

**CONSPECTUS OF TRICHOSANTHES (CUCURBITACEAE)
IN MALESIA**

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ABSTRACT

Trichosanthes (Cucurbitaceae) in Malesia comprises 5 sections with 39 species, here alphabetically arranged. Key to the sections, keys to the species within the sections and eight regional keys are presented. Twenty-five taxa are newly proposed: 1 section, 14 species, 1 subspecies, 2 varieties and 7 forms.

ABSTRAK

Trichosanthes (Cucurbitaceae) di Malesia terdiri atas 5 seksi dengan 39 jenis yang berikut ini disajikan menurut abjad. Kunci untuk seksi, kunci jenis dalam seksi dan delapan kunci regional untuk mendeterminasi jenis disuguhkan. Dua puluh lima takson baru diusulkan: 1 seksi, 14 jenis, 1 anak jenis, 2 varietas dan 7 forma.

INTRODUCTION

The genus *Trichosanthes* L. comprises some 100 species in the area of India and S. China through Indo-China and Malesia, into the Pacific and N Australia. With the completion of the revision of the genus for Malesia in the near future, 39 species are recognized for which new taxa (14 species, 1 subspecies, 2 varieties and 7 forms) have to be formally described. Eight practical regional keys to the species, applicable for both male flowering as well as for fruiting material are presented. For each region the list of accepted species is given, followed by a key. For Java we refer to a previous publication, in *Blumea* 42, 2 (1997) p. 471-482. In this way it is hoped that the present publication has an enhanced practical value. A provisional division of the Malesian species

into sections (including 1 new section) and subsections is given, and within these, keys to the pertaining species. At the end an enumeration of all accepted species names for Malesia is presented, with references of valid publication. The new taxa, on the authority of Rugayah, are described in this enumeration.

KEY TO THE SECTIONS IN MALESIA
(mainly based on fruit and seed characters) — Fig. 1

- 1a. Seed 'turgid', i.e. with at two sides hollow extensions. Fruit pulp orange or red. Probract absent..... 2 sect. *Cucumeroides* (with subsect. *Cucumeroides* and subsect. *Tetragonosperma*)
- b. Seed flat, thin or thick, not turgid..... 2
- 2a. Seed with margin, i.e. either (1) with a narrow or broad marginal band of different colour and/or texture, or, if this obscure, (2) with the rim \pm thickened, or the edge coarsely undulate or finely crenate..... 3
- b. Seed without or with faint margin, edge entire, shape of seed subcircular, (ob)ovate, or elliptic, rounded at both ends, rarely notched, at base pointed, colour mostly dark brown or blackish, rarely greyish. Fruit pulp green-black. Probract present..... 5. sect. *Involucraria* (with subsect. *Involucraria* and subsect. *Pedatae*)
- 3a. Edge of margin of seed coarsely undulate. Seed thickish, grey or (pale) brown. Fruit pulp white, turning orange-red. Probract absent..... 1. sect. *Trichosanthes*
- b. Edge of margin of seed entire (straight) or (partly) finely crenate. Seed thin or thickish, (pale) brown..... 4
- 4a. Seed subcircular, (ob)ovate, or elliptic(-oblong), rounded at both ends or \pm truncate at one end; edge entire. Fruit pulp pinkish (always?). Probract present or absent..... 4. sect. *Foliobracteola* (incl. *T. auriculata*, *T. rotundifolia*)
- b. Seed oblong, \pm parallel-sided, \pm quadrangular, or seed long-triangular, frequently truncate or notched at one or both ends; edge smooth or (partly) crenulate. Fruit pulp whitish or creamy, turning red. Probract present..... 3. sect. *Edulis*

ENUMERATION OF SECTIONS AND SUBSECTIONS,
WITH KEYS TO THE SPECIES WITHIN THE SECTIONS

1. sect. TRICHOSANTHES

Malesian taxa (1 species, 1 var.): *T. cucumerina* var. *cucumerina*, *T. cucumerina* var. *anguina*.

2. sect. CUCUMEROIDES (Gaertn.) Kitam.

Cucumeroides Gaertn., Fruct. Sem. Plantarum 2 (1791) 485, t. 4, f. 4. - sect. *Cucumeroides* (Gaertn.) Kitam., Journ. Jap. Bot. 19 (1943) 35. - Type: *Trichosanthes cucumeroides* (Ser.) Maxim. = *T. ovigera* Blume.

In Malesia 2 subsections:

a. subsect. CUCUMEROIDES (Gaertn.) Kitam.

Malesian taxon (1 species): *T. ovigera*.

b. subsect. **Tetragonosperma** (Cheng & Yueh) Rugayah, *stat. nov.*

sect. *Tetragonosperma* Cheng & Yueh, Acta Phytotax. Sin. 12(4) (1974) 424. - Type: *Trichosanthes tetragonosperma* Cheng & Yueh (China).

Malesian taxa (3 species, 1 subspecies): *T. beccariana* subsp. *beccariana*, *T. beccariana* subsp. *pusilla*, *T. mucronata*, *T. pendula*.

NOTE — This subsection is distinct by the lateral inflated parts of the seed being broadly rounded or \pm quadrangular, not \pm conical. The status of subsection is largely provisional, as we feel that a division of the tumid seeded *Trichosanthes* species into several groups of sectional rank seems unwarranted pending extensive further investigation of the species. We tentatively include here *T. pendula* and *T. mucronata* from Borneo, which possibly represent a separate subsection; *T. pendula* strongly deviates in general habit by alate stem and pendent inflorescences.

KEY TO THE MALESIAN SPECIES OF SECTION CUCUMEROIDES

- 1a. Seed with lateral hollow parts turbinate. Fruit pulp not fibrous. Stem \pm grooved..... *T. ovigera*
- b. Seed with lateral hollow parts subtetragonous or subspherical..... 2
- 2a. Seed flattish; lateral parts flattish, subquadrangular. Fruit pulp fibrous. Stem \pm grooved..... *T. beccariana*
- b. Seed \pm terete; lateral parts inflated, subglobose. Fruit pulp not fibrous..... 3
- 3 a. Stem subterete. Leaves densely soft-hairy. Inflorescences patent..... *T. mucronata*
- b. Stem sharply angular-winged. Leaves sparsely harshly hairy (scabrous). Inflorescences pendent..... *T. pendula*

Fig. 1. Note of Seed of *Trichosanthes* spp.**I. Section Trichosanthes**

1. *T. cucumerina* L. var. *cucumerina* (Koorders 27327P)
2. *T. Cucumerina* L. var. *anguina* (L.) Haines (Agus Sujadi s.n.)

II. Section Cucumeroides**A. Subsection Cucumeroides**

3. *T. ovigera* Blume (a. Steenis 11083; b. Kosterman 816; c. Vanoverbergh 3662 bis; d. Streimann & Kairo NGF 27797)

B. Subsection Tetragnosperma

4. *T. beccariana* Cogn. subsp. *beccariana* (De Wilde 21954)
5. *T. beccariana* Cogn. subsp. *pusilla* Rugayah (Fidilis Krispinus SAN 95877)
6. *T. pendula* Rugayah (Aban G. & Dewol S. SAN 91628)

III. Section Edulis

7. *T. dentifera* Rugayah (McGregor s.n.)
8. *T. densiflora* Rugayah (Henty et al. NGF 41616)
9. *T. edulis* Rugayah var. *sativa* (a. Vink 16350; b. Barran NG-9-15)
10. *T. edulis* Rugayah var. *edulis* (a. Takeuchi 7170; b. Streimann NGF 30731)
11. *T. hastata* Harms (Streimann & Fasavalu NGF 47746)
- 12 a. *T. laeoica* Cheng & Huang f. *sorongensis* Rugayah (Ave 4782)
- 12 b. *T. laeoica* Cheng & Huang f. *sicyocarpa* Rugayah (Brass 5347)
13. *T. schlechteri* Harms (Coode NGF 32837)

IV. Section Foliobracteola

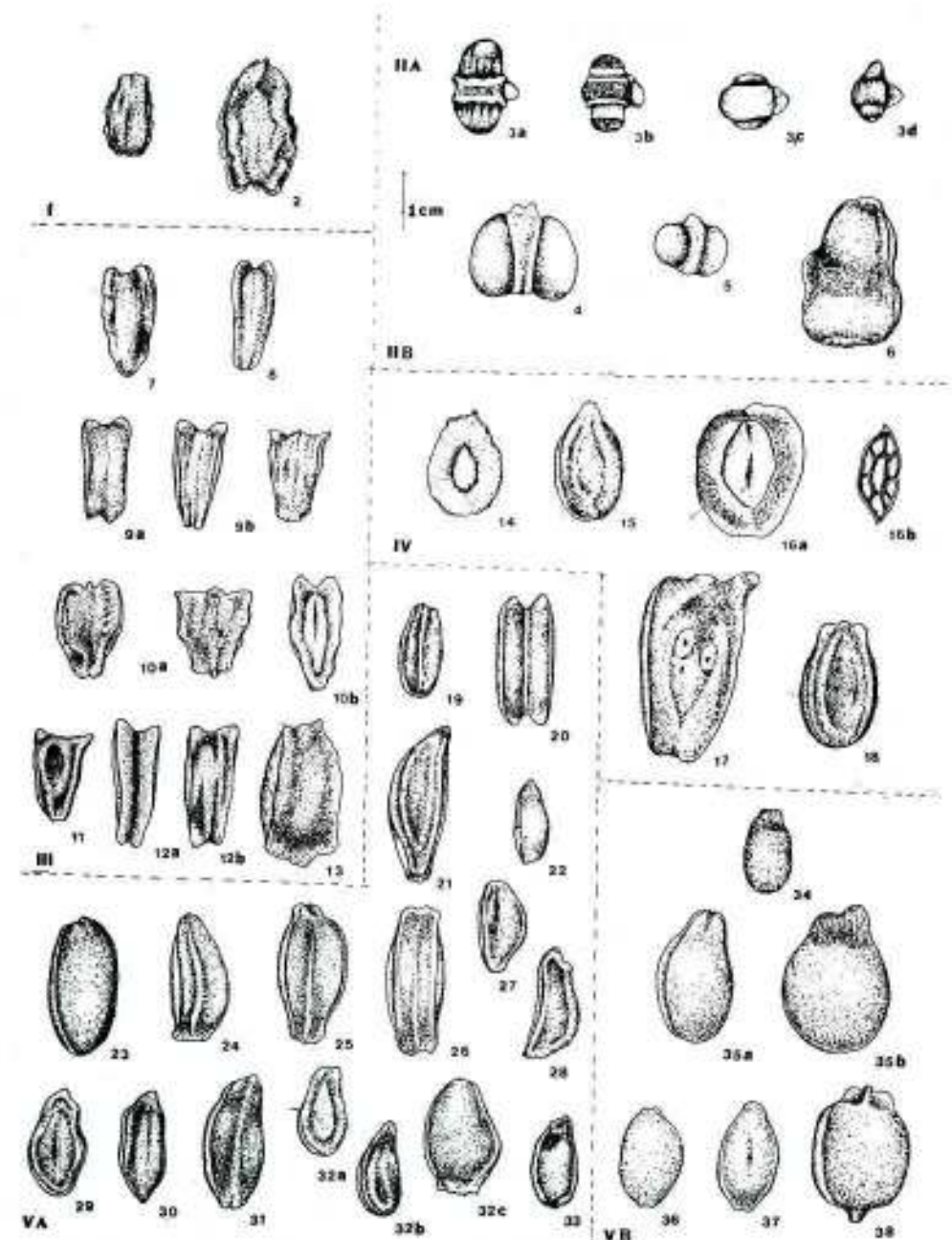
14. *T. auriculata* Rugayah (Paul Chai S 36193)
15. *T. coriacea* Blume (Laumonier 4363)
16. *T. rotundifolia* Rugayah (16a. cross section of the seed) (Rijksen s.n.)
17. *T. villosa* Blume subsp. *villosa* (Wiriadinata HW 8284)
18. *T. villosa* Blume subsp. *mindorensis* Rugayah (Stone et al. PPI403)

V. Section Involucraria**A. Subsection Involucraria**

19. *T. borneensis* Cogn. (Meeter 67)
20. *T. emarginata* Rugayah (De Wilde 14862)
21. *T. globosa* Blume (Kasik 104)
22. *T. kinabaluensis* Rugayah (Beaman 7171)
23. *T. leuserensis* Rugayah (Lörzing 5212)
24. *T. longispicata* Rugayah (Hyde & Company s.n.)
25. *T. montana* Rugayah (Susiarti s.n.)
26. *T. obscura* Rugayah (Hansen 968)
27. *T. philippinensis* Rugayah (Bartlett 14725)
28. *T. planiglans* Rugayah (Ramos & Edano Bur. Sci. 29110)
29. *T. pubera* Blume (De Wilde 21667)
30. *T. quinquangulata* Asa Gray (De Wilde, 21661)
31. *T. sepilokensis* Rugayah (Sinclair et al. 9341)
32. a. *T. tricuspidata* Lour. f. *tricuspidata* (De Wilde 21773)
- b. *T. tricuspidata* f. *siberutensis* (Wiriadinata HW 6874)
- c. *T. tricuspidata* f. *seramensis* (Ramlanto & Mogeia 803)
33. *T. alida* Rugayah (Koorders 16613P)

B. Subsection Pedatae

34. *T. celebica* Cogn. (De Vogel 6136)
35. *T. elmeri* Merr. (a. Ridsdale SMHI1852; b. Elmer 20298)
36. *T. floresana* Rugayah (Schmutz 4385)
37. *T. papuana* F. M. Bailey (Kalkman BW 3668 A)
38. *T. wawrae* Cogn. (Fanani s.n.)

Fig. 1. Seed of *Trichosanthes* spp.

3. sect. *Edulis* Rugayah, *sect. nov.*

Pulpa semenque edulis, semen oblongum lateribus plusminusve parallelis vel plusminusve longe triangulari saepe apicibus uno vel ambobus truncatis vel emarginatis. - Type: *Trichosanthes edulis* Rugayah.

Dioecious (always?) subherbaceous climbers or creepers, to c. 8 m long. Probract present, sometimes inconspicuous. Male bracts various, 5-30 mm long. Seed often numerous, densely packed in the fruit (not verified in *T. hastata* and *T. schlechteri*); seed flat, either oblong, ± parallel-sided, ± quadrangular, or seed ± long triangular; seed frequently truncate or notched at one or both ends; margin thickened or not, the edge smooth or (partly) crenulate. Fruit pulp whitish, turning red (pulp and seed edible) . - New Guinea and E. Pacific.

NOTE - This section is distinct as a group of species largely restricted to New Guinea, where it appears that all species have eatable fruit. *Trichosanthes edulis* var. *sativa* seems exclusively cultivated. The elongated seed of most species is reminiscent of *Lagenaria*. It should be mentioned that species with resembling seed occur in China, but we know little of these.

DISTRIBUTION - 8 species in New Guinea.

Malesian taxa (8 species, 2 varieties, 3 forms): *T. densiflora*, *T. dentifera*, *T. dieniensis*, *T. edulis* vars. *edulis*, *sativa*, *septemloba*, *T. hastata*, *T. laeoica* forms *sorongensis*, *sicyocarpa*, *yapenensis*, *T. pulleana*, *T. schlechteri*.

For the key to the species, see the regional key for New Guinea.

4. sect. FOLIOBRACTEOLA Cheng & Yueh

Acta Phytotax. Sin. 12(4) (1974) 427. - Type: *Trichosanthes kirilowii* Maxim. (China).

Malesian taxa (4 species, 1 subspecies): *T. auriculata*, *T. coriacea*, *T. rotundifolia*, *T. villosa* subsp. *villosa*, *T. villosa* subsp. *mindorensis*.

NOTE - Section *Foliobracteola* appears not sharply defined. It is heterogeneous, and seems to intermingle with sect. *Involucraria*. It is not sure whether the here named species truly belong to sect. *Foliobracteola*. Especially the species *T. auriculata* and *T. rotundifolia*, both with margined seed, but mutually very different; each may represent separate subsections, but their formal description should wait

for a better insight into the overall division of the genus. *Trichosanthes villosa* was formerly included in section *Involucraria*, but now has been tentatively replaced into sect. *Foliobracteola* because it has creamy pinkish edible fruit pulp, not green-black and bitter as in section *Involucraria*.

KEY TO THE MALESIAN SPECIES OF SECT. FOLIOBRACTEOLA

- 1 a. Plant wholly densely villous. Seed elliptic with truncate base, 14-25 mm long; margin broad but faint *T. villosa*
- b. Plant (sub)glabrous. Seed broad-elliptic or circular 2
- 2 a. Plant slender, dioecious. Fruit oblong. Seed c. 5 mm diam. with smooth margin c. 5 mm broad, inside chambered. - Sumatra *T. rotundifolia*
- b. Plant more robust, dioecious or (partly?) monoecious 3
- 3 a. Leaf blade with 2 gland-bearing auricles at base, at the transition to the petiole. Seed subcircular, c. 9 mm diam., with broad radially striate margin. Male bracts linear. - Borneo *T. auriculata*
- b. Leaf blade without basal auricles. Seed broadly obovate, 13-15 long, without radially striate margin. Male bracts ovate. - W Java, S & C Sumatra *T. coriacea*

5. sect. INVOLUCRARIA (Ser.) Wight

Madras Journ. Lit. Sc. 12 (1840) 52. - *Involucraria* Ser., Mem. Soc. Phys. Genève 3(1) (1825) 27, t. 5. — Type: *Involucraria wallichiana* Ser. = *Trichosanthes wallichiana* (Ser.) Wight.

In Malesia 2 subsections:

a. subsect. INVOLUCRARIA

Type: *Trichosanthes wallichiana* (Ser.) Wight.

Synonym: subsect. *Bracteatae* S.K. Chen, Bull. Bot. 5(2) (1985) 113. - Type: *Trichosanthes tricuspidata* Lour.

NOTE — The name subsect. *Bracteatae* was previously provisionally (not formally) used by Jeffrey (Cucurbitaceae of Eastern Asia, Kew, 1980, 38) for a group of species including the type of sect. *Involucraria*.

