

# การกระจายพันธุ์ของพรรณไม้สกุลกระทิงในประเทศไทย

Distribution of *Calophyllum* L. (Guttiferae) in Thailand

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## บทคัดย่อ

การศึกษาการกระจายพันธุ์ในทางภูมิศาสตร์และทางนิเวศของพรรณไม้ในสกุลกระทิงของประเทศไทย ดำเนินการโดยการสำรวจและเก็บตัวอย่างพรรณไม้จากทั่วทุกภูมิภาคร่วมกับตัวอย่างพรรณไม้แห้งซึ่งได้เก็บรวบรวมไว้แล้วในหอพรรณไม้ต่างๆของประเทศไทย บันทึกสถานที่ที่พบ ชนิดสังคมพืช ระยะเวลาการออกดอกและเป็นผล จากนั้นนำตัวอย่างพรรณไม้แห้งที่ได้จากทั้ง 2 แหล่ง มาทำการวินิจฉัยชนิดโดยอาศัยลักษณะทางสัณฐานเป็นหลัก จากการศึกษาพบพรรณไม้ในสกุลนี้ทั้งหมด 17 ชนิด โดย 8 ชนิดพบเฉพาะทางภาคใต้ และ 1 ชนิดพบเฉพาะทางภาคตะวันออกเฉียงใต้ อีก 8 ชนิดพบได้ในหลายภูมิภาคของประเทศไทย พรรณไม้ในสกุลนี้สามารถพบได้ตั้งแต่ป่าชายหาดจนถึงป่าดิบเขา ส่วนใหญ่พบในป่าไม่ผลัดใบ มีเพียง 1 ชนิดที่สามารถพบได้ในป่าผลัดใบ

กระทิงพรุ (*C. sclerophyllum* Vesque) ตังหนใบหนีบ (*C. teysmannii* Miq.) และ ตังหนขาว (*C. canum* Hook. f.) เป็นสามชนิดที่รายงานใหม่ในประเทศไทย

## ABSTRACT

The geographical and ecological distribution of the genus *Calophyllum* in Thailand were studied by comparing morphological characters of many specimens collected from field works in several regions and herbarium specimens deposited in several herbaria in Thailand. Seventeen species were reported. Eight species have been found only in Peninsular and 1 specie in South-Eastern. The rest species could be found in several regions. Ecological tolerance of this genus ranges from beach forest to montane forest. Most species proliferate in evergreen forest, only 1 specie could be grown in deciduous forest.

*C. sclerophyllum* Vesque, *C. teysmannii* Miq., and *C. canum* Hook. f. were new records for Thailand.

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## INTRODUCTION

Many species of the genus *Calophyllum* are economically important, in particular for timber, housing, ship building, furniture etc. Their non-timber products are also important, especially for medicinal uses. Nowadays *Calophyllum* species are well known as a very important woody plant in the world containing anti HIV-active compounds since around 1980. However, all these studies are concerned with *Calophyllum* species limited in Indonesia and Malaysia. Therefore, the distribution of the genus *Calophyllum* in Thailand is strongly needed for more researches about anti HIV-active compounds of *Calophyllum* species in the country. Many *Calophyllum* species in Thailand proliferate in tropical rain forests both in lowland and montane zones. No endemic species of the genus *Calophyllum* has been reported from Thailand. All native *Calophyllum* species are also found in neighboring countries of several regions: Indo-China (Gagnepain, 1944), Malesia (Henderson and Wyatt-Smith, 1956), Burma (Kurz, 1877), India (Anderson, 1973), and Java (Baker and Brink, 1963).

## MATERIALS AND METHODS

Both herbarium specimens from field works and several herbaria were identified for the legitimate name by means of taxonomical techniques based on morphological characters and also the geographical and ecological distribution of each species are reported.

## RESULT

### Botanical characteristics of the genus *Calophyllum* in Thailand

Small to large evergreen trees. *Trunk* usually without buttresses, occasionally with stilt roots and pneumatophores (*C. sclerophyllum*). *Bark* yellowish-brown to grayish-brown; usually smooth with diamond or boat-shaped lenticellate fissures in immature trees thereafter changed into longitudinally fissured in mature trees, occasionally hoop-marked present (*C. canum*); pink to reddish slash-marked bark, laminated; exudate clear honey or opaque whitish, sticky or not. *Youngest twigs* characteristically quadrangular, and with terminal buds. *Leaves* simple with petiolate, opposite and decussate; lamina coriaceous, usually glabrous and shining, occasionally dorsally pubescent (*C. molle*); lateral nerves numerous, slender, close together and paralleled from midrib towards margin, occasionally sub-marginal vein distinct (*C. teysmannii*); exstipulate. *Inflorescences* cymose, rarely pseudo-umbellate (*C. soulattri*); terminal and/or upper leaf axils or axillary; flowers usually numerous, bisexual; *tepals* 4-8, imbricate or decussate; *stamens* numerous, usually glabrous, occasionally puberulent (*C. molle*); filaments slender, basifixed, more or less joined at base into 4-6 bundles; anther oblong or oblique, 2-celled, apex retuse or apiculate, dehiscence vertically. *Ovary* superior,

