



# The *Convolvulaceae* of Timor with special reference to East Timor

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## Key words

*Argyreia*  
checklist  
conservation  
ethnobotany  
*Ipomoea*  
*Merremia*  
new species  
taxonomy

**Abstract** A taxonomic review of the *Convolvulaceae* in Timor is presented. A total of 61 taxa are listed, comprising 53 species from 15 genera. The most diverse genus by far is *Ipomoea* with 25 reported species, followed by *Merremia* with seven species. Of the seven species initially thought to be endemic, only six are endemic to the island. Two new records are presented (*Cuscuta campestris* and *Merremia quinata*) and a new species, *Argyreia paivae*, is described and illustrated. Keys to genera and species are included, as well as distribution maps. The conservation of East-Timorese *Convolvulaceae* is analysed and it is shown that they are inadequately represented in the established natural reserves' network.

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## INTRODUCTION

East Timor is a recently recognized independent country located in the eastern part of the island of Timor, in the Lesser Sunda Islands group (Bali, Lombok, Sumbawa, Flores, Sumba and Timor). East Timor's potential in natural resources has long been recognised and throughout the centuries, European and Asian traders were attracted to the territory for the commerce of coffee, cacao, tobacco and cotton, and mostly for the exploration of luxury and high profitable products of sandal (*Santalum album* L.) (Silva 1910, Magro 1943, Wright 2001). The high demand for these products, coupled with poor management of resources and, more recently, destruction caused by conflict, have resulted in the impoverishment of the plant resources of East Timor.

To support the sustainable management of the resources of East Timor, the University of Aveiro, in cooperation with the National University of East Timor, organized a project: 'Contribution to flora resources management in East Timor', to document the flora, identify taxa requiring protection and identify taxa that have the potential for sustainable use. Botanical expeditions conducted in 2004 and 2005 resulted in 750 specimens collected in nine different districts of the country (deposited in AVE). The *Orchidaceae* has already been studied with the contribution of these data (Silveira et al. 2008) and the results included 15 new genera and 32 new species records for the island. Ten species were found to be endemic and four new species were described. The conservation status of 12 species was assessed, of which eight were considered to be Critically Endangered and three others Endangered.

The *Convolvulaceae*, with seven endemic species (Monk et al. 1997), is the second richest family in terms of endemism for Timor, after *Orchidaceae*. Species of *Convolvulaceae* are

also economically important (Van Ooststroom & Hoogland 1953). Many species are used as edible crops, ornamentals or medicinal plants and some are serious weeds. Although controversially placed in this family *Cuscuta* is a significant parasite of crop plants (Heywood et al. 2007).

The most complete taxonomic account of the *Convolvulaceae* from Timor was provided by Van Ooststroom (Van Ooststroom & Hoogland 1953). However, there have been additions and emendations to this publication and many recently published works have brought new perspectives on the taxonomy of the family. Also, new collections in West and East Timor, have documented new local records of some taxa.

The purpose of this study was therefore to produce an up-to-date checklist and identification keys to the *Convolvulaceae* of Timor. Due to the paucity of specimens available, and the old age of many of them, it was not possible to assess accurately the conservation status of taxa. However, as a contribution to future studies on this topic, distribution maps and notes on habitat and ecology of the species are provided.

## MATERIAL AND METHODS

Whilst this checklist is focused on the territory of East Timor, collections and species from West Timor (Indonesia) were also included because there are no significant ecological differences between the two areas and some older specimens are only labelled 'Timor'.

The study was based on herbarium specimens from Timor (both East and West) held in the following herbaria: AVE, BM, COI, G, L, LISC, K and P, together with specimens collected in two botanical expeditions to the eastern part of the island only (2004 and 2005), and bibliographic sources. Overall, 283 specimens were studied and a variety of literature consulted, including several Asian Floras, taxonomic revisions of the genera and species and governmental publications regarding the administration of the natural resources of East Timor.

The checklist provides details of basionyms, synonyms cited for Timor and reference to types, where these were collected in Timor.

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Information on distribution, habitat and ecology, vernacular names and traditional uses are provided. The latter is based on ethnobotanical information from across the distribution range of the taxa, not only Timor, so as to demonstrate potential uses that are not known in the island but that could be further investigated (e.g. pharmaceutical research) in favour of the country's development.

The original orthography of collection sites was generally respected although in some cases it was subject to our interpretation. When in doubt, a question mark follows the name, between parentheses.

Identification keys are provided for genera, species and infra-specific taxa. Previously, the only available key was from Flora Malesiana, which covers *Convolvulaceae* from the whole Malesian region and is unnecessarily complex for an island as small as Timor. The keys are restricted to the characters of the taxa known to occur in the island and an attempt was made to give priority to characters that would be present in vegetative specimens, although this could not always be achieved.

For the study of the species of *Argyreia* in Timor, morphological observations were made on herbarium specimens of *A. paivae* A.R.Simões & P.Silveira, *A. reinwardtiana* (Blume) Miq. and *A. walshae* Ooststr. from BM, K, L and LISC. Pollen samples were taken from one individual each of all three species, and were subjected to acetolysis according to the method of Erdtman (1960) after which pollen grain morphology and ornamentation were observed using light microscopy (LM) and scanning electron microscopy (SEM). For LM the pollen samples were pre-treated with t-butanol, mounted in silicon oil (Andersen 1960), and observed using a Olympus CX31 light microscope. For SEM the samples were dehydrated in ethanol and pollen grains were mounted on aluminium stubs and coated under high vacuum with a gold/palladium film using a Jeol JFC-1100 Ion Sputter. Pollen samples were then observed with a HITACHI S-4100 SEM operating at 25 kV. LM slide preparations and SEM stub preparations are held at AVE.

## TAXONOMIC TREATMENT

### Key to the genera of *Convolvulaceae*

1. Parasites, lacking chlorophyll, leafless or with minute, scale-like leaves . . . . . 3. *Cuscuta*
1. Non-parasitic plants, with green leaves . . . . . 2
2. Style absent, stigma conical with 10 distinct ridges . . . . . 5. *Erycibe*
2. Style(s) present, stigma(s) otherwise . . . . . 3
3. Styles 2 . . . . . 4
3. Style 1 . . . . . 5
4. Styles forked. Stigmas filiform or slightly clavate. Corolla-limb nearly entire . . . . . 6. *Evolvulus*
4. Styles not forked. Stigmas capitate. Corolla-limb distinctly lobed . . . . . 2. *Cressa*
5. Flowers in racemose, paniculate or thyriform inflorescences (rarely flowers solitary) . . . . . 6
5. Flowers in one- to few- or many-flowered axillary cymose inflorescences . . . . . 7
6. Leaf venation pedate, veins prominent, often alate abaxially. Calyx covering 1/4 or less of corolla tube. Stem terete, smooth or striate . . . . . 4. *Dinetus*
6. Leaf venation pinnate, veins not prominent and not alate abaxially. Calyx covering half or more of the corolla tube. Stem lenticellate . . . . . 13. *Porana*
7. Stigmas 4 . . . . . 12. *Polymeria*
7. Stigmas 2 . . . . . 8