Malesian taxa (17 species, 3 forms): *T. borneensis*, *T. ellipsoidea*, *T. emarginata*, *T. globosa*, *T. kinabaluensis*, *T. leuserensis*, *T. longispicata*, *T. montana*, *T. obscura*, *T. philippinensis*, *T. planiglans*, *T. pubera* (a species close to the continental SE Asian *T. wallichiana*), *T.*

quinguangulata, *T. refracta*, *T. sepilokensis*, *T. tricuspida* forms *tricuspida*, *asperifolia*, *seramensis*, *siberutensis*, *T. vlldida*

NOTE — Fruit and seed is not known in *T. refracta*.

b. subsect. PEDATAE (C.Y. Cheng & Yueh) S. K. Chen

Bull. Bot. Res. North-East. Forest Inst. 5(2) (1985) 113. - sect. *Pedatae* C.Y. Cheng & Yueh, Acta Phytotax. Sin. 12(4) (1974) 444. - Type: *Trichosanthes pedata* Merr. & Chun (China).

Malesian taxa of subsect. *Pedatae* (5 species, 1 form): *T. celebica*, *T. elmeri*, *T. floresana*, *T. papuana*, *T. wawrae* forms *wawrae* and *hirsuta*.

KEY TO THE MALESIAN SPECIES OF SECT. INVOLUCRARIA

- 1 a. Leaves simple (lobed or unlobed). Fruit globose or ovate-elliptic. Pericarp thick, ± fleshy (subsect. *Involucraria*)..... 2
- b. Leaves all or partly 3-5(-7)-foliolate. Fruit ovate or elliptic-oblong. Pericarp thin, leathery, (subsect. *Pedatae*).....16
- 2 a. Fruiting pedicel of two differently coloured and textured parts, i.e. distal with a smooth part with surface similar to the fruit surface..... 3
- b. Fruiting pedicel uni-coloured. [Fruit and seed incompletely known in *T. planiglans* and *T. refracta*.]..... 4
- 3 a. Seed rounded at both ends. Fruit globose.....*T. borneensis*
- b. Seed notched at one end. Fruit short ellipsoid.....*T. emarginata*
- 4 a. Fruiting pedicel c. 5 mm thick or less. Male rachis 2-3 mm thick..... 5
- b. Fruiting pedicel 10—15 mm thick. Male rachis thickened, (3—5) mm thick. . . .12
- 5 a. Fruit globose.....6
- b. Fruit (short) ellipsoid..... 9
- 6 a. Leaves ± 5-angular. Blade glands several, small, close to the insertion of the petiole. Male bracts c. 20 mm long, entire. Seed chisel-shaped pointed at one end.....*T. quinguangulata*
- b. Leaves unlobed or (deeply) lobed.....7
- 7 a. Plant drying (reddish) brown. Younger parts reddish tinged. Male bracts less than 1/4 incised..... 8
- b. Plant drying dull blackish; not reddish tinged. Male bracts deeply finely fan-shaped incised.....*T. obscura*
- 8 a. Stem sharply angular(-winged). - Sabah.....*T. kinabaluensis*
- b. Stem faintly angular and/or grooved. — N Sumatra..... *T. leuserensis*

- 9 a. Leaf blade unlobed. Blade glands conspicuous, c. 2 mm diam.....*T. ellipsoidea*
- b. Leaf blade 3(-5)-lobed. Blade glands 1(-2) mm diam. or less.....10
- 10 a. Young parts of plant reddish tinged. Leaves ± pubescent beneath. Probract oblong. Fruiting pedicel 2.5-5 cm long.....*T. pubera*
- b. Young parts green. Leaves (sub)glabrous beneath. Probract ovate or elliptic. Fruiting pedicel 0.5-2 cm long.....11
- 11 a. Leaves drying brownish. Male bracts shallowly incised. Sepals (sub)entire. — Widespread in W Malesia, not in Philippines.....*T. tricuspida*
- b. Leaves drying green. Male bracts deeply and finely incised. Sepals deeply and finely incised. — Philippines.....*T. philippinensis*
- 12 a. Tendrils simple. Male bracts entire, pale yellowish brown, minutely soft hairy.....*T. globosa*
- b. Tendrils 2-4-fid. Male bracts coarsely dentate, drying dark brown.....13
- 13 a. Leaves unlobed or shallowly (2-)3-lobed.....*T. sepilokensis*
- b. Leaves deeply 5(-7)-lobed.....14
- 14 a. Fruit globose (or occasionally in *T. montana* obovoid when in male raceme). - W Malesia.....15
- b. Fruit ellipsoid-obovoid. [Seed 8—12 by 5—7 mm.] Lowland or montane area. — E Malesia.....*T. valida*
- 15 a. Fruit 10-14 cm long. Fruiting pedicel 3-5 cm long. Seed 17-20 by 6-8 mm. Montane.....*T. montana*
- b. Fruit c. 7.5 cm long. Fruiting pedicel 2—25 cm long. Seed c. 17 by 5—6 mm. Lowland.....*T. longispicata*
- 16 a. Plant slender, 2-5 m high. Leaves membranous, 3-foliolate or frequently partly (or all) simple (lobed or hastate). Fruit 6.5-10 cm long. Fruiting pedicel 1.5-2.5 cm long. Seed 15-18 mm long. - West Malesia.....*T. wawrae*
- b. Plant stouter. Leaves ± chartaceous, 3—5-foliolate (rarely simple).....17
- 17 a. Fruit 12-18 cm long. - W Malesia.....*T. elmeri*
- b. Fruit 10.5 cm or less. -E Malesia.....18
- 18 a. Fruiting pedicel c. 5 cm long. Fruit c. 6.5 cm long. Seed 9-10 mm long. - Sulawesi, Moluccas.....*T. celebica*
- b. Fruiting pedicel shorter.....19
- 19 a. Fruit c. 4—8 cm long. Fruiting pedicel 1—15 cm long, c. 2 mm thick. Seed 11—17 mm long. — Flores.....*T. floresana*
- b. Fruit c. 9-10.5 cm long. Fruiting pedicel 1.5-3 cm long, 6-10 mm thick. Seed 20-25 mm long. — Aru I. & New Guinea.....*T. papuana*

REGIONAL ENUMERATIONS AND KEYS TO THE SPECIES

Java (10 species)

For key and enumeration of species, see *Blumea* 42, 2 (1997) 471. Note that the name *T. sumatrana* as given in 1997 has been replaced by *T. montana*, as explained in *Reinwardtia* 11 (1998) p. 218.

Sumatra (15 species)

T. beccariana Cogn. subsp. *beccariana*

T. borneensis Cogn.

T. coriacea Blume

T. cucumerina L. [including var. *anguina* (L.) Haines]

T. elmeri Merr.

T. emarginata Rugayah, *sp. nov.*

T. globosa Blume

T. leuserensis Rugayah, *sp. nov.*

T. montana Rugayah

T. ovigera Blume

T. pubera Blume

T. quinquangulata Asa Gray

T. rotundifolia Rugayah

T. tricuspидata Lour.

{*tricuspидata*

f. *siberutensis* Rugayah, *l. nov.*

T. wawrae Cogn.

Key to the species

- 1 a. Leaves foliolate (sometimes partly or all simple).....2
 1 b. Leaves simple (unlobed or lobed).....3
- 2 a. Plant slender, 2-5 m high. Leaves 3-foliolate, chartaceous; probract membranous, flat (sometimes caducous). Tendrils simple or 2-fid. Fruit 6-10 cm long.....*T. wawrae*
 b. Plant stouter. Leaves 3-5-foliolate, coriaceous; probract chartaceous, incurved-cucullate. Tendrils 2-3-fid. Fruit more than 10 cm long.....*T. elmeri*
- 3 a. Leaves unlobed. [Leaves subcircular or ovate, margin entire, minute sparse dents excepted.].....4
 b. Leaves lobed.....9
- 4 a. Leaf margin ± revolute.....*T. coriacea*
 b. Leaf margin flat.....8
- 5 a. Leaves (usually) pubescent beneath (lens!).....6
 b. Leaves glabrous beneath.....7

- 6 a. Leaves ± membranous; venation not or but little raised beneath.....*T. ovigera*
 b. Leaves chartaceous or (sub)coriaceous; venation raised beneath, distinct....
*T. beccariana* subsp. *beccariana*
- 7 a. Leaves chartaceous, ovate; venation ± raised, distinct. Seed 8–10 mm long -
 Siberut I.....*T. tricuspидata* f. *siberutensis*
 b. Leaves ± membranous; venation flat, faint beneath. Seed 15-20 mm long8
- 8 a. Leaves subcircular.....*T. rotundifolia*
 b. Leaves ovate-hastate.....*T. wawrae*
- 9 a. Plant with fruit (and female flowers).....10
 b. Plant with male flowers.....22
- 10 a. Fruit ovoid. Seed turgid.....n
 b. Fruit globose, ellipsoid, (ob)ovoid, or long-cylindrical. Seed flat.....12
- 11 a. Fruit pulp not fibrous. Seed barrel-shaped.....*T. ovigera*
 b. Fruit pulp fibrous. Seed butterfly-shaped with inflated lateral parts. (Lobed leaves not found in Sumatra).....*T. beccariana* subsp. *beccariana*
- 12 a. Seed edge undulate or coarsely notched. Fruit ± ellipsoid, c. 5 cm long, or long-cylindrical in cultivated var. *anguina*.....*T. cucumerina*
 b. Seed edge entire. Fruit globose, ellipsoid, or (ob)ovoid.....13
- 13 a. Fruiting pedicel with 2 parts with differing surface colour and texture.....14
 b. Fruiting pedicel uni-coloured.....15
- 14 a. Fruit ellipsoid. Seed notched at one end.....*T. emarginata*
 b. Fruit globose. Seed not notched.....*T. borneensis*
- 15 a. Fruit globose.....16
 b. Fruit longer than broad.....19
- 16 a. Fruiting pedicel 10–15 mm diam. thick.....17
 b. Fruiting pedicel c. 5 mm thick.....18
- 17 a. Tendrils simple. Fruit less than 10 cm diam.....*T. globosa*
 b. Tendrils 2–3-fid. Fruit more than 10 cm diam.....*T. montana*
- 18 a. Leaves deeply 3-5-lobed. Seed 2-3 mm thick.....*T. leuserensis*
 b. Leaves shallowly 5-lobed or ± pentangular. Seed c. 1 mm thick, chisel-shaped pointed at one end.....*T. quinquangulata*
- 19 a. Fruit more than 10 cm long; fruiting pedicel c. 15 mm diam.....*T. montana*
 b. Fruit less than 10 cm long; pedicel 5 mm diam. or less.....20
- 20 a. Pericarp thin, less than 5 mm. Seed broadly ovate-oblong, 15-18 mm long, 2-3 mm thick.....*T. wawrae*
 b. Pericarp thick, c. 5 mm or more. Seed obovate, 10–13 mm long, less than 2 mm thick.....21

- 21 a. Leaves pubescent. Stem and leaves when young drying red-brown. Probract oblong.....*T. pubera*
 b. Leaves glabrous. Stem and leaves green, drying (green)brown. Probract ovate-elliptic..... *T. tricuspidata*
- 22 a. Bracts 1(-2) mm long, often caducous (including cultivated var. *anguina*).....*T. cucumerina*
 b. Bracts more than 2 mm long.....23
- 23 a. Rachis 1-2 mm thick.....24
 b. Rachis 2-10 mm thick.....25
- 24 a. Persistent basal part of pedicel 2-15 mm long.....*T. ovigera*
 b. Persistent basal part of pedicel (nearly) absent.....*T. wawrae*
- 25 a. Rachis of raceme 5-10 mm thick.....26
 b. Rachis of raceme 2-5 mm thick.....27
- 26 a. Tendrils simple. Bracts membranous, with soft yellowish hairs, margin entire.....*T. globosa*
 b. Tendrils 3-fid. Bracts chartaceous, with minute brown hairs, apical part coarsely dentate.....*T. montana*
- 27 a. Younger parts reddish tinged on drying.....28
 b. Whole plant green, brown, or blackish on drying.....29
- 28 a. Leaves glabrous. Petals completely white.....*T. leuserensis*
 b. Leaves pubescent. Petals with pinkish veining and/or pinkish fringes.....*T. pubera*
- 29 a. Leaves ± pentangular, with several minute glands close to the insertion of the petiole. Bracts entire [Sepals with slender side lobes].....*T. quinquangulata*
 b. Leaves (deeply) 3-5-lobed, c. 1/3 or deeper; glands fewer, not close to the insertion of the petiole. Bracts dentate.....30
- 30 a. Leaves deeply 5-lobed, lobes oblong. Sepals (entire or) lobed.....31
 b. Leaves to c. 1/2-way 3-lobed, lobes ± ovate-triangular. Sepals entire.....*T. tricuspidata*
- 31 a. Probract ± elliptic, c. 4 mm long. Seed notched.....*T. emarginata*
 b. Probract lanceolate(-subulate), 5-18 mm long. Seed elliptic, not notched.....*T. borneensis*

Peninsular Malaysia & Singapore (7 species)

- T. borneensis* Cogn.
T. cucumerina L.
T. elmeri Merr.
T. ovigera Blume
T. quinquangulata Asa Gray
T. tricuspidata Lour.
T. wawrae Cogn.

Key to the species

- 1 a. Leaves foliolate (in *T. wawrae* partly or all simple).....2
 b. Leaves simple.....3
- 2 a. Leaves 3-foliolate, membranous or chartaceous. Probract membranous, flat, sometimes caducous. Tendrils 1- or 2-fid. Rachis of male raceme 1-1.5 mm thick. Fruit ovoid, 6-10 cm long.....*T. wawrae*
 b. Leaves 3-5-foliolate, chartaceous or coriaceous. Probract chartaceous, concave. Tendrils 2—3-fid. Male rachis 2-3 mm thick. Fruit narrowly ovoid, more than 10 cm long.....*T. elmeri*
- 3 a. Plant (sub)annual; monoecious. Leaves membranous, green-yellow on drying. Corolla c. 3 cm diam. Male bract 1(-2) mm long, persistent or caducous. [Fruit ovoid, or much elongated, cylindrical in cultivated var. *anguina*.] Seed edge undulate.....*T. cucumerina*
 b. Plant (sub)perennial; monoecious or dioecious. Leaves membranous or chartaceous, green, brown, or blackish on drying. Corolla more than 3 cm diam. Male bract 3 mm long or more. Seed edge not undulate.....4
- 4 a. Plant with fruit (and female flowers).....5
 b. Plant with male racemes.....9
- 5 a. Fruit globose.....6
 b. Fruit ovoid or ellipsoid.....7
- 6 a. Fruiting pedicel of 2 differently structured and coloured parts. Leaves deeply 5(—7)-lobed. Seed rounded at both ends.....*T. borneensis*
 b. Fruiting pedicel of uniform colour and structure. Leaves ± pentangular. Seed at one side chisel-shaped pointed.....*T. quinquangulata*
- 7 a. Seed turgid, barrel-shaped.....*T. ovigera*
 b. Seed flat, rounded at both ends.....8
- 8 a. Leaves 3-lobed for (1/4—)1/2-way. Fruit uniformly red. Seed c. 10 mm long.....*T. tricuspidata*
 b. Leaves variously lobed. Fruit flamed. Seed c. 15 mm long.....*T. wawrae*
- 9 a. Rachis 1-2 mm thick.....10
 b. Rachis 2-4 mm thick.....11
- 10 a. Leaves usually pubescent beneath (lens). [Seed turgid, barrel-shaped.]*T. ovigera*
 b. Leaves glabrous beneath. [Seed flat.].....*T. wawrae*
- 11 a. Leaves ± pentangular, with small glands near the insertion of the petiole. Bracts entire. Sepals (mostly) with narrow lateral lobes.....*T. quinquangulata*
 b. Leaves unlobed or variously lobed. Bracts incised. Sepals entire, rarely few-lobed.....12

- 12 a Leaves deeply 5-7-lobed, usually with few glands 1-2 mm diam.....*T. borneensis*
 b Leaves Globed for 1/4-1/2-way; glands scattered, less than 1 mm diam.....*T. tricuspidata*

Borneo (21 species, 1 subspecies, 1 form)

- T. auriculata* Rugayah
T. beccariana Cogn.
 subsp. *beccariana*
 subsp. *pusilla* Rugayah
T. borneensis Cogn.
T. cucumerina L.
T. ellipsoidea Merr.
T. elmeri Merr.
T. globosa Blume
T. kinabaluensis Rugayah, *sp. nov.*
T. longispicata Rugayah, *sp. nov.*
T. montana Rugayah
T. mucronata Rugayah, *sp. nov.*
T. obscura Rugayah, *sp. nov.*
T. ovigera Blume
T. pendula Rugayah
T. pubera Blume
T. quinquangulata Asa Gray
T. refracta Yueh & Huang
T. sepilokensis Rugayah, *sp. nov.*
T. tricuspidata Lour.
T. villosa Blume
f. wawrae Cogn.
 forma *wawrae*
 forma *hirsuta* Rugayah, *l. nov.*

Key to the species

- 1 a. Leaves foliolate (in *T. wawrae* sometimes, in *T. elmeri* rarely partly or all simple).....
 b. Leaves simple (lobed or unlobed).....
 2 a Leaves 3-foliolate, membranous or chartaceous; probract membranous, flat (sometimes caducous). Tendrils simple or 2-fid. Male rachis c. 1-1.5 mm thick. Fruit 6-10 cm long.....*T. wawrae*
 b. Leaves 3-5-foliolate, chartaceous or coriaceous; probract chartaceous, concave. Tendrils 2-3-fid. Male rachis 2-3 mm thick. Fruit more than 10 cm long....
*T. elmeri*

