU, QBG and US (herbarium acronyms follow Thiers, 2021, continuously updated) were carried out. The consultation of type and non-type specimens from C, E, G, GZU, K, K-W, L, LD, M, P and US was made by means of visiting digital herbaria online. The investigation of protologues and other related literature viz. Clarke, 1885 & 1908; Ridley, 1915 & 1923; Benoist, 1935; Wood, 2001; Kress et al., 2003; Hu et al., 2005 & 2011; Newman et al., 2007 & 2017) were conducted. The herbarium specimens from the field collection were made and housed at KCU. The morphological description was performed based on the herbarium specimens and field information. The vernacular names of the new records were provided by the authors and the other species were recorded from the specimens and Thai Plant Names Tem Smitinand (Pooma & Suddee, 2014). The distribution, habitat and phenology are recorded from specimen labels and field observations. The distribution maps in Thailand were illustrated based on the locality provided on the herbarium sheet. The IUCN red list assessments were performed by means of the extent of occurrence (EOO) and the area of occupancy (AOO) using

GeoCat (Bachman et al., 2011). The type specimens have been investigated, seen by digital images and are not seen indicated by ‘!’, ‘image seen’ and ‘*n.v.*’, respectively.

### TAXONOMIC TREATMENT

**1. *Dyschoriste*** Nees in Wall., Pl. Asiat. Rar. 3: 81. 1832.

— *Calophanes* D. Don in Sweet, Brit. Flow. Gard. 2. 181. 1833.

— *Linostylis* Fenzl ex Sond., Linnaea 23(1): 94. 1850.

***Dyschoriste nagchana*** (Nees) Bennet, Indian Forester 109(4): 220. 1983.

— *Dipteracanthus nagchana* Nees in Wall., Pl. Asiat. Rar. 3: 82. 1832.— *Calophanes nagchana* (Nees) Nees in de Candolle, Prodr. 11: 109. 1847. Type: India, Patna, 19 Mar. 1812, Wall. Numer. List: 2396, 1831–1832 (syntypes **GZU** [GZU000280504], image seen & **K-W** [K001115852], image seen).

— *Dyschoriste depressa* Nees in Wall., Pl. Asiat. Rar. 3: 81. 1832.— *Calophanes depressa* (Nees) T. Anderson in Thwaites, Enum. Pl. Zeyl. 1: 225. 1860., [non *Ruellia depressa* L. f.] Type: Sri Lanka [Ceylon], Wall. Numer. List: 2379, 1831–1832 (syntypes **GZU** [GZU000280518], image seen & **K-W** [K001115803], image seen).

— *Dyschoriste erecta* auct. non (Burm.f.) Kuntze: Benoist in Lecomte et al., Fl. Indo-Chine 4: 659. 1935.

**Distribution, habitat and phenology.**— *Dyschoriste nagchana* is distributed in India, Sri Lanka, and Thailand where it grows on open spaces and sandy soil in mixed deciduous, evergreen and pine forests. This species is flowering and fruiting from Aug. to Mar.

**Specimens examined.**— THAILAND: NORTHERN Mae Hong Son [without locality, 750 m alt., 10 Nov. 2004, Maxwell 04-691 (**BKF**)]; Chiang Mai [Ban Mon, 320 m alt., 1 Nov. 1960, S.N. 2313 (**BK**); Ban Pee Lu, 24 Oct. 1996, Nanakorn et al. 7772 (**QBG**-2 sheets); Chom Thong, near Mae Klang Waterfall, 350 m alt., 15 Dec. 1965, Tagawa et al. 2230 (**BKF, KYO**); ibid., en route from Mae Klang Waterfall to Ban Yang, along Mae Klang Stream, 350–600 m alt., 16 Dec. 1965, Tagawa et al. 2302 (**KYO**); Doi Lohn, west side open wet area, 1050 m alt., 22 Oct. 1996, Maxwell 96-1372 (**BKF**); Samoeng, Mae Kahn (Karen) Village area, Mae Sahn, 675 m alt., 11 Oct. 2001, Maxwell 01-512 (**CMUB**); Lampang [Lakon, 4 Feb. 1912, Kerr 2324 (**P**); Phrae [Song, Mae Yom National Park, Dow Boon, 225 m alt., 13 Oct. 1991, Maxwell 91-899 (**CMUB, P**); Tak [Sam Ngao, Doi Pan Thee, 700 m alt., 25 Nov. 2009, Watthana 3370 (**QBG**) & 3378 (**QBG**); Sukhothai [Mueang, near Pra Tah Due Nahm

Doke So Gah Cah Nah Temple, 5 Nov. 1971, Maxwell 71-686 (**AAU, BK**); Phitsanulok [Thung Nong Luang National Park, 1 Dec. 1966, Prayad 553 (**BK**); Thung Salaeng Luang National Park, Kang So Pa Waterfall, 500 m alt., 30 Sept. 1967, Tagawa et al. 11248 (**KYO**); ibid., Kang So Pa Waterfall, 350 m alt., 11 Oct. 1979, Shimizu et al. 18357 (**BKF**-2 sheets, **KYO**) & 18377 (**BKF**-2 sheets, **KYO, L**); ibid., Kang So Pa Waterfall, 500 m alt., 29 Dec. 1982, Koyama et al. 31901 (**KYO**); ibid., about 20 km E of Phitsanulok along the path by stream along the road, 450–480 m alt., 21 Oct. 1984, Murata et al. 38289 (**BKF, KYO**-2 sheets) & 38434 (**BKF, KYO**) & 38446 (**BKF, KYO**-2 sheets, **QBG**); ibid., Poi Waterfall, 210 m alt., 22 Oct. 1984, Murata et al. 51461 (**BKF, KYO**-2 sheets, **QBG**); ibid., Poi Waterfall, 210 m alt., 22 Dec. 1984, Murata et al. 51455 (**BKF, KYO**); ibid., road side in sunny place, 520 m alt., 22 Oct. 1984, Murata et al. 38468 (**BKF, KYO, QBG**-2 sheets); ibid., without date, S.P. et al. 81 (**BKF, KYO, P**); NORTH-EASTERN: Phetchabun [Nam Nao National Park, Pha Daeng Cliff, 900–960 m alt., 26 Dec. 1982, Koyama et al. 31721 (**BKF, KYO**); ibid., 280–350 m alt., 28 Oct. 1983, Murata et al. 51510 (**BKF, KYO**); ibid., Tham Pha Hong, 12 Nov. 2013, Maknoi 6256 (**QBG**); ibid., Tham Yai, 12 Nov. 2013, Maknoi 6206 (**QBG**); ibid., 14 Nov. 2013, Maknoi 6439 (**QBG**); Loei [Phu Kradueng, Ban Na Yang Tai, 14 Nov. 2011, Lakoet 212 (**QBG**); Sithan, 300 m alt., 21 Mar. 1958, Smitinand 4893 (**BKF**); ibid., 22 Nov. 1958, Sørensen et al. 6134 (**BKF**); Phu Kradueng National Park, 22 Oct. 1947, Bunpheng 17 (**BKF**); ibid., 1300 m alt., 30 Aug. 1950, Bunpheng 8773 (**BKF**); ibid., 9 Oct. 1967, Prayad 1011 (**BK**); ibid., 10 Nov. 1970, Charoenphol et al. 4885 (**AAU, BKF, KYO, P**); ibid., 300–1200 m alt., 17 Nov. 1977, Shimizu et al. 22708 (**BKF**); 300–900 m alt., 14 Nov. 1978, Shimizu et al. 22571 (**KYO**); ibid., 300–1200 m alt., 17 Nov. 1979, Shimizu et al. 22708 (**BKF**); ibid., 350–900 m alt., 17 Dec. 1982, Koyama et al. 31194 (**BKF, KYO**) & 31195 (**KYO**); ibid., 4 Nov. 1984, Murata et al. 43074 (**BKF**); ibid., along trail from Samhaek to Langpae, 750 m alt., 29 Aug. 1988, Takahashi 63229 (**KYO**-2 sheets)]; Bueng Kan [Seka, Phu Wua Wildlife Sanctuary, Chet Si Waterfall, 26 Aug. 2001, Pooma et al. 2749 (**BKF**)]; Sakon Nakhon [68 km from Kalasin Province border on road from Khon Kaen, 13 Oct. 1990, Chantaranothai & Parnell 90/684 (**KKU**); Phu Phan National Park, 350 m alt., 14 Dec. 1982, Koyama et al. 31022 (**BKF, KYO, L**); ibid., 380 m alt., 12 Nov. 1984, Murata et al. 50636 (**AAU, BKF, KYO**); ibid., 380 m alt., 13 Nov. 1984, Murata et al. 48873 (**QBG**) & 48876 (**QBG**); ibid., 380 m alt., 14 Nov. 1984, Murata et al. 50512 (**BKF**); ibid., 380 m alt., 15 Nov. 1984, Murata & Phengklai

50432 (**BKF**); *ibid.*, 13 Sept. 1999, *Chaikong 18/42* (**KKU**); *ibid.*, 20 Nov. 1999, *Chaikong 19/42 & 20/42* (**KKU**); *ibid.*, without date, *Chantaranothai 1400* (**KKU**) & *1460* (**BKF**); Poon Ngarn, 12 Dec. 1962, *Adisai 236* (**BK**); Mukdahan [en route 2030, 38 km from Mukdahan to Khamcha-i, 250–280 m alt., 13 Dec. 1982, *Koyama et al. 30947* (**BKF, KYO**); Mueang, along route 213 Dong Man Village, 12 Dec. 1982, *Koyama et al. 30859* (**BKF**); *ibid.*, Dong Man Village, 220–300 m alt., 12 Dec. 1982, *Koyama et al. 30923* (**KYO**); Khon Kaen [Phu Pa Ngam National Park, 216 m alt., 30 Oct. 2017, *Norsaengsri 2845* (**QBG**); EASTERN: Chaiyaphum [Mueang, 456 m alt., 17 Nov. 2010, *Thongson & Boonprakop 328* (**QBG**); Phu Khiao, Pa Ban Moei, 300 m alt., 8 Nov. 1966, *S.N. 286* (**BK**); Nakhon Ratchasima [Bua Yai, 31 Oct. 1931, *Put 4235* (**BK**); Pak Thong Chai, 13 Nov. 1963, *Pradit 613* (**BK**); *ibid.*, Wang Nam Khieo, 27 Nov. 2010, *Damrongsak 433* (**BKF**); Wang Nam Khieo, 27 Nov. 1970, *Sonan 88* (**BKF**); *ibid.*, 27 Dec. 1970, *Sonan 764* (**BKF**); Roi Et [Selaphum, Roi Et Rajabhat University, 26 Nov. 2015, *Saensouk et al. 141* (**QBG**); Si Sa Ket [Pha Mo Aee Dang, 500 m alt., 21 Dec. 2005, *Pooma et al. 6007* (**AAU, BKF**); Phanom Dong Rak Wildlife Sanctuary, 375 m alt., 23 Oct. 2003, *Maxwell 03-410* (**CMUB**); Ubon Ratchathani [Buntharik, 270 m alt., 10 Dec. 1982, *Koyama et al. 30715* (**BKF**); Khong Chiam, Soi Sawan Waterfall, without date, *Pooma et al. 2383* (**BKF**); SOUTH-WESTERN Uthai Thani [Lan Sak, Huai Kha Khaeng Wildlife Sanctuary, To Jone Waterfall along Huai Kha Khaeng, 280–330 m alt., 12 Nov. 1979, *Shimizu et al. 22275* (**BKF**); Kanchanaburi [Srisawat, Erawan, 2 May 1974, *K. Larsen & S. Larsen 34001* (**AAU**); *ibid.*, Erawan National Park, Koh Buk Village, 350 m alt., 26