8. Stigmas tongue-shaped . . . . . 9. *Jacquemontia*
8. Stigmas not tongue-shaped . . . . . 9
9. Stigmas ovate-oblong, complanate . . . . . 7. *Hewittia*
9. Stigmas biglobose . . . . . 10
10. Pollen echinate . . . . . 11
10. Pollen not echinate . . . . . 12
11. Leaf-blades with black dots beneath. Calyx completely enclosing the ripe fruit. Fruit with distinct exocarp and endocarp; the endocarp with two well-developed ridges . . . . . 14. *Stictocardia*
11. Leaf-blades without black dots beneath. Calyx not completely enclosing the ripe fruit. Fruit without distinct endocarp . . . . . 13
12. Fruit a capsule opening by a more or less fleshy circumscissile lid (operculum) on the upper part of the epicarp. Stems terete or winged . . . . . 11. *Operculina*
12. Fruit a capsule opening by four valves. Stems terete or striate, but never winged . . . . . 14
13. Fruit a thin-walled capsule opening by valves or irregularly dehiscent . . . . . 8. *Ipomoea*
13. Fruit indehiscent, a flesh, leathery berry . . . . . 1. *Argyreia*
14. Pollen pantoporate. Leaves linear (in some cases nearly filiform), linear-oblong to oblanceolate, spatulate or subquadrate; base truncate to hastate; basal lobes obscurely to sharply dentate . . . . . 15. *Xenostegia*
14. Pollen 3–12-colpate or 12-rugate. Leaves of various shapes, not as above . . . . . 10. *Merremia*

### 1. ARGYREIA Lour. (1790) 134

#### Key to the species of *Argyreia*

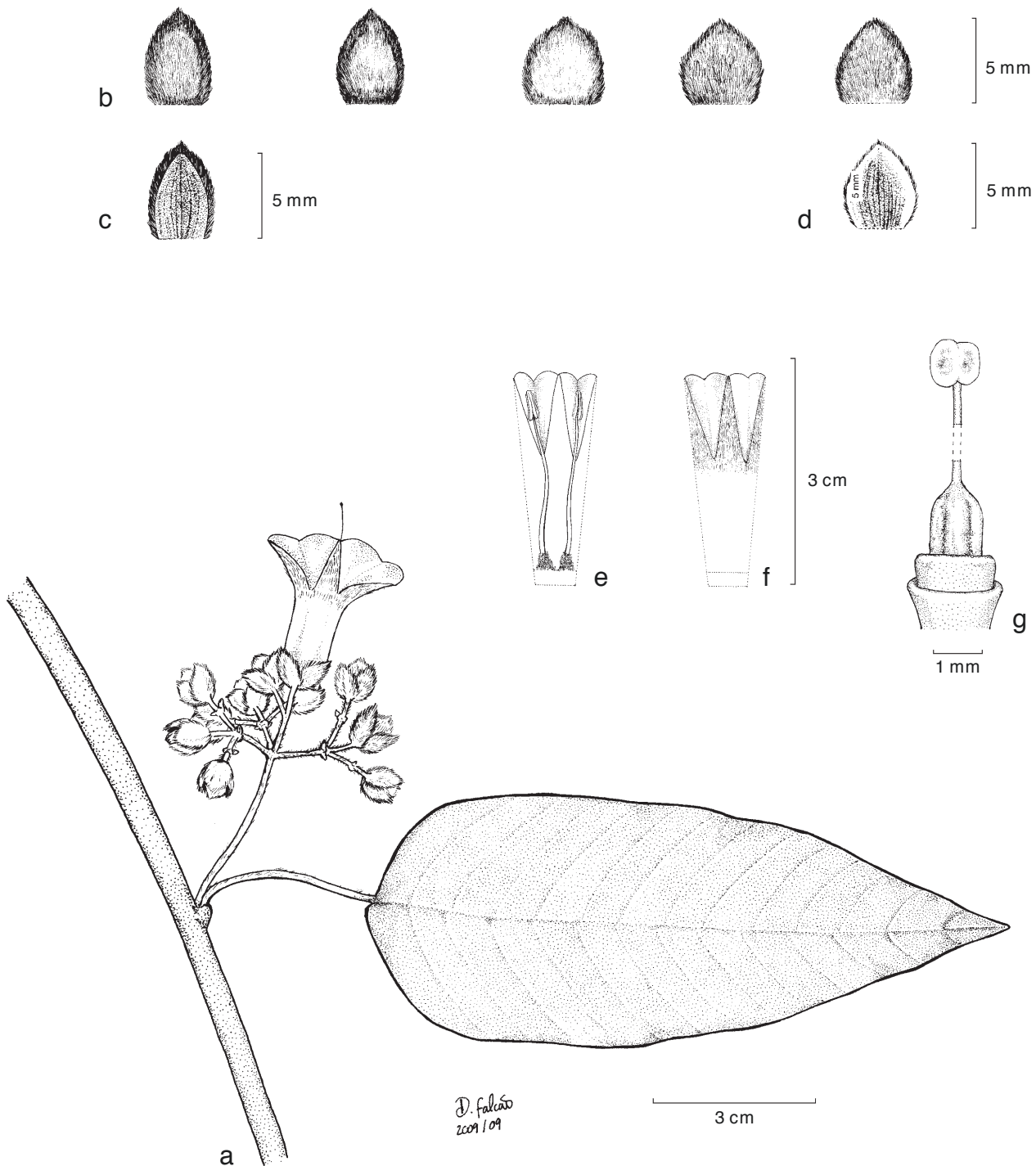
1. Sepals unequal, two outer ones (10–)15–18 mm long, two inner ones (7–)8–9 mm; the outer ones with more or less undulate margins. Corolla funnel-shaped, purplish pink, 3–4.5 cm long . . . . . 2. *A. reinwardtiana*
1. Sepals subequal, 5–8 mm long; margins entire. Corolla tubular to funnel-shaped, whitish or yellowish, 2–3 cm long . . . . . 2
2. Leaves broadly ovate to ovate; length less than two times the width. Lower surface densely pubescent to tomentose with short curled hairs . . . . . 3. *A. walshae*
2. Leaves narrowly ovate; length two or more times the width. Lower surface sparsely to rather densely pilose with short appressed, straight hairs . . . . . 1. *A. paivae*

#### 1. *Argyreia paivae* A.R.Simões & P.Silveira, *sp. nov.* — Fig. 1, 2; Map 1

Ab *Argyreia walshae* Ooststr. foliis multo longioribus anguste ovatis (nec late ovatis vel ovatis) et subtus pilis brevibus adpressis rectis (nec crispatis) instructis differt. — Typus: *Friedberg 257a* (holo LISC), East Timor, Abis, 1.vi.1966.

*Etymology.* The name *Argyreia paivae* is a tribute to Jorge Paiva, who has dedicated his life to the study of tropical flora and who gave a fundamental contribution to this project.

Woody twiner. Stems with milky sap, sparsely pilose with short, appressed whitish hairs when young, later glabrescent and lenticellate. Leaves narrowly ovate, two or more times as long as wide, 6.5–12 cm long, 2–5 cm broad, rounded at the base, attenuate to acuminate at the apex, glabrous or nearly so above, sparsely to rather densely pilose beneath with short, appressed, straight hairs; midrib and 10–13 pairs of lateral nerves rather prominent beneath; petiole 2–5 cm long, appressed-pilose. Inflorescences axillary; 3–10-flowered compound cymes; peduncles shorter or as long as the petiole,



**Fig. 1** *Argyreia paivae* A.R. Simões & P. Silveira. a. Node with inflorescence and leaf; b. corolla section, view from inside; c. corolla section, view from outside; d. ovary and disk; e. sepals, view from outside; two on the left inner ones, three on the right outer ones; f. sepals, view from inside; left hand one of the outer sepals, right hand one of the inner sepals (based on *Friedberg 257a*, LISC, complemented with information from *Kooy 706* and *Kooy 905*, both L).