- 3 a. **Plant (sub)annual**; monoecious. [Leaves membranous, green-yellow on drying.] **Corolla** c. 3 cm diam. Male bracts 1(-2) mm long, often fugacious. [Fruit ovoid, or long-cylindrical in cultivated var. *anguina*.] Seed with undulate edge.....*T. cucumerina*
 b. **Plant** (sub)perennial; monoecious or dioecious. Corolla more than 3 cm diam. **Male bract** 3 mm long or more (\pm absent in *T. mucronata* and *T. pendula*). Seed **turgid or flat**, edge not undulate..... 4
 4 a. Whole plant conspicuously (densely) soft hairy; hairs 1 mm long or more. Leaves mucronate..... 5
 b. Whole plant glabrous or (sparsely) hairy, or scabrous; hairs less than 1 mm long. Leaves not or little mucronate (long-mucronate in *T. pendula*)..... 6
 5 a. Indumentum of stem and leaves (grey-)rusty villose. Tendrils (2- or) 3-5(-9)-fid. Seed flat.....*T. villosa*
 b. Indumentum of stem and leaves grey(-brown), hirsute. Tendrils 2 or 3-fid. Seed **turgid**.....*T. mucronata*
 6 a. Leaf blade at transition to petiole with 2 gland-bearing auricles. [Male bracts linear. Fruit in a raceme, globose.] Seed subcircular with broad radially striate **margin**.....*T. auriculata*
 b. Leaf blade at base without auricles. Seed turgid or flat, without radially striate margin..... 7
 7 a. Stem sharply angular or ridged..... 8
 b. Stem smooth, striate, or grooved..... 9
 8 a. Stem and leaves drying brown, reddish tinged. Probract oblong. Male raceme solitary. Seed flat, chisel-shaped pointed at one end.....*T. kinabaluensis*
 b. Stem and leaves drying green or brown, not reddish tinged. [Leaf apex narrowly mucronate.] Probract absent. Male (and female) racemes mostly fascicled, pendent. Seed turgid.....*T. pendula*
 9 a. Plant with fruit (and/or female flowers) (incompletely known in *T. refracta*) ... **10**
 b. **Plant with male** flowers..... 23
10 a. Seed turgid..... 11
 b. **Seed flat**..... 12
11 a. Leaf venation \pm flat beneath. Fruit pulp not fibrous. Seed barrel-shaped.....*T. ovigera*
 b. **Leaf venation much raised beneath. Fruit pulp coarsely fibrous. Seed butterfly-shaped**.....*T. beccariana*
12 a. Fruit globose..... 13
 b. **Fruit ovoid/ellipsoid.**..... 19
13 a. Fruiting pedicel with two parts of different surface and colour, \pm tapering.....*T. borneensis*
 b. **Fruiting pedicel uni-coloured**..... 14

- 14 a. Fruiting pedicel less than 10 mm thick 15
 b. Fruiting pedicel 10—15 mm thick 16
- 15 a. Leaves \pm 5-angular, with several small glands close to the insertion of the petiole. Seed oblong, chisel-shaped pointed at one end. *T. quinquangulata*
 b. Leaves unlobed or (deeply) lobed, drying blackish brown, dull, roughish above; glands few, scattered. Seed 18—21 by 7—8 mm, rounded at both ends *T. obscura*
- 16 a. Leaves drying pale green. Tendrils simple *T. globosa*
 b. Leaves drying green or brown. Tendrils (usually) 2-4(-5)-fid 17
- 17 a. Leaves unlobed or shallowly 3-lobed, drying green. Seed 13-16 by 7-8 mm *T. sepilokensis*
 b. Leaves deeply 5-7-lobed 18
- 18 a. Fruit less than 10 cm diam., fruiting pedicel 2—3 cm long. Seed c. 17 by 5—6 mm. — Lowland *T. longispicata*
 b. Fruit 10 cm diam. or more, fruiting pedicel c. 2 cm long. Seed 17-20 by 6-8 mm. — Montane *T. montana*
- 19 a. Fruiting pedicel c. 10 mm thick *T. montana*
 b. Fruiting pedicel c. 5 mm thick or less 20
- 20 a. Plant slender, leafy stem 2-3 mm diam. Pericarp \pm leathery, thin 21
 b. Plant stouter, leafy stem 3-4 mm diam. or more. Pericarp carnos, c. 5 mm thick when dry. [Dry fruit uniformly (orange-)red. Seed c. 10 mm long. Leaves 3-or 5-lobed.] 22
- 21 a. Leaves ovate-hastate, usually \pm lobed. Blade glands c. 0.5 mm diam. Fruit 6-10 cm long, yellow flamed. Seed 15—18 mm long *T. wawrae*
 b. Leaves ovate, margin entire. Blade glands 1-2 mm diam. Fruit c. 5 cm long. Seed c. 13 mm long *T. ellipsoidea*
- 22 a. Leaves (\pm) pubescent, 3-5-lobed, margin coarsely dentate. Young parts (drying) reddish brown. Probract oblong. Petal fringes tinged pinkish. Fruiting pedicel 2-3 cm long *T. pubera*
 b. Leaves glabrous or early glabrescent, 3-lobed to 1/4-1/2 of the blade, margin entire or dentate. Petals completely white. Fruiting pedicel (0.5-)-1-2 cm long *T. tricuspidata*
- 23 a. Rachis of male raceme 1—15(-2) mm thick. [Leaves frequently unlobed.] 24
 b. Rachis of male raceme 2-10 mm thick. [Leaves mostly lobed.] 27
- 24 a. Blade glands c. 2 mm diam. *T. ellipsoidea*
 b. Blade glands less than 1 mm diam., or absent 25
- 25 a. Leaves \pm pubescent beneath. Remaining part of pedicel 2 mm long or more.. 26
 b. Leaves glabrous beneath (except in f. *hirsuta*). Remaining part of pedicel almost absent *T. wawrae*

- 26 a. Venation on lower leaf surface raised. Peduncle less than 1 cm long *T. beccariana*
 b. Venation on lower leaf surface \pm flat. Peduncle more than 1 cm long *T. ovigera*
- 27 a. Leaves \pm 5-angular. Bracts entire. Sepals mostly with narrow side lobed *T. quinquangulata*
 b. Leaves various. Bracts incised. Sepals entire or lobed 28
- 28 a. Persisting part of pedicel 5-10 mm long (in deviating specimens shorter, see note). Bracts less than 15 mm long *T. longispicata*
 b. Persistent part of pedicel shorter or absent. Bracts larger, partly withering... 29
- 29 a. Rachis 2-4 mm thick 30
 b. Rachis 5-10(-20) mm thick 34
- 30 a. Rachis \pm zig-zag *T. refracta*
 b. Rachis straight 31
- 31 a. Bracts broad, deeply fan-shaped incised. Plant drying dull blackish *T. obscura*
 b. Bracts incised, but not fan-shaped. Plant drying green or (reddish) brown 32
- 32 a. Leaves \pm hairy. Shoots reddish tinged. [Probract oblong.] Petal fringes tinged pinkish *T. pubera*
 b. Leaves glabrous or early glabrescent. Shoots green or brown. Petals completely white 33
- 33 a. Leaves 5-7-lobed. Blade glands few (or absent), c. 1 mm diam. Probract membranous, elongate *T. borneensis*
 b. Leaves 3-lobed to 1/4 -1/3 of the blade. Blade glands scattered, less than 1 mm diam. Probract \pm (ob)ovate, chartaceous, with conspicuous glands *T. tricuspidata*
- 34 a. Bracts entire, membranous, pale pubescent. Tendrils simple *T. globosa*
 b. Bracts incised, (sub)glabrous. Tendrils 2-4-fid 35
- 35 a. Leaves unlobed or shallowly (2- or) 3-lobed. - Lowland *T. sepilokensis*
 b. Leaves deeply 5(-7)-lobed. - Montane *T. montana*

Sulawesi (6 species)

T. celebica Cogn.

T. cucumerina L.

T. ovigera Blume

T. quinquangulata Asa Gray

T. tricuspidata Lour.

T. valida Rugayah, *sp. nov.*

Key to the species

- 1 a. Leaves 3-foliolate (or partly or all simple)..... *T. celebica*
 b. Leaves simple (unlobed or lobed)..... 2
- 2 a. Plant (sub)annual; monoecious. Probract absent. Male bracts 1(–2) mm long, often fugacious. Corolla c. 2 cm diam. [Fruit small, ovoid, or long-cylindrical in cultivated var. *anguina*.] Seed flat, edge undulate..... *T. cucumerina*
 b. Plant (sub)perennial; monoecious or dioecious. Probract present (absent in *T. ovigera*). Corolla c. 3 cm diam. or more. Seed turgid or flat, edge not undulate..
 3
- 3 a. Leaves ± pentangular, drying green blackish; with minute glands close to the insertion of the petiole. Male bracts entire. [Sepals usually with distinct, narrow, lateral lobes.] Fruit globose. Seed flat, oblong, chisel-shaped pointed at one end *T. quinquangulata*
 b. Leaves various. Male bracts entire or mostly incised. Fruit (short-)ovoid, obovoid, or ellipsoid. Seed turgid or flat, not chisel-shaped pointed at one end 4
- 4 a. Plant with fruit (and female flowers) 5
 b. Plant with male flowers..... 8
- 5 a. Fruit ± obovoid, c. 10 cm long; fruiting pedicel c. 10 mm thick. [Seed flat, obovate, 8–12 by 5–7 mm.]..... *T. valida*
 b. Fruit ovoid or ellipsoid; fruiting pedicel 2–4 mm thick..... 6
- 6 a. Seed turgid, barrel-shaped. Fruit mostly flamed..... *T. ovigera*
 b. Seed flat. Fruit evenly coloured..... 7
- 7 a. Leaves subhastate (or 3-foliolate). Fruiting pedicel 5–6 cm long. Seed 9–10 by 5 by 2–3 mm..... *T. celebica*
 b. Leaves suborbicular, 3-lobed to about half-way the blade. Fruiting pedicel 2(–3) cm long. Seed 10–12 by 4–6 by 1 mm..... *T. tricuspidata*
- 8 a. Leaves deeply 5-lobed. Peduncle 9–18.5 cm long. Rachis c. 5 mm thick
 *T. valida*
 b. Leaves ± unlobed or 3-lobed. Rachis (1–)2–3 mm thick, peduncle usually shorter 9
- 9 a. Plant drying greenish. Bracts 15 mm long or less. Leaves various..... 10
 b. Plant drying green blackish. Bracts 15–25 mm long. Leaves ± glabrous, 3-lobed to c. half-way the blade *T. tricuspidata*
- 10 a. Leaves usually ± pubescent beneath. Remaining part of pedicel 2 mm long or more..... *T. ovigera*
 b. Leaves glabrous. Remaining part of pedicel less than 2 mm long *T. celebica*

Philippines (10 species, 1 subspecies)*T. cucumerina* L.*T. ellipsoidea* Merr.*T. elmeri* Merr.*T. ovigera* Blume*T. philippinensis* Rugayah, *sp. nov.**T. planiglans* Rugayah, *sp. nov.**T. quinquangulata* Asa Gray*T. refracta* Yueh & Huang*T. valida* Rugayah, *sp. nov.**T. villosa* Blume *subsp. mindorensis* Rugayah, *subsp. nov.***Key to the species**

- 1 a. Leaves 3- or 5-foliolate. – Palawan..... *T. elmeri*
 b. Leaves simple (unlobed or lobed)..... 2
- 2 a. Plant (sub)annual; monoecious; diurnal. Corolla c. 2 cm diam. Male bracts 1(–2) mm long, mostly fugacious. Seed flat, edge undulate. [Probract absent. Fruit small, ovoid, or long cylindrical in cultivated var. *anguina*..... *T. cucumerina*
 b. Plant (sub)perennial; monoecious or dioecious. Corolla 3 cm diam. or more. Male bracts larger. Seed turgid or flat, edge not undulate..... 3
- 3 a. Plant densely (grey-)brown villous. [Male bracts large, membranous, ± entire. Fruit narrowed at base at the transition to the pedicel.]..... *T. villosa* *subsp. mindorensis*
 b. Plant thinly pubescent or glabrous..... 4
- 4 a. Leaves (broadly) ovate. Blade glands c. 2 mm diam. or more..... 5
 b. Leaves unlobed or lobed. Blade glands 1(–2) mm diam. or less, or absent..... 6
- 5 a. Leaf margin coarsely dentate. Blade glands (1–)2–5 mm diam., near the insertion of the petiole. Seed 15–16 mm, pointed at one end..... *T. planiglans*
 b. Leaf margin entire. Blade glands 1–2 mm diam., not confined to the blade base. Seed 13 mm, not pointed..... *T. ellipsoidea*
- 6 a. Plant with fruit (and female flowers)..... 7
 b. Plant with male flowers..... 10
- 7 a. Fruit globose. Leaves ± 5-angular, drying blackish green, with several minute glands close to the insertion of the petiole. Seed oblong, chisel-shaped pointed at one end. [Male bracts entire.]..... *T. quinquangulata*
 b. Fruit ± (ob)ovoid or ellipsoid [ovary ovoid, mature fruit not known in *T. refracta*.]..... 8
- 8 a. Fruit c. 10 mm long. Fruiting pedicel 10–15 mm thick..... *T. valida*
 b. fruit smaller. Fruiting pedicel less than 5 mm thick..... 9

- 9 a. Fruit flamed. Seed turgid, barrel-shaped *T. ovigera*
 b. Fruit uniformly red. Seed flat, ovate-oblong *T. philippinensis*
- 10 a. Bracts entire. Leaves 5-angular, drying green-blackish *T. quinquangulata*
 b. Bracts incised. Leaves various 11
- 11 a. Male raceme with stout rachis, c. 5 mm thick. Leaves deeply 5-lobed *T. valida*
 b. Male raceme with slender rachis, 1-2 mm thick. Leaves unlobed or 3(-5)-lobed, 12
- 12 a. Leaves usually ± pubescent beneath. Corolla c. 3 cm diam. *T. ovigera*
 b. Leaves glabrous (early glabrescent). Corolla larger 13
- 13 a. Raceme zig-zag; bracts 10-25 mm long, shallowly coarsely incised, without glands *T. refracta*
 b. Raceme straight; bracts 25-45 mm long, deeply finely incised, glandular *T. philippinensis*

Moluccas (8 species, 1 form)

- T. celebica* Cogn.
T. cucumerina L.
T. ovigera Blume
T. papuana F.M. Bailey
T. pulleana Harms
T. quinquangulata Asa Gray
T. tricuspidata Lour. f. *seramensis* Rugayah, /, nov.
T. valida Rugayah, sp. nov.

Key to the species

- 1 a. Leaves 3-foliolate (or partly or all simple) 2
 b. Leaves simple (unlobed or lobed) 3
- 2 a. Fruit c. 6.5 cm long. Fruiting pedicel c. 5 cm long. Seed 9-10 by 2-3 mm. - Buru *T. celebica*
 b. Fruit 9-10.5 cm long. Fruiting pedicel 1.5-3 cm long. Seed 20-25 by 13-14 mm. - Aruls *T. papuana*
- 3 a. Plant (sub)annual; monoecious; diurnal. [Probract absent.] Male bracts 1(-2) mm long, mostly fugacious. Corolla c. 2 cm diam. Seed flat, pale, with coarsely undulate edge. [Fruit small, ovoid, or long-cylindrical in cultivated var. *anguina*.] *T. cucumerina*
 b. Plant (sub)perennial; monoecious or dioecious. Probract present or absent.] Male bracts larger. Corolla c. 3 cm diam. or more. Seed turgid or flat, edge not undulate 4

- 4 a. Plant with fruit (or female flowers) 5
 b. Plant with male flowers. [Male flowers not known in *T. tricuspidata* f. *seramensis*.] 9
- 5 a. Seed turgid, barrel-shaped. [Probract absent] *T. ovigera*
 b. Seed flat 6
- 6 a. Fruit globose. Leaves ± 5-angular; with several small blade glands close to the insertion of the petiole. Seed oblong, chisel-shaped pointed at one end *T. quinquangulata*
 b. Fruit dbovoid or ellipsoid (not known in *T. pulleana* from Aru Is.) 7
- 7 a. Fruit large, ± obovoid, c. 10 cm long; fruiting pedicel c. 10 mm thick. - Halmahera *T. valida*
 b. Fruit smaller; fruiting pedicel more slender 8
- 8 a. Leaves ± hastate (or 3-foliolate). Fruiting pedicel c. 5 cm long. - Buru *T. celebica*
 b. Leaves 3-lobed to c. half-way. Fruiting pedicel c. 1 cm long. - Seram *T. tricuspidata* f. *seramensis*
- 9 a. Bracts c. 2 cm long, entire. [Sepals mostly with narrow lateral lobes. Leaves 5-angular, drying green blackish; with small glands close to the insertion of the petiole.] *T. quinquangulata*
 b. Bracts either large (c. 20 mm long or more), incised (sometimes only shallowly so at apex), or bracts much smaller 10
- 10 a. Leaves deeply 5(-7)-lobed. Rachis of raceme c. 5 mm thick *T. valida*
 b. Leaves unlobed or lobed. Rachis 1-3 mm thick 11
- 11 a. Leaf margin conspicuously dentate. Bracts 6-8 mm long. Bracts and flowers (inflorescence) densely brown pubescent. - Aru Is. *T. pulleana*
 b. Leaf margin entire. Bracts larger. Bracts and flowers (sub)glabrous 12
- 12 a. Remaining part of pedicel 2 mm long or more *T. ovigera*
 b. Remaining part of pedicel less than 2 mm long or absent (but flowers from Moluccas not seen) *T. celebica* (Buru), *T. papuana* (Aru Is.)