Nov. 1982, *Koyama et al. 30334* (**BKF, KYO**); Ratchaburi [Tung Luang, under 50 m alt., 8 Nov. 1931, *Kerr 20603* (**BK**); CENTRAL Lop Buri [Chai Badan, 10 Oct. 1926, *Lakshnakara 262* (**BK**); Saraburi [Mueang, Samlan [Sahm Lahn] forest, 16 Dec. 1973, *Maxwell 73-770* (**AAU, BK**); SOUTH-EASTREN Sa Kaeo [Wattana Nakhon, 14 Oct. 1928, *Put 1914* (**BK**); PENINSULAR Narathiwat [Ban La Dua, ca 200 m alt., 28 Nov. 1920, *Kerr 4660* (**BK**). INDIA: Patna [19 Mar. 1812, *Wall. Numer. List: 2396* (**K-W**); Peninsula Indiae Orientalis [*Wight 2181* (**L**)]. SRI LANKA: without locality [without date, *Wall. Numer. List: 2379* (**GZU, K-W**).

**Vernacular name.**— I tu khok (อีตุ๊ก), sabai nam (สะบายน้ำ), ya sam chan (หญ้าสามชั้น).

**Notes.**— *Dyschoriste nagchana* was formerly known in Thailand as *Dy. erecta* (Burm. f.) Kuntze according to the report of Benoist (1935). However, this was a misapplication of the name *Dy. erecta* (Burm. f.) Kuntze because it was accepted as a synonym of *Hygrophila erecta* (Burm. f.) Hochr. by Hochreutiner (1934) and Bremekamp (1948). *Dyschoriste nagchana* is commonly observed in Thailand and is distributed in Northern, North-Eastern, Eastern, South-Western, Central, South-Eastern and Peninsular floristic regions (Fig. 1). This species has an Extent of Occurrence (EOO) of 590,049.441 km<sup>2</sup> and an Area of Occupancy (AOO) of 168.000 km<sup>2</sup> and is assessed as the Least Concern (LC) criterion based on the IUCN Red List Categories (IUCN Standards and Petitions Committee, 2022).

**2. *Eranthemum* L., Sp. Pl. 1: 9. 1753.**

— *Daedalacanthus* T. Anderson in Thwaites, Enum.

Pl. Zeyl. 1: 229. 1860.

— *Upudalia* Raf., Fl. Tellur. 4: 66. 1836.

**Key to species of *Eranthemum* from Thailand**

1. Bracts variegated white and green; stamens exserted except *E. tetragonum*
  2. Stamens included..... *E. tetragonum*
  2. Stamens exserted
    3. Bracts margin ciliate..... *E. ciliatum*
    3. Bracts margin never ciliate
      4. Corolla blue; lobes ovate, all lobes not reflexed at anthesis..... *E. pulchellum*
      4. Corolla pale purple; lobes obovate, four upper lobes reflexed at anthesis..... *E. macrophyllum*
1. Bracts not variegated white and green; stamens included
  5. Bracts rhomboid or elliptic-orbicular, margin crenulate or subentire..... *E. burmanicum*
  5. Bracts not as above
    6. Stems decumbent; leaves ovate-oblong, base cuneate or rounded; bracts with sticky glandular hairs..... *E. decumbens*
    6. Stems erect; leaves ovate-lanceolate to narrowly lanceolate or oblong to linear, base attenuate; bracts without sticky glandular hairs..... *E. tetragonum*

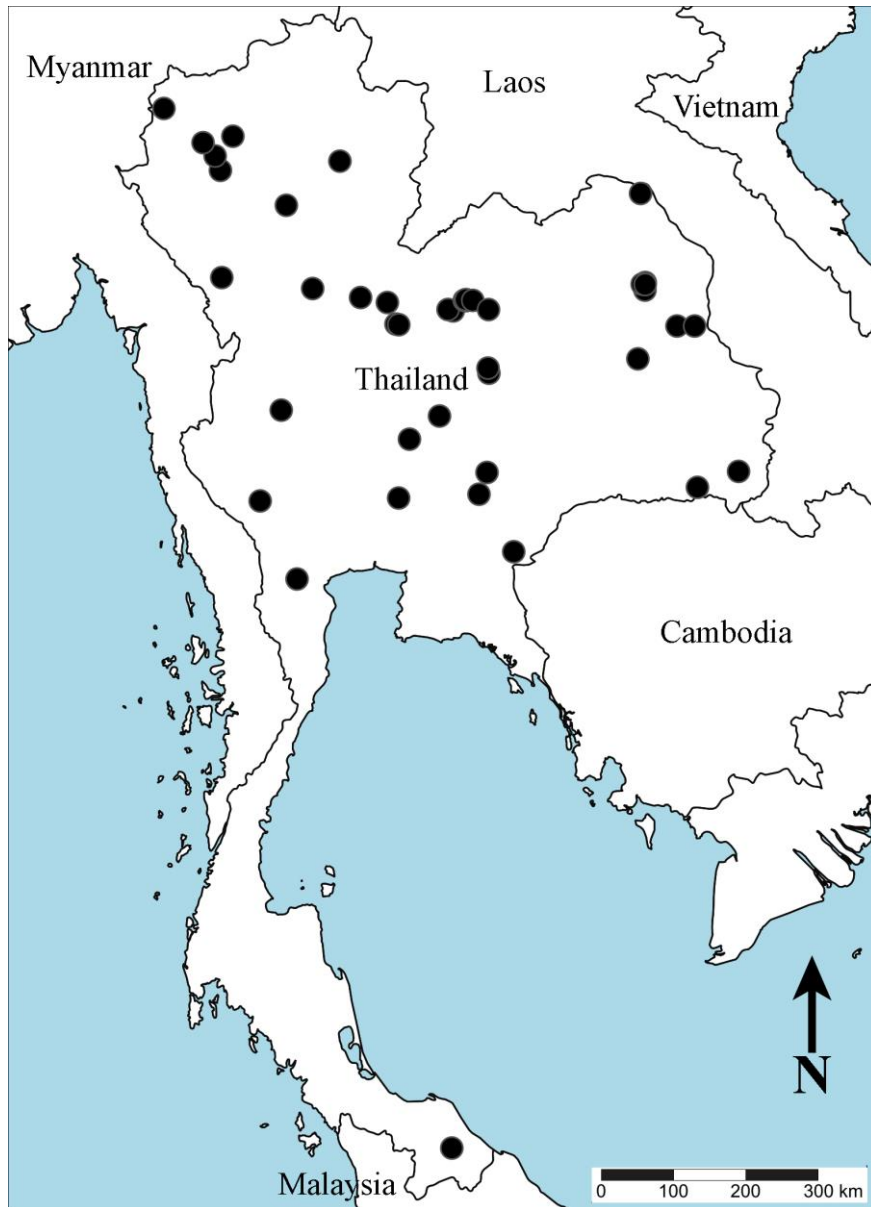


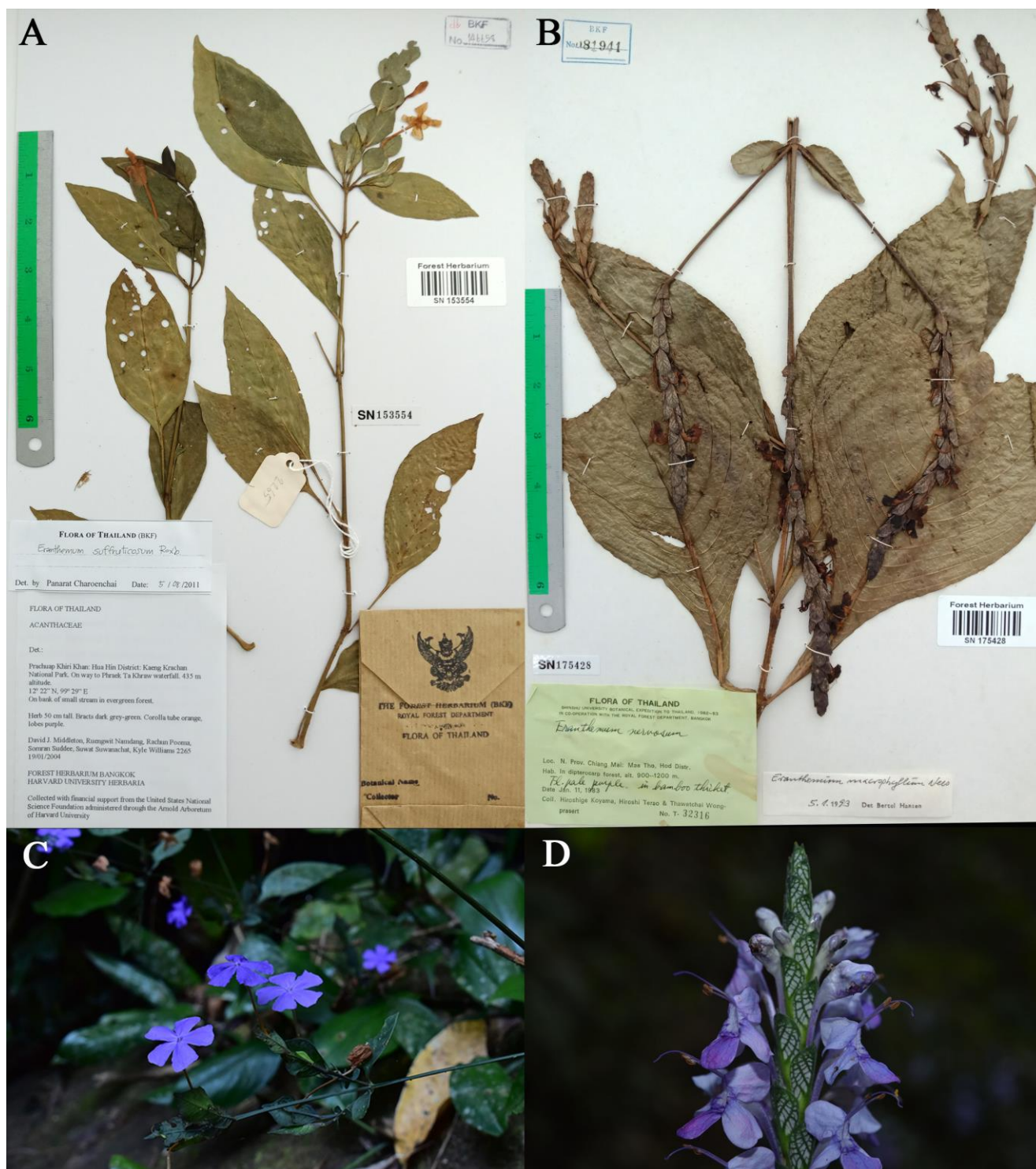
FIGURE 1. Distribution map of *Dyschoriste nagchana* (Nees) Bennet in Thailand.