occasionally pubescent (*C. molle*), 1-locular, 1 ovule, anatropous, basal placentation; style slender, stigma peltate. *Fruit* a drupe, ovoid to globose with crustose endocarp; yellowish-green, pale brown, orange or blackish when ripen; seed exalbuminous, single, erect; ovoid to globose; not arillate; testa thin or thick and spongy; embryo slender, straight, distinct large cotyledons.

The geographical and ecological distribution of seventeen *Calophyllum* species are described as follows:

1. *Calophyllum thorelii* Pierre, Fl. Forest. Cochinch. 1: *pl.* 103. 1885; Craib, Fl. Siam. Enum. 1: 122. 1931; P. F. Stevens, Jour. Arnold Arb. 61: 218. 1980.- *C. thorelii* Pierre var. *oxycarpum* Gagnep. in Humbert, Fl. Gen. Indo-Chine Suppl. 1: 270. 1943

Geographical Distribution.- NORTH-EASTERN: Mukdahan; SOUTH-EASTERN: Chon Buri, Chanthaburi, Trat.

Ecological Distribution.- In semi-evergreen forest, at ca. 50-300 m. altitude. Flowering November-January. Fruiting December-May.

2. *Calophyllum touranense* Gagnep. ex P. F. Stevens, Jour. Arnold Arb. 61: 226. *fig.8, b-d.* 1980.- *C. touranense* Gagnep. in Humbert, Fl. Gen. Indo-Chine Suppl. 1: 271. 1943.

Geographical Distribution.- NORTH-EASTERN: Phetchabun; EASTERN: Chaiyaphum, Nakhon Ratchasima; SOUTH-WESTERN: Phetchaburi.

Ecological Distribution.- Usually present in hill evergreen forest, at ca. 700-1200 m. altitude. Flowering January-March. Fruiting February-June and September-October.

3. *Calophyllum polyanthum* Wall. ex Choisy, Descr. Guttif. Inde, 43. 1849; Craib, Fl. Siam. Enum. 1: 121. 1931; P. F. Stevens, Jour. Arnold Arb. 61: 220. 1980.- *C. smilesianum* Craib;- *C. smilesianum* Craib var. *lutea* Craib;- *C. williamsianum* Craib, Fl. Siam. Enum. 1: 122. 1931; Gagnep. in Humbert, Fl. Gen. Indo-Chine Suppl. 1: 270,271. 1943.

Geographical Distribution.- NORTH: Mae Hong Son, Chiang Mai, Nan; NORTH-EASTERN: Loei; SOUTH-WESTERN: Uthai Thani, Prachuap Khiri Khan; PENINSULAR: Nakhon Si Thammarat, Trang.

Ecological Distribution.- Evergreen forest in Peninsular, at ca. 100-200 m. altitude and in hill evergreen forest in North and North-Eastern, at ca. 950-1500 m. altitude. Flowering March-May. Fruiting May-November and October-February.

4. *Calophyllum dryobalanoides* Pierre, Fl. Forest. Cochinch. 1: *pl.* 106. 1885; Gagnep. in Humbert, Fl. Gen. Indo-Chine Suppl. 1: 274. 1943; P. F. Stevens, Jour. Arnold Arb. 61: 232. 1980.

Geographical Distribution.- SOUTH-EASTERN: Chanthaburi, Trat.

Ecological Distribution.- In semi-evergreen forest, at ca. 900-1000 m. altitude. Flowering November-December. Fruiting January-March.

5. *Calophyllum symingtonianum* M. R. Henderson & Wyatt-Smith, Gard. Bull. Singapore 15: 338. *pl.* 18. 1956; P. F. Stevens, Jour. Arnold Arb. 61: 229. 1980.

Geographical Distribution.- PENINSULAR: Trang, Songkhla, Yala.

Ecological Distribution.- In evergreen Forest, at ca. 100-150 m. altitude. Flowering unknown. Fruiting February-April.