2–5 cm long, densely appressed-pilose. Bracts oblong, 2–3 mm long, appressed-pilose outside, glabrous inside, caducous. Pedicels 3–6 mm, hairy like the peduncles, thickened towards the apex. Sepals subequal, the outer two ovate, the inner three broadly ovate, 5–6 mm long, apices obtuse, outside fulvous tomentose, inside glabrous and brown, three inner ones with a slightly scarious margin. *Corolla* whitish, tubular to funnel-shaped, c. 2–3 cm long, the limb shallowly lobed, midpetaline bands and upper portion of the tube sericeous. Stamens slightly exserted; filaments c. 20 mm long, inserted at c. 5 mm from the base of the corolla tube, hairy at the base; anthers sagittate, c. 3 mm long. Disc annular, c. 0.5 mm high. Ovary, 2-celled, glabrous; style glabrous, exserted, 20–25 mm long, stigma globose. *Fruit* unknown.

**Distribution** — Timor.

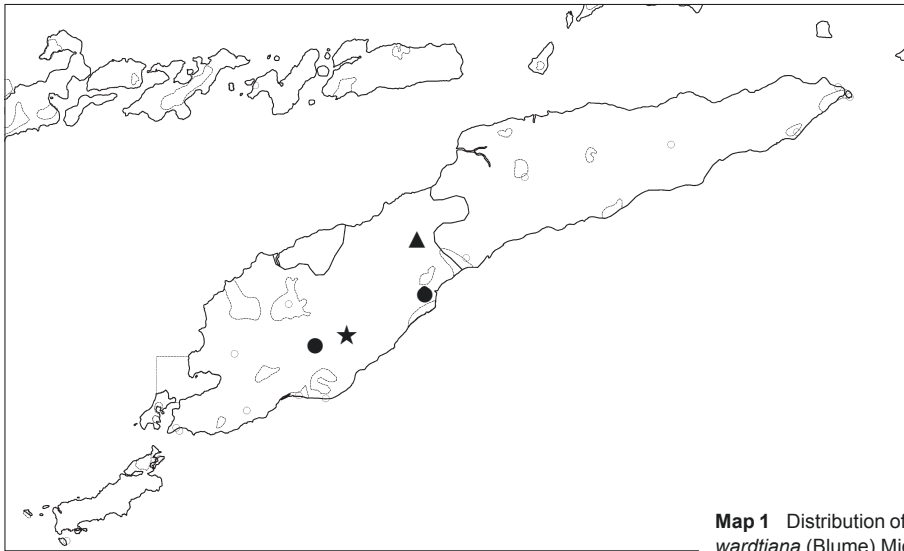
**Habitat & Ecology** — Thick liana, growing over shrubs, collected at 700 m.

**Uses** — The bark can be boiled and the resulting water is drunk for treating gonorrhoea.

**Vernacular name** — Mau halé (Timor: unknown dialect).

*Other specimens examined.* INDONESIA, West Timor, Nikiniki, 700 m, 1.iv.1974, *Kooy 905* (L!); Supul, c. 750 m, 25.iii.1969, *Kooy 706* (L!).

**Notes** — We examined specimens of *Argyreia* from Timor and three of them stood out because they did not appear to match any of the species of *Argyreia* included in Flora Malesiana (Van Ooststroom & Hoogland 1953). After careful study, extensive comparison with the descriptions of species from



**Map 1** Distribution of *Argyreia paivae* A.R.Simões & P.Silveira (★), *A. reinwardtiana* (Blume) Miq. (●) and *A. walshae* Ooststr. (▲).

other territories and comparison with herbarium material (especially from BM, K and L), it was found necessary to describe *A. paivae* as a new species.

Specimens of *A. paivae* share some characteristics with each of the other two Timorese endemic species: *A. reinwardtiana* and *A. walshae*. Like *A. reinwardtiana* this new species has the lower leaf surfaces sparsely to rather densely pilose with short, appressed, straight hairs, while in *A. walshae* the lower surface is densely pubescent to tomentose with short curled hairs. The inner and outer sepals are subequal and thus similar to those of *A. walshae*. In *A. reinwardtiana*, the outer sepals are distinctly larger than the inner ones, with peculiar undulate margins. The indumentum of the sepals is also like that of *A. walshae*, in that it is entirely densely sericeous outside. In *A. reinwardtiana*, the sepals are distinctly less sericeous towards the apex. A distinctive feature of *A. paivae* are the narrowly ovate leaves that are at least twice as long as they are wide. The other two Timor endemics have broadly ovate to ovate leaves, the length of which is less than two times the width. Given the distinctive leaf shape of *A. paivae*, the possibility that it is a hybrid between the two other Timorese species is unlikely.

In the absence of fruit, and in order to confirm that these specimens should indeed be included in the genus *Argyreia*, we studied the pollen morphology of the three endemic Timor *Argyreia* (Fig. 2).

The pollen of all three species is very similar, apolar, with radial symmetry, circular in optical section, pantoporate. In detail, they are characterised in the following way: diameter 83–100 µm; pori operculate, diameter of opercula 6–8 µm; opercula microreticulate-cristate; exine c. 16 µm thick under the spines, c. 9 µm between the spines; tectum echinate-microreticulate-cristate; spines 6.8–9.4 µm long (excluding the dilated exine bases), cylindrical, obtuse, psilate, with subglobose, microreticulate-cristate bases.

Considering that the fruit of *A. reinwardtiana* is known (Van Ooststroom & Hoogland 1953) and that the pollen morphology is very similar in all three species, we can confirm that the complex belongs to *Argyreia*.

## 2. *Argyreia reinwardtiana* (Blume) Miq. — Fig. 2; Map 1

*Argyreia reinwardtiana* (Blume) Miq. (1857) 589. — Type: *Reinwardt 1351* (holo L), Timor.

*Ipomoea reinwardtiana* Blume (1826) 720.

*Argyreia guichenotii* Choisy (1834) 423; Decne. (1834) 388; Span. (1841) 338; Miq. (1856) 589; Fawc. (1885) 511.

Distribution — Timor (Van Ooststroom & Hoogland 1953).

Habitat & Ecology — Creeper; found between chalkrocks; collected at 200 and c. 762 m.

## 3. *Argyreia walshae* Ooststr. — Fig. 2; Map 1

*Argyreia walshae* Ooststr. (1943) 361; Ooststr. (in Ooststr. & Hoogland 1953) 499; Kalkman (1955) 216. — Type: *Walsh 388* (holo L; iso BM), Indonesia (West Timor), Tobaki, c. 800 m, 10.vi.1929.

Distribution — Timor (Van Ooststroom & Hoogland 1953).

Habitat & Ecology — Not common; collected at c. 800 m.

Note — Van Ooststroom (Van Ooststroom & Hoogland 1953) makes a note that this species is rather frequent in Timor. However, Mrs. Walsh's collection notes on the type indicate the opposite.

## Doubtful records

*Argyreia setosa* Choisy (1834) 425; Decne. (1834) 388; Span. (1841) 338; Miq. (1856) 592

Miquel (1856) quotes Spanoghe (1841), who assumes the presence of this species in Timor based on Decaisne's publication (1834). Still, Decaisne did not show evidence of this, instead stating: "Je n'ai point vu dans les herbiers du Muséum cette espèce originaire de Timor, je la cite d'après l'autorité de M. Choisy".

