



A new species of *Phyllanthus chayamaritiae* (*Phyllanthaceae*) from Thailand

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Key words

Phyllanthaceae
Phyllanthus chayamaritiae
Thailand

Abstract *Phyllanthus chayamaritiae* from north-eastern and eastern Thailand is described and illustrated as a new taxon. It is distributed in open places in deciduous forests. The new taxon is characterised by the long spine-like capsule. An identification key to the species and morphologically related species is provided.

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INTRODUCTION

The genus *Phyllanthus* L. (*Phyllanthaceae*) consists of c. 700 species (Radcliffe-Smith 2001), mainly distributed in the tropics and subtropics. The family *Phyllanthaceae* is most notable for being biovulate and it has been segregated from *Euphorbiaceae* s.l. based on molecular evidence (APG II 2003). The first revision of the Thai species of the genus was the treatment of Airy Shaw for the *Euphorbiaceae* of Siam (Thailand) (Airy Shaw 1972), who recognised 31 species in *Phyllanthus*. Later Chantaranothai (2007) published 36 species of the genus in Thailand.

MATERIAL AND METHODS

Morphological study

Field collections and herbarium material were studied. The morphological characteristics of the specimens described herein as *P. chayamaritiae* sp. nov. were compared with those of the similar species, *P. amarus* Schumach. & Thonn. and *P. urinaria* L. Voucher specimens are deposited at KKU. Additional materials have been examined and consulted from the following herbaria (abbreviations according to Thiers 2011): AAU, BCU, BK, BKF, C, CMU, K, KKU, L, PSU, QBG, TCD and the Herbarium of the Department of Biology, Chiang Mai University, Thailand.

Anatomical and SEM studies

Living material of *P. amarus*, *P. chayamaritiae* and *P. urinaria* was fixed and preserved in 70 % ethanol. Stem internodes used were the sixth, seventh and eight from the apex of each specimen. The samples were dehydrated in an ethanol series (70 %, 85 % and 96 %, respectively), embedded in Technovit 7100 polymerizing resin (Heraeus Kulzer GmbH, Germany), sectioned with rotary microtomes at 6–8 µm thickness and stained with Ruthenium red and Toluidine blue. The sections were mounted in Entellan mounting medium for examination.

The epidermal study was made by peeling methods; samples were prepared by mechanical scraping with a razor blade; passed through the alcohol series for 10–15 min. in each series and

then stained in 1 % safranin O in alcohol. Excess stain was washed off with distilled water. The samples were then dehydrated by alcohol series, cleared with pure xylene and mounted in the DePeX artificial mounting medium.

For scanning electron microscopy (SEM), the capsules of three species were fixed in 70 % (v/v) ethanol, dried and then mounted directly on stubs using double-sided adhesive tape. The stubs were coated with gold-palladium for 5 min in a Sputter Coater Balzers SCD 040. The capsules were observed with a JEOL JSM-6390 SEM.

Voucher specimens for anatomical and SEM studies.

Phyllanthus amarus: C. Kantachot 504, Si Sa Ket, Kanthralak, 28 Apr. 2011; C. Kantachot 505, Ubon Ratchathai, Warinchamrab, 29 Apr. 2011.

Phyllanthus chayamaritiae: C. Kantachot 495, Ubon Ratchathani, Phu Jong Nayoi National Park, 3 Oct. 2010; C. Kantachot 500, Sakon Nakhon, Phu Phan National Park, 25 Oct. 2010.

Phyllanthus urinaria: C. Kantachot 506, Ubon Ratchathai, Warinchamrab, 29 Apr. 2011.

DESCRIPTION OF THE SPECIES

Phyllanthus chayamaritiae Chantar. & Kantachot, sp. nov. — Fig. 1, 2, 3c, d

A *P. amario* L. et *P. urinario* L. affinis, ovario et capsula dense spiniformibus differt. — Typus: *P. Chantaranothai* & C. Kantachot 2010-1 (holo KKU; iso BKF), Thailand, Sakon Nakhon, Phu Phan National Park, 10 July 2010.

Etymology. The name of the species honours Dr Kongkanda Chayamarit, the head of the *Euphorbiaceae* project for the Flora of Thailand.

