

Keys to and checklist of species of the genus *Trichosanthes* L. (Cucurbitaceae) in Indochina

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ABSTRACT

In this account the genus *Trichosanthes* L. has 20 species occurring in Thailand, Cambodia, Laos and Vietnam. Since the treatments in *Flore du Cambodge, du Laos et du Viêt Nam* (Keraudren-Aymonin 1975; 10 species), and in *Flora of Thailand* (De Wilde & Duyfjes 2008a; 17 species) more knowledge by field-work in Thailand has become available resulting in the inclusion for Thailand of the taxa *T. baviensis* Gagnep., *T. pedata* Merr. & Chun, *T. tricuspidata* Lour. subsp. *rotundata* W.J.de Wilde & Duyfjes. For Cambodia, Laos and Vietnam of the species *T. dunniana* H.Lév., *T. erosa* Duyfjes & Pruesapan var. *erosa*, *T. inthanonensis* Duyfjes & Pruesapan, *T. fissibracteata* C.Y.Cheng & C.H.Yueh, *T. tricuspidata* Lour. subsp. *rotundata* W.J.de Wilde & Duyfjes, and *T. truncata* C.B.Clarke. Two keys to the species are presented, one for male flowering specimens, and one for fruiting specimens, as well as for each species literature references, distribution and occasional other information.

KEY WORDS

Cucurbitaceae,
Trichosanthes,
Southeast Asia,
Thailand,
Cambodia,
Laos,
Vietnam,
new records.

RÉSUMÉ

Clés pour et liste des espèces du genre Trichosanthes L. (Cucurbitaceae) en Indo-Chine. Dans cette mise au point, 20 espèces du genre *Trichosanthes* L. sont reconnues en Thaïlande, ainsi qu'au Cambodge, au Laos et au Vietnam. Depuis les traitements floristiques correspondants dans *Flora of Thailand* (De Wilde & Duyfjes 2008a; 17 espèces), et dans *Flore du Cambodge, du Laos et du Viêt Nam* (Keraudren-Aymonin 1975; 10 espèces), la connaissance du genre s'est étendue, grâce aux études de terrain en Thaïlande. Pour cette dernière, on doit signaler la présence des taxons *T. baviensis* Gagnep., *T. pedata* Merr. & Chun, et *T. tricuspidata* Lour. subsp. *rotundata* W.J.de Wilde & Duyfjes. Quant au Cambodge, au Laos et au Vietnam, les espèces suivantes sont reconnues : *T. dunniana* H.Lév., *T. erosa* Duyfjes & Pruesapan var. *erosa*, *T. inthanonensis* Duyfjes & Pruesapan, *T. fissibracteata* C.Y.Cheng & C.H.Yueh, *T. tricuspidata* Lour. subsp. *rotundata* W.J.de Wilde & Duyfjes, et *T. truncata* C.B.Clarke. Deux clés sont présentées, l'une pour les individus mâles et l'autre pour les spécimens en fruits. Pour chaque espèce sont mentionnées les références bibliographiques, la distribution et d'autres remarques éventuelles.

MOTS CLÉS

Cucurbitaceae,
Trichosanthes,
Asie du Sud-Est,
Thaïlande,
Cambodge,
Laos,
Viêt Nam,
nouvelles signalisations.

INTRODUCTION

Trichosanthes L., which is dioecious, except for *T. cucumerina* L., is by far the largest genus of Cucurbitaceae Juss. in Southeast Asia, with about 100 species ranging from India and China east to Australia.

Since the treatment of the family Cucurbitaceae for the *Flore du Cambodge, du Laos et du Viêt Nam* (Keraudren-Aymonin 1975), additional collecting in the genus *Trichosanthes* in that area has been limited. In adjoining Thailand, however, recent collecting was intensified, mainly in connection with the well-progressing *Flora of Thailand*. The family Cucurbitaceae for Thailand was published in 2008a (De Wilde & Duyfjes). For China the genus was surveyed by Jeffrey (1980a), by Yueh & Cheng (1980), and by Huang & Jeffrey (2011). For Thailand, 17 species were accepted (Duyfjes & Pruesapan 2004; De Wilde & Duyfjes 2008a), but through enhanced interest in the genus more additional material was collected and in Thailand two

more species, *T. baviensis* Gagnep. and *T. pedata* Merr. & Chun came to light (De Wilde *et al.* 2011). Also, the recent advanced knowledge of the genus as a whole, e.g., Newman *et al.* (2007), allowed for some changes and additions in Cambodia, Laos and Vietnam. In this paper, a new extended enumeration of *Trichosanthes* is presented for the area of Thailand, Cambodia, Laos and Vietnam, preceded by two keys to the species, one for male flowering and one for female flowering and/or fruiting material, comprising 20 indigenous species. For *T. tricuspidata* Lour., with three subspecies, the relation to certain species to be accepted in China is not clear as it is briefly discussed with that species. *Trichosanthes fissibracteata* C.Y.Cheng & C.H.Yueh, described from China, appeared to occur in northern Vietnam where it is known from male and from fruiting specimens.

For names of taxa which are accepted in the present paper for Cambodia, Laos and Vietnam, but not mentioned in Keraudren-Aymonin's treatment for this area (1975), the examined material is cited.

KEY TO MALE FLOWERING SPECIMENS OF THE GENUS *TRICHOSANTHES* L.

(Male inflorescences not known or doubtful in *T. dunniiana*, *T. inthanonensis* and *T. kostermansii*.)

1. Leaves in adult plants 3- or 5-foliolate 2
— Leaves in adult plant simple, lobed or unlobed 3
2. Leaves 3-foliolate. [Seeds broader, 10-11 mm wide.] 20. *T. wawrae* Cogn.
— Leaves 3-or 5-foliolate. [Seeds narrower, c. 8 mm wide.] 11. *T. pedata* Merr. & Chun
3. Male flowers single or paired, not in a raceme; stamens (anthers) free
..... *T. dioica* Roxb. (introduced)
— Male flowers in a raceme 4
4. Probract absent, or in *T. pallida* c. 3 mm long or less, caducous (check on young shoots) ... 5
— Probract present 13
5. Male bracts 2 mm long or less, or absent 6
— Male bracts longer than 2 mm; plants usually dioecious 7
6. Monoecious; male raceme long-peduncled 2. *T. cucumerina* L.
— Dioecious; male raceme short, subsessile 1. *T. baviensis* Gagnep.
7. Leaves villose or velvety below 8
— Leaves short hairy, or scabrous, or glabrous below 9
8. Portion of tendrils below the point of branching 0.5-1 cm long; male bracts 10-20 mm long 8. *T. kerrii* Craib
— Portion of tendrils below the point of branching 2-4 cm long; male bracts 20-40 mm long 19. *T. villosa* Blume