Lesser Sunda Islands (6 species, 1 form)

- T. cucumerina* L.
T. floresana Rugayah, sp. nov.
T. ovigera Blume
T. quinquangulata Asa Gray (not yet recorded for Lesser Sunda Is.)
T. tricuspidata f. *asperifolia* Rugayah, /, nov.
T. villosa Blume

Key to the species

- 1 a. Leaves 3(-5)-foliolate (or partly unlobed?) *T. floresana*
 b. Leaves simple (unlobed or lobed) 2
- 2 a. Plant (sub)annual; monoecious; diurnal. Male bracts 1(-2) mm long, mostly fugacious. Corolla c. 2 cm diam. [Fruit small, ovoid, or long-cylindrical in cultivated var. *anguina*.] Seed flat, pale, edge coarsely undulate *T. cucumerina*
 b. Plant (sub)perennial. Corolla c. 3 cm diam. or more. Seed turgid or flat, edge not undulate 3
- 3 a. Whole plant densely grey-brown villose *T. villosa*
 b. Plant thinly pubescent or glabrous (glabrescent) 4
- 4 a. Plant with fruit (or female flowers) 5
 b. Plant with male flowers 7
- 5 a. Fruit globose. Seed oblong, chisel-shaped pointed at one end [Leaves \pm 5-angular, drying green-blackish; with several small glands close to the insertion of the petiole.] *T. quinquangulata*
 b. Fruit ovoid(-ellipsoid). Seed turgid or flat, not pointed. [Leaves unlobed or (deeply) lobed.] 6
- 6 a. Seed turgid, barrel-shaped. Leaves (sub)glabrous or pubescent, not scabrous *T. ovigera*
 b. Seed flat, ovate-oblong, rounded at both ends. Leaves scabrid *T. tricuspudata* f. *asperifolia*
- 7 a. Leaves glabrous, \pm 5-angular, [drying green blackish, with several small glands near the insertion of the petiole.] Bracts c. 20 mm long, entire. Sepals with narrow lateral lobes *T. quinquangulata*
 b. Leaves glabrous, pubescent, or scabrous, unlobed or (deeply) lobed. Bracts (coarsely) indented, or much smaller, \pm unlobed. Sepals (mostly) entire 8
- 8 a. Leaves subglabrous or pubescent, not scabrous. Bracts 15 mm long or less, coarsely dentate or entire *T. ovigera*
 b. Leaves scabrous. Bracts c. 20 mm long, deeply indented *T. tricuspudata* f. *asperifolia*

New Guinea (12 species, 3 varieties, 3 forms)

- T. cucumerina* L.
T. densiflora Rugayah, *sp. nov.*
T. dentifera Rugayah, *sp. nov.*
T. dieniensis Merr. & Perry

- T. edulis* Rugayah, *sp. nov.*
 var. *edulis*
 var. *sativa* Rugayah
 var. *septemloba* Rugayah
T. hastata Cogn. ex Harms
T. laeica Cheng & Huang
 f. *sorongensis* Rugayah, *l. nov.*
 f. *sicyocarpa* Rugayah, *l. nov.*
 f. *yapenensis* Rugayah, *l. nov.*
T. ovigera Blume
T. papuana F.M. Bailey
T. pulleana Harms
T. quinquangulata Asa Gray
T. schlechteri Cogn. ex Harms

Key to the species

- 1 a. Leaves 3—5-foliolate (sometimes simple in juvenile stages) *T. papuana*
 b. Leaves simple (unlobed or lobed) 2
- 2 a. Plant (sub)annual; monoecious; diurnal. Probract absent. Male bracts 1(-2) mm long, mostly fugacious. Corolla c. 2 cm diam. Seed flat, pale, edge coarsely undulate. [Fruit small, ovoid, or long-cylindrical in cultivated var. *anguina*.] *T. cucumerina*
 b. Plant (sub)perennial; monoecious or dioecious; largely nocturnal. Male bracts 5 mm long or more. Corolla c. 3 cm diam. or more. Seed (turgid in *T. ovigera*) flat, edge not undulate 3
- 3 a. Entire portion of petal oblong. Seed turgid, barrel-shaped *T. ovigera*
 b. Entire portion of petal \pm obovate. Seed flat 4
- 4 a. Male bracts c. 20 mm long, entire. Fruit globose; seed embedded in green-black pulp, uneatable, oblong, chisel-shaped pointed at one end. Leaves \pm 5-angular *T. quinquangulata*
 b. Male bracts dentate (sometimes only at very apex), or bracts much smaller. Fruit globose, ellipsoid, or oblong; pulp not blackish; seed various, usually densely packed. Leaves of various shape, unlobed or (deeply) lobed. Peduncles and/or pedicels often persistent, straw-like. Sect. *Edulis* 5
- 5 a. Plant with fruit (or female flowers) (fruit not known in *T. dieniensis*, *T. pulleana*) 6
 b. Plant with male flowers (male flowers not known in *T. dentifera*) 11
- 6 a. Adult leaves scabrous above, pubescent or subglabrous beneath. [Fruit globose, ellipsoid, or oblong.] Seed \pm parallel-sided *T. laeica*
 b. Adult leaves smooth or rough, but not scabrous above, glabrous (glabrescent) beneath. [Fruit ellipsoid or oblong.] 7

- 7 a. Leaves ± hastate or triangular; margin usually remotely spiny-dentate 8
 b. Leaves subcircular or ovate in outline, unlobed or (deeply) lobed; margin entire or obscurely minutely dentate.....10
- 8 a. Lowland and lower montane, up-to 1500 m.....9
 b. Montane, 1800-2500 m. [Fruit ovoid-oblong, 6-8 by 4.5 cm. Seed parallel-sided, 10-13 by 4-5 mm, c. 1 mm thick, shallowly notched at one or both ends.].....*T. densiflora*
- 9 a. Leaf margin spiny-dentate. Petiole with scabrous hairs. Fruit ca. 7.5 by 4.5 cm. Seed± triangular, 8-10 by 4-5 mm, 1-2 mm thick, shallowly notched at both ends.....*T. hastata*
 b. Leaf margin towards base usually with some prickly teeth only. Petiole glabrous. Fruit 6.5-11 by 5-7.5 cm. Seed elliptic-oblong, 17-20 by 8-10 mm, ca. 3 mm thick, not notched.....*T. schlechteri*
- 10 a. Leaves broadly ovate, unlobed. Fruit 7.5-10 by 5-6 cm. Seed narrowly oblong, tooth-like cuneate at base, [12-13 by 5 mm, c. 1 mm thick.] - Lowland E Papua New Guinea, Solomon Is.....*T. dentifera*
 b. Leaves ± orbicular in outline, unlobed or lobed. Fruit 15-20 cm long. Seed parallel-sided or somewhat triangular, base not cuneate. - Lowland and montane, whole of New Guinea.....*T. edulis*
- 11 a. Inflorescences (and flowers) densely hairy. Plants drying green or brown. Peduncle c. 10 cm long.....12
 b. Inflorescences (sub)glabrous (glabrescent). Plants drying greenish. Peduncle c. 5 cm long or less.....14
- 12 a. Hairs of inflorescences and flowers ± straight, light brown, 1-2 mm long . . . 13
 b. Hairs of inflorescences and flowers woolly, ± curly, dark brown, more than 2 mm long.....*T. edulis*
- 13 a. Leaves hastate, unlobed, (sub)glabrous, not scabrous. Bracts oblong, entire, less than 10 mm long.....*T. pulleana*
 b. Leaves ovate, unlobed, or shallowly 3-lobed, pubescent or glabrescent, scabrous above. Bracts elliptic or obovate, dentate, c. 10 mm long.....*T. laeoica*
- 14 a. Plant delicate. Leaves membranous, ovate, margin entire. Bracts less than 10 mm long.....*T. dieniensis*
 b. Plant stouter. Leaves chartaceous, or coriaceous, ± hastate, margin usually ± dentate. Bracts 10 mm long or more.....15
- 15 a. Rachis c. 5 mm thick. Bracts 30-45 mm long. - Montane at c. 2000 m.....*T. densiflora*
 b. Rachis c. 2 mm thick. Bracts smaller.....16
- 16 a. Leaves (sub)coriaceous, towards the base usually with some marginal prickles. Petiole glabrous. Rachis ± zig-zag. Bracts c. 10 mm long.....*T. schlechteri*
 b. Leaves chartaceous, margin remotely spiny-dentate. Petiole scabrous. Rachis straight. Bracts 10-25 mm long.....*T. hastata*

ENUMERATION OF ACCEPTED SPECIES, WITH DESCRIPTIONS OF NEW TAXA

I. TRICHOSANTHES AURICULATA Rugayah

Trichosanthes auriculata Rugayah, Reinwardtia 11(3) (1998) 216. -Type: *Paul Chai S 36193* (L; iso K, KL, SAR), Sarawak.

DISTRIBUTION - Borneo: Sarawak, Sabah, E. Kalimantan.

NOTE - *Clemens 21110* and *Kato et al. 11279*, both (almost) sterile, possibly represent a new species close to *T. auriculata* or *T. mucronata*.

2. TRICHOSANTHES BECCARIANA Cogn.

a. subsp. BECCARIANA

Trichosanthes beccariana Cogn. in A.DC. & CDC, Mon. Phan. Prodr. 3 (1881) 380. - Type: *Beccari 802, 802 bis* (FI; iso K, MEL), W. Sumatra.

DISTRIBUTION - West Sumatra, Borneo (Sabah).

b. subsp. PUSILLA Rugayah

Trichosanthes beccariana Cogn. subsp. *pusilla* Rugayah, Reinwardtia 11(3) (1998) 217. - Type: *Mogea* (with *De Wilde*) 4372 (BO; iso K, L), C Kalimantan.

DISTRIBUTION - Borneo (Sarawak, Sabah, C & E Kalimantan).

3. TRICHOSANTHES BORNEENSIS Cogn.

Trichosanthes borneensis Cogn. in A.DC. & C.DC., Mon. Phan. Prodr. 3 (1881) 369 - Type: *Korthals 54* (L), Borneo (Kalimantan).

Trichosanthes sumatrana Cogn. in A.DC. & C.DC. -Mon. Phan. Prodr. 3 (1881) 373 (incl. a *acutiloba*, lectotype; excl. *P obtusiloba*^iuch. is *T. globosa* Blume). - Type (i.e. lectotype of *T. sumatrana*): *Beccari s.n.* (FI acquisition number *FI 4427* '*Trichosanthes sumatrana* Cogn. a *acutiloba* Cogn.'). Prov. Padang, 360 m (FI).

DISTRIBUTION - Sumatra, Peninsular Malaysia, Borneo.

4. TRICHOSANTHES CELEBICA Cogn.

Trichosanthes celebica Cogn. in A.DC. & CDC, Mon. Phan. Prodr. 3 (1881) 385. — Type: *Beccari 51* (FI), Lepo-Lepo near Kendari, SE Sulawesi.

DISTRIBUTION — Sulawesi, Moluccas (Buru).

5. TRICHOSANTHES CORIACEA Blume

Trichosanthes coriacea Blume, Bijdr. Fl. Ned. Ind. (1826) 935; Miq., Fl. Ind. Bat. 1, 1 (1856) 674; Cogn. in A.D.C. & CDC, Mon. Phan. Prodr. 3 (1881) 355; Backer in Backer & Bakh. f. Fl. Java 1 (1963) 303; Rugayah & W.J. de Wilde, Blumea 42, 2 (1997) 477. - Type: *Blume s.n.* (L), Mt. Salak, W. Java.

DISTRIBUTION - W Java (Mt. Salak), S & C Sumatra.

6. TRICHOSANTHES CUCUMERINA L.

a. var. CUCUMERINA

Trichosanthes cucumerina L., Sp. Pl. (1753) 1008; Blume, Bijdr. Fl. Ned. Ind. (1826) 933; Miq., Fl. Ind. Bat. 1, 1 (1856) 676; Cogn. in A.D.C. & CDC, Mon. Phan. Prodr. 3 (1881) 357; Ridl., Fl. Mai. Penins. 1 (1922) 844; Backer in Backer & Bakh. f. Fl. Java 1 (1963) 304; Jeffrey, The Cucurbitaceae of Eastern Asia, Roy. Bot. Gard., Kew (1980) 51; Rugayah & W.J. de Wilde/Blumea 42, 2 (1997) 478. - Type: Pada valam, p.39, tab. 15 in Rheede, Hort. Ind. Malab. 8 (1688), fide Jeffrey (1980).

Trichosanthes reniformis Miq., Fl. Ind. Bat. 1, 1 (1856) 675. - Type: *Horsfield s.n.* (BM), Java.

Trichosanthes pedatifolia Miq., Fl. Ind. Bat. 1, 1 (1856) 677. - Type: *Horsfield s.n.* (BM), Java.

DISTRIBUTION - Wide-spread; India, Sri Lanka, S China, through Malesia eastward to N Australia.

b. var. ANGUINA (L.) Haines

Trichosanthes cucumerina L. var. *anguina* (L.) Haines, Bot. Bihar Orissa (1922) 388; Jeffrey, The Cucurbitaceae of Eastern Asia, Roy. Bot. Gard., Kew (1980) 52; Rugayah & W.J. de Wilde, Blumea 42, 2 (1997) 478. - *Trichosanthes anguina* L., Sp. Pl. (1753) 1008; Blume, Bijdr. Fl. Ned. Ind. (1826) 933; Miq., Fl. Ind. Bat. 1, 1 (1856) 677; Cogn. in A.D.C. & CDC, Mon. Phan. Prodr. 3 (1881) 359; Backer in Backer & Bakh. f. Fl. Java 1 (1963) 304. - Type (lectotype, Jeffrey, 1993): 'Anguina', Micheli, Nov. Pl. Gen.: t. 9. 1729.

DISTRIBUTION - Wide-spread; cultivated.

7. *Trichosanthes densiflora* Rugayah, *sp. nou.*

Trichosanthes bracteata auct. non Voigt: Harms, Bot. Jahrb. 60 (1925) 160, *p.p.*

Cirrhii bifidi, inflorescentiae masculae rhachis 11-13 cm longus 3(-5) mm crassus multiflorus, bracteae 30-45 mm longae subintegrae. - Type: *Von Roemer 706* (BO), Irian Jaya.

Climber, dioecious; glabrescent (but see note). Probract c. 5 mm long. Tendrils 2-fid (one branch much reduced). Leaves unlobed, subhastate; margin minutely nearly spiny dentate. Blade glands small, several at very blade base. Male: raceme 17-19 cm long, peduncle 4.5-6 cm long included, rachis stout, with bract scars, 11-13 cm long, (3-)5 mm thick; flowers many; bracts obovate-oblong, 30-45 mm long, membranous, subentire, with few scattered glands less than 1 mm diam.; male flowers incompletely known. Female flowers not known. Fruit ± fleshy, ellipsoid(-oblong), 6-8 by 4.5 cm, shortly contracted at base (when dry), fruiting pedicel c. 3 cm long, c. 3 mm thick. Seed flat, narrowly oblong, ± parallel-sided, notched at apex, cuneate at the other end, 10-13 by 4-5 mm, c. 1 mm thick, margin faint, edge entire.

DISTRIBUTION - New Guinea (SW Irian Jaya; Papua New Guinea: Western Highlands, West Sepik). - Collections: *Flenley ANU 2703*; *Henty et al. NGF 41616*; *Von Roemer 706*.

HABITAT & ECOLOGY - Montane area; 1500-1700 m altitude.

NOTE — Known from a few scattered collections, which differ in details. *Eyma 5123* (from Wissel Lake area in Irian Jaya), is provisionally mentioned here; it differs markedly in conspicuous dense red-brown indumentum, and possibly it represents a separate taxon, but with its immature female flowers it does not permit an adequate description.

8. *Trichosanthes dentifera* Rugayah, *sp. nov.*

Folia elobata late ovata cordata margine integro, cirrhi 2- vel 3-fidi, fructus longitudinaliter vadoso sulcatus, 10-12 cm longus 6-7 cm latus, semen oblongum 12-13 mm longum c. 5 mm latum c. 2 mm crassum apice emarginato basi cuneata margine integro. — Type: *McGregor s.n.* (anno 1890) (MEL), Papua New Guinea.

Climber, dioecious, glabrescent, drying (dark) greenish brown. Probract oblong, 3-4 mm long, entire, glands not obvious. Tendrils 2 or 3-fid. Leaves unlobed, ovate, base cordate, margin entire with minute remote teeth only. Blade glands several to many, c. 0.5 mm diam. Male flowers incompletely known. Female sepals linear, c. 12 mm long, entire. Fruit (dry) ellipsoid or ellipsoid-oblong, 10-12 by 6-7 cm, shallowly lengthwise grooved; fruiting pedicel c. 2.5 cm long, c. 6 mm thick. Seed brown, flat, oblong, 12-13 by 5 mm, c. 2 mm thick, ± notched at apex, cuneate at base, margin obscure, edge (sub)entire.

DISTRIBUTION - E Papua New Guinea and W Pacific area (Bougainville, New Hebrides). - Collections: *Brass 1533*; *McGregor s.n.* (anno 1890); *Kajewski 1936*; *Raynal RSNH16306*.

HABITAT & ECOLOGY - Coastal forest and scrub.

9. *TRICHOSANTHES DIENIENSIS* Merr. & Perry

Trichosanthes dieniensis Merr. & Perry, Journ. Arn. Arb. 30 (1949) 59. - Type: Brass 3898 (A; iso K, US), Papua New Guinea.

DISTRIBUTION - Papua New Guinea.

10. *Trichosanthes edulis* Rugayah, *sp. nov.*

Racemus masculus pilis lanatis ferrugineis 2-3 mm longis obiectus, bracteae obovatae 10-25(-40) mm longae margine superiore undulato vel vadose plusminusve dentato, fructus (10-15-25 cm longus 5-7 cm latus. Semina dense farcta margine integro vel subtiliter crenulato. - Type: *Streimann NGF 30731* (L; iso BRI, CANB, LAE), Papua New Guinea.

Medium sized climber; dioecious; brown pubescent, usually largely glabrescent. Probract elliptic or oblong, 5-15 mm long, often caducous. Tendrils 2-4-fid. Leaves unlobed or 3-7-lobed to 1/3-5/6. Blade glands few or many, c. 1 mm diam. or less, mostly scattered. Male: raceme 10-25(-55) cm long, with woolly rusty hairs 2-3 mm long; peduncle 4-16(-20) cm long, rachis slender or stout, with bract scars; bracts chartaceous or coriaceous, ovate-rhomboid, 10-15(-40) mm long, upper margin undulate or coarsely dentate; sepals narrowly triangular or ovate-elliptic, 5-15 mm long, margin entire or lobed (or incised). Ovary ellipsoid or oblong, densely brown hairy. Fruit pyriform or oblong, (10-)15-25 cm long, c. 5 cm diam.; pulp red; fruiting pedicel (3-)4-10 cm long. Seed densely packed, (pale) brown or blackish, flat, narrowly oblong (\pm parallel-sided), or obtriangular, notched at one or both ends, 10-15 by 4-8 mm, 1-2 mm thick, lateral sides \pm depressed in the centre or not, margin broad, edge entire or faintly crenulate towards the apex.