Choisy (1834) clearly assumed the presence of such species in Timor but no specimens have been found to support such statement. Van Ooststroom (Van Ooststroom & Hoogland 1953) has suggested that the specimen mentioned by Choisy might belong to *A. reinwardtiana*.

## *Argyreia capitiformis* (Poir.) Ooststr. (1972) 941

*Ipomoea trichotoma* Blume (1826) 717; Span. (1841) 340.

*Argyreia capitata* (Vahl) Choisy (1834) 423; Miq. (1856) 589.

This species has been listed as occurring in Timor, but no specimens have been found to support this statement.

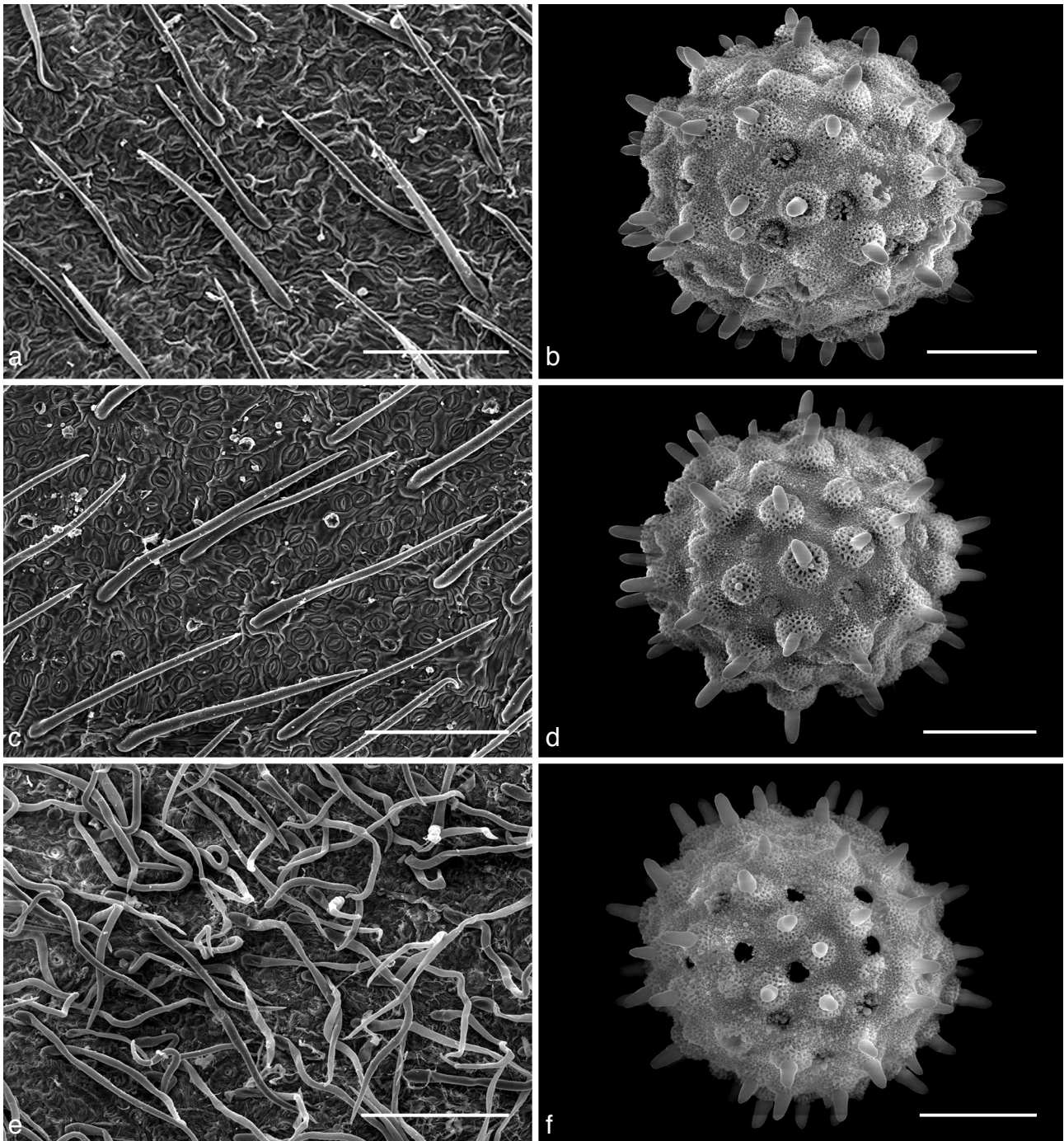
## 2. CRESSA L. (1753) 223

### 1. *Cressa australis* R.Br. — Map 2

*Cressa australis* R.Br. (1810) 490.

*Cressa cretica* auct. non L. (1753) 223; Ooststr. (1972) 937.





**Fig. 2** SEM images showing detail of indumentum of abaxial surface of the leaf (left) and pollen morphology (right) of all three species of *Argyreia* from Timor. a, b. *Argyreia paivae* A.R.Simões & P.Silveira; c, d. *Argyreia reinwardtiana* (Blume) Miq.; e, f. *Argyreia walshae* Ooststr.

**Distribution** — East Timor, Australia (Western Australia, Northern Territory, Southern Australia, Queensland, New South Wales, Victoria) (Austin 2000).

**Habitat & Ecology** — The only specimen known from Timor was collected at 100 m from the sea in a pure stand in the shade of the mangrove tree *Avicennia marina*.

**Note** — Van Ooststroom (1972) recognised the specimen from Timor as the only known occurrence of this genus in Malesia. Although he noted several differences between Australasian and European material, he was unable to recognise specific differences and consequently treated the Timor material as *Cressa cretica*. Austin (2000) studied the morphological variation in the genus and came to conclude that the specimen from Timor would be better placed in *Cressa australis*.

**3. CUSCUTA L. (1753) 124**

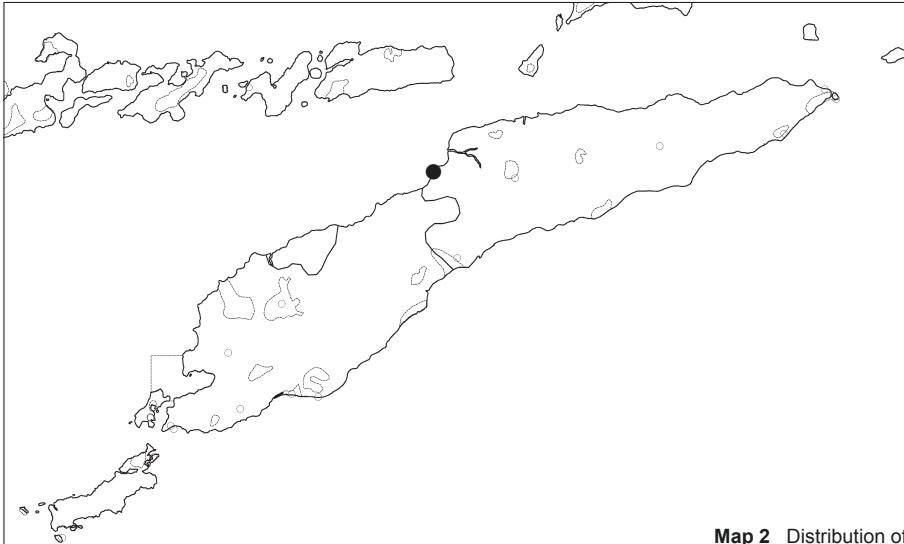
**Key to the species of *Cuscuta***

- 1. Stems filiform, less than 0.5 mm wide. Styles 2, distinct. Ovary depressed-globose . . . . . 1. *C. campestris*
- 1. Stems 0.5–2 mm or more diam. Style 1, longer than the depressed-globose stigmas. Ovary ovoid-conical . . . . . 2. *C. cassytoides*

**1. *Cuscuta campestris* Yunck. — Map 3**

*Cuscuta campestris* Yunck. (1932) 138.