6. *Calophyllum macrocarpum* Hook. f., Fl. Brit. India 1: 273. 1874; M. R. Henderson & Wyatt-Smith, Gard. Bull. Singapore 15: 317. 1956; P. F. Stevens, Jour. Arnold Arb. 61: 452. *fig. 28, g, h.* 1980.

Geographical Distribution.- PENINSULAR: Chumphon, Ranong, Krabi, Nakhon Si Thammarat, Trang, Songkhla, Narathiwat.

Ecological Distribution.- In evergreen forest, at ca. 100-220 m. altitude. Flowering May-July. Fruiting August-April.

7. *Calophyllum sclerophyllum* Vesque, Epharosis 2: *t.* 33. 1889; M. R. Henderson & Wyatt-Smith, Gard. Bull. Singapore 15: 324. 1956; P. F. Stevens, Jour. Arnold Arb. 61: 447. 1980.- *C. teysmannii* Miq. var. *inophylloide* (King) P. F. Stevens, *sensu.* C. Phengklai & C. Niyomdham, Flora in Peat Swamp Areas of Narathiwat, 196. *fig. 108.* 1991.

Geographical Distribution.- PENINSULAR: Narathiwat.

Ecological Distribution.- In peat swamp forest, at ca. sea level-10 m. altitude. Flowering July-August. Fruiting August-December.

8. *Calophyllum teysmannii* Miq., Fl. Indiae Batavae Suppl. 1(3): 499. Dec. 1861; P. F. Stevens, Jour. Arnold Arb. 61: 431. 1980.- *C. intramarginale* M. R. Henderson & Wyatt-Smith, Gard. Bull. Singapore 15: 342. *pl.* 22. 1956.- *C. inophylloide* King var. *singaporense* M. R. Henderson & Wyatt-Smith, Gard. Bull. Singapore 15: 316. *pl.* 9. 1956.

Geographical Distribution.- PENINSULAR: Narathiwat.

Ecological Distribution.- In evergreen forest, at ca. 230-315 m. altitude. Flowering May-June. Fruiting July-August.

9. *Calophyllum inophyllum* L., Sp. Pl. 513. 1753; Craib, Fl. Siam. Enum. 1: 120. 1931; M. R. Henderson & Wyatt-Smith, Gard. Bull. Singapore 15: 314. *pl.* 1C. 1956; P. F. Stevens, Jour. Arnold Arb. 61: 324. 1980.

Geographical Distribution.- SOUTH-EASTERN: Chon Buri, Trat; SOUTH-WESTERN: Prachuap Khiri Khan; PENINSULAR: Chumphon, Ranong, Surat Thani, Phatthalung, Trang, Satun, Songkhla, Narathiwat.

Ecological Distribution.- Usually in beach forest or coastal area and commonly planted for ornamental trees. Flowering and fruiting all year.

10. *Calophyllum tetrapterum* Miq., Pl. Jungh. 291. 1854; P. F. Stevens, Jour. Arnold Arb. 61: 505. 1980.- *C. floribundum* Hook. f. Fl. Brit. India 1: 272. 1874; M. R. Henderson & Wyatt-Smith, Gard. Bull. Singapore 15: 332. *pl.* 16. 1956. - *C. dryobalanoides* auct., non Pierre - *C. pulcherrimum* auct., non Wall. ex Choisy; Craib, Fl. Siam. Enum. 1: 120, 121. 1931; Gagnep. in Humbert, Fl. Gen. Indo-Chine, Suppl. 1: 274. 1943.

Geographical Distribution.- SOUTH-EASTERN: Trat; PENINSULAR: Chumphon, Ranong, Krabi, Trang, Satun, Songkhla, Narathiwat.

Ecological Distribution.- Usually found along stream in evergreen or peat swamp forest, at ca. sea level to 150 m. altitude. Flowering September-January. Fruiting January-April.

11. *Calophyllum molle* King, Jour. Asiatic Soc. Bengal, II. 59: 177. 1890; M. R. Henderson & Wyatt-Smith, Gard. Bull. Singapore 15: 307. 1956; P. F. Stevens, Jour. Arnold Arb. 61: 641. *fig.* 40, *h, j.* 1980.

Geographical Distribution.- PENINSULAR: Narathiwat.

Ecological Distribution.- In evergreen forest, at ca. 200-300 m. altitude.

12. *Calophyllum canum* Hook. f., Fl. Brit. India 1: 271. 1874; M. R. Henderson & Wyatt-Smith, Gard. Bull. Singapore 15: 306. 1956; P. F. Stevens, Jour. Arnold Arb. 61: 371. 1980.