DISTRIBUTION - Whole of New Guinea; 3 varieties.

Key to the varieties

- 1 a. Leaves deeply 5-7-lobed, margin coarsely irregularly dentate. Plant (especially the tendrils) rather sparsely hirsute.....c. var. *septemloba*
- b. Leaves 3-lobed or \pm unlobed, margin entire (except minute dents).....2
- 2 a. Plant drying greenish. Male bracts rather shallowly undulate in upper margin. Seed 12-15 by 4-5 mm. Degraded places, but not cultivated; up to c. 1200 ma. var. *edulis*
- b. Plant drying dark brown. Male bracts coarsely dentate. Seed 10-12 by 5-8 mm. Montane at 1000-2500 m, cultivated.....b. var. *sativa*

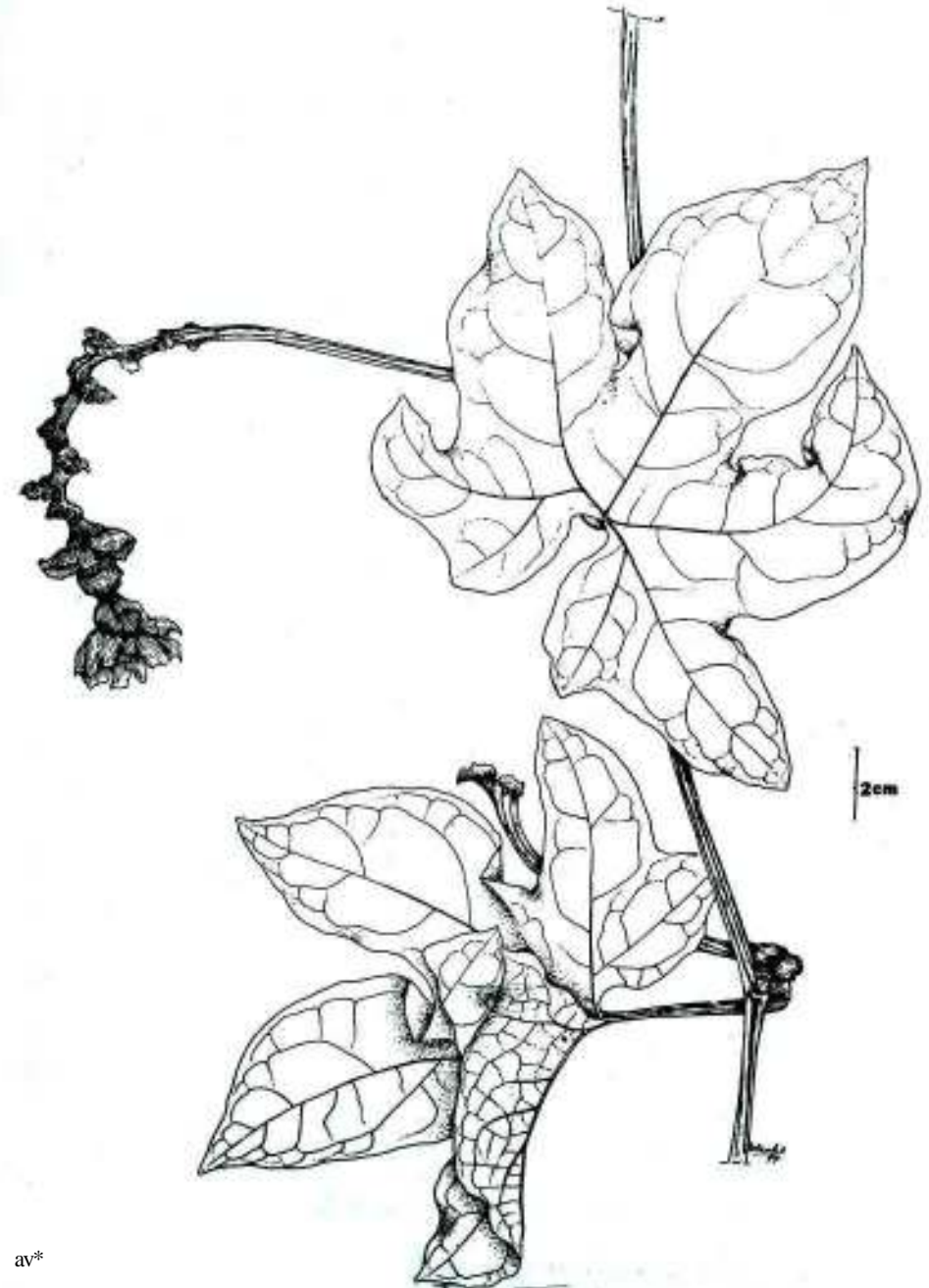


Fig. 2. *Trichosanthes edulis* Rugayah var. *edulis*. Twig and male flower (*Streimann NGF 25890*, L)

a. var. *EDULIS* - Fig. 2

DISTRIBUTION - New Guinea (Irian Jaya, Papua New Guinea). - Collections: *Brass 1359*; *Clemens 2179*; *Damas LAE 58939* (L, p.p.); *Fryar NGF 3993*; *Hartley TGH 9871, TGH 10505*; *Henty & Osborn NGF 14804*; *Streimann NGF 25890, NGF 30731*; *Takeuchi 7170*; *Womersley 17613*.

HABITAT & ECOLOGY - Secondary growth and degraded forest in logged areas; also in swampy places; 0–1500 m altitude.

USES - Apparently never cultivated, but fruit frequently recorded as edible.

NOTE — Most collections of the typical variety are from E Papua New Guinea. One collection, *Kalkman 4401* from Star Mountains (at c. 1500 m), deviates by smaller flowers. Three collections from Vogelkop, from lower altitudes, up to 450 m, viz *Ave 4076*, *Polak 850*, *Vink 17576*, are tentatively included in the present variety; they agree vegetatively, but differ in the seed which is broadly obtriangular (not parallel sided), approaching the cultivated, mountainous var. *sativa* in this respect. More material, and preferably field study is needed to establish the status of the present varieties.

b. var. *sativa* Rugayah, var. nov.

Florum masculinum bracteae margine grosse vadose dentato, fructus plusminusve pyriformis c. 15 cm longus. — Type: *Vink 16350* (L; iso CAN, LAE), Papua New Guinea.

Leaves drying dark brown, usually 3-5-lobed to c. 1/3-way. Male: peduncle not seen; bracts irregularly dentate. Fruit pyriform-ellipsoid, 15-20 cm long (c. 25 cm long when fresh), c. 5 cm wide; fruiting pedicel c. 4.5 cm long; seed narrowly oblong or obtriangular, parallel-sided, 10–12 by 5–8 mm, c. 1 mm thick, notched at one or both ends, not grooved in the middle; edge entire or finely crenulate.

DISTRIBUTION - Papua New Guinea. - Collections: *Barran NG-9-15*; *Borgmann 323*; *Carr 15654*; *Hamilton 55*; *Hays 451*; *Hiepko et al. 1110*; *Hyn 182*; *Panoff NGF 133*; *Sterley 1615*; *Vink 16350*.

HABITAT & ECOLOGY - Cultivated, 1000-2500 m altitude.

c. var. *septemloba* Rugayah, var. nov. - Fig. 3

Planta omnis pubescens cirrhis inclusis. Folia profunde 5-7-lobata margine irregulariter grosse dentato. - Type: *Stevens LAE 54823* (L; iso BRI, CANB, LAE), Papua N4w Guinea.



Fig. 3. *Trichosanthes edulis* var. *septemloba* Rugayah. Twig and male flower. (*Stevens LAE 54323*, L)

Whole plant softly brown pubescent. Leaves drying (dark) brown, pubescent at both sides. Blade deeply (5-)7-lobed to 3/4-5/6, margin coarsely irregularly dentate. Tendrils 3-fid, markedly pubescent. Probract oblong, 10-15 mm long. Male: raceme 10-17 cm long, including the 9-15 cm long peduncle; bracts 20-30(-40) mm long, subentire or minutely incised at very apex. Female flowers and fruit not known.

DISTRIBUTION - Papua New Guinea (Morobe Prov.). - Collections: *Brass* 5445; *Damas LAE* 58939; *Lane Poole* 375; *Stevens LAE* 54823.

HABITAT & ECOLOGY - Secondary forest borders and scrub; 800-1600 m altitude.

11. *TRICHOSANTHES ELLIPSOIDEA* Merr.

Trichosanthes ellipsoidea Merr., Philipp. Journ. Sc, Bot. 13 (1918) 332. - Type: *BS 30364 Ramos* (PNH; iso K, US), Philippines.

DISTRIBUTION - Sarawak, Philippines.

12. *TRICHOSANTHES ELMERI* Merr.

Trichosanthes elmeri Merr., Univ. Calif. Publ. Bot. 15 (1929) 299. - Type: *Elmer 20298* (PNH; iso BR, CANB, U), Sabah.

DISTRIBUTION - Sumatra, Peninsular Malaysia, Borneo, Philippines.

13. *Trichosanthes emarginata* Rugayah, *sp. nov.* — Fig. 4

Probractea oblonga, folia profunde 5-lobata, semen apice emarginato. - Type: *De Wilde & Duyfjes 14862* (L; iso BO, K), N Sumatra.

Climber, 5–20 m long; dioecious(?); glabrescent. Probract oblong, c. 4 mm long, with few glands. Tendrils 2-fid. Leaves chartaceous, deeply 5-lobed to 4/5, margin entire. Blade glands absent or few, c. 1 mm diam. or less, near the blade base. Male: raceme 15-22 cm long, thinly hairy, peduncle 13-18 cm long, rachis c. 3 mm thick; bracts obovate rhomboid, 40-55 mm long, at apex faintly or distinctly dentate, without glands; sepals oblong-lanceolate, 13-15 mm long, at base 4-5 mm wide, entire. Fruit broad ellipsoid, 10-14 by 6-8 cm, dry pericarp (5-) 10-15 mm thick; fruiting pedicel c. 5 cm long, two-coloured, with a smooth part c. 1 cm long at the side of the fruit. Seed oblong, 15-18 by 7-10 mm, 3-5 mm thick, conspicuously notched at apex, margin not obvious, edge entire.

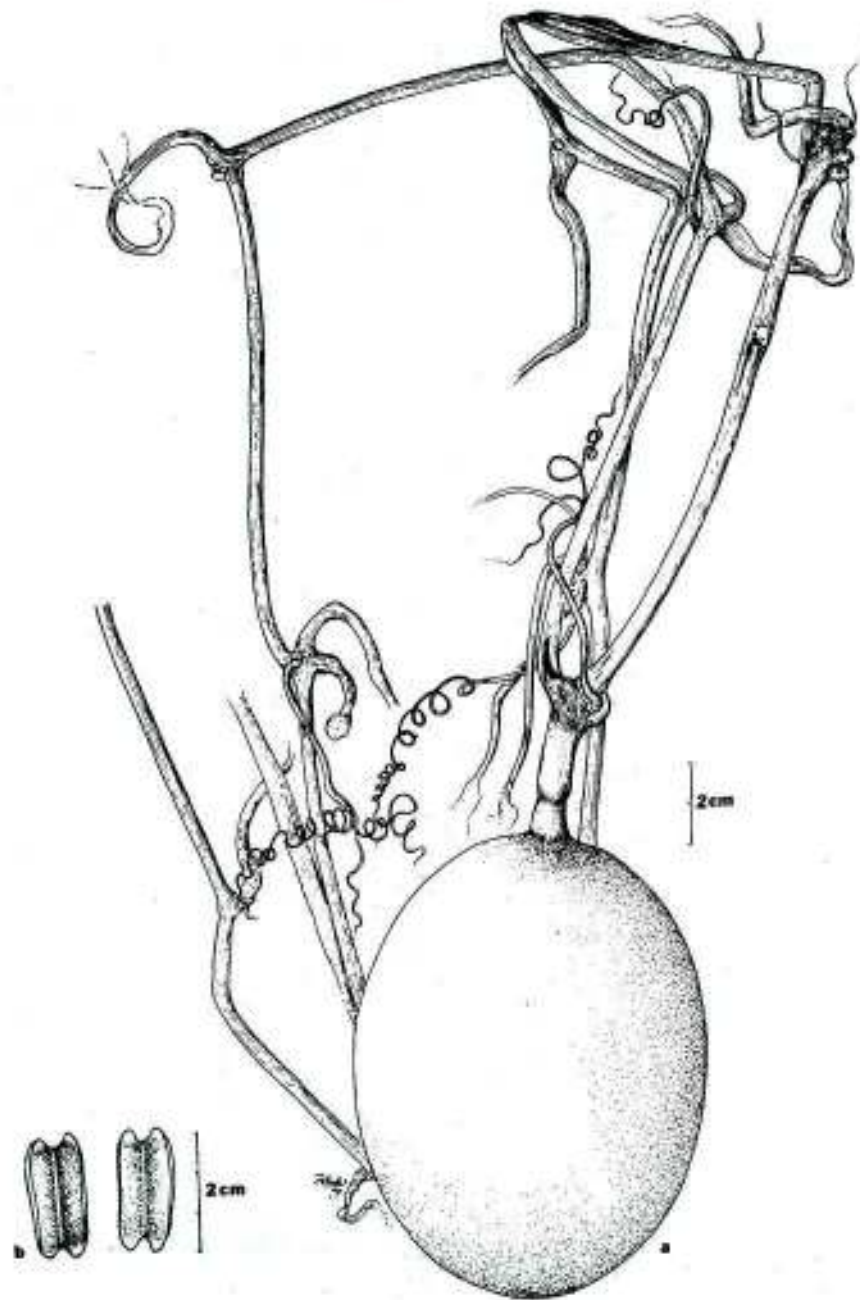


Fig. 4. *Trichosanthes emarginata* Rugayah. a. fruit; b. seed. (*De Wilde & Duyfjes 14862*, L.)

DISTRIBUTION - N Sumatra. - Collections: *Lbrzing 8347*; *Be Wilde & Duyfjes 14862*.

HABITAT & ECOLOGY - Forest edge, and along river; 200-400 m altitude. Plant died off when with ripe fruit.

NOTE - Insufficiently known, but distinct by ellipsoid fruit with 2-coloured fruiting pedicel, and conspicuously notched seed. It has the 2-coloured fruiting pedicel in common with *T. borneensis*, which differs in globose fruit and seed not notched at apex.

14. *Trichosanthes floresana* Rugayah, *sp. nov.* — Fig. 5

Folia 3—5-foliolata, fructus 4—8 cm longus, pedicello 1—15 cm longo, semen 11-16 mm longum 6-10 mm latum 3-5 mm crassum. - Type: *Schmutz 4614* (L), Flores.

Climber, dioecious; early glabrescent. Probract ovate-elliptic, 5-10 mm long, glands not obvious. Tendrils 2 or 3-fid. Leaves subcoriaceous, 3—5-foliolate, margin entire. Blade glands not apparent. Male: raceme 10-16 cm long, sparsely pubescent; peduncle c. 8 cm long; bracts obovate-rhomboid, 20-35 mm long, glandular, entire or shallowly or deeply incised; sepals narrowly triangular, 15 mm long, entire. Fruit subglobose-ovoid, 4—8 by 3—6 cm; fruiting pedicel 1—15 cm long, 3—4 mm thick. Seed \pm flat, ovate-oblong, 11—16 by 6—10 mm, 3—5 mm thick, margin absent, edge entire.

DISTRIBUTION - Lesser Sunda Islands (Flores). - Collections: *Loeters 1397a.*; *Schmutz 1287, 4385, 4614*; *Verheijen 4282*.

HABITAT & ECOLOGY - Secondary forest; 400-650 m altitude.

NOTE — Close to *T. celebica* and *T. wawrae*; distinct by subcoriaceous leaves, and comparatively small fruit with short fruiting pedicel.

15. *TRICHOSANTHES GLOBOSA* Blume

Trichosanthes globosa Blume, *Bijdr. Flora Ned. Ind.* (1826) 936; *Miq., Fl. Ind. Bat.* 1, 1 (1856) 679; *Cogn. in A.D.C. & CDC, Mon. Phan. Prodr.* 3 (1881) 363; *Backer in Backer & Bakh. f., Fl. Java* 1 (1963) 304; *Rugayah & W.J. de Wilde, Blumea* 42, 2 (1997) 478. - *Involucraria globosa* (Blume) M.J. Roemer, *Syn. Fasc.* 2 (1846) 99. - Type: *Blume s.n.* (L; iso BR, P), Java.

Trichosanthes grandiflora Blume, *Bijdr. Fl. Ned. Ind.* (1826) 934; *Miq., Fl. Ind. Bat.* 1, 1 (1856) 674; *Cogn. in A.D.C. & CDC, Mon. Phan. Prodr.* 3 (1881) 364. - Type: *Blume s.n.* (L; iso BR, P), Java.

DISTRIBUTION - Sumatra, Java, Borneo.