**Distribution** — Native of North America, recently introduced in several countries of the Old World (Liao et al. 2005). New record for Timor.



Map 2 Distribution of *Cressa australis* R.Br.

**Habitat & Ecology** — Often on *Medicago sativa*, *Trifolium* and *Satureja hortensis*, but also on a great number of other herbaceous plants (Van Ooststroom & Hoogland 1953).

**2. *Cuscuta cassyoides* Nees ex Engelm. — Map 3**

*Cuscuta cassyoides* Nees ex Engelm. (1859) 513; Ooststr. (1958) 558.  
*Cuscuta timorensis* Decne. ex Engelm. (1859) 514; Ooststr. (in Ooststr. & Hoogland 1953) 393; Kalkman (1955) 216.  
*Cuscuta monogyna* auct. non Vahl (1791) 32; Miq. (1856) 632; Fawc. (1885) 511.  
*Cuscuta reflexa* auct. non Roxb. (1799) 3, t. 104; Decne. (1834) 393; Span. (1841) 341; Fawc. (1885) 511.

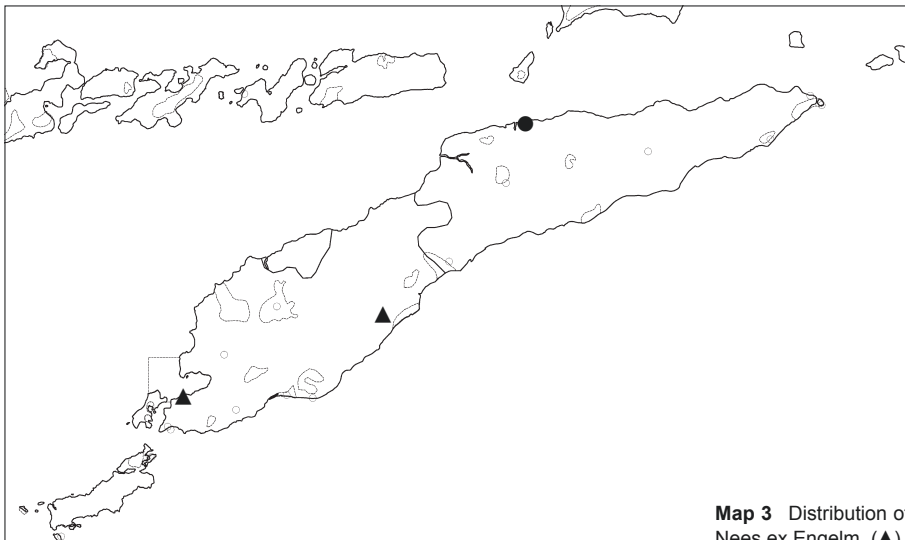
**Distribution** — East Africa to South Africa and South Malesia: East Java (Asem Bagus) and Lesser Sunda Islands (Timor, Wetar) (Van Ooststroom & Hoogland 1953).

**Habitat & Ecology** — On *Ficus glomerata* Roxb. and other woody plants; apparently confined to regions with a very dry season (Van Ooststroom & Hoogland 1953). A specimen from Timor was found at 300 m.

Vernacular name — Non-atois (Dawan).

**Unidentified specimens**

A specimen, *Kooy 903* (L!), remains to be identified at species level. It lacks flowers, presenting only capsules, which do not seem to match the description of any of the above listed species of *Cuscuta*.



Map 3 Distribution of *Cuscuta campestris* Yunck. (●) and *C. cassyoides* Nees ex Engelm. (▲).

**4. DINETUS** Buch.-Ham. ex Sweet (1825) t. 127

**1. *Dinetus racemosus* (Roxb.) Buch.-Ham. ex Sweet — Map 4**

*Dinetus racemosus* (Roxb.) Buch.-Ham. ex Sweet (1825) t. 127.  
*Porana racemosa* Roxb. (1824) 466; Fawc. (1885) 511; Ooststr. (in Ooststr. & Hoogland 1953) 403; Kalkman (1955) 216.

**Distribution** — Pakistan throughout North India, Nepal, Bhutan, China, Myanmar and Southeast Asia to Malesia (Staples 2006).

**Habitat & Ecology** — In open sites in forests, thickets, scrub, on hillsides and along watercourses on diverse soil types at (50–)1 000–2 000(–3 200) m elevation (Staples 2006).

**Uses** — In China the whole plant is used for treating ‘wind damage’ and dyspepsia; in Laos the young leaves are eaten with pepper, being edible both in fresh and dry state (Staples 2006).

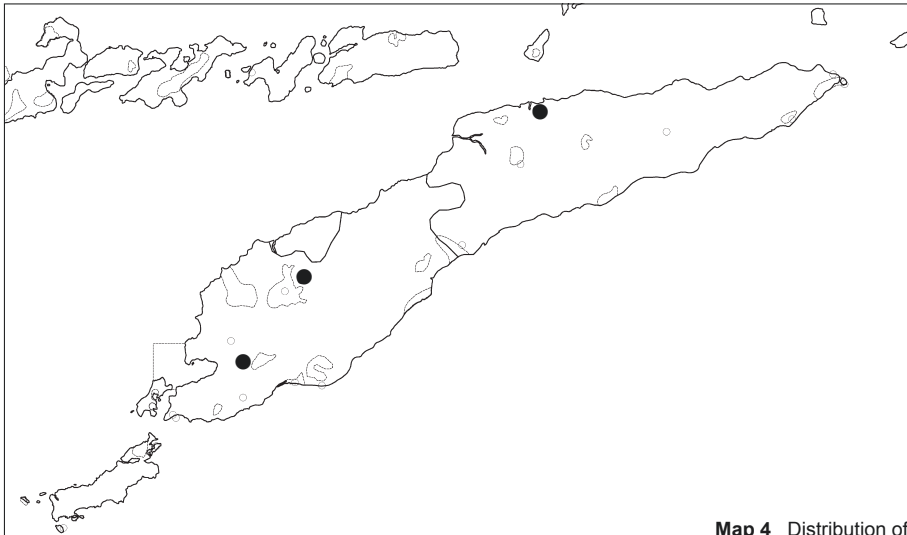
**5. ERYCIBE** Roxb. (1802) 31, t. 159

**1. *Erycibe timorensis* Hallier f. ex Hoogl.**

*Erycibe timorensis* Hallier f. ex Hoogl. (1953) 318; Ooststr. (in Ooststr. & Hoogland 1953) 423. — Type: *Spanoghe 43* (holo L; iso P), Timor.

**Distribution** — Timor (Van Ooststroom & Hoogland 1953).

**Habitat & Ecology** — In the mountains (Van Ooststroom & Hoogland 1953).



**Map 4** Distribution of *Dinetus racemosus* (Roxb.) Buch.-Ham ex Sweet.

Note — The specimens examined lack precise locality information. Spanoghe is known to have collected in several different localities in Timor but it is not clear where he collected each of the plants. Zippelius, who collected some other specimens of this species, is known to have collected in Kupang and surrounding areas.