9. Leaves finely hairy below, especially along the veinlets; petiole often also with gland-hairs; male bracts without glands 13. *T. pilosa* Lour.
- Leaves hairy, scabrous or glabrous below; petiole without gland-hairs; male bracts with glands 10
10. Leaves deeply 5-lobed, scabrous by coarse sparse hairs; male inflorescences lax, sometimes borne on the older wood 12. *T. phonsenae* Duyfjes & Pruesapan
- Leaves unlobed or shallowly 3-lobed, glabrous. Male inflorescences on the leafy twigs 11
11. Leaf base rounded or cuneate; blade pale on drying below; tendrils unbranched 10. *T. pallida* Duyfjes & Pruesapan
- Leaf base rounded or cordate; blade not pale on drying below; tendrils unbranched or branched 12
12. Veins prominent below; tendrils 2- or 3-branched 18. *T. truncata* C.B. Clarke
- Veins not prominent below; tendrils unbranched 16. *T. siamensis* Duyfjes & Pruesapan
13. Younger stems, leaves, and inflorescences green, not tinged reddish; petals white or white with yellow fringes 14
- Younger stems, leaves, and inflorescences usually red or reddish tinged; petals pale pink (red) or white with red veins or white with reddish fringes, rarely completely white 18
14. Edge of male bracts entire or but faintly lobed 15
- Edge of male bracts dentate or incised 17
15. Male bracts faintly (shallowly) lobed 3. *T. dolichosperma* Duyfjes & Pruesapan
- Male bracts (sub)entire 16
16. Male sepals entire; probract less than 10 mm long 5. *T. erosa* Duyfjes & Pruesapan
- Male sepals lobed; probract (8-)10-15 mm long 15. *T. quinquangulata* A. Gray
17. Male bracts deeply finely and narrowly incised to over halfway; probract lanceolate, c. 3 cm long; blade glands 2-3 mm in diameter 6. *T. fissibracteata* C.Y. Cheng & C.H. Yueh
- Male bracts dentate or narrowly incised, much less than halfway deep; probract (sub) ovate, less than 1 cm long; blade glands c. 1 mm in diameter 17. *T. tricuspidata* Lour. (3 subspecies)
18. Leaves hairy below; probract long-linear, without glands 14. *T. pubera* Blume subsp. *rubriflos* (Cayla) Duyfjes & Pruesapan
- Leaves glabrous or scabrous below; probract elliptic or narrowly elliptic, provided with glands 19
19. Probract c. 25 mm long 9. *T. kostermansii* Duyfjes & Pruesapan
- Probract 5-10 mm long (male inflorescences not known yet) 20
20. Male sepals (China, as *T. lepiniana*) lobed-incised; seeds compressed, base cuneate 7. *T. inthanonensis* Duyfjes & Pruesapan
- Male sepals (China) entire; seeds tumid 4. *T. dunniana* H. Lév.

KEY TO FEMALE FLOWERING AND FRUITING SPECIMENS OF THE GENUS *TRICHOSANTHES* L.
(Mainly based on vegetative characters and seeds, with in addition characters of the male bracts.)

1. Leaves in adult plants 3- or 5-foliate 2

- Leaves in adult plants simple, lobed or unlobed 3
- 2. Seeds broad, 10-11 mm wide 20. *T. wawrae* Cogn.
- Seeds narrower, *c.* 8 mm wide 11. *T. pedata* Merr. & Chun
- 3. Seeds tumid, appearing as 3-loculed 4
- Seeds tumid or compressed, not appearing as 3-loculed 5
- 4. Male bracts 6-20 mm long, dentate 13. *T. pilosa* Lour.
- Male bracts *c.* 2 mm long, entire, or absent 1. *T. baviensis* Gagnep.
- 5. Leaves villose or velvety below 6
- Leaves sparsely or short hairy, or scabrous or glabrous below 7
- 6. Seed edge crenulate; hairs brownish 8. *T. kerrii* Craib
- Seed edge entire; hairs greyish 19. *T. villosa* Blume
- 7. Monoecious; probract absent; seeds $\pm$ compressed but thickish, with coarsely undulate edge 2. *T. cucumerina* L.
- Dioecious; probract absent or present; seeds globose or elongate, little or much compressed, edge entire 8
- 8. Seeds globose *T. dioica* Roxb. (introduced)
- Seeds not globose, little or much compressed 9
- 9. Younger parts of plants often reddish tinged; petals white or white but pinkish veined or fringed 10
- Younger parts of plants green; petals white 13
- 10. Leaves hairy below; probract long-linear, without glands 14. *T. pubera* Blume subsp. *rubriflos* (Cayla) Duyfjes & Pruesapan
- Leaves scabrous or glabrous below; probract elliptic or narrowly elliptic, with glands 11
- 11. Probract *c.* 25 mm long 9. *T. kostermansii* Duyfjes & Pruesapan
- Probract 5-10 mm long 12
- 12. Seeds compressed 7. *T. inthanonensis* Duyfjes & Pruesapan
- Seeds hardly compressed, rounded at both ends 4. *T. dunniana* H.Lév.
- 13. Probract absent or 3 mm long or less, caducous 14
- Probract present, 2 mm long or more, persistent 17
- 14. Leaf blade deeply cordate at base 15
- Leaf blade base shallowly cordate, or rounded (or truncate) or cuneate 16
- 15. Leaves hairy 12. *T. phonsenae* Duyfjes & Pruesapan
- Leaves glabrous 16. *T. siamensis* Duyfjes & Pruesapan
- 16. Leaves at base rounded or cuneate; lower surface pale on drying; veinlets faint 10. *T. pallida* Duyfjes & Pruesapan
- Leaf blade base shallowly cordate or truncate; lower surface not pale on drying; veinlets sharp 18. *T. truncata* C.B.Clarke
- 17. Seeds narrowly ellipsoid, hardly compressed, tumid 3. *T. dolichosperma* Duyfjes & Pruesapan

- Seeds compressed 18
- 18. Fruits (sub)globose; seeds cuneate at one side 15. *T. quinquangulata* A.Gray
- Fruits longer than wide; seeds truncate or rounded, or ± emarginate at the ends 19
- 19. Leaf blade 3-lobed to halfway deep or less; glands small, scattered; male bracts dentate 17. *T. tricuspidata* Lour. (3 subspecies)
- Leaf blade (deeply) (3-)5-7-lobed to over halfway 20
- 20. Leaf blade glands few (large) or several, scattered; male bracts lacinate 21
- Leaf blade glands crowded at blade base close to the insertion of the petiole; male bracts (sub)entire 5. *T. erosa* Duyfjes & Pruesapan
- 21. Leaves thinly membranous; probract long, narrow, c. 3 cm long; male bracts green, finely deeply lacinate to over halfway 6. *T. fissibracteata* C.Y.Cheng & C.H.Yueh
- Leaves chartaceous; probract small, 2-3 mm long; male bracts whitish, lacinate to less than halfway 17. *T. tricuspidata* Lour. subsp. *rotundata* W.J.de Wilde & Duyfjes

SYSTEMATICS

1. *Trichosanthes baviensis* Gagnep.