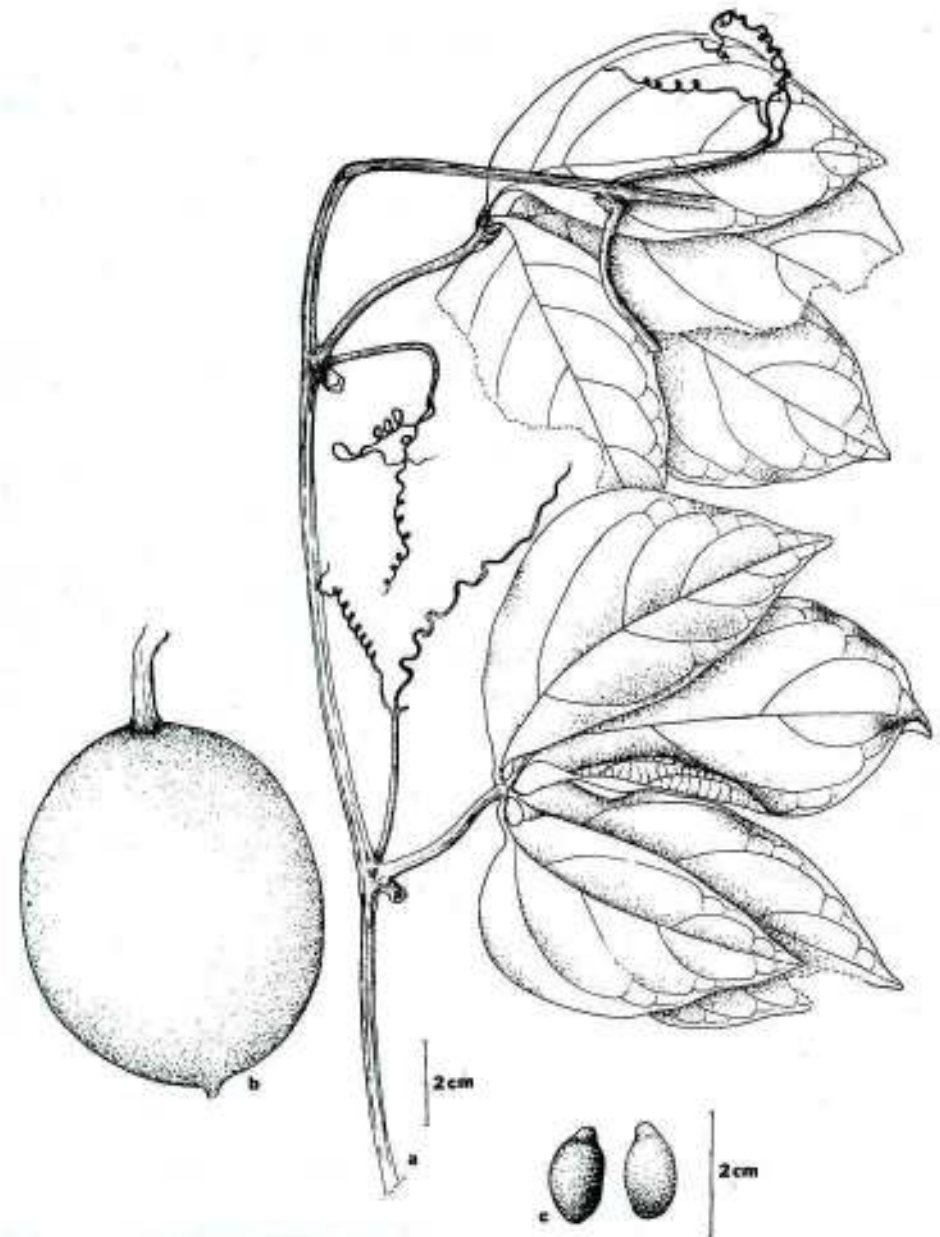


Fig. 5. *Trichosanthes floresana* Rugayah. a. habit; b. fruit; c. seed. (*Schmutz 4385, L.*)

16. *TRICHOSANTHES HASTATA* Harms

Trichosanthes hastata Harms, Engl. Bot. Jahrb. 60 (1925) 160. - Type: *Schlechter* 19286 (B, lost; iso BR), Papua New Guinea.

DISTRIBUTION - Papua New Guinea.

17. *Trichosanthes kinabaluensis* Rugayah, *sp. nou.* — Fig. 6

Caulis 5-angulatus rubelle suffusus, florum masculorum bractee grosse incisae, semen oblongum c. 10 mm longum 3-4 mm latum, basi cuneata. - Type: *Chew, Corner & Stainton* 2830 (BO; iso K, L, SAN), Sabah or *De Wilde & Duyffjes* SAN 139472 (SAN holo; L iso)

Climber or creeper, dioecious; stem 4 or 5-angular or winged, young parts pubescent, pink-purple tinged. Probract oblong-lanceolate, c. 1 cm long. Tendrils 2-fid. Leaves shallowly 3-5-lobed up to 1/3, margin \pm undulate-dentate. Blade glands few, (0.5-)1-2 mm diam., near the insertion of the petiole. Male: raceme stout, peduncle 7-16 cm long, rachis 4-12 (or more) cm long; bracts \pm rhomboid, 30-45 mm long, deeply irregularly incised at apex, without or with few glands; flowers large, sepals long-triangular, 10-17 by 3-5 mm, usually coarsely dentate or entire. Fruit globose, 5.5-7.5 cm diam.; fruiting pedicel 15-2.5 cm long, 4-7 mm thick. Seed flat, elliptic, c. 10 by 3-4 mm, 1-2 mm thick, base \pm cuneate, margin obscure, edge entire.

DISTRIBUTION - N Sabah (Kinabalu and Crocker Range area). - Collections: *Beaman et al.* 7171; *Chew et al.* 2830; *Clemens* 26250, 29041 (in L for the leaves only, the detached fruit is *T. montana*), 32076; *Kokawa & Hotta* 3011; *Maikin et al.* SAN 132160; *Ogata* 11278; *Vermeulen & Chan* 414; *De Wilde & Duyffjes* 21956, 21950, SAN 139460, 139472.

HABITAT & ECOLOGY - Secondary roadside vegetation, forest and scrub edges; 1000-1600 m altitude.

18. *TRICHOSANTHES LAEOICA* Cheng & Huang

Trichosanthes laeoica Cheng & Huang, *Bull. Bot. Research (Beijing)* 16(4) (1996) 503, f. 2. - Type: *Coode, Henty & Dockrill* NGF 32585 (CANB; iso BO, K, L), Papua New Guinea.

DISTRIBUTION — Whole of New Guinea; 4 forms.

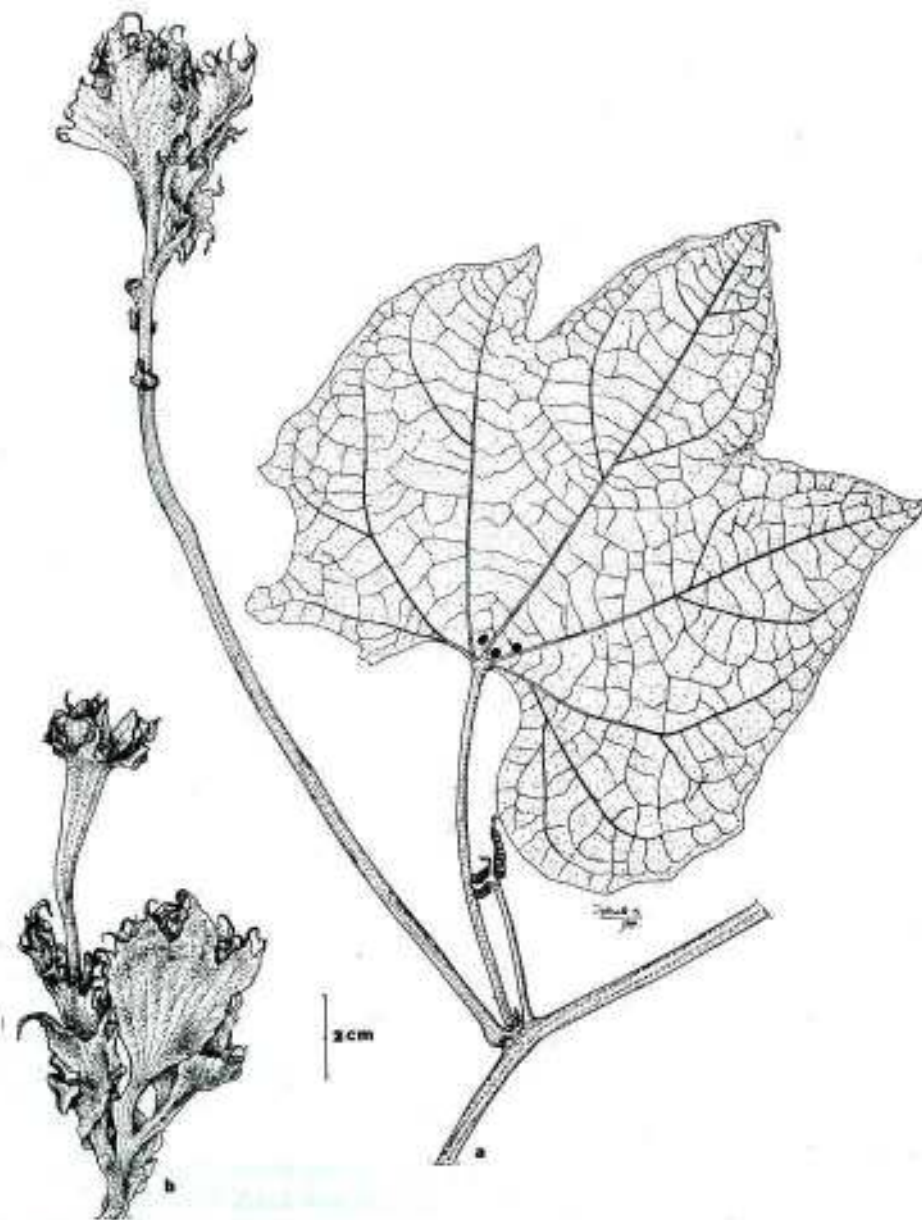


Fig. 6. *Trichosanthes kinabaluensis* Rugayah. a. habit, b. male flower. (*De Wilde & Duyffjes* 21956, BO)

Key to the forms

- 1 a. Leaves unlobed, lower surface glabrous; fruit pyriform, exocarp ± smooth. - Papua New Guinea...v.....b. forma *sicyocarpa*
 b. Leaves unlobed or shallowly 3-lobed, or 3-angular, lower surface densely hairy or glabrescent.....2
- 2 a. Fruit (sub)globose or short ellipsoid, exocarp woody, smooth. - Irian Jaya: Bird's Head (Sorong area).....c. forma *sorongensis*
 b. Fruit ellipsoid-oblong, exocarp wrinkled (not completely known in forma *laeoica*).....3
- 3 a. Male flower 40-50(-80) mm long. - Papua New Guinea: Eastern Highlands Prov.....a. forma *laeoica*
 b. Male flower c. 35 mm long. - Western Irian Jaya.....d. forma *yapenensis*

a. forma LAEOICA

Leaves unlobed, 3—5-angular or shallowly 3-lobed, greenish brown on drying, pubescent on lower surface. Male raceme with solitary flower (the pedicel often as a straw-like remnant) at base. Male flowers: pedicel c. 5 mm long, c. 75 mm in solitary flowers; receptacle tube (40-)50—80 mm long. Fruit not completely known, c. 5 cm wide; exocarp finely wrinkled, glabrous.

DISTRIBUTION — Papua New Guinea: Eastern Highlands Prov. — Collections: *Clarke 88; Coode et al. NGF 32585.*

HABITAT & ECOLOGY - Secondary forest, at c. 1400 m altitude.

NOTE — Fruit said to be red when ripe; fruit edible.

b. forma *sicyocarpa* Rugayah, / *nov.*

Folia integra infra glabrescentia, fructus pyriformis c. 20 cm longus. — Type: *Brass 5347* (BO; iso BRI), Papua New Guinea.

Leaves unlobed, broadly ovate, margin entire or shallowly undulate, green or brown (blackish) on drying, lower surface glabrous. Male raceme and male and female flowers not known. Fruit oblong or pyriform (precise size and shape not known), c. 20 by 8 cm; exocarp thinly woody, smooth, glabrous, paler blotched when dry; fruiting pedicel c. 3 cm long, c. 8 mm thick.

DISTRIBUTION - Papua New Guinea (Central Prov., Morobe Prov.). - Collections: *Brass 5347; Clarke ANU 9557; Katik LAE 77807a.*

HABITAT & ECOLOGY - Secondary regrowth forest at 900-1400 m altitude.

NOTE - **Fresh fruit orange to red, cucumber-like**; sometimes cultivated.

c. forma *sorongensis* Rugayah, / *nov.*

Folia integra vel vadosa 3-lobata infra pubescentia, fructus subglobosus vel breviter ellipsoideus c. 10 cm diam. - Type *Avé 4782* (L), Irian Jaya (Vogelkop).

Leaves unlobed or 3-lobed to c. 1/4, greenish on drying, lower surface densely pubescent, glands many, scattered. Male raceme, and male flowers and female flowers not known. Fruit (sub)globose or short-ellipsoid, 7.5-12.5 by 8-10 cm (spirit); exocarp thinly woody, smooth, sparsely hairy; fruiting pedicel 15—3 cm long, 4—6 mm thick.

DISTRIBUTION - New Guinea, Irian Jaya (Vogelkop). - Collections: *Avé 4782; De Vogel 9817.*

HABITAT & ECOLOGY - Secondary forest, margin of garden, at c. 450 m altitude.

NOTE — Fruit red when ripe, inside orange-red; edible.

d. forma *yapenensis* Rugayah, / *nov.*

Folia integra subcircularia vel plusminusve triangularia supra scabra infra breviter pubescentia vel subglabrescentia, flores masculi c. 5 cm longi, fructus c. 10 cm longus 5 cm latus. - *Widjaja et al. EAW 6882* (BO; iso L), Irian Jaya (Yapen I.).

Leaves unlobed or 3-lobed 1/3—2/3 deep, green or brown on drying, scabrous on both surfaces, lower surface scabrous hairy or glabrous. Male raceme at base with straw-like appendage(s) presenting withered peduncle or pedicel of solitary flower. Male flower: pedicel c. 5 mm long; receptacle tube c. 35 mm long. Fruit ellipsoid-oblong, c. 10 by 5 cm (c. 12 by 6 cm in spirit), leathery, finely wrinkled; fruiting pedicel c. 3.5 cm long, c. 4 mm thick.

DISTRIBUTION - Irian Jaya: Bird's Head (S of Manokwari), Yapen I., Wapoga Drilling Camp (3.08 S, 136.34 E). - Collections: *Aet & Idjan 957; Kanehira & Hatusima 13392; Ridsdale CER 2559; Widjaja et al. EAW 6882, 6968.*

HABITAT & ECOLOGY - Secondary forest, roadsides; sea level to c. 1000 m altitude.

NOTE - Fruit edible.

19. *Trichosanthes leuserensis* Rugayah, *sp. nov.*

Folia 3-5-lobata scabra rubella in sicco, probractea ovata at linearis 10-15 cm longa, fructus subglobosus c. 8 cm diam., pedicello c. 4 mm crasso, semen 15—18 mm longum 3-4 mm crassum. - Type: *de Wilde & Duyffjes 18605* (BO; iso K, L), Sumatra (Aceh).

Medium liana, 10–20 m long; monoecious (always?). Stem and leaves drying reddish-brown. Probract obovate to linear, 10–15 mm long. Tendrils 2 or 3-fid. Leaves early glabrescent but \pm scabrous above, 3–5(-7)-lobed to 1/2–2/3, margin remotely minutely dentate. Blade glands few, 0.5–1 mm diam., at base near the insertion of the petiole, and near apex. Male: raceme 10–20 cm, peduncle 6–11 cm long; rachis not thickened, 2–4 mm thick; bracts broadly ovate-rhomboid, 3–4.5 cm long, without glands, shallowly or deeply (up to 10 mm) incised; sepals long-triangular (ovate-oblong), 13–15 mm long, margin mostly dentate. Female flower solitary or 1 or 2 at base in male raceme. Fruit subglobose, 6–8 by 4.5–8 cm, dry pericarp 10–15 mm thick; fruiting pedicel 0.5–1.5 cm long, c. 4 mm thick. Seed flat, elliptic-oblong (various of shape), 15–18 by 6–11 mm, 3–4 mm thick, margin absent, edge entire.

DISTRIBUTION - C & N Sumatra. - Collections: *Ldrzing* 5212, 5215, 6149; *Nur* 7406; *De Wilde & Duyffjes* 18605, 20060.

HABITAT & ECOLOGY - Forest borders, scrub along rivers; 60–600 m altitude.

NOTE — Close to *T. pubera* (with similar reddish tinge of young parts), but *T. pubera* differs in elongated probract, smaller ellipsoid fruit, and thinner seed.

20. *Trichosanthes longispicata* Rugayah, *sp. nov.* - Fig. 7

Folia profunde 3–5(-7)-lobata, racemus masculus ad 30 cm longus bracteis numerosis persistentibus 7–12 mm longis, fructus globosus, pedicello 10–20 mm crasso. - Type: *Yii & Othman* S 46270 (L; iso BO, K, SAR), Sarawak.

Climber, c. 5 m long, dioecious, glabrescent, drying dark brown. Probract lanceolate, 4–5 mm long. Tendrils 2–3-fid. Leaves deeply 3–5(-7)-lobed, margin entire. Blade glands absent or few, c. 1 mm diam. Male: raceme 14–32 cm long, peduncle 2–5 cm long, rachis not thickened, many-flowered, bracts persistent, (ob)ovate-oblong, 7–10 mm long, conspicuously dentate, pedicels persistent, 3–11 mm long; sepals lanceolate, c. 4 mm long, entire. Female flowers not known. Fruit (depressed) globose, c. 7.5 cm diam., dry pericarp c. 10 mm thick; fruiting pedicel 2–2.5(-3) cm long, 10–20 mm thick. Seed flat, narrowly oblong, c. 18 by 5–8 mm, c. 2 mm thick, margin faint, edge entire.

DISTRIBUTION - Borneo (Sarawak, Sabah, Kalimantan). - Collections: *Amdjah* 72, 748; *Hallier* 1200; *Hyde et al.* s.n.; *Jaheri* 1113; *Fidilis* SAN 130111; *Teysmann* 8240; *Yii & Othman* S 46270.

HABITAT & ECOLOGY - Lowland forest.



Fig. 7. *Trichosanthes longispicata* Rugayah. Twig and male flower (*Yii & Othman* S 46270, L.)

NOTE -The homogeneity of the specimens cited is not sure. Possibly the male specimen *SAN 130111*, differs in shorter persistent pedicels, c. 3 mm only, larger bracts, and the basal part of the hypanthium tube thickened into a pseudo-ovary.

21. TRICHOSANTHES MONTANA Rugayah

Trichosanthes montana Rugayah Reinwardtia 11(3) (1998) 218. - *Trichosanthes sumatrana* auct. non Cogn.: Rugayah & W.J. de Wilde, *Blumea* 42, 2 (1997) 479, f. 4. - Type: *De Wilde & Duyffes 21841* (BO; iso L), W Java.

DISTRIBUTION - Sumatra, Java, N Borneo.