**6. EVOLVULUS L. (1762) 391**

Note — Van Oostroom (1934) has recognised 15 different varieties of *Evolvulus alsinoides*, the boundaries of which are far from clear-cut. The three varieties existing in Timor are not always easy to separate, and some transitional forms seem to occur, as Van Oostroom himself observed (Van Oostroom & Hoogland 1953).

**Key to the varieties of *Evolvulus alsinoides***

- 1. Leaves oblong, elliptic or spatulate, c. 1.5–2.5 times as long as broad, apex obtuse or shallowly emarginate and mucronulate . . . . . a. var. *alsinoides*
- 1. Leaves lanceolate to linear, 2.5 or more times as long as broad, apex acute or acuminate . . . . . 2
- 2. Stems 6–20 cm, rather stiff, densely appressed-pilose with more or less shining hairs. Peduncles shorter than the leaves, 2–5 mm. Sepals appressed-pilose . . . . . c. var. *javanicus*

- 2. Stem 30–45 cm, slender, appressed pilose and patently-pilose, with few or many hairs, not shining. Peduncles longer than the leaves, 15–30 mm. Sepals villose. . . . . b. var. *decumbens*

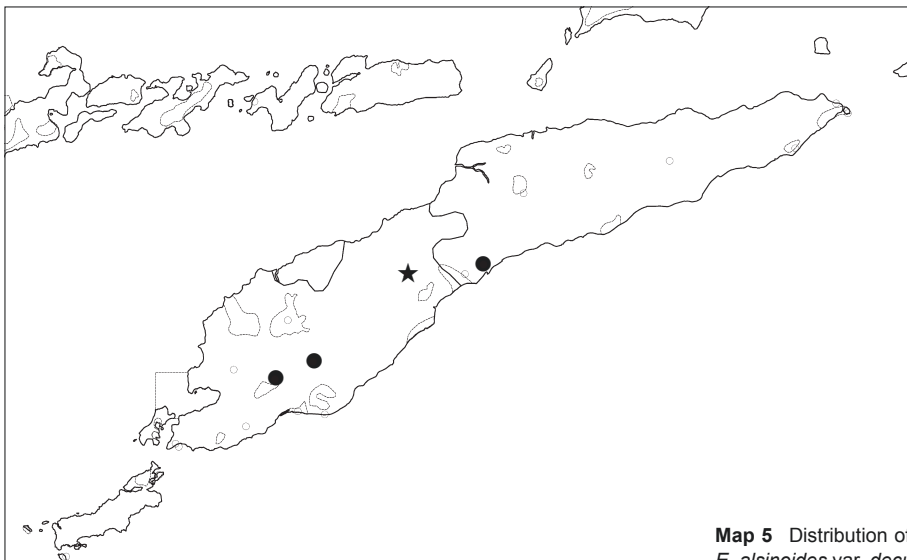
**a. var. *alsinoides* (L.) L. — Map 5**

*Evolvulus alsinoides* var. *alsinoides* (L.) L. (1762) 392; Fawc. (1885) 511; Ooststr. (in Ooststr. & Hoogland 1953) 395; Kalkman (1955) 216.  
*Convolvulus alsinoides* L. (1753) 157.  
*Evolvulus pumilus* Span. (1835) 348; (1841) 341.  
*Evolvulus pseudo-incanus* Span. (1841) 341, nom. nud.

Distribution — Tropical East Africa, Madagascar, India, Indo-China, South China, in Malaysia: Lesser Sunda Islands (Timor), Philippines (Luzon) (Van Oostroom & Hoogland 1953).

Habitat & Ecology — The Malesian varieties of the species can be found in dry grasslands, often on limestone, at low and medium altitudes (Van Oostroom & Hoogland 1953). Specimens from Timor have been found on chalk rocks in full sunshine, at 500 and c. 762 m.

Uses — Used in Ayurvedic medicine (Indian subcontinent) as a medicine for a series of mental problems, such as epilepsy, insanity, nervous debility, and loss of memory (Allimuth & Venilla, Anis et al., Auddy et al., all cited in Austin 2008). Also known to be used as a febrifuge and tonic (Van Oostroom 1934), and in treating internal haemorrhages or intermittent fever of children (Watt in Van Oostroom 1934).



**Map 5** Distribution of *Evolvulus alsinoides* var. *alsinoides* (L.) L. (●) and *E. alsinoides* var. *decumbens* (R.Br.) Ooststr. (★).



**b. var. *decumbens*** (R.Br.) Ooststr. — Map 5

*Evolvulus alsinoides* var. *decumbens* (R.Br.) Ooststr. (1934) 38; Fawc. (1885) 511; Ooststr. (in Ooststr. & Hoogland 1953) 396.  
*Evolvulus decumbens* R.Br. (1810) 489.  
*Evolvulus lanceaefolius* Span. (1841) 341.

Distribution — South China and Indo-China to Australia and the Pacific Islands, in Malesia: North Sumatra, Peninsular Malaysia, Lesser Sunda Islands (Bali, Timor, Wetar), Southwest–Southeast Celebes, Moluccas, Philippines (Luzon, Mindanao), New-Guinea (Van Ooststroom & Hoogland 1953).

Habitat & Ecology — A specimen from Timor was found at 300 m.

**c. var. *javanicus*** (Blume) Ooststr.

*Evolvulus alsinoides* var. *javanicus* (Blume) Ooststr. (1934) 39; Ooststr. (in Ooststr. & Hoogland 1953) 398.  
*Evolvulus javanicus* Blume (1826) 724.

Distribution — Malesia: Lesser Sunda Islands (Timor, Wetar), Moluccas (Van Ooststroom & Hoogland 1953).

**Doubtful record*****Evolvulus linifolius*** L. (1762) 392; Miq. (1856) 628

Miquel (1856) reports this species for Timor, indicating *E. javanicus* Blume as a synonym. According to Van Ooststroom (1934) *Evolvulus linifolius* L. (syn. *Evolvulus alsinoides* var. *linifolius* (L.) Baker) occurs mainly in Africa, Madagascar and Yemen, and not in Asia. No specimens from Timor were found that could agree with Miquel, and given the difficulty of separating the varieties of *Evolvulus alsinoides*, it could be that this was a case of confusion between var. *linifolius* and var. *javanicus*.