Bulletin du Muséum national d'Histoire naturelle, Paris 24: 379 (1918); *Flore Générale de l'Indo-Chine* 2: 1046 (1921); Keraudren-Aymonin, *Flore du Cambodge, du Laos et du Vietnam* 15: 88 (1975); S.K.Chen, *Flora Yunnanica* 6: 371, pl. 96 (1995); Huang & Jeffrey in Lu & Jeffrey, *Flora of China*, <http://efloras.org>: species no. 30 (2011); W.J.de Wilde, Duyfjes, Phonsena & R.W.Ham, *Thai Forest Bulletin. Botany* 39: 12, figs 8, 9 (2011). — Type: Vietnam (Tonkin), *Balansa* 4016 (holo-, P).

DISTRIBUTION. — S China, N Thailand, N Vietnam.

REMARK

This species became known for Thailand after the treatment of the family Cucurbitaceae in *Flora of Thailand* (De Wilde & Duyfjes 2008a).

2. *Trichosanthes cucumerina* L.

Species Plantarum ed. 2: 1008 (1753); Keraudren-Aymonin, *Flore du Cambodge, du Laos et du Vietnam* 15: 90 (1975); W.J.de Wilde & Duyfjes, *Flora of Thailand* 9 (4): 516 (2008a); *Flora Malesiana. Series 1. Spermatophyta* 19: 261 (2010). — Type: “*Padavalam*” in Rheede, *Hortus Malabaricus* 8 (1688) 39, tab. 15 (lecto-, designated by Keraudren-Aymonin [1975: 91]), *habitat in India*.

KEY TO THE VARIETIES OF *TRICHOSANTHES CUCUMERINA* L.

- 1. Fruits subglobose, c. 4 cm in diameter; wild a. var. *cucumerina*
- Fruits snake-like 30-80 cm long; cultivated b. var. *anguina* (L.) Haines

a. var. *cucumerina*

DISTRIBUTION. — Widespread; India to Australia.

REMARK

Possibly a part of the records of var. *cucumerina*, having a very large distributional area (comparable to that of *T. pilosa*), are feral, i.e. small-fruited forms

of the widely cultivated var. *anguina*, of which the area of origin is unknown.

b. var. *anguina* (L.) Haines

The Botany of Bihar and Orissa 3: 388 (1922); C.Jeffrey, *Kew Bulletin* 34: 797 (1980b); W.J.de Wilde & Duyfjes, *Sandakania* 17: 79 (2008). — *Trichosanthes anguina* L.,

Species Plantarum ed. 2: 1008 (1753); Keraudren-Aymonin, *Flore du Cambodge, du Laos et du Vietnam* 15: 89 (1975). — Type: “*Anguina Sinensis, flore albo, elegantissimo, capillamentis tenuissimis ornato, fructu longo intorto, sub initium ex albo, & viridi variegato, per maturitatem prorsus rubro*” in Micheli, *Nova plantarum genera*: 12, tab. 9 (1729), (lecto-, designated by Jeffrey in Jarvis *et al.* [1993: 95]).

DISTRIBUTION. — Widespread; cultivated.

REMARK

The var. *anguina* was accepted as a species by Keraudren-Aymonin (1975: 89).

Trichosanthes dioica Roxb.

Flora Indica 3: 701 (1832) (“*dioeca*”); Chakrav., *Records of the Botanical Survey of India* 17 (1): 54 (1959); *Fascicles of Flora of India* 11: 114 (1982); C. Jeffrey, *Kew Bulletin* 34: 798 (1980b). — Type: *Icones Roxburghianae*: pl. 1090 (lecto-, K, designated by Jeffrey [1980b: 798]).

DISTRIBUTION. — India.

REMARKS ON DISTRIBUTION AND TYPIFICATION

This species, indigenous and widely cultivated in India, was found only once in Vietnam (*d’Alleizette* 2611 [L]) growing in a hedgerow near Hanoi, possibly an escape from cultivation.

Although there are three collections in the Wallich herbarium (K): *Wallich Cat.* 6692 A, B and D, Jeffrey (1980b) chose the above mentioned plate as the lectotype, apparently because no reference to Wallich’s collections was made in the original description by Roxburgh.

3. *Trichosanthes dolichosperma*

Duyfjes & Pruesapan

Thai Forest Bulletin. Botany 32: 84, fig. 1b (2004); De Wilde & Duyfjes, *Flora of Thailand* 9 (4): 518 (2008a); W.J.de Wilde, Duyfjes, Phonsena & R.W.Ham, *Thai Forest Bulletin. Botany* 39: 15, fig. 6: b, c (2011). — Type: Thailand (Phetchabun), Shimizu *et al.* T11779 (holo-, BKF; iso-, KYO, L).

DISTRIBUTION. — Endemic to Thailand, only known from several collections from Phetchabun (Phu Pha Man National Park).

4. *Trichosanthes dunniana* H.Lév.

Repertorium Specierum Novarum Regni Vegetabilis 19: 148 (1911); S.K.Chen, *Flora Yunnanica* 6: 358, pl. 93: 1-4 (1995); Duyfjes & Pruesapan, *Thai Forest Bulletin. Botany* 32: 85, fig. 1c (2004); W.J.De Wilde & Duyfjes, *Flora of Thailand* 9 (4): 518 (2008a); Huang & Jeffrey in Lu & Jeffrey, *Flora of China*, <http://efloras.org>: species no. 22 (2011). — Type: S China, *Esquirol* 726 (holo-, E; iso-, K).

MATERIAL EXAMINED. — Laos, Khammouan, 17°53’ N-105°30’ E, 543 m, 6.XI.2005, fr., Newman LAO 910 (E).

DISTRIBUTION. — S China, Myanmar, northern Thailand (Chiang Mai, Nan), Laos.

5. *Trichosanthes erosa* Duyfjes & Pruesapan

Thai Forest Bulletin. Botany 32: 85, fig. 1d (2004); W.J.De Wilde & Duyfjes, *Flora of Thailand* 9 (4): 519 (2008a). — Type: Thailand (Ratchaburi), *Niyomdham* 4485 (holo-, BKF).