22. *Trichosanthes mucronata* Rugayah, *sp. nov.*

Planta omnis cinereo-brunnea pubescens, folii apex 10–20(–25) mm longus mucronatus, racemus masculus brunnea pubescens 6–10 cm longus pauciflorus. — Type: *De Wilde & Duyffes SAN 139464* (SAN holo; BO, L iso), Sabah (Tenompok).

Climber, c. 5 m long, dioecious, drying greenish, grey-brown pubescent all over. Probract absent. Tendril 3–5-fid. Leaves unlobed, (broadly) ovate, densely pubescent, base cordate, apex 10–20(–25) mm long mucronate, margin minutely serrate-dentate. Blade glands several, scattered, less than 0.5 mm diam. Male: raceme 6–10 cm long, sparsely to densely brown hairy; peduncle 4–8(–9) cm long, c. 3 mm thick, flowers few, brown hairy; bracts c. 1 mm long, caducous; receptacle tube 35–65 mm long, sepals narrowly triangular, acute, 11–16 mm long, entire; petals oblong, c. 15 mm long. Fruit oblong, 9–10 by c. 6 cm, green, white-striped. Seed whitish, turgid with two lateral inflated parts, c. 10 by 18 mm, c. 4 mm thick, margin absent, edge entire.

DISTRIBUTION - Sabah (Mt. Kinabalu area). - Collections: *Makoto Togashi 6718*; *De Wilde & Duyffes 21949* (sterile); *De Wilde & Duyffes SAN 139459, 139463, 139464, 139467, 139473*.

HABITAT & ECOLOGY - Wet places in forest edges, shrubby roadsides; 1000–1400 m altitude.

NOTE - May be related to *T. pendula*, with leaves with similarly long mucronate apex, and with similar seed. Two (sub)sterile resembling collections are mentioned under *T. auriculata*.

23. *Trichosanthes obscura* Rugayah, *sp. nov.*

Planta sordide nigro-brunnea in sicco, florum masculorum bractee late obovoideae profunde flabellatae 15–20 mm longae, fructus globosus c. 8 cm diam., pedicello c. 2 cm longo 5 mm crasso. - Type: *Hansen 968* (L; iso C, SAR), Sarawak.

Climber to 8 m long, dioecious, glabrescent, drying dull (greyish or blackish) dark brown. Probract (ob)ovate, 4–8 mm long, subentire. Tendrils 2 or 3-fid, sometimes pubescent at base. Leaves ± scabrous above, glabrescent beneath, unlobed or 3-lobed to 1/3–2/3, margin subentire. Blade glands few, 1–2 mm diam., or absent, mainly towards the base of the blade. Male: raceme 8–14 cm long (including peduncle 8–10 cm), minutely brown pubescent; bracts broadly obovate-rhomboid, 15–20 mm long, not glandular, the upper margin finely deeply incised; sepals ovate-lanceolate, 5–7 mm long, c. 3 mm wide at base, entire. Fruit globose, c. 8 cm diam. (white spotted when immature); fruiting pedicel c. 2 cm long, c. 5 mm thick. Seed (narrowly) oblong, 18–22 by 7–8 mm, c. 2 mm thick, margin faint (but broad), edge entire.

DISTRIBUTION - N Borneo (Sarawak, Brunei, Sabah, Kalimantan). - Collections: *Hansen 968*; *Ilias Paie S 39228*; *Jaheri 1570*; *Sumbing Jimpin SAN 110399, 116679*; *WONG WKM1581*.

HABITAT & ECOLOGY - Mixed forest, riversides; low altitudes.

24. TRICHOSANTHES OVIGERA Blume

Trichosanthes ovigera Blume, *Bijdr. Fl. Ned. Ind.* (1826) 934; *Miq., Fl. Ind. Bat.* 1, 1 (1856) 674; Cogn. in A.D.C. & CDC, *Mon. Phan. Prodr.* 3 (1881) 380; Backer in Backer & Bakh. f., *Fl. Java* 1 (1963) 303; Jeffrey, *The Cucurbitaceae of Eastern Asia*, *Roy Bot. Gard., Kew* (1980) 49; Rugayah & W.J.J. de Wilde, *Blumea* 42, 2 (1997) 478. - Type: *Blume s.n.* (L; iso P), Java.

Trichosanthes horsfieldii *Miq., Fl. Ind. Bat.* 1, 1 (1856) 677. - Type: *Horsfield s.n.* (K; iso BM), Java.

Trichosanthes vanoverberghii *Merr., Philipp. Journ. Sc. Bot.* 9 (1914) 458. - Type: *Vanoverbergh 3662* (iso K), Philippines (Luzon).

Trichosanthes mafulensis *Merr. & Perry, Journ. Arn. Arb.* 30 (1949) 58. - Type: *Brass 5257* (iso BO), Papua New Guinea.

DISTRIBUTION - Wide-spread, SE Asia through Malesia to N Australia.

NOTE - A very variable taxon. *De Wilde & Duyffes SAN 116493* from Sepilok (Sabah) strongly deviates in obtriangular petals, at variance with narrowly elliptic petals typical for the species.

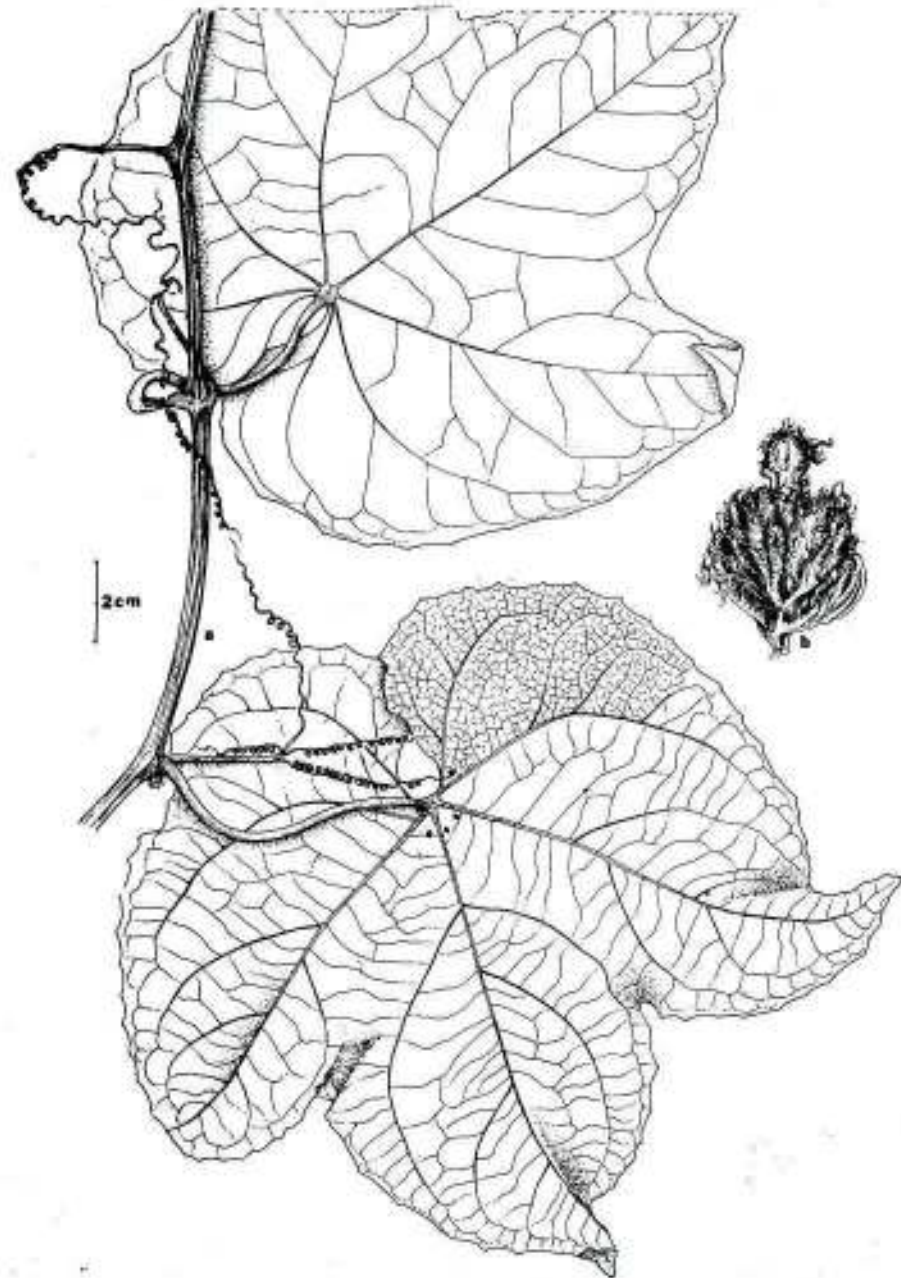


Fig. 8. *Trichosanthes philippinensis* Rugayah. a. habit; b. male flower. (Elmer 11067, L.)

25. TRICHOSANTHES PAPUANA F.M. Bailey

Trichosanthes papuana F.M. Bailey, Queensl. Agric. Journ. 7 (1900) 349; Harms, Bot. Jahrb. 60 (1925) 160. - Type: *Ruthven Le Hunte s.n.* (CANB, n.v.), SE Papua New Guinea.

DISTRIBUTION - Aru I., Papua New Guinea.

26. TRICHOSANTHES PENDULA Rugayah

Trichosanthes pendula Rugayah, Reinwardtia 11(3) (1998) 219, f. 1, 2, 3. - Type: *Joseph B. et al. SAN 120771* (male fl.) (KEP; iso L), Sabah.

DISTRIBUTION - E Sabah.

27. *Trichosanthes philippinensis* Rugayah, *sp. nov.* - Fig. 8

Folia viridescens in sicco 3-lobata, florum masculinorum bracteae plusminusve rhomboideo-obovatae 25-45 mm longae subtiliter ad fere medium incisae. - Type: *Elmer 11067* (L; iso BM, K, U), Philippines (Mindanao).

Climber, dioecious; glabrescent, drying greenish. Probract ovate, 5-8 mm long, glandular. Tendrils 3-fid. Leaves 3 or 5-lobed to 1/3-3/4, margin (coarsely) dentate-serrate. Blade glands few, 0.5-1 mm diam., scattered or near the insertion of the petiole. Male: raceme (including peduncle 5-7 cm long) 10-20 cm long, densely brown pubescent; bracts rhomboid, 25-45 mm long, in apical part densely lacinate 4-15 mm deep; sepals long-triangular, 10-14 mm long, 2-5 mm wide at base, margin finely 1-2 mm deep incised. Fruit ovoid, c. 6.5 by 5-6 cm; fruiting pedicel c. 2 cm long, c. 2 mm thick. Seed obovate-oblong, 10-12 by 4.5-7 mm, c. 2 mm thick, margin obscure or absent, edge entire.

DISTRIBUTION - Philippines (Luzon, Mindanao). - Collections: *ANU 1684; Bartlett 14725; Elmer 11067; Loher 2121; Mendoza PNH 18235; Ramos & Edaño BS 49596.*

HABITAT & ECOLOGY - Degraded and secondary forest; 500-1200 m altitude.

NOTE - Possibly most related to *T. tricuspidata*; variable of leaf shape (depth of lobing), but characterised by green drying colour and the finely and deeply incised male bracts.

28. *Trichosanthes planiglans* Rugayah, sp. nov. - Fig. 9

Folia elobata ovata margine grosse serrato-dentato, laminae glandulae c. 5 mm diam., semen 13-16 mm longum basi cuneata. - Type: *Ramos & Edaiio BS 29110* (US; iso K), Philippines (Luzon).

Slender climber, dioecious, glabrescent, drying greenish. Probract \pm concave, glandular, c. 5 mm long. Tendrils 2-fid. Leaf blade unlobed, membranous, (broadly) ovate, margin coarsely dentate-serrate. Blade glands large, flat, (1-4) 4-5 mm diam., close to the insertion of the petiole. Fruit incompletely known; fruiting pedicel c. 2 cm long, 4 mm thick. Seed flat, \pm lanceolate, 13-16 by 6-7 mm, c. 1.5 mm thick, with cuneate base, margin faint or not obvious, edge entire or indistinctly crenulate.

DISTRIBUTION - Philippines; known only from the type, Mt. Tulaog, Luzon. - Collection: *Ramos & Edaño BS 29110*.

HABITAT & ECOLOGY - nothing known.

NOTE - The seed, with cuneate base, reminds of *T. quinquangulata*.

29. TRICHOSANTHES PUBERA Blume

Trichosanthes pubera Blume, Bijdr. Fl. Ned. Ind. (1826) 936; Miq., Fl. Ind. Bat. 1, 1 (1856) 675; Rugayah & W. J. J. de Wilde, Blumea 42, 2 (1997) 479, f. 1c. - *Trichosanthes bracteata* (Lam.) Voigt var. *pubera* (Blume) Cogn. in A.D.C. & CDC, Mon. Phan. Prodr. 3 (1881) 377. - Type: *Blume s.n.* (L; iso P), Java.

DISTRIBUTION - Wide-spread in W Malesia.

NOTE - This species is close to *T. ruhriflos* Thorel ex Cayla (1908) and *T. wallichiana* (Ser.) Wight (1825).

30. TRICHOSANTHES PULLEANA Harms

Trichosanthes pulleana Harms, Bot. Jahrb. 60 (1925) 160. - *Trichosanthes papuana* Pulle, Nova Guinea 8 (1910) 406. - Type: *Versteeg 1116* (L; iso K, U), Irian Jaya.

DISTRIBUTION - Moluccas (Aru Is.), W Irian Jaya.

31. TRICHOSANTHES QUINQUANGULATA Asa Gray

Trichosanthes quinquangulata Asa Gray, Bot. Un. St. Exo. 1. Exped. 1 (1854) 645; Cogn. in A.D.C. & CDC, Mon. Phan. Prodr. 3 (1881) 378; Rugayah & W.J. de Wilde, Blumea 42, 2 (1997) 479, f. 1a. - Type: *Wilkes s.n.* (GH-A), Mangsi I., Sulu Sea.

Trichosanthes longiflora Cogn. in A.D.C. & CDC, Mon. Phan. Prodr. 3 (1881) 374. - Type: *Beccari 223* (Fl), Irian Jaya (Vogelkop: Sorong).

DISTRIBUTION - Wide-spread in Malesia.

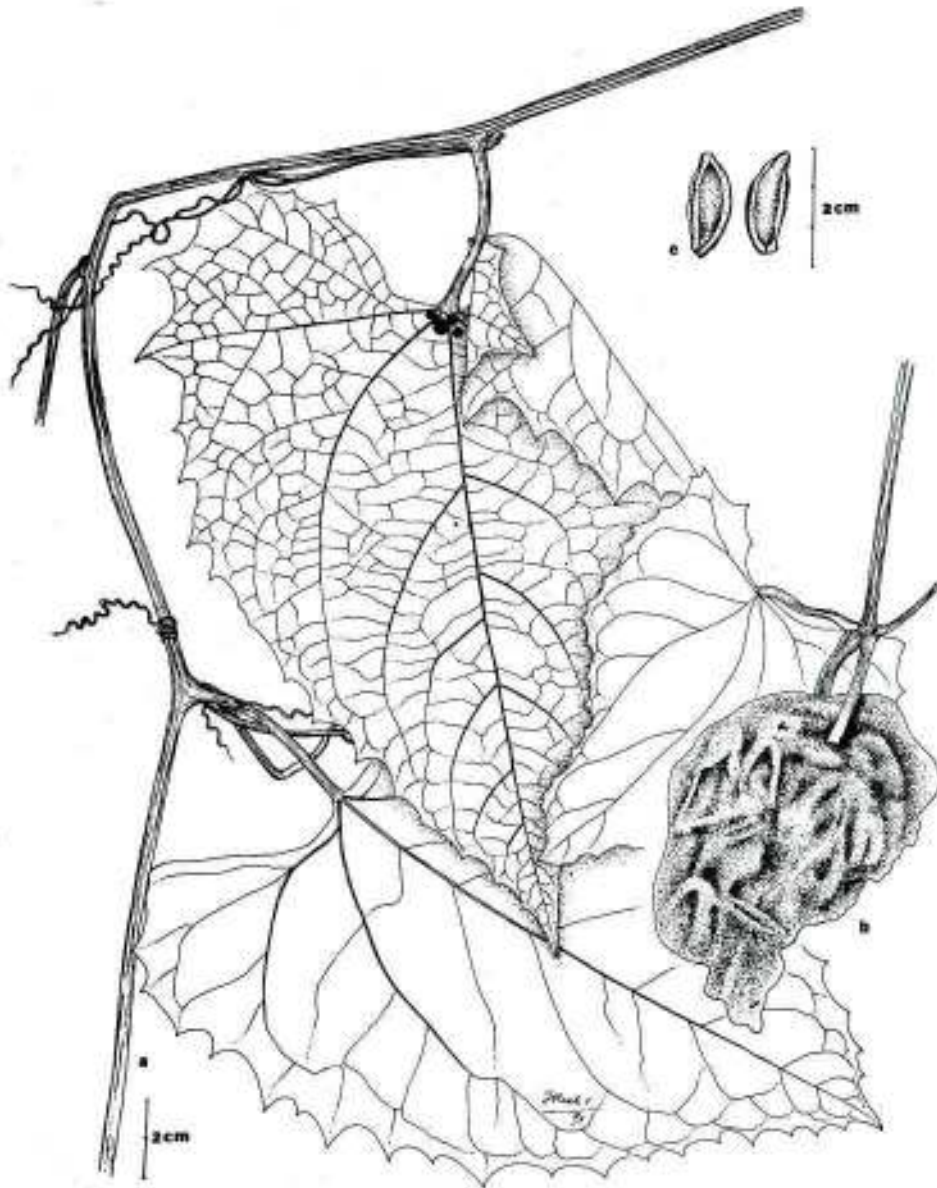


Fig. 9. *Trichosanthes planiglans* Rugayah. a. habit; b. fruit (a part of dried fruit); c. seed. (*Ramos & Edaiio 29910*, US)

32. TRICHOSANTHES REFRACTA Yueh & Huang

Trichosanthes refracta Yueh & Huang, Bull. Bot. Research (Beijing) 16(4) (1996) 500, f. 4. - Type: *M. Ramos BS 43279* (UC), Philippines.