*Eranthemum burmanicum* N.P. Balakr., J. Bombay Nat. Hist. Soc. 67: 63. 1970., Fig. 2A & 2C.

— *Daedalacanthus parishii* T. Anderson, J. Linn. Soc., Bot. 9: 489. 1867.— *Eranthemum parishii* T. Anderson in **K** (unpublished), [non *E. parishii* (T. Anderson) C.B. Clarke]. Type: Myanmar [Bruma], Mawlamyine [Moulmein], 1862, *Parish 414* (lectotype **CAL** [CAL0000019509], image seen, **designated here**; isolectotype **K** [K000882627], image seen).

Perennial herb, isophyllous. *Stems* 4-angled, pubescent at nodes. *Leaves* broadly ovate or ovate-elliptic or elliptic, 8–14 by 4–7 cm, apex acute to acuminate, base cuneate to attenuate, margin subentire, slightly recurved, glabrous or pilose both surfaces,

lateral veins 5–7 on each side of midvein, conspicuous on both surfaces; petiole subsessile to 3.5 cm long, upper petioles shorter, pilose or pubescent. *Inflorescences* of axillary clustered of spikes, 2–6 cm long; peduncle subsessile to 5 cm long, glabrous or pilose; bracts rhomboid or elliptic-orbicular, 2–3 by 1.5–2 cm, persistent, glabrous or pilose on both surfaces, not variegated white and green, apex acute or attenuate to acuminate, margin crenulate or subentire; bracteoles linear-lanceolate, 4–5 by ca 2 mm, glabrous, apex tipped, white with green tip. *Calyx* 4–5.5 by 2–3 mm; lobes lanceolate, apex acute to acuminate. *Corolla* purple, 3.5–5 cm long, glandular trichomes pubescent outside; tube cylindrical, narrow, ca 1.5 mm wide; lobes obovate, 1–1.5 by 0.8–1.3 cm, apex obtuse or rounded.



**FIGURE 2.** Two new recorded species of *Eranthemum* from Thailand: A. & C., *E. burmanicum* N.P. Balakr.; B. & D., *E. macrophyllum* Wall. ex Nees. Photos C. by T. Kankha; D. by S. Suddee.

*Stamens* 2 fertile and 2-minute staminodes inserted near the apex of the corolla tube; filament *ca* 2 mm long; anther thecae *ca* 3 mm long. *Ovary* pubescent; style *ca* 4 cm long, pubescent. *Capsule* clavate, stalked. *Seeds* rounded in outline, flattened, densely hairy.

**Distribution, habitat and phenology.**— *Eranthemum burmanicum* is distributed in Myanmar and Thailand where it grows in a shady area of hardwood with bamboo forest and near a stream in an evergreen forest. This species is flowering and fruiting from Nov. to Jan.

**Specimens examined.**— THAILAND: NORTHERN Nakhon Sawan [Mae Wong National Park, 2 km west of Mae Rewa Ranger Station, 170 m alt., 25 Dec. 2003, *van de Bult 735* (**BKF, CMUB**)]; SOUTH-WESTERN Uthai Thani [Huai Kha Khaeng Wildlife Sanctuary, To Jone Waterfall along Huai Kha Khaeng, 280–330 m alt., 12 Nov. 1979, *Shimizu et al. 22279* (**BKF-2** sheets, **KYO**) & 22305 (**BKF-2** sheets, **KYO**)]; Prachuap Khiri Khan [Hua Hin, Kaeng Krachan National Park, on way to Phraek Ta Khraw Waterfall, 435 m alt., 19 Jan. 2014, *Middleton et al. 2265* (**BKF**)]; SOUTH-EASTERN Chanthaburi [Klong Narai Waterfall, 21 Jan. 1973, *Maxwell 73-22* (**AAU, BK**)]; Khao Sa Bap, 100 m alt., 7 Nov. 1993, *Larsen 44279* (**AAU**)]; Trat [Dan Chumphon, under 50 m alt., 19 Dec. 1924, *Kerr 17611* (**BK**)]; PENINSULAR Chumphon [Khao Phra Bat, 23 Nov. 1930, *Lakshnakara 501* (**BK**)]; Phuket [Kathu, Kathu Waterfall, 100–200 m alt., 14 Dec. 1979, *Shimizu et al. 27319* (**BKF-2** sheets, **KYO**)]. MYANMAR: Mawlamyine [1862, *Parish 414* (**CAL, K**)]; Tenasserim and Andamans [1861, *Helper 6176* (**K, P**)]; Dawei [Tavoy] [without date, *Parish 413* (**K**)]; Suayghin [Dec. 1854, *Scott 385* (**CAL**)].

**Vernacular name.**— Khem kap liam (เขมกานเหล็ชม).

**Notes.**— *Eranthemum burmanicum* is similar to *E. suffruticosum* Roxb. a native species of the Andaman Islands (Clarke, 1885) but differs based on having ovate to ovate-elliptic leaves with slender petioles vs ovate-oblong with stout petioles in *E. suffruticosum*. In addition, the bract of *E. burmanicum* is rhomboid or elliptic-orbicular with attenuate to acuminate at apex vs obovate or wedge-shaped with apiculate at the apex in *E. suffruticosum*.

*Eranthemum burmanicum* was proposed as a new name of *D. parishii* T. Anderson (Balakrishnan, 1970) according to the Anderson combination, *E. parishii* was never published for this species. Indeed, the name was treated as a combination name of *Asystasia parishii* T. Anderson by Clarke (1885) as *E. parishii* (T. Anderson) Clarke. However, it is presently accepted as a synonymy of *Pseuderanthemum parishii* (T. Anderson) Lindau (POWO, 2022).

The collections of Brandis, Parish and Scott were cited in the original protologue of *D. parishii* (Anderson, 1867). On the examination, we found *Parish 414* and *Scott 385* correspond with the type location mentioned in the protologue. *Scott 385* is kept in CAL (CAL0000019508). Two duplicates of *Parish 144* are observed and each one is deposited in CAL (CAL0000019509) and K (K000882627). The specimens at CAL have been annotated as “*Daedalacanthus parishii*” by Anderson’s handwriting and fit the description in the protologue. However,

*Parish 414* has mature leaves and inflorescences; therefore, we selected this specimen as the lectotype of *D. parishii*. The sheet at K (K000882627) is isolectotype.

*Eranthemum burmanicum* was formerly known as endemic to Myanmar, but now it is a new record for Thailand where it distributes in Northern, South-Western, South-Eastern and Peninsular floristic regions. The Thai specimen extends the distribution of this species Eastern ward of its range (Fig. 3). This species has an Extent of Occurrence (EOO) of 255,937.811 km<sup>2</sup> and an Area of Occupancy (AOO) of 40.000 km<sup>2</sup> and is assessed as the Least Concern (LC) criterion based on the IUCN Red List Categories (IUCN Standards and Petitions Committee, 2022).

***Eranthemum ciliatum*** (Craib) Benoist in Lecomte, Fl. Indo-Chine 4: 661. 1935.

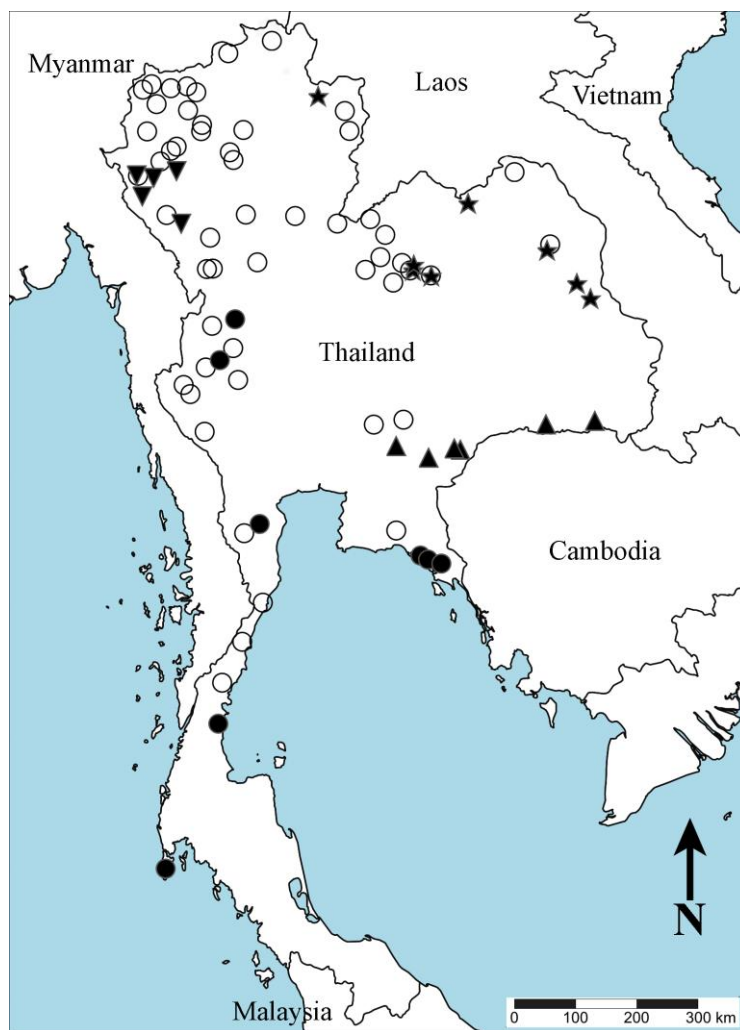
— *Daedalacanthus ciliatus* Craib, Bull. Misc. Inform. Kew. 1913: 202. 1913. Type: Thailand, Nan, 21 Feb. 1912, *Kerr 2398* (lectotype **K** [K000882624], image seen, **designated here**; isolectotypes **BM** [BM000950036], image seen, **K** [K000882623], image seen).