KEY TO THE VARIETIES OF *TRICHOSANTHES EROSA* DUYFJES & PRUESAPAN

1. Upper surface of leaves scabrid; seeds notched at apex a. var. *erosa*
- Upper surface of leaves smooth; seeds blunt at apex b. var. *integra* De Wilde & Duyfjes

a. var. *erosa*

MATERIAL EXAMINED. — Vietnam. Tonkin, Hanoi, VIII.1908, male, *d’Alleizette* s.n. (L).

DISTRIBUTION. — Thailand, Vietnam.

b. var. *integra* W.J.de Wilde & Duyfjes

Reinwardtia 12: 269, fig. 1 (2008b); *Flora of Thailand* 9 (4): 520, fig. 42 (2008a). — Type: Thailand, Phetchaburi (Kaeng Krachan National Park), Phonsena, De Wilde & Duyfjes 5280 (holo-, BKF; iso-, L).

DISTRIBUTION. — Endemic to Thailand.

REMARK ON SYSTEMATICS

Trichosanthes erosa keys out in the electronic version of *Flora of China* (Huang & Jeffrey 2011) to *T. cordata* Roxb. (type from India). The latter name is erroneously used in Huang & Jeffrey (2011) as a species occurring in Laos and Malaysia. *Trichosanthes erosa* differs from *T. cordata* for instance in its deeply lobed leaves.

6. *Trichosanthes fissibracteata*

C.Y.Cheng & C.H.Yueh
(Fig. 1)

Acta Phytotaxonomica Sinica 12 (4): 438 (1974); S.K.Chen, *Flora Yunnanica* 6: 357 (1995); Huang & Jeffrey in Lu & Jeffrey, *Flora of China*, <http://efloras.org>: species no. 16 (2011); W.J.de Wilde, Duyfjes, Phonsena & R.W.Ham, *Thai Forest Bulletin. Botany* 39: 15 (2011). — Type: *Hu Xue Ying* 6002464 (holo-, Herb. Yunnan Prov., Medical Products Res. Institute, Yunnan, not seen).

MATERIAL EXAMINED. — **China.** SW Guangxi; SE Yunnan, 1500 m, 22.VII.1982, male, *Yu, Che & Wu, Quan-An* 974 (KUN).

Laos. Col Barthélémy, 1000 m, male, *Poilane* 16778 (P). **Vietnam.** Hanoi, Cuc Phuong National Park, fr., *Cuong & Cuong* 2076 (HN). — Tonkin, Phu Tho, IV.1823, male, *Pételot* 1084 (P). — Traibutt à Yèn Bay, male, *Lecomte & Finet* 619 (P). — Annam, massif de Dong Ché, 400 m, 23.V.1924, male, *Poilane* 11304 (P). — Without locality (*fide* Jeffrey [1980a]), *Pételot* 1723 (not found in P).

DISTRIBUTION. — SW Guangxi, SE Yunnan, Vietnam (Tonkin).

REMARKS

Trichosanthes fissibracteata is characterised by a 20–30 mm long linear probract, some conspicuous large glands towards the base of the leaf blade, and by the undersurface of the leaf blade drying light green or greyish (see Fig. 1).

During a quick visit to HN herbarium (Hanoi) in November 2011, the authors saw several recent collections of the present species, for instance collected in Cuc Phung National Park near Hanoi.

7. *Trichosanthes inthanonensis*

Duyfjes & Pruesapan

Thai Forest Bulletin. Botany 32: 86, fig. 1e (2004); W.J.de Wilde & Duyfjes, *Flora of Thailand* 9 (4): 520 (2008a). — Type: Thailand (Doi Inthanon), *Phonsena, De Wilde & Duyfjes* 3930 (holo-, BKF; iso-, L).

Trichosanthes lepiniana auct. non (Naudin) Cogn.: Chen, *Flora Yunnanica* 6: 356, pl. 92, 5–8 (1995); Huang & Jeffrey in Lu & Jeffrey, *Flora of China*, <http://efloras.org>: species no. 17 (2011).

MATERIAL EXAMINED. — **Laos.** Xiang Khouang, *Spire* 526 (P). — Khammouane, *Spire* 1570 (P). — Bolikhamxai, 18°10'N, 105°00'E, 553 m, 5.IV.2005, fr., *Svengsuksa et al.* *BT* 93 (L). — Vientiane, 20.X.1971, *Vidal* 5397A (P).

DISTRIBUTION. — S China, Thailand, Laos.

8. *Trichosanthes kerrii* Craib

Bulletin of Miscellaneous Information, Royal Gardens, Kew: 7 (1914); S.K.Chen, *Flora Yunnanica* 6: 365, pl. 95, 1–4 (1995); Duyfjes & Pruesapan, *Thai Forest Bulletin. Botany* 32: 87, fig. 1f, 2, 6d (2004); W.J.de Wilde & Duyfjes, *Flora of Thailand* 9 (4): 523 (2008a); Huang & Jeffrey in Lu & Jeffrey, *Flora of China*, <http://efloras.org>: species no. 11 (2011). — Type: Thailand (Nan), *Kerr* 2454 (holo-, K; iso-, BM).

Trichosanthes villosa auct. non Blume: Keraudren-Aymonin, *Flore du Cambodge, du Laos et du Vietnam* 15: 77, p.p., pl. 13, 1–4 (1975). Part of the material used for the description, including the plate, concerns *T. kerrii*.

DISTRIBUTION. — India, S China, N Thailand, Laos, N Vietnam.

9. *Trichosanthes kostermansii*

Duyfjes & Pruesapan

Thai Forest Bulletin. Botany 32: 89 (2004); W.J.de Wilde & Duyfjes, *Flora of Thailand* 9 (4): 523 (2008a); *Reinwardtia* 12: 271 (2008b). — Type: Thailand (Kanchanaburi), *Kostermans* 743 (holo-, L; iso-, BK, L, SING).

DISTRIBUTION. — Endemic to Thailand.

10. *Trichosanthes pallida* Duyfjes & Pruesapan

Thai Forest Bulletin. Botany 32: 90 (2004); W.J.de Wilde & Duyfjes, *Flora of Thailand* 9 (4): 525, fig. 44, pl. 12: 4 (2008a). — Type: Thailand (Phetchaburi), *Phonsena*, *De Wilde & Duyfjes 3981* (holo-, BKF; iso-, L).

DISTRIBUTION. — Endemic to western Thailand (Mae Hong Son, Kanchanaburi, Phetchaburi [Kaeng Krachan National Park], Ranong [Raksawarin Arboretum]).