**7. HEWITTIA** Wight & Arn. (1837) 22**1. *Hewittia malabarica*** (L.) Suresh — Map 6

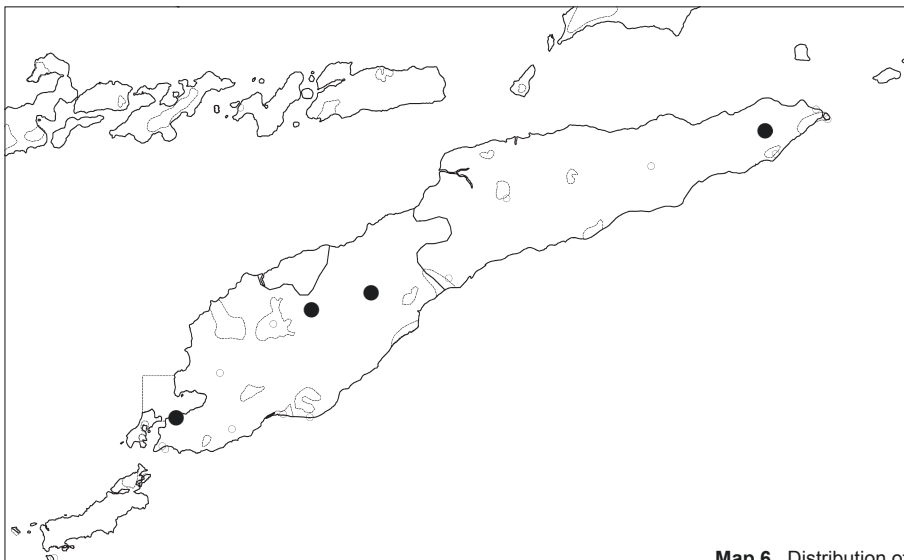
*Hewittia malabarica* (L.) Suresh in Nicolson, Suresh & Manilal (1988) 88.  
*Convolvulus malabaricus* L. (1753) 155.  
*Convolvulus sublobatus* L.f. (1781) 135.  
*Shuterea bicolor* Choisy (1834) 486; Decne. (1834) 392; Span. (1841) 338.  
*Hewittia bicolor* (Choisy) Wight & Arn. (1837) 22; Fawc. (1885) 511.  
*Convolvulus scandens* Deille (1847) 7.  
*Hewittia sublobata* (L.f.) Kuntze (1891) 441; Ooststr. (in Ooststr. & Hoogland 1953) 438; Kalkman (1955) 216.  
*Hewittia scandens* (Milne) Mabb. (1980) 606.

Distribution — North America (naturalized in Jamaica), Africa, Asia: Sri Lanka, India, China, Myanmar, Laos, Malaysia, Thailand, Cambodia, Vietnam, Indonesia, Philippines, New Guinea; Pacific Islands (Fang & Staples 1995). Also in East Timor.

Habitat & Ecology — In open grasslands, thickets, hedges, teak-forests, grassy dikes and waysides, waste places; both in regions with a feeble and with a pronounced dry season; at low and medium altitudes, from sea level to 1 400 m (Van Ooststroom & Hoogland 1953). Specimens from Timor were found at 400 and c. 460 m.

**8. IPOMOEA** L. (1753) 159**Key to the species of *Ipomoea***

1. Sepals distinctly awned at or below the apex, awn straight or curved. Corolla salver-shaped with a long and narrow tube. Stamens and style exerted . . . . . 2
1. Sepals not distinctly awned at or below the apex, whether or not mucronulate. Corolla mostly funnel-shaped, or campanulate, or sometimes salver-shaped. Stamens and style mostly included, sometimes exerted . . . . . 4
2. Corolla c. 3–4.5 cm long, scarlet, rarely pure white, tube distinctly widened above the middle. Outer sepals 2–4.5 mm long (awn excluded), inner ones 3–6 mm (awn excluded) . . . . . 3
2. Corolla 7–12 cm long, white with greenish bands, tube not or only slightly widened above the middle. Outer sepals 5–12 mm long (awn excluded), inner ones 7–15 mm (awn excluded) . . . . . 2. *I. alba*
3. Leaves pinnately divided, segments linear-lanceolate, linear or filiform . . . . . 19. *I. quamoclit*
3. Leaves cordate, entire, angled or palmately lobed, not pinnately divided . . . . . 10. *I. hederifolia*
4. Corolla 10 cm long or longer, salver-shaped with a long and narrow tube, white, or with greenish or reddish midpetaline bands. Seeds hairy. Large twiners . . . . . 5
4. Corolla usually less than 10 cm long, funnel-shaped or campanulate, rarely salver-shaped, in the latter case not longer than c. 7 cm. Seeds hairy or glabrous. Large to small twiners, or prostrate to erect plants . . . . . 7
5. Stamens inserted near the mouth of the corolla-tube. Sepals subequal or outer ones slightly longer than the inner ones . . . . . 1. *I. aculeata* var. *mollissima*



**Map 6** Distribution of *Hewittia malabarica* (L.) Suresh.



5. Stamens inserted near the base of the corolla-tube. Outer sepals slightly or much shorter than the inner ones . . . 6
6. Stamens exserted. Corolla white or with reddish midpetaline bands, 11–14 cm long. Leaves mostly (3–)5(–7)-lobed, rarely entire. Outer sepals much shorter than inner ones. Stems terete or angular, often longitudinally wrinkled, smooth or rarely muricated . . . . . 22. *I. trichosperma*
6. Stamens included. Corolla white with greenish bands, 9–12 cm long. Leaves mostly entire. Outer sepals mostly slightly shorter than inner ones. Stems terete, smooth or minutely verrucose . . . . . 25. *I. violacea*
7. Sepals entirely glabrous, sometimes muricated . . . . . 8
7. Sepals hairy on the outer surface, or fimbriate at the margins . . . . . 18
8. Leaves palmately lobed to palmately compound . . . . . 9
8. Leaves not palmately divided . . . . . 11
9. Leaves palmately divided to the base. Pseudostipules (small leaves of the axillary shoot) often present . . . . . 6. *I. cairica*
9. Leaves palmately lobed often beyond the middle, but never to the base. Pseudostipules absent . . . . . 10
10. Stems twining. Sepals not mucronulate. Seeds with long woolly-sericeous easily detaching hairs 11. *I. mauritiana*
10. Stems prostrate, rooting at the nodes. Inner sepals distinctly mucronulate. Seeds glabrous . . . . . 4. *I. batatas*
11. Large woody twiner, stems stout. Flowers in axillary panicles . . . . . 21. *I. sumatrana*
11. Smaller, mostly herbaceous twiners with thin stems, or prostrate plants. Flowers in few- to several-flowered, peduncled, axillary cymes, or solitary in the leaf-axils . . 12
12. Corolla salver-shaped . . . . . 20. *I. sagittifolia*
12. Corolla funnel-shaped . . . . . 13
13. Corolla up to 2.5 cm long . . . . . 13. *I. obscura*
13. Corolla 3 cm or longer . . . . . 14
14. Plants aquatic or growing in marshy places. Stems mostly trailing and rooting, or floating; thick, soft, fistulose or spongy . . . . . 3. *I. aquatica*
14. Terrestrial plants. Stems twining or trailing; not thick, soft, fistulose or spongy . . . . . 15
15. Stems mostly twining . . . . . 16
15. Stems trailing and mostly rooting at the nodes, rarely twining . . . . . 17
16. Corolla yellow, apical parts of the midpetaline bands pubescent. Seeds tomentose. Sepals 5–6.5 mm with attenuate, broadly rounded to truncate, slightly emarginate, mucronulate apex . . . . . 14. *I. ochracea*
16. Corolla sky blue with a paler or white tube, entirely glabrous. Seeds glabrous, puberulent or pilose along the edges only. Sepals 4.5–6 mm long, without a distinct mucro . . . . . 23. *I. tricolor*
17. Leaves subcoriaceous or fleshy; emarginate or sometimes truncate at the apex. Stems 5–30 m long, containing milky juice . . . . . 15. *I. pes-caprae* subsp. *brasiliensis*
17. Leaves herbaceous, broadly ovate-orbicular in outline, attenuate towards the acute or obtuse apex. Stems 1–5 m, without milky juice . . . . . 4. *I. batatas*
18. Flowers axillary. Peduncles very short, or absent. Corolla less than 1.5 cm long . . . . . 19
18. Flowers not axillary. Peduncles well-developed. Corolla 1.5 cm long, or mostly longer . . . . . 21
19. Erect or ascending herb. Leaf-base acute, attenuate into the petiole. Corolla glabrous . . . . . 17. *I. polymorpha*
19. Twining or prostrate herbs. Leaf-base cordate. Corolla with midpetaline bands hairy or at least pilose towards the apex . . . . . 20
20. Ovary and capsule hairy. Outer sepals linear-acuminate, base ovate. Pedicels none or very short, up to 3 mm. Corolla pink or purple, c. 7–9 mm long . . . . . 9. *I. eriocarpa*
20. Ovary and capsule glabrous. Outer sepals deltate-lanceolate, base auriculate. Pedicels 8–15 mm. Corolla white, up to 19 mm long . . . . . 5. *I. biflora*
21. Flowers aggregated at the end of the peduncle, involucrate by large bracts . . . . . 16. *I. pes-tigridis*
21. Flowers whether or not aggregate at the end of the peduncle, not distinctly involucrate . . . . . 22
22. Sepals up to 4 mm long . . . . . 13. *I. obscura*
22. Sepals 5 mm or longer . . . . . 23
23. Outer sepals orbicular, broadly rounded at the apex. Corolla with puberulent tube and midpetaline bands. Seeds sericeous-pubescent . . . . . 7. *I. carnea* subsp. *fistulosa*
23. Outer sepals mostly acute, sometimes subobtusate. Corolla glabrous outside. Seed puberulent or glabrous, sometimes pilose at the hilum or at the edges only . . . . . 24
24. Sepals long-attenuate, or long and linear-acuminate at the apex, herbaceous . . . . . 25
24. Sepals acute or subobtusate, not long-attenuate towards the apex, herbaceous, membranaceous or coriaceous . . 26
25. Sepals almost linear, acute, 8–15 mm long. Corolla up to 3 cm long, purple . . . . . 8. *I. decaisnei*
25. Sepals lanceolate, 17–25 mm long. Corolla 5–6 cm long, pale to bright blue with whitish tube (fading to pink in age) . . . . . 12. *I. nil*
26. Outer sepals not mucronulate. Corolla 4–6 cm. Sepals 11–16 mm, margins not ciliate nor fimbriate . . . . . 18. *I. purpurea*
26. Sepals mucronulate. Corolla 1.5–4(–5) cm. Sepals 5–6 mm, margins ciliate or fimbriate . . . . . 27
27. Sepals glabrous or sparsely hairy on the back, the margins always distinctly fimbriate. Corolla funnel-shaped c. 1.75–2 cm long, with short obtuse, mucronulate lobes . . . . . 24. *I. triloba*
27. Sepals entirely glabrous, or pilose on the back, the margins ciliate. Corolla campanulate to funnel-shaped, c. 3–4.5 cm long, not distinctly lobed . . . . . 4. *I. batatas*