**Distribution, habitat and phenology.**— *Eranthemum ciliatum* is distributed in Myanmar, Thailand, Laos, and Vietnam. In Thailand, it grows in mixed deciduous and evergreen forests. This species is flowering from Nov. to Feb.

**Specimens examined.**— THAILAND: NORTHERN Nan [Song Kwae, Tham Sakoen National Park, 12 Feb. 2011, *La-onsri & Romkham 1499* (**QBG**)]; NORTH-EASTERN Nong Khai [Ban Choum Mani, 27 Jan. 1966, *Sutheesorn 101* (**BK**)]; Sakon Nakhon [Phu Phan National Park, 20 Nov. 1999, *Chaikong 22/42* (**KKU**)]; Nakhon Phanom [Dong Bang Ee, 150 m alt., 17 Dec. 1963, *Smitinand 8458* (**BKF**)]; Mukdahan [Khamcha-I, without locality, 300 m alt., 13 Dec. 1982, *Koyama et al. 30974* (**BKF, KYO-2** sheets, **QBG**)]; Nikom Khamsoi, Phu Moo Forest Park, 350–450 m alt., 11 Dec. 1982, *Koyama et al. 30849* (**BKF-3** sheets, **KYO-2** sheets)]; Khon Kaen [Phu Pha Man National Park, Sam Nam Yoi, 291 m alt., 25 Feb. 2001, *Norsaengsri et al. 7580* (**QBG**)]; Phu Wieng, ca 300 m alt., 7 Feb. 1931, *Kerr 20017* (**BK**)]; Photiyarn Cave, 16 Feb. 1963, *Adisai 311* (**BK**)].

**Vernacular name.**— Cha hom (เจ้าหม่อม), khem phuang (เขมพuang).

**Notes.**— *Eranthemum ciliatum* superficially resembles *E. pulchellum* Andrews in having a distinct greenish midrib and veins on white ovate-lanceolate bract but *E. ciliatum* has hairy bracts with ciliate margin vs glabrous to pubescent but never ciliate in *E. pulchellum*. This species was known in Thailand, Laos and Vietnam as *E. nervosum* (Vahl) R. Br. ex Roemer



**FIGURE 3.** Distribution map of *Eranthemum* in Thailand; *E. burmanicum* N.P. Balakr. (●), *E. ciliatum* (Craib) Benoist (★), *E. decumbens* Kladwong & Chantar. (▲), *E. macrophyllum* Wall. ex Nees (▼) and *E. tetragonum* Wall. ex Nees (○).

& Schultes (Benoist, 1935). Later, *E. nervosum* was accepted as a synonym of *E. pulchellum* (Fosberg & Sachet, 1953; Pooma & Suddee, 2014). However, after investigating the specimens cited by Benoist (1935). These specimens were collected from Thailand, Laos and Vietnam and housed at P.

We found that the bracts are variegated white and green and ciliate at the margin which is determined as *E. ciliatum*. Therefore, we concluded that *E. nervosum* (now *E. pulchellum*) which was formerly recorded in Thailand, Laos and Vietnam by Benoist (1935) is a misidentification. *Eranthemum pulchellum* is native to India, Bangladesh, Bhutan and Nepal (Andrews, 1797; Fosberg & Sachet, 1953; Wood, 2001), but it is not occurred in Thailand except cultivated as an ornamental plant. *Eranthemum ciliatum* is distributed in Northern and North-Eastern floristic regions (Fig. 3). This species has an Extent of Occurrence (EOO) of 155,278.136 km<sup>2</sup> and an Area of Occupancy (AOO) of 44,000 km<sup>2</sup> and is assessed as the Least Concern (LC)

criterion based on the IUCN Red List Categories (IUCN Standards and Petitions Committee, 2022).

*Kerr 2398* was mentioned in the protologue of *D. ciliatus* and it has three duplicates, one in BM and two in K. The sheet K000882624 at K is selected as the lectotype of this species because it has preserved a whole plant with completed leaves and inflorescences.

***Eranthemum decumbens*** Kladwong & Chantar., *Nordic J. Bot.* 39(8): 3. 2021. Type: Thailand, Surin, 10 Jan. 1924, *Kerr 8249* (holotype **BK!** [231335]).

**Distribution, habitat and phenology.**— *Eranthemum decumbens* is distributed in Laos and Thailand where it grows in mixed deciduous or dry evergreen forests and it is flowering and fruiting from Jan. to Mar.

**Specimens examined.**— THAILAND: EASTERN Si Sa Ket [Kanthararak, Phumisarol Village, 15 Mar. 1967, *Phusomsaeng 56* (**BKF**)]; SOUTH-EASTERN Sa Kaeo [Pang Sida National Park, Pang Sida

Waterfall, 300 m alt., 11 Jan. 2002, *Jaikrasene 145* (CMUB); *ibid.*, 109 m alt., 17 Feb. 2009, *Norsaengsri 4956* (QBG); Prachin Buri [Khao Yai National Park, Kaeng Hin Phaeng Ranger Unit, nature trail, 12 Feb. 2006, *Poopath et al. RP 6204* (BKF); Ta Phraya National Park, 4 Jan. 1967, *S & J 2107* (BK); *ibid.*, Lam Sa Ton, 16 Jan. 1932, *Put 35* (BKF)].

**Vernacular name.**— Cha hom tia (เจ้าหอมเตี้ย), khem prakai pruek (เข็มประกายพุกกีย์).

**Notes.**— *Eranthemum decumbens* is distributed in Eastern and South-Eastern floristic regions (Fig. 3) and also know from Champasak, Southern Laos. This species has the Vulnerable (VU) criterion (Kladwong & Chantaranonthai, 2021).

*Eranthemum macrophyllum* Wall. ex Nees in Wall., Pl. Asiat. Rar. 3: 106. 1832., Fig. 2B & 2D.

— *Daedalacanthus macrophyllus* (Wall. ex Nees) T. Anderson, J. Linn. Soc., Bot. 9: 487. 1867. Type: Myanmar, Pyay [Prome], Pingee, Ayeyarwady [Irawaddi] River, 1826, *Wall. Numer. List: 7179.A*, 1831–1832 (lectotype **K-W** [K001126830], image seen, **designated here**).

Herb 0.5–1.5 m tall, isophyllous. *Stems* erect, 4-angled, pubescent and scabrous. *Leaves* elliptic or elliptic-ovate, 8–15 by 4–8 cm, apex attenuate or caudate or sometimes obtuse, base attenuate, decurrent onto petiole, margin subentire or weakly serrate, slightly recurved, glabrous or scabrous on both surfaces, lateral veins 9–12 pairs, prominent on abaxial surface; petiole 2.5–4 cm long, subglabrous. *Inflorescences* terminal or axillary spikes, 8–20 cm long; peduncle 2.5–10 cm long, subglabrous or scabrous; bracts elliptic or obovate-elliptic, 0.5–2.5 by 0.4–1.5 cm, persistent, subglabrous, variegated white and green, apex mucronate, margin entire; bracteoles linear-lanceolate, ca 5 by 2 mm, subglabrous, apex acute. *Calyx* 5-lobed, ca 5 by 2–3 mm; lobes lanceolate, sparsely pubescent, apex attenuate or acute. *Corolla* pale purple, 4–5 cm long, pubescent outside; tube cylindrical, inflated toward the top, 1–2 mm wide; lobes obovate, 6–9 by 5–7 mm, four upper lobes reflexed at anthesis, apex rounded or obtuse. *Stamens* 2 fertile and 2-minute staminodes, exerted; filament 1.5–2 cm long, glabrous; anthers thecae ca 2.5 mm long. *Ovary* glabrous; style 3–4 cm long, hairy. *Capsule* clavate, ca 1.5 cm long, stalked. *Seeds* rounded in outline, flattened, densely hairy.

**Distribution, habitat and phenology.**— *Eranthemum macrophyllum* is distributed in India, Bangladesh, Myanmar and Thailand where it grows in deciduous

and dry evergreen forests. This species is flowering and fruiting from Jan. to Mar.

**Specimens examined.**— THAILAND: NORTHERN Mae Hong Son [Mae Sariang, 350 m alt., 14 Feb. 1971, *Smitinand 11424* (BKF); Sob Moei, Ban Hua Kong Moon, 880 m alt., 1 Mar. 2014, *Pongamornkul 4089* (QBG); *ibid.*, 950 m alt., 24 Jan. 2015, *Pongamornkul 4784* (QBG)]; Chiang Mai [Hod, Mae Tho, 900–1200 m alt., 11 Jan. 1983, *Koyama et al. 32316* (BKF, KYO); Mae Rim, Doi Monlong, 1400 m alt., 8 Jan. 2014, *Wongnak s.n.* (QBG)]; Tak [Mae Ramad, 200 m alt., 22 Nov. 2005, *Pooma et al. 5780* (AAU)]; road between Sob Moei and Mae Ngao National Park, 13 Jan. 2015, *Tanning 759* (QBG)]; MYANMAR: Mawlamyine, Pyay, Pingee, Ayeyarwady River, 1826, *Wall. Numer. List: 7179.A*, 1831–1832 (**K-W**)].

**Vernacular name.**— Khem phuang bi yai (เข็มพวงใบใหญ่).

**Notes.**— *Eranthemum macrophyllum* is similar to *E. pulchellum* Andrews in having white bract with prominent green midrib and reticulate venation, but the corolla of *E. macrophyllum* is pale purple vs blue in *E. pulchellum*. The corolla lobes of *E. macrophyllum* are obovate and four upper lobes are reflexed at anthesis vs ovate and all lobes not reflexed in *E. pulchellum*.