11. *Trichosanthes pedata* Merr. & Chun

Sunyatsenia 2 (1): 20 (1934); Keraudren-Aymonin, *Flore du Cambodge, du Laos et du Viêt Nam* 15: 91 (1975); S.K.Chen, *Flora Yunnanica* 6: 361 (1995); Huang & Jeffrey in Lu & Jeffrey, *Flora of China*, <http://efloras.org>: species no. 27 (2011) (including var. *yunnanensis* C.Y.Cheng & C.H.Yueh); W.J.de Wilde, Duyfjes, Phonsena & R.W.Ham, *Thai Forest Bulletin. Botany* 39: 17, fig. 6: d-f (2011). — Type: China (Kwantung), *Tso 23625* (holo-, NY, photo seen).

? *Trichosanthes quinquefolia* Wu in Yueh & Cheng, *Acta Phytotaxonomica Sinica* 18 (3): 351 (1980). — Type: China (Yunnan), *Wang 75810* (holo-, KUN, not seen).

Trichosanthes wawrae auct. non Cogn.: Duyfjes & Pruesapan, *Thai Forest Bulletin. Botany* 32: 103, p.p. (2004); W.J.de Wilde & Duyfjes, *Flora of Thailand* 9 (4): 539, p.p. (2008a).

DISTRIBUTION. — S China, Thailand, Laos, Vietnam.

REMARK ON SYSTEMATICS

Advanced knowledge of the foliolate-leaved *Trichosanthes* species in Thailand, through more collections and field study, made it clear that the Thai material (except that from Peninsular Thailand) belongs to the present species. The difference with *T. wawrae* is in the size of the fruit, and particularly in the size of the seeds. The fruit in *T. wawrae* is c. 7 cm long, with seeds 15-17 by 10-11 mm; in *T. pedata* the fruit is 5-6 cm long, with narrower seeds, 10-12 by c. 8 mm.

Possibly *T. pedata*, as at present accepted, includes the much resembling *T. quinquefolia* described from China (Wu in Yueh & Cheng 1980), which

is distinct by (almost) entire leaflet margins. Such specimens are also known from Laos, but we suspect that one species only is concerned.

12. *Trichosanthes phonsenae*

Duyfjes & Pruesapan

Thai Forest Bulletin. Botany 32: 91, fig. 3 (2004); W.J.de Wilde & Duyfjes, *Flora of Thailand* 9 (4): 526, fig. 45, pl. 15: 1-2 (2008a). — Type: Thailand, Phetchaburi (Kaeng Krachan National Park), *Phonsena*, *De Wilde & Duyfjes 4002* (holo-, BKF; iso-, L).

DISTRIBUTION. — Endemic to southwestern Thailand.

13. *Trichosanthes pilosa* Lour.

Flora Cochinchinensis: 588 (1790); Gagnep., *Flore générale de l'Indo-Chine* 2: 1046 (1921); W.J.de Wilde & Duyfjes, *Flora of Thailand* 9 (4): 526 (2008a); *Flora Malesiana. Series 1. Spermatophyta* 19: 294, pl. 29c (2010); Huang & Jeffrey in Lu & Jeffrey, *Flora of China*, <http://efloras.org>: species no. 29 (2011). — Type: Vietnam, *Bon 4019* (neo-, P, designated by W.J.de Wilde & Duyfjes [2008b: 270]).

Trichosanthes ovigera Blume, *Bijdragen tot de Flora van Nederlandsch Indië* 15: 934 (1826); Keraudren-Aymonin, *Flore du Cambodge, du Laos et du Viêt Nam* 15: 85 (1975); C.Jeffrey, *The Cucurbitaceae of Eastern Asia*: 50 (1980a); S.K.Chen, *Flora Yunnanica* 6: 374, pl. 98: 6-13 (1995); Duyfjes & Pruesapan, *Thai Forest Bulletin. Botany* 32: 89 (2004). — Type: Java (Gunung Salak), *Blume s.n.* (holo-, L [L0130442]; iso-, L [L0130439], P).

Trichosanthes pierrei Gagnep. *Bulletin du Muséum National d'Histoire Naturelle, Paris* 24: 380 (1918); *Flore générale de l'Indo-Chine* 2: 1039 (1921); Keraudren-Aymonin, *Flore du Cambodge, du Laos et du Viêt Nam* 15: 88 (1975). — Type: Vietnam (Baria), *Pierre 4491* (holo-, P, not seen).

REMARK ON SYNONYMY

In placing *T. pierrei* in the synonymy we follow Jeffrey (1980a).

KEY TO THE VARIETIES OF *TRICHOSANTHES PILOSA* LOUR.

1. Fruit pulp whitish; hairs of all parts partly topped with an inconspicuous glandular cell a. var. *pilosa*
- Fruit pulp bright orange-red; hairs of all parts topped with a conspicuous dark glandular cell b. var. *roseipulpa* W.J.de Wilde & Duyfjes