Geographical Distribution.- PENINSULAR: Narathiwat.

Ecological Distribution.- In evergreen forest, at ca. 200-300 m. altitude.

13. *Calophyllum calaba* L., Sp. Pl. 732. 1753; P. F. Stevens, Jour. Arnold Arb. 61: 256. 1980.- *C. saigonense* Pierre, Fl. Forest. Cochinch. 1: *pl.* 105. 1885; Craib, Fl. Siam. Enum. 1: 121. 1931; Gagnep. in Humbert, Fl. Gen. Indo-Chine Suppl. 1: 274. 1943.- *C. curtisii* Ridl., Jour. Asiatic Soc. Bengal, II. 59: 176. 1890; M. R. Henderson & Wyatt-Smith, Gard. Bull. Singapore 15: 321. 1956.

Geographical Distribution.- NORTH-EASTERN: Udon Thani, Nong Khai; EASTERN: Buri Ram, Surin, Roi Et, Yasothon, Si Sa Ket, Ubon Ratchathani; SOUTH-EASTERN: Chon Buri, Chanthaburi, Trat; PENINSULAR: Ranong, Chumphon, Surat Thani, Phangnga, Phuket, Nakhon Si Thammarat, Trang, Songkhla, Pattani, Yala, Narathiwat.

Ecological Distribution.- In peat swamp forest, beach forest to and evergreen forest in the Peninsular. Semi-evergreen forest to dry dipterocarps forest with pine in other part of our country, at ca. 800-1000, except the Northern. Flowering August-December. Fruiting October-April.

14. *Calophyllum rupicolum* Ridl., Trans. Linn. Soc. Bot. II. 3: 278. 1893; M. R. Henderson & Wyatt-Smith, Gard. Bull. Singapore 15: 346. 1956; P. F. Stevens, Jour. Arnold Arb. 61: 515. 1980 (“*C. rupicola*”).- *C. rupicolum* Ridl. variety; M. R. Henderson & Wyatt-Smith, Gard. Bull. Singapore 15: 347. pl. 27. 1956.

Geographical Distribution.- PENINSULAR: Narathiwat.

Ecological Distribution.- Peat swamp forest and along stream on granite bedrock in evergreen forest, at ca. 200-270 m. altitude. Flowering October-November. Fruiting December-April.

15. *Calophyllum pisiferum* Planchon & Triana, Ann. Sci. Nat. Bot. IV. 15: 294. 1862; M. R. Henderson & Wyatt-Smith, Gard. Bull. Singapore 15: 345. 1956; P. F. Stevens, Jour. Arnold Arb. 61: 518. fig. 32, k, l. 1980.- *C. retusum* Wall. ex Choisy var. *cambodgense* Pitard in Lecomte - *C. retusum* Wall. ex Choisy var. *cochinchinense* Pitard in Lecomte, Fl. Gen. Indo-Chine 1(4): 321. 1910; Gagnep. in Humbert, Fl. Gen. Indo-Chine Suppl. 1: 275. 1943.- *C. sangkhae* Craib, Kew Bull. 1925: 18. 1925, Fl. Siam. Enum. 1: 122. 1931.

Geographical Distribution.- SOUTH-EASTERN: Prachin Buri, Chanthaburi, Trat.

Ecological Distribution.- Along stream in semi-evergreen forest, at ca. sea level-730 m. altitude. Flowering October-November. Fruiting November-January.

16. *Calophyllum depressinervosum* M. R. Henderson & Wyatt-Smith, Gard. Bull. Singapore 15: 335. pl. 17. 1956; *C. depressinerve* Wyatt-Smith, Malayan Forest Rec. 17: 113. 1952; P. F. Stevens, Jour. Arnold Arb. 61: 389. Fig. 21, f. 1980.

Geographical Distribution.- SOUTH-EASTERN: Chanthaburi(?); PENINSULAR: Chumphon, Krabi, Nakhon Si Thammarat, Trang, Narathiwat.

Ecological Distribution.- Usually in evergreen forest in the Peninsular, at ca. 100-200 m. altitude. Flowering unknown. Fruiting January-April.

17. *Calophyllum soulattri* Burman f., Fl. Indica, 121. 1768; M. R. Henderson & Wyatt-Smith, Gard. Bull. Singapore 15: 319. 1956; P. F. Stevens, Jour. Arnold Arb. 61: 277. 1980.- *C. spectabile* auct., non Willd.; Gagnep. in Humbert, Fl. Gen. Indo-Chine, Suppl. 1: 274. 1943.