The original protologue of *E. macrophyllum* was based on *Wallich's* collections from Pyay and Thandaung [Toong Dong] in Myanmar (Nees, 1832). On the examination, we found that *Wallich 7179.A* was collected from Pyay and deposited at K-W (K001126830). *Wallich 7179.B* was collected from Thandaung and it has four duplicates, each one in CAL (CAL0000019511), K (K000882636) and K-W (K001126831). We select *Wallich 7179.A* at K-W (K001126830) as the lectotype of *E. macrophyllum* because it has more mature leaves and complete inflorescences.

*Eranthemum macrophyllum* was formerly known from India, Bangladesh and Myanmar and now it is a new report for Thailand where it distributes in the Northern floristic region (Fig. 3). The Thai specimen extends the distribution of this species Eastern ward of its range. This species has an Extent of Occurrence (EOO) of 14,279.316 km<sup>2</sup> and an Area of Occupancy (AOO) of 24.000 km<sup>2</sup> and is assessed as the Vulnerable (VU), B1ab (i, ii, iii) criterion based on the IUCN Red List Categories (IUCN Standards and Petitions Committee, 2022).

*Eranthemum tetragonum* Wall. ex Nees in Wall., Pl. Asiat. Rar. 3: 106. 1832.

— *Daedalacanthus tetragonus* (Wall. ex Nees) T. Anderson, J. Linn. Soc., Bot. 9: 488. 1867. Type: Myanmar, Troglä, 12 Mar. 1827, *Wall. Numer. List:*



7180, 1831–1832 (lectotype **K-W** [K001126832], image seen, **designated here**; isolectotype **GZU** [GZU00024997], image seen).

— *Eranthemum obovatum* J.B. Imlay, Bull. Misc. Inform. Kew 1939(3): 115. 1939, [non *E. obovatum* E. Mey. ex Nees]. Type: Thailand, Kanchanaburi, 2 Jan. 1924, *Kerr 10126* (lectotype, **BM** [BM000950037] image seen, **designated here**; isolectotypes **ABD** (ABDUH:2/840) *n.v.*, **BK!** [BK257604]), **syn. nov.**

**Distribution, habitat and phenology.**— *Eranthemum tetragonum* is distributed in Myanmar, China, Thailand, Laos, Cambodia and Vietnam. In Thailand, it grows in the shade or near a stream in a mixed deciduous forest. This species is flowering and fruiting from Dec. to Feb.

**Specimens examined.**— THAILAND: NORTHERN Mae Hong Son [Khun Yuam, Huai Yuak Village, 500 m alt., 13 Jan. 1983, *Koyama et al. 32436* (**BKF, KYO**); Mae Sariang, Ban Papae, 800 m alt., 8 Feb. 1969, *Smitinand & Saphasi 10682* (**BKF, L**); Mueang, Huai San, Tham Pla-Namtok Pha Suea National Park, 5 Feb. 2014, *Norsaengsri 10748* (**QBG**); Nai Soi, Pong Mu, 280 m alt., 6 Feb. 2013, *Norsaengsri 10181* (**QBG**); Wat Tham Wua, Ban Mae Suya, Huai Pha, 738 m alt., 4 Feb. 2014, *Norsaengsri 10732* (**QBG**); Pai, en route from Pai to Maeyan Waterfall, 570 m alt., 15 Jan. 1983, *Koyama et al. 32500* (**BKF, KYO, L**); Mueang Sroi Waterfall, 800 m alt., 17 Jan. 1983, *Koyama et al. 32644* (**KYO**); near Hmo Paeng Waterfall, 850 m alt. 15 Jan. 1983, *Koyama et al. 32492* (**BKF, KYO, L**); Chiang Mai [Chiang Dao, Doi Chiang Dao Wildlife Sanctuary, 13 Feb. 1905, *Hosseus 389* (**L, M**); *ibid.*, Mae Na Lao, 400–600 m alt., 16 Mar. 1950, *Garrett 1281* (**L**); *ibid.*, Pang Wua [Boh], 800 m alt., 10 Mar. 1965, *CC. & CH. 322* (**BKF**) & *Chemsirivathana 324* (**BK**); *ibid.*, southeastern side, 500–1510 m alt., 9 Feb. 1983, *Koyama et al. 33250* (**BKF, KYO**); *ibid.*, east side, Pa Blawng Cave area, 525 m alt., 15 Jan. 1989, *Maxwell 89-68* (**CMU, L**); *ibid.*, south side, off the dirt road to Bahng Hahng Village, 925 m alt. 4 Feb. 1996, *Maxwell 96-193* (**BKF, CMUB, L**); *ibid.*, Road Huai Pha Tung-Na Lao, near Huai Pha Tung-Na Lao Wildlife Sanctuary, 930 m alt., 18 Jan. 2012, *Sirimongkol & Karakate 244* (**BKF-2** sheets); Mae Taman, 1000–1500 m alt., 28 Jan. 1996, *Nanakorn et al. 5824* (**QBG-2** sheets); Chom Thong, Mae Klang, 780 m alt., 17 Jan. 1936, *Garrett 1049* (**BKF**); Mae Pan Waterfall, Doi Inthanon National Park, 1110 m alt., 8 Jan. 1983, *Koyama et al. 32100* (**BKF, KYO**); Mae Soi Valley, east part, Mae Sai, 425 m alt., 13 Jan. 1990, *Maxwell 90-74* (**CMU, L**); Doi Saket, en route from Chiang Rai to Chiang Mai, along route 1019, 930 m alt., 15 Feb. 1983, *Koyama et al. 33556* (**BKF,**

**KYO, L**); Fang, Doi Pha Hom Pok National Park, 550 m alt., 31 Jan. 2007, *Srisanga et al. 2906* (**CMUB, QBG, KYO**); Fang Hot Spring, 640 m alt., 10 Feb. 1983, *Koyama et al. 33310* (**BKF, KYO, L**); without locality, 350–400 m alt., 22 Feb. 1958, *Sørensen et al. 1509* (**L**); Hot, Bo Luang, 960 m alt., 2 Feb. 1964, *Hansen et al. 11031* (**BKF**); Huai Nam Dang National Park, Pong Dueat Hot Spring, 800 m alt., 16 Jan. 2002, *Chayamarit et al. 3118* (**BKF**); Mae Chaem, Ban Huai Pha, 1050 m alt., 8 Feb. 2017, *Pongamornkul 5979* (**QBG**); Huai Sai Luang Waterfall, 1000 m alt., 5 Feb. 1998, *Konta & Phengklai 3975* (**BKF**); Mae Kang, Bah Bae, Tah Fah (Karen) Village, 725 m alt., 12 Feb. 2001, *Maxwell 01-51* (**BKF, CMUB, L**); Mae On, Doi Lohn [Lahn], west side, Huey Gayo, Mae Lie Village, 1050 m alt., 9 Feb. 2005, *Palee 789* (**CMUB, L**); Ban Mae Kam Pong, Huai Kaew, 6 Dec. 2014, *Kamonmate 913* (**QBG**); Mae Rim, Queen Sirikit Botanic Garden, 750 m alt., 1 Jan. 1998, *Srisanga & Puff 14* (**QBG**); *ibid.*, 622 m alt., 23–24 Jan. 2014, *Wongakson PW04* (**BKF**); *ibid.*, 682 m alt., 30 Jan. 2017, *Pingyot 44* (**QBG**); Mae Taeng, Ban Mueang Kuet, 450 m alt., 18 Feb. 1985, *Santisuk 6892* (**BKF-2** sheets); Doi Sahng Liang, 1025 m alt., 8 Jan. 1998, *Maxwell 98-37* (**BKF, CMUB, L**); *ibid.*, 800 m alt., 6 Feb. 1981, *Thongisan 52* (**CMUB**); near Pong Dueat Hot Spring, Bah Bae, 950 m alt., 13 Jan. 1991, *Maxwell 91-76* (**CMUB, L**); Mueang, Doi Suthep-Pui National Park, 5 Feb. 1905, *Hosseus 426a* (**M**); *ibid.*, near 670 m alt., 25 Jan. 1910, *Kerr 948* (**L**); *ibid.*, Feb. 1926, *Collins 1218* (**US**); *ibid.*, 24 Sept. 1950, *Pleanchit 44* (**BKF**); *ibid.*, 550 m alt., 2 Feb. 1959, *Sørensen et al. 6837* (**L**); *ibid.*, 800 m alt., 6 Feb. 1981, *Thongisan 42* (**CMUB**); *ibid.*, 600–1650 m alt., 16 Feb. 1983, *Koyama et al. 33580* (**BKF, KYO, L**); *ibid.*, 900 m alt., 30 Jan. 1988, *Maxwell 88-105* (**BKF, CMUB, L**); *ibid.*, 1100 m alt., 10 Jan. 1994, *Fukuoka & Koyama 62119* (**BKF**); *ibid.*, without date, *Cockerell s.n.* (**US**); Omkoi, Ban Kong Pho Tai, 900 m alt., 22 Jan. 2015, *Pongamornkul 4720* (**QBG**); Paow, Khun Jae, Mae Waeng, 28 Dec. 2014, *Panta 82* (**QBG**); Wang Tao, 700 m alt., 13 Feb. 1958, *Sørensen et al. 1043* (**BKF, L**); without locality, 500 m alt., 27 Jan. 1969, *Nooteboom et al. 861* (**BKF, L**); without locality, 580 m alt., 22 Feb. 1985, *Smitinand 4300 & 4301* (**BKF**); Chiang Rai [Ban Pa Denah, Bah Sahng, 625 m alt., 13 Feb. 1991, *Maxwell 100* (**CMU**); Doi Tam Tu Pu between hill and rattan swamp, 385 m alt., 14 Jan. 1926, *Garrett 266* (**BKF**); km 56 to Chiang Mai, 800 m alt., 27 Jan. 1984, *S.N. W.N.296* (**BKF**); Mae Chan, Doi Tung roadside, 1400 m alt., 29 Jan. 1989, *Bragg 2* (**CMU, L**); Mae Sai, Doi Tung, along the main road slightly above Doi Tung Temple, 1400 m alt., 10 Feb. 2005, *Maxwell 05-155* (**BKF, CMUB, L**); Pan, Phu Kaeng Wildlife Forest, Doi Luang