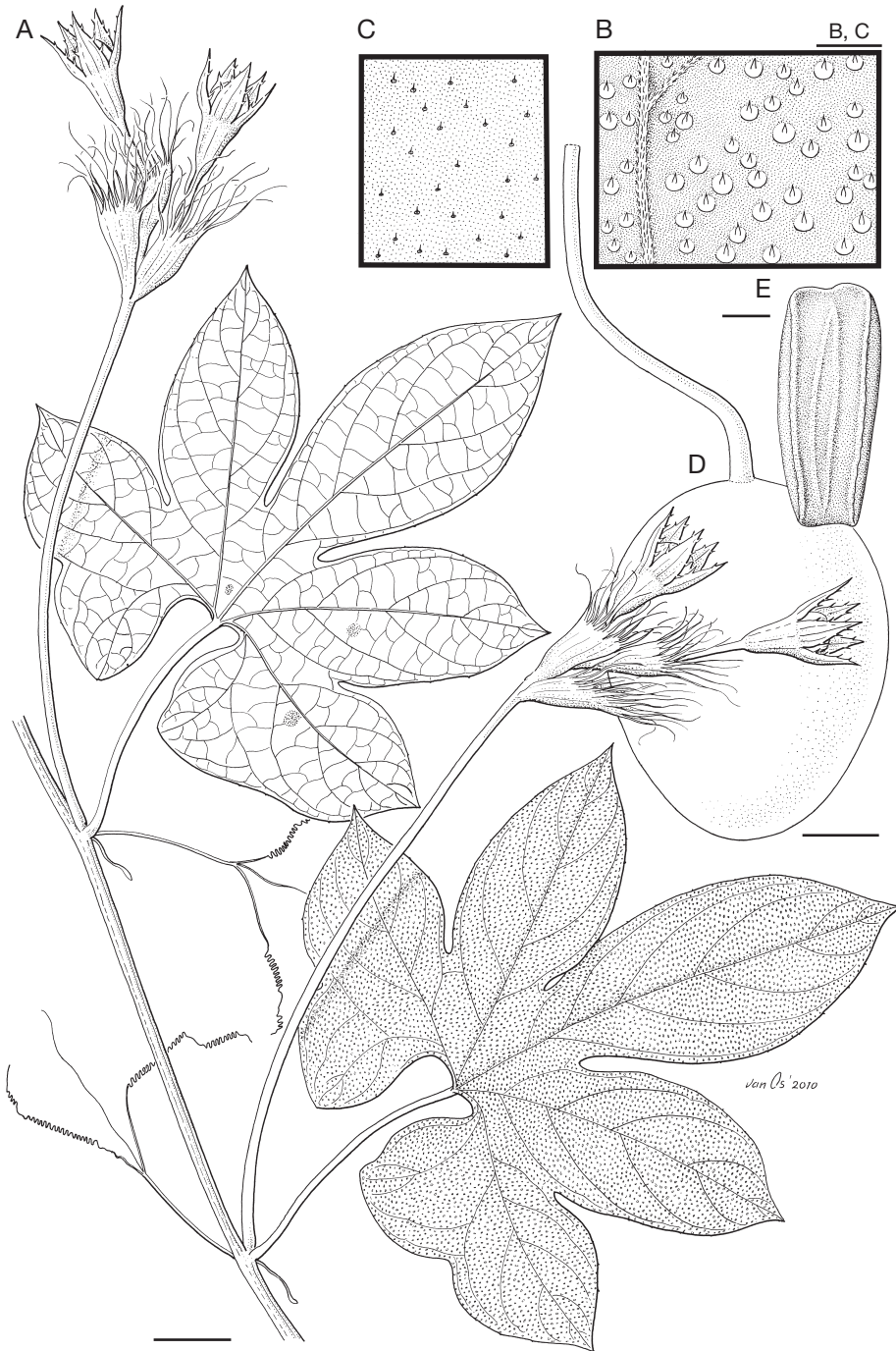


Fig. 1. — *Trichosanthes fissibracteata* C.Y.Cheng & C.H.Yueh: **A**, portion of shoot with male inflorescences; **B**, upper leaf surface with rough cystoliths; **C**, ditto from a different specimen; **D**, fruit; **E**, seed; **A, B**, Yu, Che & Wu, Quan-An 974 (KUN); **C**, Poilane 11304 (P); **D, E**, Cuong & Cuong 2076 (HN). Scale bars: A, D, 2 cm; B, C, 1 mm, E, 3 mm.

a. var. *pilosa*

DISTRIBUTION. — Widespread and very variable: NE India, China, through Malesia to Australia, and Solomon Islands.

b. var. *roseipulpa*

W.J.de Wilde & Duyfjes

Reinwardtia 12: 271 (2008b); W.J.de Wilde & Duyfjes, *Flora of Thailand* 9 (4): 529 (2008a). — Type: Thailand, Nan Province, *Phonsena*, De Wilde & Duyfjes 4694 (holo-, BKF; iso-, L).

DISTRIBUTION. — Northern Thailand and expected in Laos.

14. *Trichosanthes pubera* Blume subsp. *rubriflos* (Cayla) Duyfjes & Pruesapan

Thai Forest Bulletin. Botany 32: 94, fig. 1h (2004); W.J.de Wilde & Duyfjes, *Flora of Thailand* 9 (4): 531 (2008a); *Flora Malesiana. Series 1. Spermatophyta* 19: 299 (2010). — *Trichosanthes rubriflos* Cayla, *Bulletin du Muséum national d'Histoire naturelle*, Paris 14: 170 (1908); Gagnep., *Flore générale de l'Indo-Chine* 2: 1043 (1921); Keraudren-Aymonin, *Flore du Cambodge, du Laos et du Viêt Nam* 15: 80 (1975); S.K.Chen, *Flora Yunnanica* 6: 358, pl. 93: 5-8 (1995); Huang & Jeffrey in Lu & Jeffrey, *Flora of China*, <http://efloras.org>; species no. 23 (2011). — Type: Cambodia (Stung-Streng), *Thorel* 2126 (lecto-, P [P00313090], designated by Keraudren-Aymonin [1975: 80]; iso-, P, K).

DISTRIBUTION. — NE India, S China, Myanmar, Thailand, Cambodia, Laos, Vietnam.

KEY TO THE VARIETIES OF *TRICHOSANTHES PUBERA* BLUME
SUBSP. *RUBRIFLOS* (CAYLA) DUYFJES & PRUESAPAN

1. Male sepals undivided or occasionally with a short side-lobe; male bracts with coarsely incised margin a. var. *rubriflos* (Cayla) Duyfjes & Pruesapan
- Male sepals with side-lobes or deeply incised; male bracts densely and finely incised, 5-10 mm deep b. var. *fissisepala* Duyfjes & Pruesapan

a. var. *rubriflos* (Cayla) Duyfjes & Pruesapan

DISTRIBUTION. — S China, Myanmar, Thailand, Cambodia, Laos, Vietnam.

b. var. *fissisepala* Duyfjes & Pruesapan

Thai Forest Bulletin. Botany 32: 95 (2004); W.J.de Wilde & Duyfjes, *Flora of Thailand* 9 (4): 532, fig. 47, pl. 41: 3-4 (2008a). — Type: Thailand (Chiang Mai), *Van Beusekom & Phengkklai* 1250 (holo-, L; iso-, AAH, BKE, C, E, K, KYO, P).

DISTRIBUTION. — Southwestern and northern Thailand; probably also in Cambodia, Laos, Vietnam, S China.

Malesiana. Series 1. Spermatophyta 19: 302, pl. 31a (2010); Huang & Jeffrey in Lu & Jeffrey, *Flora of China*, <http://efloras.org>; species no. 18 (2011). — Type: E Malesia (Sulu Isl.), *Wilkes s.n.* (holo-, GH-A).

DISTRIBUTION. — Widespread: S. China, Myanmar, Thailand, Cambodia, Laos, Vietnam, through Malesia to New Guinea.

REMARK

Keraudren-Aymonin (1975: 81) treated this species together with some other resembling ones under the collective name "*T. tricuspidata*".

16. *Trichosanthes siamensis* Duyfjes & Pruesapan

Thai Forest Bulletin. Botany 32: 97 (2004); W.J.de Wilde & Duyfjes, *Flora of Thailand* 9 (4): 534 (2008a). — Type: Thailand (Kanchanaburi), *Maxwell* 94-546 (holo-, L; iso-, L).