Geographical Distribution.- SOUTH-WESTERN: Kanchanaburi; PENINSULAR: Chumphon, Ranong, Surat Thani, Krabi, Nakhon Si Thammarat, Phatthalung, Trang, Songkhla.

Ecological Distribution.- Usually found along stream in evergreen forest or in peat swamp area, at ca. 50-300 m. altitude. Flowering and fruiting all year.

## DISCUSSION

For the specimen of *C. depressinervosum* corresponded to the herbarium sheet number "BKF 2484 (SN 027933)", which was collected by "Put" (Collector number: *Put No. 427*) from Chanthaburi, Southeastern Thailand, have not found in the southeastern forest complex in this study. The geographical distribution range of this species is from Chumphon to Narathiwat, in Southern Thailand only.

## SUMMARY

The following is could be summarizing for this study:

1. Seventeen species were recorded namely: *C. thorelii*, *C. touranese*, *C. polyanthum*, *C. dryobalanoides*, *C. symingtonianum*, *C. macrocarpum*, *C. sclerophyllum*, *C. teysmannii*, *C. inophyllum*, *C. tetrapterum*, *C. molle*, *C. canum*, *C. calaba*, *C. rupicolum*, *C. pisiferum*, *C. depressinervosum*, and *C. soulattri*.

2. Thirteen species were found in Peninsular as follows; *C. polyanthum*, *C. symingtonianum*, *C. macrocarpum*, *C. sclerophyllum*, *C. teysmannii*, *C. inophyllum*, *C. tetrapterum*, *C. molle*, *C. canum*, *C. calaba*, *C. rupicolum*, *C. depressinervosum*, and *C. soulattri*. Almost species occurred in tropical rain forest. *C. inophyllum* was found only in beach forest and *C. sclerophyllum* was specific to peat swamp forest. For three species; *C. tetrapterum*, *C. rupicolum*, and *C. soulattri* were usually found along stream in evergreen forest or peat swamp area.

3. Six species were found in South-Eastern as follows; *C. thorelii*, *C. dryobalanoides*, *C. inophyllum*, *C. tetrapterum*, *C. calaba*, and *C. pisiferum*. The species *C. inophyllum* was found only in beach forest. Two species, *C. tetrapterum* and *C. pisiferum* were found along stream in evergreen forest. The rest species occurred in semi-evergreen forest.

4. Four species were found in South-Western as follows; *C. touranese*, *C. polyanthum*, *C. inophyllum*, and *C. soulattri*. Almost species were found in evergreen forest, except *C. inophyllum* was in beach forest.

5. Four species were found in North-Eastern as follows; *C. thorelii*, *C. polyanthum*, and *C. touranese* were found in evergreen forest, particular for the two latter species were specific to montane zone. *C. calaba* could be grown both of evergreen and deciduous forest.

6. Two species were found in Eastern as follows; *C. touranese* and *C. calaba*.

7. Only one species was found in Northern was *C. polyanthum*.

8. Phetchaburi Province, South-Western is the new locality of *C. touranense*; Uthai Thani and Prachuap Khiri Khan Provinces, South-Western are the new locality of *C. polyanthum*, and Mukdahan, North-Eastern is the new locality of *C. thorelii*.

9. The geographical distribution of *C. calaba* is over all regions of Thailand, except the Northern. An also the ecological distribution of this species is wide range from beach forest to dry dipterocarps forest.

10. The new records for Thailand from this study were *C. sclerophyllum*, *C. teysmannii*, and *C. canum*.

#### LITERATURE CITED

- Anderson, T. 1973. Guttiferae, pp. 271-276. In J. D. Hooker (ed.). Flora of British India. Vol.1. Bishen Singh Mahendra Pal Singh New Connaught Place, Dehradun.
- Backer, C. A. and R. C. Brink. 1963. Flora of Java. Vol.1. N. V. P. Noordhoff, Groningen, Netherlands. 648 p.
- Gagnepain, F. 1944. Guttiferes, pp. 268-275. In H. Huart (ed.). Supplement A La Florae Generale De L'Indochine. Fasc. 1 (3). Meseum National d' Histoire Naturelle, Paris.
- Henderson, M. R. and J. Wyatt-Smith. 1956. *Calophyllum* Linn. The Gardens' Bulletin Singapore 15: 284-375.
- Kurz, S. 1877. Forest Flora of British Burma. Vol.1. Office of the Superintendent of Government Printing, Calcutta. 549 p.