- National Park, 2 Mar. 2015, *Norsaengsri 11749* (QBG); *ibid.*, 31 Mar. 2015, *Norsaengsri 11978* (QBG); *ibid.*, 8 Feb. 2016, *Muanyen 611* (QBG); Than Pha Yao Cave, Doi Luang National Park, 450 m alt., 4 Feb. 1995, *Adhikari & Charariroong 4* (CMUB, L); Mueang, Ban Du and Ban Mae Ki, 18 Jan. 1922, *Rock 1872* (US); Phayao [Mueang, Doi Luang National Park, east side, Jahm Bah Tawng Waterfall, 610 m alt., 23 Jan. 1998, *Petrmitr 255* (BKF, CMUB, L); *ibid.*, 600–610 m alt., 16 Mar. 1998, *Petrmitr 283* (BKF, CMUB, L-2 sheets)]; Nan [Mae Charim, Ban Nam Phang, Nam Phang, 907 m alt., 13 Feb. 2018, *Phaosrichai et al. 828* (QBG); *ibid.*, 480 m alt., 15 Feb. 2018, *Phaosrichai et al. 853* (QBG); Tham Pha Klong, Doi Phu Kha National Park, 850 m alt., 17 Jan. 2002, *Srisanga 2395* (BKF, QBG)]; Lamphun [Mae Tah, Doi Khun Tan National Park, 325 m alt., 24 Dec. 1993, *Maxwell 93-1534* (BKF, CMUB, L-2 sheets); Mueang, Kru Pa Sai Wichai Kham Phee Monument, 608 m alt., 9 Feb. 2012, *Jatupol et al. 677* (QBG)]; Lampang [Hang Chat, Huai Mae San, rest area, 600 m alt., 6 Jan. 1983, *Koyama et al. 31967* (BKF, KYO, L); Mueang Pan, along Mae Mawn Stream, below Jae Sawn Waterfall, Jae Sawn National Park, 475 m alt., 8 Jan. 1996, *Maxwell 96-41* (CMUB, L); *ibid.*, 525 m alt. 16 Jan. 1997, *Panakool 71* (CMUB, L); Dawn Chai Village area, Jae Sawn National Park, 600 m alt., 16 Feb. 1996, *Maxwell 96-242* (BKF, CMUB, L-2 sheets); Mae Tha, Doi Khun Tan, 700–800 m alt., 28 Dec. 1984, *Koyama & Phengklai 39130* (KYO); *ibid.*, 800–850 m alt., 9 Jan. 1994, *Koyama 62058* (BKF)]; Uttaradit [Nam Pat, Phumiang-Phuthong Wildlife Sanctuary, 300 m alt., 22 Mar. 2011, *Romklao Botanical Garden Staff 0218/2554* (QBG)]; Tak [Lan Sang National Park, 10 Jan. 1969, *Cheviwat & Nimanong 17* (BKF)]; Ton Krabaak Yai National Park, 700 m alt., 19 Jan. 1995, *Pooma 982* (BKF); Mae Sot, Khao Phra War, 695–800 m alt., 21 Jan. 1983, *Koyama et al. 32822* (BKF, KYO); *ibid.*, Huai Ton Pueng, 26 Jan. 1985, *Paisooksantivatana y1543-85* (BK-2 sheets) & *y1545-85* (BK); Sam Ngao, Bhumibol Dam, Dec. 1959, *Boonnak 564* (BK); Tha Song Yang, Mae Sariang-Mae Sod road no. 105 between km 153–154, 700 m alt., 21 Mar. 2005, *Pooma et al. 4988* (BKF); Umphang, Doi Hua Mod, 14 Oct. 2002, *Wongnak 357* (QBG); Mae Da Mung, Ban Sib Lang, ca 900 m alt., 11 Feb. 1987, *Paisooksantivatana et al. y 2168-87* (BK); Thung Na Noi Station, Thung Yai Narasuan East, 12 Jan. 2011, *Wattana 3605* (QBG)]; Sukhothai [Khiri Mat, Ramkhamhaeng National Park, 350 m alt., 27 Jan. 1995, *Maxwell 95-16* (BKF, CMUB, L); Sri Satchanalai, route to Pha Cho, Ban Mae San, 28 Jan. 2016, *Maknoi 8503* (QBG); route to Tham Kangkao, Mae San, Sri Satchanalai National Park., 4 Feb. 2015, *Maknoi 7340* (QBG); without locality, 600 m alt., *Maxwell 74-67* (AAU)]; Phitsanulok [Ban Romklao, 520 m alt., 18 Feb. 2016, *Nguanchoo 649* (QBG)]; Kamphaeng Phet [50 km east of Kamphaeng Phet, 500 m alt., 18 Jan. 1959, *Sørensen et al. 6623 & 6630* (L)]; NORTH-EASTERN Phetchabun [Nam Nao National Park, Pha Hong Cave, 800–900 m alt., 26 Dec. 1982, *Koyama et al. 31696* (KYO); *ibid.*, 900 m alt., 27 Dec. 1982, *Koyama et al. 31801* (BKF, KYO); *ibid.*, Tham Yai Nam Nao, 18 Feb. 2014, *Maknoi 6534* (QBG)]; Loei [Na Haew, Phu Suan Sai National Park, 19 Dec. 2006, *Maknoi et al. 1221 & 1229* (QBG); Phu Kradueng, Phu Kradueng National Park, 800–1200 m alt., 23 Dec. 1971, *van Beusekom et al. 4487* (KYO); 350–900 m alt., 14 Nov. 1979, *Shimizu et al. 22553* (BKF-2 sheets, KYO), 22654 (KYO); *ibid.*, 350–900 m alt., 17 Dec. 1982, *Koyama et al. 31199* (BKF, KYO); Phu Ruea, north ridge of Phu Luang, 1100–1500 m alt., 4 Dec. 1965, *Tagawa et al. 1241* (BKF, KYO); *ibid.*, 5 Dec. 1965 *Tagawa et al. 1058* (KYO); *ibid.*, 8 Feb. 1968, *Bunchuai 1606* (BKF, P); Phu Ruea National Park, 980 m alt., 23 Dec. 1982, *Koyama et al. 31520* (BKF, KYO) & *31549* (KYO); *ibid.*, 1 Feb. 2004, *Chantaranothai et al. s.n.* (BKF, QBG); without locality, 800–1200 m alt., 23 Dec. 1971, *van Beusekom et al. 4487* (BKF); without locality, 570 m alt., 10 Nov. 1998, *Srisanga et al. 118* (CMUB, QBG-2 sheets)]; Udon Thani [Nam Som, Huai Ka Phueng, Ban Thep Phu Ngern, 321 m alt., 6 Feb. 2008, *Norsaengsri 3327* (QBG)]; Bueng Kan [along route 212, between Bungkan and Pakkad, 210 m alt., 15 Dec. 1982, *Koyama et al. 31076* (BKF, KYO)]; Sakon Nakhon [Phu Phan National Park, 350 m alt., 14 Dec. 1982, *Koyama et al. 31044* (BKF, KYO); *ibid.*, 21 Jan. 1999, *Chaikong 23/42* (KKU); *ibid.*, 15 Nov. 1999, *Chaikong 32/42* (KKU); *ibid.*, without locality, 3 Dec. 1961, *Suvarnakoset 2003* (BKF); *ibid.*, without date, *Chantaranothai et al. 1475* (KKU)]; Khon Kaen [Northeastern Plant Collection Center, 3 Feb. 2009, *Norsaengsri 4774* (QBG); Phu Pha Man, Ban Dong Sakharn, 652 m alt., 14 Jan. 2001, *Lakoet 287* (QBG); Phu Weing National Park, Tap Phu Ya Suea, 500 m alt., 9 Jan. 1997, *Nanakorn et al. 8495* (QBG)]; EASTERN Chaiyaphum [Khon San, Thung Phra, Ban Nong Jan, 330 m alt., 8 Jan. 1970, *Lekagul 47* (BKF); *ibid.*, 520 m alt., 27 Jan. 1970, *Lekagul 85* (BKF)]; Nakhon Ratchasima [Khao Yai National Park, near Khlong Hin Lap Falls, 600–650 m alt., 20 Nov. 1982, *Koyama et al. 30158* (KYO); Pak Chong, 29 Dec. 1923, *Marcan 1525* (BK); Pak Thong Chai, Wang Nam Yen Training Center for forest student, 350 m alt., 29 Jan. 1983, *Koyama et al. 33075* (KYO)]; SOUTH-WESTERN Uthai thani [Ban Rai, Katatak, 4 Mar. 1977, *Sutheesorn 4004* (BK); Thung Yai

Naresuan Wildlife Sanctuary, Huai Dong Whee, 420 m alt., 26 Feb. 1993, *Smitinand & Santisuk et al.* 360 (BKF-2 sheets); Kanchanaburi [Sai Yok, along route no. 323, 23 km Northwest from Kanchanaburi, 200 m alt., 25 Jan. 1983, *Koyama et al.* 32877 (BKF, KYO); *ibid.*, Huai Mae Nam Noi, 7 km west of Sai Yok, 200 m alt., 1 Jan. 1962, *Larsen* 9077 (L); *ibid.*, without locality, 170 m alt., 5 Jan. 1962, *Larsen* 9154 (L); Sangkhla Buri, Kroeng Krawia Waterfall, 265 m alt., 1 Mar. 2017, *Muangyen* 1780 (QBG); Thung Yai Naresuan Wildlife Sanctuary, Lai Wo, Ban Saneh Pawng area, 200 m alt., 17 Jan. 1994, *Maxwell* 94-87 (CMUB, L); Thong Pha Phum, en route from Thong Pha Phum to Pilok, 700–970 m alt., 26 Jan. 1983, *Koyama et al.* 32930 (BKF, KYO, L); vicinity of Pilok, 580 m alt., 10 Jan. 1985, *Koyama et al.* 48985 (BKF, KYO, L), *ibid.*, 23 Dec. 2000, *Tiptabiankarn s.n.* (QBG); Phetchaburi [Kaeng Krachan, Kaeng Krachan National Park, trail from Khao Phanoen Thung Ranger Substation to Thor Thip Waterfall, 4 Dec. 1993, *Larsen et al.* 45035 (AAU). *ibid.*, 590 m alt., 11 Dec. 2002, *Middleton et al.* 1576 (BKF)]; Prachuap Khiri Khan [Bang Saphan, 2 Dec. 1927, *Put* 1376 (BK); Mueang, Kan Kradi, 17 Jan. 1929, *Put* 2330 (BK)]; CENTRAL Nakhon Nayok [Mueang, Khao Khiao, Khao Yai National Park, 1200 m alt., 8 Feb. 2006, *Poopath et al.* RP6151 (BKF)]; SOUTH-EASTERN Rayong [Khao Cha Mao National Park, 50–150 m alt., 23 Nov. 1979, *Shimizu et al.* (KYO)]; PENINSULAR Chumphon [Ta Ngaw, 16 Jan. 1927, *ca* 50 m alt., *Kerr* 11467 (BK)].