DISTRIBUTION. — Endemic to southwestern Thailand; known only from the type.

15. *Trichosanthes quinquangulata* A.Gray

United States Exploring Expedition During the Years 1838, 1839, 1840, 1841, 1842 under the Command of Charles Wilkes. Botany 1: 645 (1854); S.K.Chen, *Flora Yunnanica* 6: 353, pl. 92: 1-4 (1995); Duyfjes & Pruesapan, *Thai Forest Bulletin. Botany* 32: 96 (2004); W.J.de Wilde & Duyfjes, *Flora of Thailand* 9 (4): 532, fig. 41i, 48: a-á (2008a); *Flora*

17. *Trichosanthes tricuspidata* Lour.

Flora Cochinchinensis: 723 (1790); Keraudren-Aymonin, *Flore du Cambodge, du Laos et du Viêt Nam* 15: 81, p.p. (1975); Duyfjes & Pruesapan, *Thai Forest Bulletin. Botany* 32: 98 (2004); W.J.de Wilde & Duyfjes, *Flora*

of Thailand 9 (4): 535 (2008a); *Flora Malesiana. Series 1. Spermatophyta* 19: 308 (2010); Huang & Jeffrey in Lu & Jeffrey, *Flora of China*, <http://efloras.org>: species no. 26 (2011). — Type: Vietnam (Quang Nam, Da Nang), J. & M.S.Clemens 3267 (neo-, P, designated by Keraudren-Aymonin [1975: 82]; iso-, BM).

KEY TO THE SUBSPECIES OF *TRICHOSANTHES TRICUSPIDATA* LOUR.

1. Male bracts with finely, densely, more deeply serrate-laciniate margin; male sepals with serrate margin or with side-lobes (female sepals entire); Thailand, Indochina 2
— Male bracts with shallowly coarsely dentate margin; male sepals (almost) entire (female sepals entire); seed edge square; SW, SE & Peninsular Thailand, Malesia, excl. Philippines b. subsp. *javanica* Duyfjes & Pruesapan
2. Seed much compressed, almost flat, with square edge a. subsp. *tricuspidata* Lour.
— Seed moderately compressed with rounded edge ... c. subsp. *rotundata* De Wilde & Duyfjes

a. subsp. *tricuspidata* Lour.

DISTRIBUTION. — S China, Thailand, Cambodia, Laos, Vietnam.

b. subsp. *javanica* Duyfjes & Pruesapan

Thai Forest Bulletin. Botany 32: 99, fig. 6b (2004); W.J.de Wilde & Duyfjes, *Flora of Thailand* 9 (4): 536 (2008a); *Flora Malesiana. Series 1. Spermatophyta* 19: 308, fig. 89 (2010). — Type: Indonesia (Java), De Wilde & Duyfjes 21777 (holo-, L; iso-, BO, K, L).

DISTRIBUTION. — Southwestern Thailand and through Malesia to the Lesser Sunda Islands and the Moluccas.

REMARK

In the subspecies *javanica* two varieties can be distinguished, one with completely white flowers (var. *javanica*), and one with bright yellow petal-fringes (var. *flavofila* W.J.de Wilde & Duyfjes; *Reinwardtia* 12: 270 [2008b]), an endemic from Thailand, Kaeng Krachan National Park.

c. subsp. *rotundata* W.J.de Wilde & Duyfjes
(Fig. 2)

Reinwardtia 12: 413 (2009); W.J.de Wilde, Duyfjes, Phonsena & R.W.Ham, *Thai Forest Bulletin. Botany* 39:

18, fig. 6g (2011). — Type: Thailand (Sakon Nakhon), Poama, De Wilde, Duyfjes, Chamchoonroon & Phattarahirankanok 2574 (holo-, BKF; iso-, L)

Trichosanthes kirilowii auct. non Maxim.: Gagnep., *Flore générale de l'Indo-Chine* 2: 1044 (1921); Keraudren-Aymonin, *Flore du Cambodge, du Laos et du Viêt Nam* 15: 84, pl. 13: 5 (1975).

DISTRIBUTION. — Thailand (excluding Peninsular), Laos, Vietnam.

REMARKS ON SYSTEMATICS

This subspecies closely links up with the type-subspecies of *T. tricuspidata*, but markedly differs in the rounded edge of the seeds. It is possibly identical with (part of) a species accepted for *Flora of China* (Huang & Jeffrey 2011), but it is not clear with which. The most obvious species of these are *T. lepiniana* Cogn. (type from S India), *T. laceribractea* Hayata and *T. fissibractea* C.Y.Cheng & C.H.Yueh, but all have characteristics not completely agreeing.

In *Trichosanthes tricuspidata*, subspecies *tricuspidata* and *rotundata* are similar in aspect. Apart for their seeds, subsp. *rotundata* differs in deeper laciniations in the male bracts (to nearly halfway deep) and in fresh specimens the male bracts are conspicuously pale (whitish), contrasting with the scattered dark green glands.

The species *Trichosanthes kirilowii* Maxim. does not occur in Indochina. This name was accepted by Keraudren-Aymonin (1975: 84), but only the deeply divided 5-7-lobed leaves resemble that spe-

cies. The specimens cited by Keraudren-Aymonin from Vietnam and Laos all belong to the present *T. tricuspidata* subsp. *rotundata*.

18. *Trichosanthes truncata* C.B. Clarke

Flora of British India 2: 608 (1879); S.K. Chen, *Flora Yunnanica* 6: 364 (1995); Duyfjes & Pruesapan, *Thai Forest Bulletin. Botany* 32: 99 (2004); W.J. de Wilde & Duyfjes, *Flora of Thailand* 9 (4): 537 (2008a); Huang & Jeffrey in Lu & Jeffrey, *Flora of China*, <http://efloras.org>; species no. 9 (2011); W.J. de Wilde, Duyfjes, Phonsena & R.W. Ham, *Thai Forest Bulletin. Botany* 39: 19, fig. 1b (2011). — Type: India, *Hooker & Thomson 1188* (lecto-, K, designated by Duyfjes & Pruesapan [2004: 100]).

MATERIAL EXAMINED. — Vietnam. Annam, 4.VII.1922, *Poilane 4366* (P [P00313067, P00313068]). — Annam, VI.1909, *d'Alleizette s.n.* (P [P00313061]).

DISTRIBUTION. — N India, Bangladesh, S China, Thailand, Vietnam (Annam).