Annual herb up to 70 cm high; branchlets angled, glabrous. *Stipules* lanceolate or ovate-lanceolate, 0.3–1 mm long. *Leaves*: petiole 0.2–0.8 mm long; blade oblong, elliptic-oblong or obovate, 2.6–11 by 1.3–5 cm, chartaceous or subcoriaceous, finely puberulous on both sides, base slightly unequal, obtuse or rounded, margin entire and finely puberulous, apex obtuse or rounded and apiculate; lateral veins in 3–4 pairs; reticulation inconspicuous on both sides. *Flowers* axillary, mostly bisexual fascicles; first 1 or 2 axils with staminate flowers, succeeding axil each with 1 pistillate flower and 1 staminate flower and the last 1 or 2 axils of the distal axils with 1 pistillate flower. *Staminate flowers*: pedicels 0.5–1 mm long; sepals 6, ovate or elliptic, 0.2–0.7 by 0.1–0.4 mm, light yellowish; disc glands 6, star-shaped or orbicular; stamens 3, staminal column 0.1–0.3 mm long, anthers 0.1–0.3 mm long. *Pistillate flowers*: pedicels

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Fig. 1 *Phyllanthus chayamaritiae* Chantar. & Kantachot. a. Habit; b. leaflet; c. staminate flower; d. pistillate flower; e. fruit; f. seed (all: *P. Chantaranonthai* & *C. Kantachot* 2010-1, KKU). — Drawn by Wirot Kasonbua.

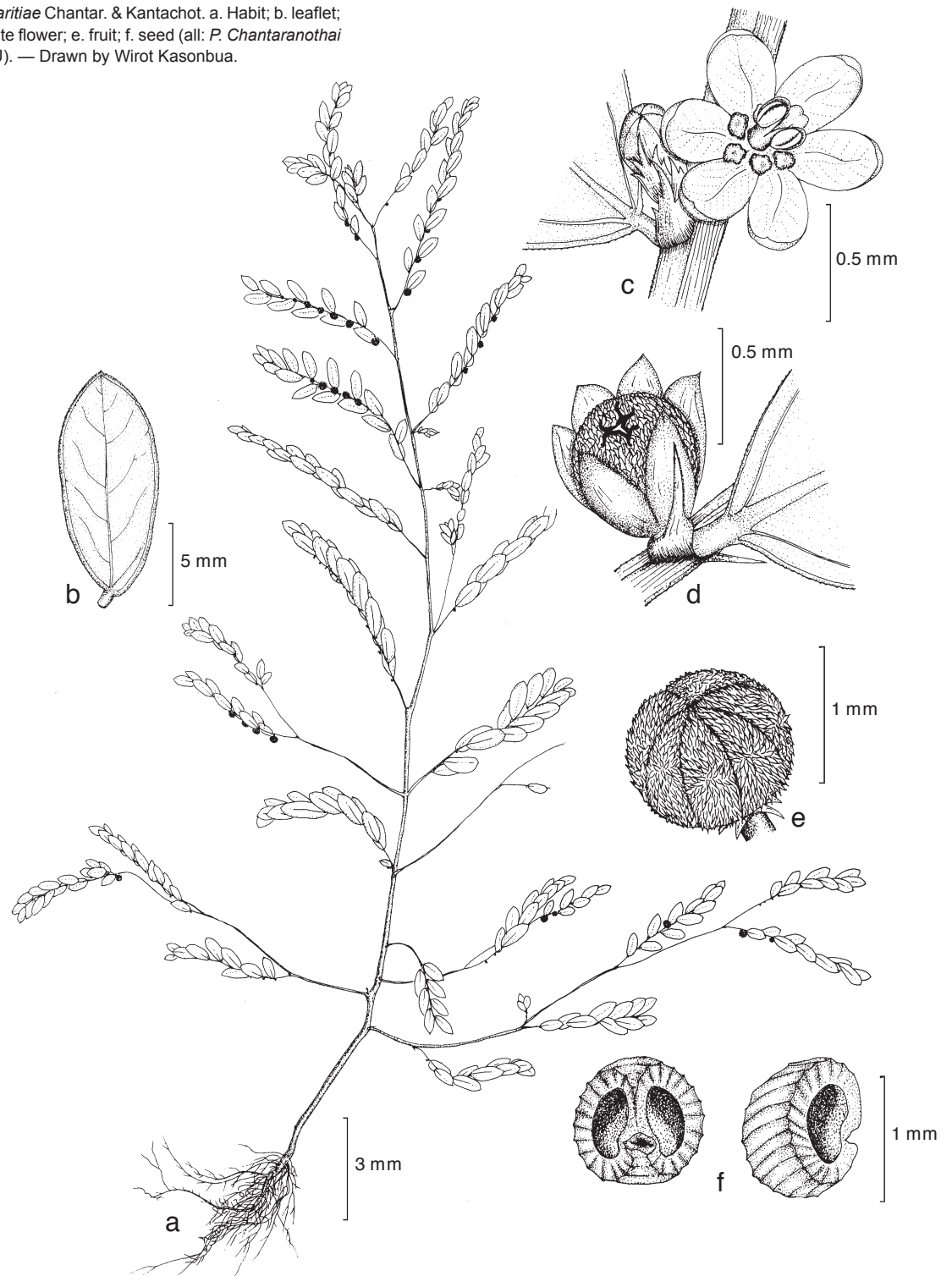


Table 1 Comparison between *Phyllanthus chayamaritiae* and morphologically related species (Fig. 3).