**Vernacular name.**— Cha hom (จ้ำหอม), pan ngu pa (พันธุ์ป่า), salet phang phon pa (เสลดพังพอนป่า), ta kai muang (ตากลม).

**Notes.**— *Eranthemum tetragonum* has many features in common with *E. ciliatum*, but it has ovate-lanceolate or oblong to linear leaves, attenuate to acuminate apex vs oblong-lanceolate, attenuate or acute at the apex in *E. ciliatum*. The stamens of *E. tetragonum* are included vs exserted in *E. ciliatum*. The original protologue of *E. tetragonum* was based on *Wallich* 7180 (Nees, 1832). On examination, we found that this collection has two duplicates, each one in GZU and K-W. We selected the sheet K001126832 at K-W as the lectotype because it has more mature leaves and inflorescences. *Eranthemum tetragonum* is distributed in Northern, North-Eastern, Eastern, South-Western, Central, South-Eastern and Peninsular floristic regions (Fig. 3). This species has an Extent of Occurrence (EOO) of 427,531.845 km<sup>2</sup> and an Area of Occupancy (AOO) of 216,000 km<sup>2</sup> and is assessed as the Least Concern (LC) criterion based on the IUCN Red List Categories (IUCN Standards and Petitions Committee, 2022).

Imlay (1939) proposed *E. obovatum* which differed from *E. tetragonum* based on short ovate to ovate-lanceolate leaves, obovate bracts with rounded or short attenuate apex and corolla lobe truncate at apex. The examination of type and non-type material of the *E. obovatum* and *E. tetragonum* showed that the differences between them are so small and unreliable that they are best united. Therefore, *E. obovatum* is regarded as conspecific *E. tetragonum*.

*Eranthemum obovatum* was described based on Kerr's specimens. In the examination of nomenclatural circumscription, we found that this name is illegitimate because it is a later homonym of *E. obovatum* E. Mey. ex Nees (Nees, 1847) according to the guidelines of Art. 53.1 of the ICN Shenzhen Code (Turland *et al.* 2018). *Kerr* 10126 was cited as type in the protologue of this species and it has two duplicates, each one in BK and BM. We selected the sheet BM000950037 at BM as the lectotype because it has completely mature flowers.

**3. *Phaulopsis* [*Phaylopsis*] Willd., Sp. Pl. 3(1): 342. 1800., **nom. cons.****

— *Aetheilema* R. Br., Prodr. Fl. Nov. Holland. 1: 478. 1810.

— *Micranthus* J.C. Wendl., Bot. Beob. 1: 39. 1798., **nom. rej.**

— *Theileamea* Baill., Bull. Mens. Soc. Linn. Paris 2: 821. 1890.

***Phaulopsis dorsiflora* (Retz.) Santapau, Kew Bull. 3(2): 276. 1948.**

— *Ruellia dorsiflora* Retz., Observ. Bot. 6: 31. 1791.— *Micranthus dorsiflorus* (Retz.) C.E.C. Fisch., Bull. Misc. Inform. Kew 1932(2): 63. 1932. Type: India, Bengala, *König s.n.* (lectotype LD [1745105], image seen, **designated** by Fischer (1932); isolectotype M [M-0186725], image seen, C [C10005082, C10005083, C10005084, C10005085], image seen).

— *Phaulopsis parviflora* Willd., Sp. Pl. 3(1): 342. 1800., **nom. superfl.**

— *Aetheilema reniforme* Nees in Wall., Pl. Asiat. Rar. 3: 94. 1832. Type: Myanmar, Prome [Promae], Dec. 1826, *Wall. Numer. List: 2353g*, 1831–1832 (syntypes K-W [K001115717], image seen & M [M-0188724], image seen).

**Distribution, habitat and phenology.**— *Phaulopsis dorsiflora* is distributed in India, Bangladesh, Sri Lanka, Andaman Island, Myanmar, China, Laos, Vietnam and Thailand where it is common in the disturbed area with secondary growth or near a stream in primary dry dipterocarp and evergreen forests,

sandstone or limestone bedrocks. This species is flowering and fruiting from Nov. to May.

**Specimens examined.**— THAILAND: NORTHERN Mae Hong Son [Khun Yuam, 500 m alt., 13 Jan. 1983, *Koyama et al.* 32430 (**KYO**); Mueang, Huai Pha, Ban Nam Kat, 13 Dec. 2007, *Tanaka et al.* HN8254 (**KYO**, **QBG**); *ibid.*, Tham Pla-Namtok Pha Suea National Park, Ban Huai Phung, 640 m alt., 21 Nov. 2013, *Lakoet* 568 (**QBG**); *ibid.*, Mok Cham Pae, 15 Dec. 2007, *Tanaka et al.* HN8441 (**QBG**); Mae Hong Son Forest Office, 240 m alt., 22 Feb. 1968, *Hansen & Smitinand* 12698 (**L**); *ibid.*, Pha Sue Waterfall, 25 Dec. 2012, *Norsaengsri et al.* 9982 (**QBG**); Pai, en route from Pai to Maeyan Waterfall, 570 m alt., 15 Jan. 1983, *Koyama et al.* 32501 (**BKF**, **KYO**, **L**); *ibid.*, Mueang Sroi Waterfall, 800 m alt., 17 Jan. 1983, *Koyama et al.* 32665 (**KYO**); without locality, 350 m alt., 14 Feb. 1971, *Smitinand & Boonkird* 11425 (**BKF**, **L**); Chiang Mai [Ban Takilek, 300 m alt., 14 Jan. 1905, *Hosseus* 324 (**M**); Chiang Dao, southeast side of Doi Chiang Dao, 500–1510 m alt., 9 Feb. 1983, *Koyama et al.* 33254 (**BKF**, **KYO**); *ibid.*, Doi Chiang Dao foothill at Ban Yang Pong Luang, 550 m alt., 6 Jan. 1989, *Maxwell* 89-10 (**BKF**, **CMU**, **L**); *ibid.*, 550 m alt., 29 Jan. 1989, *Maxwell* 89-119 (**BKF**, **CMU**, **L**); Chom Thong, near Mae Klang Waterfall, 350 m alt., 15 Dec. 1965, *Tagwa et al.* 2231 (**KYO**, **L**); Fang, 350 m alt., 22 Feb. 1958, *Sørensen et al.* 1481 (**L**); *ibid.*, Doi Pha Hom Pok National Park, 550 m alt., 31 Jan. 2007, *Srisanga et al.* 2895 (**CMUB**, **KYO**, **QBG**); *ibid.*, Fang Hot Spring, 640 m alt., 10 Feb. 1983, *Koyama et al.* 33311 (**BKF**, **KYO**, **L**); Mae Chaem, Bahng Hin Fohn, 1200 m alt., 19 Feb. 2008, *Maxwell* 08-28 (**CMUB**); Mae Taeng, en route to Ban Mueang Kuet, 500 m alt., 18 Feb. 1989, *Santisuk* 6894 (**BKF**); *ibid.*, Bah Bao, Tah Pah (Karen Village), 725 m alt., 12 Feb. 2001, *Maxwell* 01-50 (**BKF**, **CMUB**, **L**); *ibid.*, Doi Mah Geu, 675 m alt., 10 Jan. 1997, *Maxwell* 97-26 (**BKF**, **CMUB**, **L**); Mae On, Huai Kaew, Ban Mae Kam Pong, 30 Nov. 2014, *Kamonnte* 824 (**QBG**); Mae Rim, Mae Mae, 600 m alt., 20 Dec. 1994, *Nanakorn et al.* 2838 (**QBG**-2 sheets); Mae Sa National Park, Mae Sa Waterfall, 470–600 m alt., 15 Feb. 1983, *Koyama et al.* 33564 (**BKF**, **KYO**, **L**); *ibid.*, Mae Ram, Tat Mok Waterfall, 575 m alt., 5 Dec. 1989, *Maxwell* 89-1503 (**CMU**, **L**); *ibid.*, Queen Sirikit Botanic Garden, 600 m alt., 27 Dec. 1993, *Nanakorn et al.* 305 (**QBG**-2 sheets); *ibid.*, 700 m alt., 16 May 1994, *Nanakorn et al.* 928 (**QBG**-2 sheets); Mae Taeng, Ban Bae, 900 m alt., 20 Jan. 1992, *Maxwell* 92-40 (**L**); Mueang, Doi Suthep-Pui National Park, *Kerr* 1611b (**L**); *ibid.*, east of Doi Pui, Suan Song Saen, 10 Jan. 1979, *Yingyong* 78-79 (**BK**, **CMUB**); *ibid.*, 1165 m alt., 10 Dec. 1987, *Maxwell* 87-1563 (**BKF**, **CMU**,