DISTRIBUTION - Brunei, Philippines (Bohol Is.).

33. TRICHOSANTHES ROTUNDIFOLIA Rugayah - Fig. 10

Trichosanthes rotundifolia Rugayah, Reinwardtia 11(3) (1998) 223. - Type: *Lorzing 5284* (BO; iso L), N Sumatra.

DISTRIBUTION - Whole of Sumatra.

34. TRICHOSANTHES SCHLECHTERI Harms

Trichosanthes schlechteri Harms, Bot. Jahrb. 60 (1925) 159. - Type: *Schlechter 16866, 17144, 18079; Gjellerup 718* (B, lost: isolecto BO, L), Irian Jaya.

DISTRIBUTION - Whole of New Guinea.

35. *Trichosanthes sepilokensis* Rugayah, *sp. nov.*

Folia integra vel subtiliter (2- vel) 3-lobata, margine integro. Inflorescentiae masculae rachis c. 5 mm crassus, bracteae 20-30 mm longae, fructus subglobosus c. 13 cm diam., pedicello 15-20 mm crasso. - Type: *De Wilde & Duyffjes SAN 139042* (SAN; iso L), Sabah.

Liana 15-20 m, monoecious. Probract ellipsoid-oblong, 3-4 mm long, entire. Tendrils 4-6-fid. Leaves unlobed or shallowly (2- or) 3-lobed, margin entire. Male: rachis c. 5 cm thick; bracts 20-30 mm long, coarsely irregularly incised; sepals narrowly triangular, 10(—12) mm long, entire. Fruit (sub)globose, 10—13 cm diam.; fruiting pedicel 3.5-4.5 cm long, 15—20 mm thick. Seed brown, flat, (ovate or) elliptic-oblong, 13—18 by 7-9 mm, 3-4 mm thick, margin absent, edge entire.

DISTRIBUTION - Sabah, in the Sepilok area. - Collections: *Sinclair et al. 9341; De Wilde & Duyffjes SAN 139042, 139475.*

HABITAT & ECOLOGY - Lowland (degraded) forest borders; fl. & fr. Jan.-Feb.

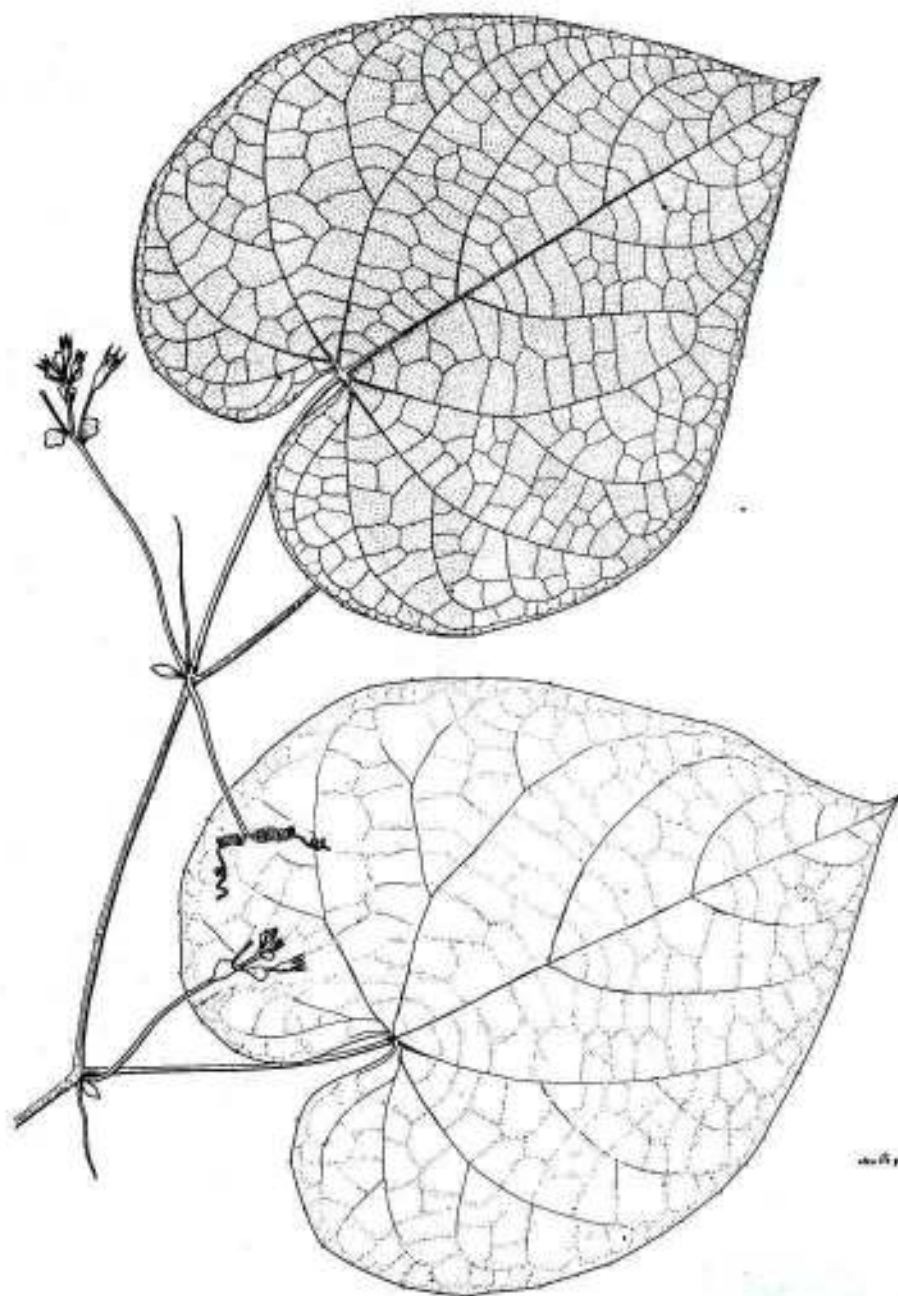


Fig. 10. *Trichosanthes rotundifolia* Rugayah. Twig and male flower. (*De Wilde & Duyffjes 12412, L*)

36. TRICHOSANTHES TRICUSPIDATA Lour.

Trichosanthes tricuspidata Lour., Fl. Cochinch. 2 (1790) 588; Blume, Bijdr. Fl. Ned. Ind. (1826) 935; Miq., Fl. Ind. Bat. 1, 1 (1856) 676; Cogn. in A.D.C. & CDC, Mon. Phan. Prodr. 3 (1881) 374; Ridl., Fl. Mai. Penins. 1 (1922) 844; Keraudren-Aymonin in Aubrev. & Leroy, Fl. Camb., Laos, Vietnam 15 (1975) 81, p.p., pi. 14, f. 1, 4-7; Jeffrey, The Cucurbitaceae of Eastern Asia, Roy. Bot. Gard., Kew (1980) 39, p.p.; Rugayah & W.J. de Wilde, Blumea 42, 2 (1997) 481, f. 1b. - Type: *Loureiro s.n.* (lost); neotype (Keraudren-Aymonin, 1975): *J. & M.S. Clemens 3267* (P; iso BM), Vietnam.

Trichosanthes tricuspis Miq., Fl. Ind. Bat. 1, 1 (1856) 679. - Type: *Horsfield s.n.* (K), Java.

Trichosanthes bracteata auct. non (Lam.) Voigt: Backer in Backer & Bakh. f, Fl. Java 1 (1963) 304, p.p.

DISTRIBUTION - Wide-spread in Indochina, W and C Malesia; 4 forms.

Key to the forms

- 1 a. Leaves Lobed. Fruiting pedicel 0.5-2.5 cm long.....2
 b. Leaves unlobed. Fruiting pedicel c. 0.5 cm long. - Siberut I.....
d. forma *siberutensis*
- 2 a. Leaves deeply (far over half-way) 3-lobed; scabrous. - Timor.....
b. forma *asperifolia*
 b. Leaves 3-lobed to 1/3(-1/2)-way.....3
- 3 a. Seed flat, 1 (-2) mm thick. - W & C Malesiaa. forma *tricuspidata*
 b. Seed 2-3 mm thick. - Seram.....c. forma *seramensis*

a. forma TRICUSPIDATA

Trichosanthes tricuspidata Lour, forma *tricuspidata*

DISTRIBUTION - Wide-spread in W Malesia.

b. forma *asperifolia* Rugayah, /. nov.

Trichosanthes asperifolia Zipp. ex Span., *Linnaea* 15 (1841) 206, nomen.

A forma typica in foliis profunde lobatis, supra scabris, margine grosse serrato differt. - Type: *Zipelius 14* (L), Timor.

Plant drying (bright) brown. Leaf blade 3(-5)-lobed to c. 2/3, margin coarsely dentate; upper surface scabrous.

DISTRIBUTION - Lesser Sunda Islands (Timor). - Collection: *Zipelius 14*.
 HABITAT & ECOLOGY - Nothing known.

c. forma *seramensis* Rugayah, /. nov.

A forma typica semine crassiore 2-3 mm crasso differt. - Type: *Ramlanto & Mogeia 803* (BO; iso L), Moluccas (Seram).

Leaves subcoriaceous, 3-lobed to 2/3, not or hardly scabrous above, margin subentire. Seed obovate, 2-3 mm thick, edge entire.

DISTRIBUTION - Moluccas (Seram). - Collection: *Ramlanto & Mogeia 803*.

HABITAT & ECOLOGY - Nothing known.

NOTE - In habit this form resembles the type form, but differs in much thicker seed. It is known only from one collection, far away from the area of the typical form in W. Malesia.

d. forma *siberutensis* Rugayah, /. nov.

A forma typica in foliis integris elobatis ovato-cordatis, pedicello in fructu c. 0.5 cm longo differt. - Type: *Wiriadinata HW 6874* (BO; iso L), Sumatra (Siberut I).

Small perennial climber. Leaves chartaceous, unlobed, margin obscurely minutely dentate. Fruit 5-6 by 4-5 cm, pericarp 6-7 mm thick; fruiting pedicel c. 0.5 cm long. Seed flat, obovate, 8-10 by 5-6 mm, c. 2 mm thick, edge entire.

DISTRIBUTION - Sumatra (Siberut I.) - Collection: *Wiriadinata HW 6874*.

HABITAT & ECOLOGY - Nothing known.

NOTE - This taxon possibly represents a local geographical form, in an isolated environment, quite distinct in its unlobed leaves and short-pedicelled fruit.

37. *Trichosanthes valida* Rugayah, sp. nov.

Inflorescentiae masculae rhachis 5-10 mm crassus, bracteae 40-50 mm longae¹ vadosae dentatae, fructus ellipsoideo-obovoideus 10-12 cm longus c. 8 cm latus, semen planum obovatum 8-11 mm longum. - Type: *Koorders 16611/3* (BO; iso L), Sulawesi (Minahasa).

Climber, 10 m, dioecious, largely glabrescent. Probract oblong, c. 3-4 mm long. Tendrils 2 or 3-fid. Leaf blades deeply 5-lobed, margin entire. Blade glands several, ± scattered, 1-2 mm diam. Male raceme thinly pubescent, 15-25(-30) cm long; peduncle 9-13(-18) cm long, rachis 5-10

mm thick, with bract scars; bracts 40-50 mm long, upper margin shallowly lobed. Male flower: pedicel short; receptacle tube c. 45 mm long; sepals narrow, 10-12 mm long, entire; petals (excluding threads) c. 12 mm long. Female flower: pedicel 15-20 mm long; ovary ellipsoid-oblong, c. 15 by c. 7 mm, pubescent. Fruit ellipsoid-obovoid, c. 10 by 8 cm, pericarp thick; fruiting pedicel c. 4.5 cm long, 10-20 mm thick. Seed flat, obovate, 8-11 by 6-7 mm, c. 2 mm thick, margin absent, edge entire.

DISTRIBUTION - Sulawesi, Moluccas (Halmahera), Philippines. - Collections: *Bicknell 666, 1344; Conklin & Buwaya 80390; Idjan & Mochtar 229; Koorders 16611/3, 16613/3; Sidiyassa et al. TCW 3660; De Vogel & Vermeulen 6989; De Wilde & Duyffjes 21914.*

HABITAT & ECOLOGY — Forest edges and secondary scrub.; wet soil; sealevel up to 1000 m altitude.

38. TRICHOSANTHES VILLOSA Blume

Key to the subspecies

- 1 a. Male bracts more than 20 mm long. Seed 20-25 by 10-15 mm, 5 mm thick.....a. subsp. *villosa*
 b. Male bracts 20 mm long. Seed 14-18 by 8-9 mm, 2-3 mm thick.....
b. subsp. *mindorensis*

a. subsp. VILLOSA

Trichosanthes villosa Blume, *Bijdr. Fl. Ned. Ind.* (1826) 934; *Miq., Fl. Ind. Bat.* 1, 1 (1856) 675; *Cogn. in A.D.C. & CDC, Mon. Phan. Prodr.* 3 (1881) 366; *Backer in Backer & Bakh. f., Fl. Java 1 (1963) 304; Rugayah & W.J. de Wilde, Blumea 42, 2 (1997) 481.* - Type: *Blume s.n.* (L; iso P), W Java.

DISTRIBUTION - Wide-spread in West Malesia; possibly also in Indochina.

b. subsp. *mindorensis* Rugayah, *subsp. nov.*

Scandens villosus. Inflorescentiae masculae bractae c. 20 mm longae integrae, semen planum ovato-oblongum 14-18 mm longus 8-9 mm latum 2-3 mm crassum. - Type: *Conklin PNH 19132*, (BO; iso L), Philippines (Mindoro).

Climber, younger parts wholly densely brown villose. Probract absent. Tendrils 3-5-fid. Male bracts c. 20 mm long, entire. Male

flowers: sepals narrow, c. 10 mm long, entire. Fruit c. 10.5 by 8 cm, dry pericarp c. 5 mm thick; fruiting pedicel c. 3.5 cm long, c. 3 mm thick. Seed ovate-oblong, 14-18 by 8-9 mm, 2-3 mm thick.

DISTRIBUTION - Philippines (Luzon, Mindoro, Cebu, Palawan). - Collections: *Bicknell 1467; Conklin PNH 18707, 19132; Edano PNH 12009; Gutierrez PNH 78316; Ramos BS 42735; Stone et al. PPI 403, 677.*

HABITAT & ECOLOGY- Secondary forest; 300-700 m altitude.

39. TRICHOSANTHES WAWRAE Cogn.

Key to the forms

- 1 a. Plant glabrous. Fruiting pedicel c. 2 cm long,..... a. forma *wawrae*
 b. Plant hairy. Fruiting pedicel c. 0.5 cm long,..... b. forma *hirsuta*

a. forma WAWRAE

Trichosanthes wawrae Cogn. in *A.D.C. & CDC, Mon. Phan. Prodr.* 3 (1881) 384 (*Cwawraei*); *Ridl., Fl. Mai. Penins.* 1 (1922) 845; *Rugayah & W.J. de Wilde, Blumea 42, 2 (1997) 481.* - Type: *Wawra 241* (W), Singapore.

Trichosanthes trifolia auct. non (L.) Blume, *Bijdr. Fl. Ned. Ind.* (1826) 936 (*trifoliata*); *Sev. in DC, Prodr.* 3 (1828) 316; *Miq., Fl. Ind. Bat.* 1, 1 (1856) 679; *Cogn. in A.D.C. & CDC, Mon. Phan. Prodr.* 3 (1881) 383; *Merr., Interpret. Rumph. Herb. Amb.* (1917) 494; *Backer in Backer & Bakh. f., Fl. Java 1 (1963) 303.* - *Involucraria trifolia* auct. non (L.) M. Roem.: *M. Roem., Syn.* 2 (1846) 99 (*trifoliata*), based on Blume s.n., "crescit in provincia Krawang juxta Tjiradjas, W Java, in herbarium L".

DISTRIBUTION - Sumatra, Peninsular Malaysia, Singapore, Borneo, W Java.

b. forma *hirsuta* Rugayah, *l. nov.*

Scandens dense brunnee pubescens, folia 3-foliolata. - Type: *Banyeng S 44194* (SAR; iso L), Sarawak.

Small climber, rather densely brown pubescent. Probract elliptic, c. 4 mm long, with few glands, coarsely dentate at apex. Tendrils simple or 2-fid. Leaves 3-foliolate, ± chartaceous, margin few-dentate. Flowers not known. Fruit (immature?) c. 4 by 3.5 cm, glabrous; fruiting pedicel c. 1 cm long.

DISTRIBUTION - Borneo (Sarawak). - Collection: *Banyeng S 44194*.

HABITAT & ECOLOGY - Degraded forest edge along logging road in mixed forest; low(?) altitude.

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A NEW SPECIES OF ANADENDRUM (ARACEAE) FROM MALESIA

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ABSTRACT

A new species of *Anadendrum ellipticum* Widyartini & Widjaja, collected from Malay Peninsula, Kalimantan, North Sulawesi and Java proposed. This species is closely related with *A. microstachyum* but it differs on the structure of leaves, perianth and filament.

ABSTRAK

Sebuah jenis baru dari *Anadendrum ellipticum* Widyartini & Widjaja, dari Semenanjung Malaya, Kalimantan, Sulawesi Utara dan Jawa dipertelakan. Jenis ini sangat berdekatan dengan jenis *Anadendrum microstachyum* tetapi dibedakan dari struktur daun, daun tenda dan tangkai sarinya.

Anadendrum is one of the genus of Araceae which grow widely in Malesia. According to Engler (1905) there are six species of *Anadendrum* growing in Indomalaya, that is *A. marginatum*, *A. affine*, *A. angustifolium*, *A. latifolium*, *A. montanum* and *A. cordatum*. In 1898, Koorders described two species of *Anadendrum* from Sulawesi namely *A. montanum* and *A. malayanum*, whereas in 1920 Backer & Alderwereld proposed *A. superans* and *A. microstachyum* from Sumatra. Mabberley (1987) estimated that there are 9 species of *Anadendrum* in Indomalaya.

In revising *Anadendrum* in Malesia, the first author encountered that there is a number of specimens which are not identical with the known species. After a long study on the morphological and anatomical aspects, finally it is concluded that those specimens belong to a new species which we herewith name *Anadendrum ellipticum*.