Character	<i>P. chayamaritiae</i>	<i>P. amarus</i>	<i>P. urinaria</i>
Sepal number	6	5	6
Capsule surface	with long spines	glabrous	scurfy-tuberculate
Apex of pistillate flower	acute	acute	obtuse or orbicular
Pistillate pedicel length (mm)	0.7–1.2	0.7–1.2	0.1–0.4
Ovary	with long spines	glabrous	tuberculate
Stomatal type	paracytic	anomocytic (rarely paracytic)	paracytic
Stem diameter (mm)	0.6–1.0	1.5–2.0	1.5–2.2
Stem outline in transverse section	semicircular with ridge	circular	semicircular with ridge
Number of hypodermis layers	1	2	1

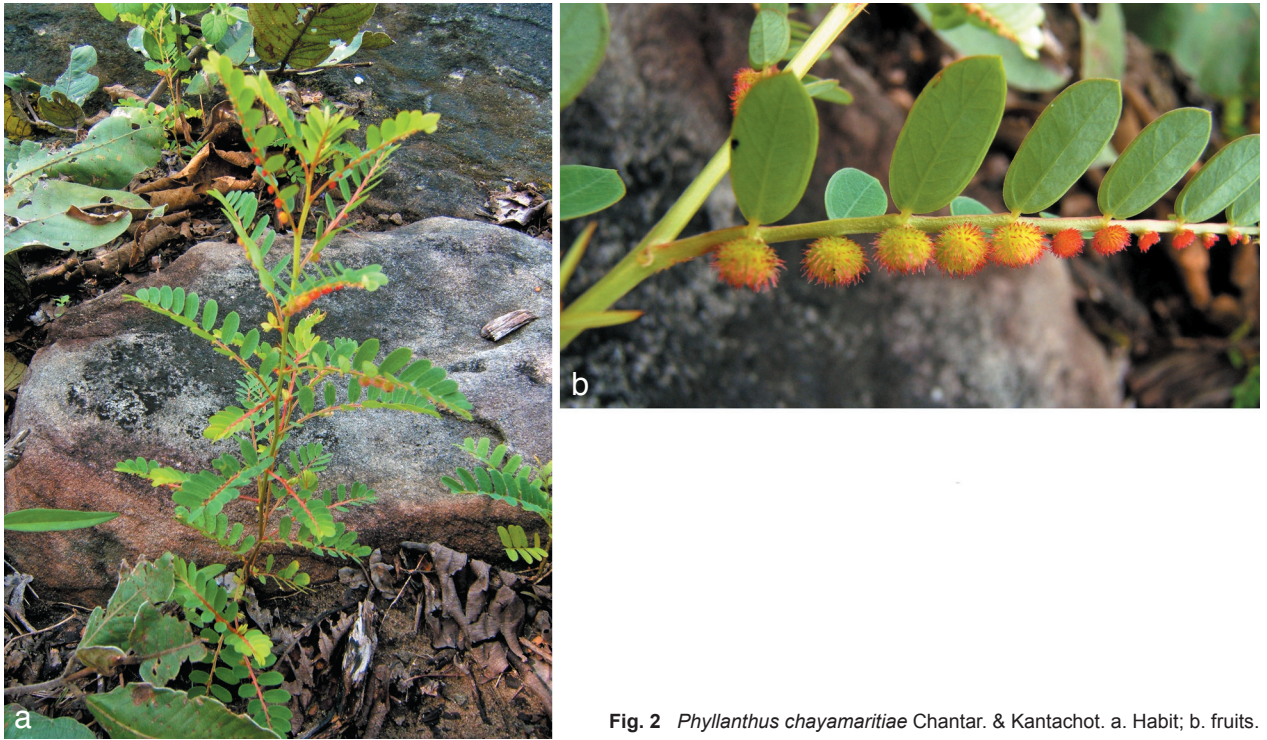


Fig. 2 *Phyllanthus chayamaritiae* Chantar. & Kantachot. a. Habit; b. fruits.