**L**); Huai Nam Dang National Park, Pong Duet Hot Spring, 600 m alt., 26 Nov. 1993, *Larsen et al.* 31874 (**BKF**-2 sheets, **KYO**, **L**); *ibid.*, 650 m alt., 23 Jan. 1996, *Nanakorn et al.* 5629 (**QBG**-2 sheets); *ibid.*, 800 m alt., 16 Jan. 2002, *Chayamarit et al.* 3113 (**BKF**); *ibid.*, Mok Champae, Mok Champae Village, 275 m alt., 9 Jan. 2011, *Maxwell* 11-10 (**CMUB**, **L**-2 sheets, **QBG**); without locality, 580 m alt., 22 Feb. 1958, *Smitinand* 4312 (**BKF**); Chiang Rai [Huai Hin Fon, 21 Jan. 1970, *Sutheesorn* 1616 (**BK**); Mae Fa Luang, Teut Tai, 1025 m alt., 1 Feb. 2006, *Maxwell* 06-93 (**CMUB**, **L**); Mae Sai, 550 m alt., 14 Dec. 1983, *Koyama et al.* 33504 (**BKF**, **KYO**, **L**); *ibid.*, Tham Luang-Khun Nam Nang Non National Park, 469 m alt., 12 Jan. 2011, *Norsaengsri & Tathana* 7465 (**QBG**); Mueang, Khun Korn Waterfall, 29 Feb. 2000, *Tiptabiankarn* 4484 (**QBG**); Phayao [Mueang, Doi Luang National Park, east side, Doi Nok, Huai Fad Stream, 550 m alt., 29 Dec. 1997, *Petrmitr* 237 (**BKF**, **CMUB**); Lamphun [Mae Tah, Doi Khun Tan National Park, 1000 m alt., 24 Dec. 1993, *Maxwell* 93-1529 (**BKF**, **CMUB**, **L**); Mueang, Sri Bao Ban, 300 m alt., 20 Jan. 2017, *Muangyen* 1704 (**QBG**); Lampang [Jae Hom, Bahn Sahn, near Pie Ngahm Village, 300 m alt., 8 Jan. 2015, *Maxwell* 15-15 (**CMUB**); Mueang Pan, Jae Sawn National Park, Jae Sawn Waterfall, 500 m alt., 8 Jan. 1996, *Maxwell* 96-40 (**BKF**, **CMUB**, **L**); Wang Nuea, Jae Sawn National Park, Wang Die, Pah Ngahm Station area, Nahn Kant Cave, 500 m alt., 5 Dec. 1995, *Maxwell* 95-1286 (**BKF**, **CMUB**, **L**); Phrae [Huai Mae Chem, 200 m alt., 7 Jan. 1972, *van Beusekom et al.* 4707 (**BKF**, **KYO**, **L**); Tak [Bhumibol Dam, Dec. 1956, *Boonnak s.n.* (**BK**); Mae Sot, Doi Muser, 3 Jan. 1980, *Yingyong* Y229A-80 (**BK**); Umphang, Doi Hua Mod, 800 m alt., 21 Dec. 2007, *Pongamornkul* 2051 (**QBG**); *ibid.*, Thung Yai Naresuan East, Thung Na Noi Station, 12 Jan. 2011, *Wattana* 3603 (**QBG**); Sukhothai [Kirimat, Ramkhamhaeng National Park, 350 m alt., 31 Jan. 1995, *Maxwell* 95-67 (**BKF**, **CMUB**, **L**); Phitsanulok [Thung Nong Luang, 2 Dec. 1966, *Prayad* 556 (**BK**); Thung Salaeng Luang National Park, 300–600 m alt., 12 Dec. 1965, *Tagawa & Fukuoka* 2114 (**BKF**, **KYO**, **L**); NORTH-EASTERN Loei [Na Haew, Tad Heang Waterfall, 180 m alt., 5 Nov. 1995, *Nanakorn et al.* 5085 (**QBG**-2 sheets)]; Bueng Kan [Phu Wua Wildlife Sanctuary, trail to Tham Noi Waterfall, 1 Dec. 2020, *Kladwong et al.* 540 (**KKU**)]; Sakon Nakhon [Phu Phan National Park, without date, *Chantaranothai et al. s.n.* (**KKU**)]; Nakhon Phanom [Phu Lang Ka National Park, Tad Kham Waterfall, 2 Dec. 2020, *Kladwong et al.* 541 (**KKU**)]; Khon Kaen [Phu Wiang, 26 Dec. 1964, *Chermsirivathana* 250 (**BK**)]; EASTERN Chaiyaphum [Nam Phrom, 600 m alt., 12 Dec. 1971, *van Beusekom*

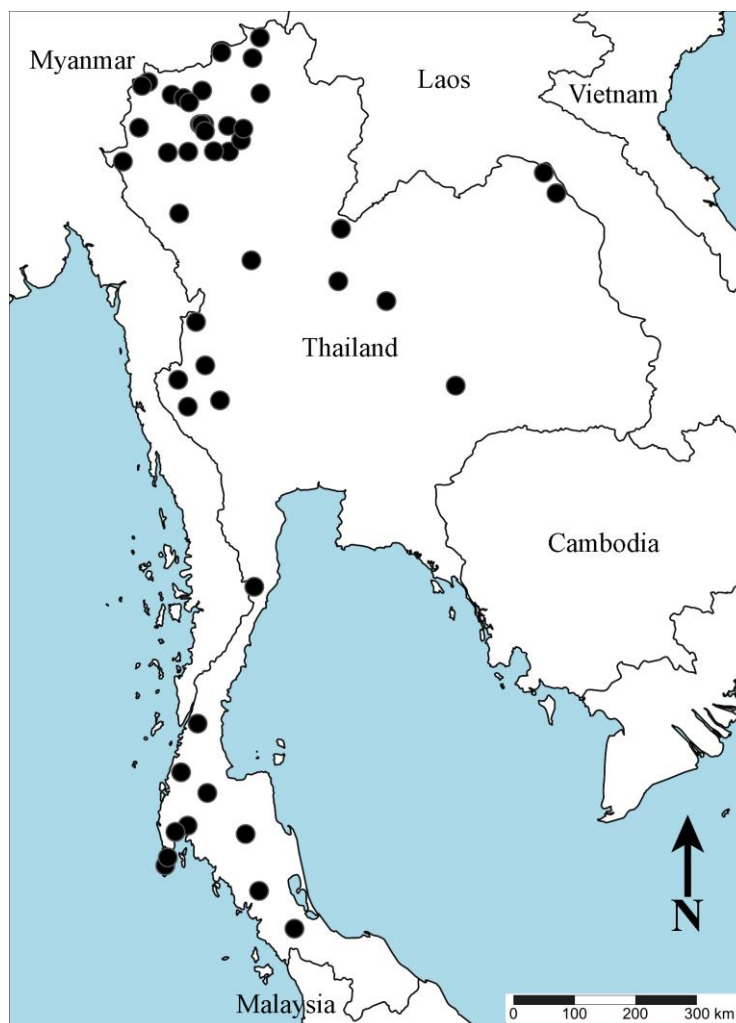


FIGURE 4. Distribution map of *Phaulopsis dorsiflora* (Retz.) Santapau in Thailand.

*et al.* 4169 (**BKF, KYO, L**); Nakhon Ratchasima [Huai Thalaeng, 23 Dec. 1928, *Put 2204* (**BKF**); *ibid.*, near Huai Thalaeng Bridge, 200 m alt., 20 Dec. 2005, *Pooma et al.* 5947 (**BKF**); SOUTH-WESTERN Kanchanaburi [Sangkhla Buri, 225 m alt., 13 Jan. 1994, *Maxwell 94-35* (**BKF, CMUB, L**); Si Sawat, 150 m alt., 6 Nov. 1971, *van Beusekom et al.* 3472 (**BKF, KYO, L**); Sai Yok, Huai Mae Nam Noi, 5 km west of Sai Yok, 250 m alt., 2 Jan. 1962, *Larsen 9108* (**L**); *ibid.*, 160 m alt., 4 Jan. 1962, *Larsen 9148* (**L**); Thong Pha Phum, 190 m alt., 6 Feb. 1962, *Larsen 9620* (**L**); *ibid.*, en route from Thong Pha Phum to Pilok, 700–970 m alt. 26 Jan. 1983, *Koyama et al.* 32929 (**BKF, KYO, L**); *ibid.*, vicinity of Pilok, 550 m alt., 10 Jan. 1985, *Koyama et al.* 48973 (**L**); Prachuap Khiri Khan [Kui Buri, Kui Buri National Park, trail behind Ai Dang Dam, 220 m alt., 24 Jan. 2004, *Middleton et al.* 2468 (**BKF**); PENINSULAR Ranong [Mueang, Hot Spring Park, 60–250 m alt., 6 Dec. 1979, *Shimizu et al.* 26211 (**BKF-2 sheets, KYO, L**) & 26230 (**BKF, KYO**); Surat Thani [Khiri Rat Nikhom, 110–260 m alt., 3 Mar. 1983, *Koyama et al.* 33969 (**BKF, KYO,**

**L**]; Phangnga [Khao Phra Mi, 100 m alt., 7 Jan. 1966, *Hansen & Smitinand 11806* (**BKF, L-2 sheets**); Thap Put, 5 Mar. 1972, *Sadakorn s.n.* (**BK**); *ibid.*, 4 Apr. 1972, *Sadakorn s.n.* (**BK**); *ibid.*, Ban Tam Tong Lang, 100–200 m alt., 15 Dec. 1979, *Shimizu et al.* 27364 (**BKF-2 sheets, KYO**); Mueang, Suwana Koha Cave, Ban Takua Tong, 20–30 m alt., 15 Dec. 1979, *Shimizu et al.* 27353 (**BKF-2 sheets, KYO**); Phuket [Kathu, Kathu Waterfall, 100–200 m alt., 14 Dec. 1979, *Shimizu et al.* 27304 (**BKF-2 sheets, KYO, L**) & 27313 (**BKF-2 sheets, KYO**); Thalang, Khao Phra Thaeo Wildlife Sanctuary, Ton Sai Waterfall, 100–170 m alt., 13 Dec. 1979, *Shimizu et al.* 27148 (**BKF, KYO**); Nakhon Si Thammarat [Chawang, Ban Nah, Group 1, 200 m alt., 24 Feb. 1987, *Maxwell 87-203* (**BKF, CMU**); Trang [Na Yong, Khao Chong, 7 Feb. 1969, *Phusomsaeng & Pinnin 78* (**BKF, L**); *ibid.*, Ton Pliw Waterfall, 100 m alt., 5 Feb. 2005, *Ballmer 1191* (**CMUB**); Mueang, Kao Chong Forest, 200 m alt., 2 Feb. 1985, *Maxwell 85-156* (**BKF**); Thung Wa, Khao Ting Cave, 100 m alt., 7 Mar. 2006, *Middleton et al.* 4101 (**E**)].

**Vernacular name.**— Nam mok bo wai (น้ำหมอกบัวขาว).

**Notes.**— *Phaulopsis dorsiflora* is commonly observed in Thailand which is distributed in Northern, North-Eastern, Eastern, South-Western and Peninsular floristic regions (Fig. 4). This species has an Extent of Occurrence (EOO) of 640,248,486 km<sup>2</sup> and an Area of Occupancy (AOO) of 196,000 km<sup>2</sup> and is assessed as the Least Concern (LC) criterion based on the IUCN Red List Categories (IUCN Standards and Petitions Committee, 2022).

### Excluded species

*E. acuminatissimum* Miq. = *Pseuderanthemum graciliflorum* (Nees) Ridl.

*E. album* Nees = *Pseuderanthemum album* Radlk.

*E. parishii* C.B. Clarke = *Pseuderanthemum parishii* (T. Anderson) Lindau

*E. pumilio* C.B. Clarke = *Pseuderanthemum latifolium* (Vahl) B. Hansen

*E. zollingerianum* Nees = *Pseuderanthemum diversifolium* (Miq.) Radlk.

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