19. *Trichosanthes villosa* Blume

Bijdragen tot de Flora van Nederlandsch Indië 15: 934 (1826); Keraudren-Aymonin, *Flore du Cambodge, du Laos et du Viêt Nam* 15: 77, pl. 13: 1-3, p.p. (1975); S.K. Chen, *Flora Yunnanica* 6: 354 (1995); Duyfjes & Pruesapan, *Thai Forest Bulletin. Botany* 32: 101 (2004); W.J. de Wilde & Duyfjes, *Flora of Thailand* 9 (4): 539, fig. 41m, 49, pl. 39: 3-4 (2008a); *Flora Malesiana. Series I. Spermatophyta* 19: 313 (2010); Huang & Jeffrey in Lu & Jeffrey, *Flora of China*, <http://efloras.org>; species no. 20 (2011). — Type: Indonesia (West Java), *Blume s.n.* (holo-, L [L0130803]; iso-, P).

DISTRIBUTION. — Widespread: S China, Myanmar (?), Thailand, Vietnam, Java, Borneo, Philippines, Lesser Sunda Islands east to Flores.

REMARKS

The treatment in Keraudren-Aymonin (1975: 77) cannot be used for this species as the description is a mixture with *T. kerrii* (in the plate 13: 1-3, *T. kerrii* is depicted).

In the electronic version of *Flora of China* (Huang & Jeffrey 2011) the colour of the fruit is given as brown-red, contradictory to the green, longitudinally whitish or pale yellow striped ripe fruit known for Thailand and the Malesian region.

20. *Trichosanthes wawrae* Cogn.

In A.D.C. & C.D.C., *Monographiae Phanerogamarum Prodrumi* 3: 384 (1881) ("wawraei"); Duyfjes & Pruesapan, *Thai Forest Bulletin. Botany* 32: 103 (2004); W.J. de Wilde & Duyfjes, *Flora of Thailand* 9 (4): 539, fig. 41: 1 (2008a); *Flora Malesiana. Series I. Spermatophyta* 19: 316 (2010). — Type: Singapore, *Wawra 241* (holo-, W).

DISTRIBUTION. — S Thailand (Peninsular) and W Malesia.

REMARK

This species resembles *T. pedata*, and for its distinction ripe fruit and seeds are needed. The whole group of compound-leaved species, including those from Malesia, needs further investigation.

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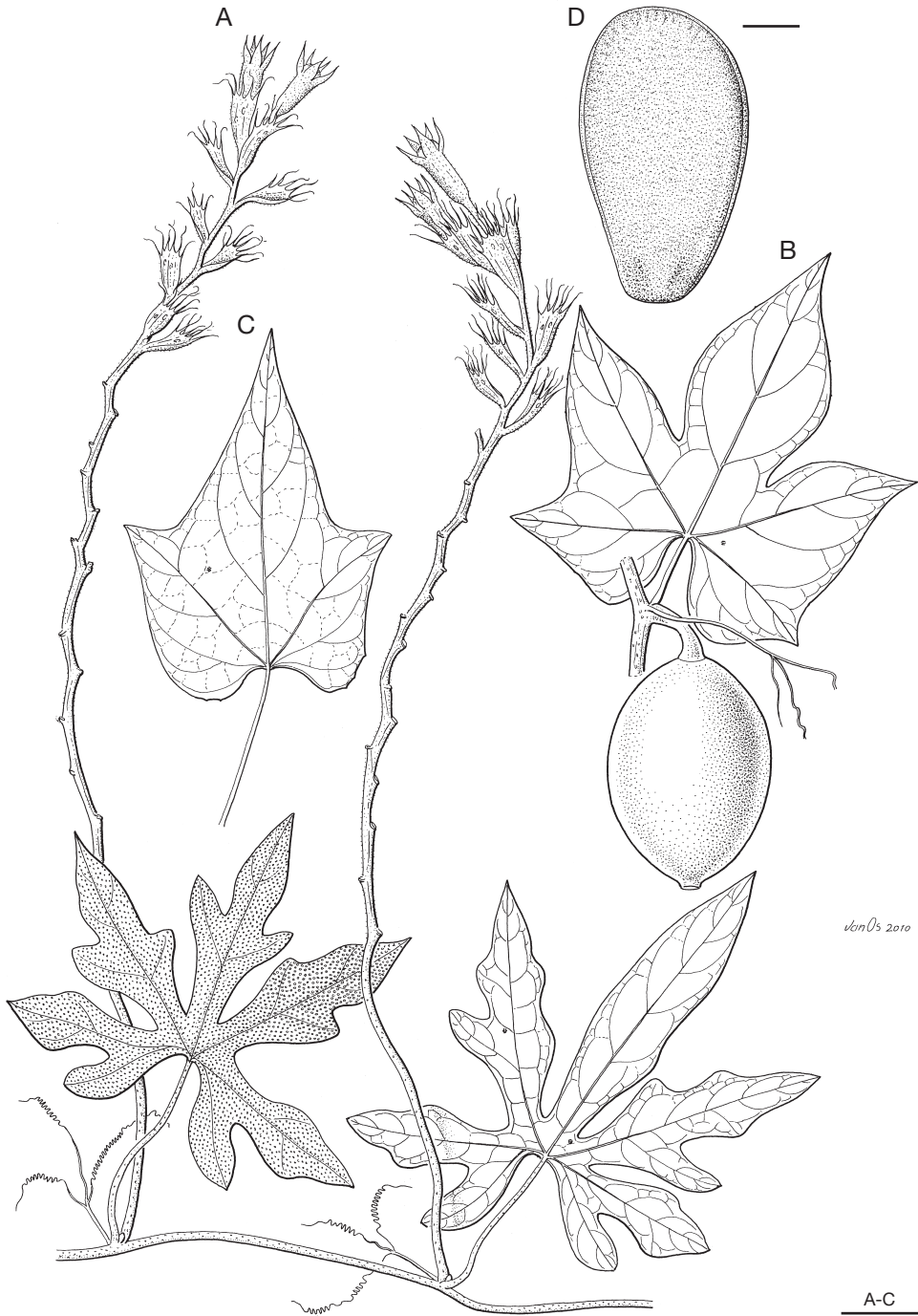


Fig. 2. — *Trichosanthes tricuspidata* Lour. subsp. *rotundata* W.J.de Wilde & Duyfjes: **A**, portion of branch with male inflorescences; **B**, portion of leafy twig with fruit; **C**, adult shallowly lobed leaf of fruiting specimen; **D**, seed; **A**, *Phonsena & Patthum* 5502 (L); **B**, *Parnell et al.* 95-270 (L); **C**, **D**, *Maxwell* 87-1224 (L). Scale bars: A-C, 2 cm; D, 2 mm.

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