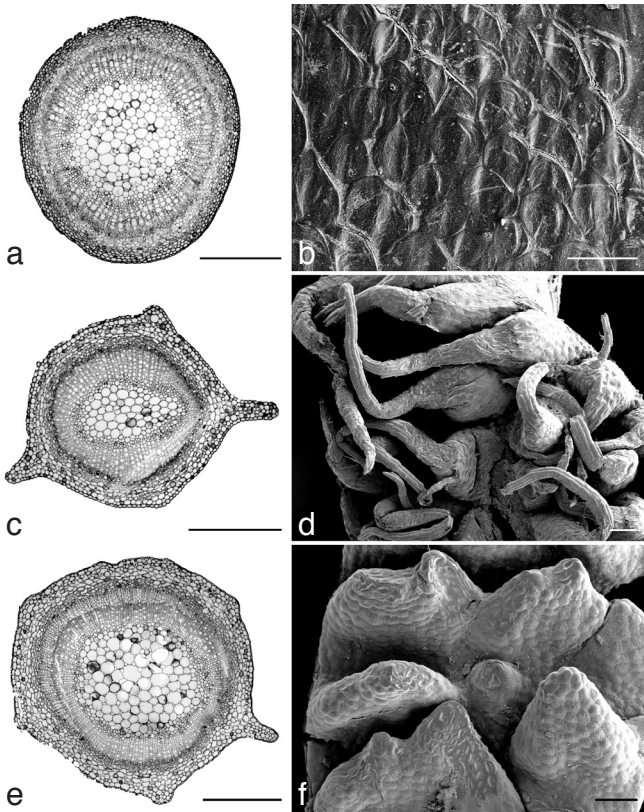


Fig. 3 a, b: *Phyllanthus amarus* Schumach. & Thonn. a. Transverse sections of stems; b. SEM photographs of fruit surface. — c, d: *Phyllanthus chayamaritiae* Chantar. & Kantachot. c. Transverse sections of stems; d. SEM photographs of fruit surface. — e, f: *Phyllanthus urinaria* L. e. Transverse sections of stems; f. SEM photographs of fruit surface (a, b: *C. Kantachot* 504; c, d: *C. Kantachot* 495; e, f: *C. Kantachot* 506; all KKU). — Scale bars: a, c, e = 500 µm; b = 50 µm; d, f = 100 µm.

0.7–1.2 mm long; sepals 6, obovate-oblong or lanceolate, 0.3–0.8 by 0.2–0.5 mm, glabrous, apex acute with broad whitish scarios margin; disc glands 6; ovary covered with soft spine-like hairs; styles 0.1–0.2 mm long; stigma c. 0.1 mm long. *Fruits*: pedicel 1.5–2 mm long, 0.8–2 mm diam, capsular, depressed globose, covered with soft spine-like hairs, light green or light yellowish green. *Seeds* trigonous, 0.5–1.2 by c. 1 mm wide, with 2 hollows on the sides.

Distribution — Thailand: North-Eastern: Sakon Nakhon, Khon Kaen; Eastern: Ubon Ratchathani.

Habitat & Ecology — *Phyllanthus chayamaritiae* occurs in open places of deciduous forests with stone bedrock habitat, at 300–600 m a.s.l. The populations cover restricted areas of only 15–40 m² and are growing together with *Amalocalyx microlobus* Pierre ex Spire (*Apocynaceae*), *Crotalaria* sp. (*Fabaceae*), *Droogmansia godefroyana* Schindl. ex Gagnep. (*Fabaceae*), *Eriocaulon echinulatum* Mart. (*Eriocaulaceae*), *Fimbri-stylis dichotoma* (L.) Vahl (*Cyperaceae*), *Justicia diffusa* Willd. (*Acanthaceae*), *Lindernia kerrii* T.Yamaz. (*Schrophulariaceae*), *Tephrosia vestita* Vogel (*Fabaceae*) and *Xyris* sp. (*Xyridaceae*).

Phenology — Flowering occurs from June to September and fruiting from July to November.

Voucher specimens. THAILAND, Ubon Ratchathani, Phu Jong Nayoi National Park, 3 Oct. 2010, *C. Kantachot 495* (KKU); Sakon Nakhon, Phu Phan National Park, 28 Sept. 2004, *Daroon 05* (KKU); Sakon Nakhon, Phu Phan National Park, 25 Oct. 2010, *C. Kantachot 500* (KKU); Khon Kaen, Nam Phong National Park, 15 July 2011, *P. Chantaranothai 2011-1* (KKU).

Note — The morphological, anatomical and SEM investigations (Table 1) show the characters of *P. chayamaritiae* as compared with *P. amarus* and *P. urinaria*. However, *P. chayamaritiae* differs from other species in having long spine hairs on the capsule, and ovary and absence of druses in pith. It is found in Sakon Nakhon, Khon Kaen and Ubon Ratchathani provinces in north-eastern and eastern Thailand whereas *P. amarus* and *P. urinaria* are widespread through the country.

KEY TO PHYLLANTHUS CHAYAMARITIAE AND MORPHOLOGICALLY RELATED SPECIES

- 1. Sepals 5. *P. amarus*
- 1. Sepals 6. 2
- 2. Capsule scurfy-tuberculate *P. urinaria*
- 2. Capsule spiny *P. chayamaritiae*

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