### 1. *Ipomoea aculeata* Blume

*Ipomoea aculeata* Blume (1826) 715; Kalkman (1955) 216.

**a. var. *mollissima*** (Zoll.) Hallier f. ex Ooststr. — Map 7

*Ipomoea aculeata* Blume var. *mollissima* (Zoll.) Hallier f. ex Ooststr. (1940) 574; Malm (1934) 286; Ooststr. (in Ooststr. & Hoogland 1953) 486.  
*Calonyction mollissimum* Zoll. (1854) 128, 131.

Distribution — In continental Asia: China, Myanmar and Thailand (Fang & Staples 1995). In Malesia: Middle and East Java, Madura, Lesser Sunda Islands (Lombok, Sumbawa, Timor, Alor) and Philippines (Luzon) (Van Ooststroom & Hoogland 1953).

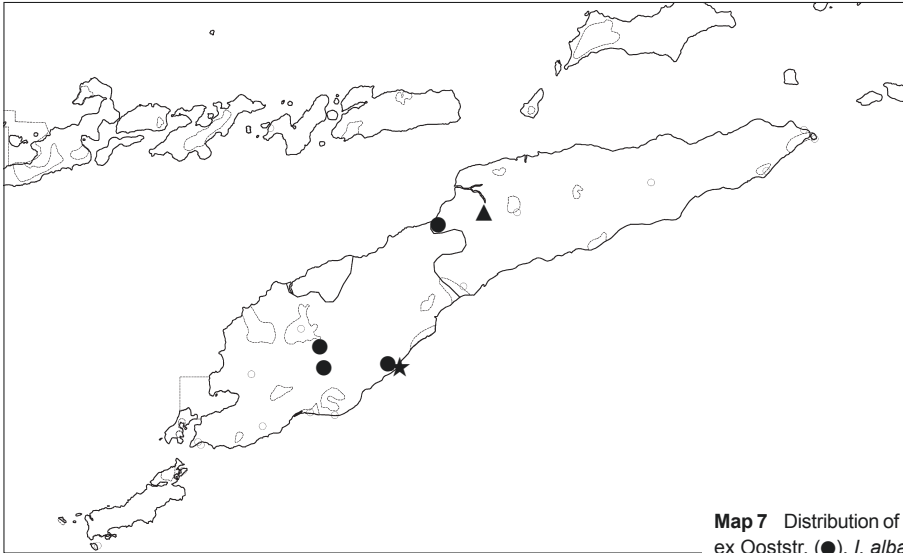
Habitat & Ecology — In thickets and thin forests, from sea level to 700 m.

Vernacular name — Lak-laku, non hau kase (Dawan).

Uses — The leaves are used as purgative and as a substitute for soap (Heyne in Van Ooststroom & Hoogland 1953).

### 2. *Ipomoea alba* L. — Map 7

*Ipomoea alba* L. (1753) 161; Ooststr. (in Ooststr. & Hoogland 1953) 480.  
*Ipomoea bona-nox* L. (1762) 228; Fawc. (1885) 511.  
*Calonyction speciosum* Choisy (1834) 441; Decne. (1834) 389; Span. (1841) 338.



**Map 7** Distribution of *Ipomoea aculeata* Blume var. *mollissima* (Zoll.) Hallier f. ex Ooststr. (●), *I. alba* L. (▲) and *I. aquatica* Forssk. (★).

**Distribution** — Circumtropical: originally in tropical America, in Malesia cultivated in gardens and run wild (Van Ooststroom & Hoogland 1953).

**Habitat & Ecology** — In thickets, hedges, along waysides and edges of forests; widely distributed in the settled areas at low and medium altitudes; cultivated and run wild (Van Ooststroom & Hoogland 1953).

**Uses** — The whole plant is used for treating snakebite (Fang & Staples 1995). The young leaves are eaten as a vegetable Heyne in Van Ooststroom & Hoogland 1953); the dried flowers are used in pies and in *kimlo* (Chinese vegetable soup) (Ochse in Van Ooststroom & Hoogland 1953). It is often cultivated in gardens for its nocturnal, fragrant flowers.

### 3. *Ipomoea aquatica* Forssk. — Map 7

*Ipomoea aquatica* Forssk. (1775) 44; Fawc. (1885) 511; Ooststr. (in Ooststr. & Hoogland 1953) 473; Kalkman (1955) 216.

*Ipomoea reptans* Poir. (1813) 460; Span. (1841) 339; Miq. (1856) 601.

*Ipomoea repens* Roth (1821) 110.

**Distribution** — Circumtropical, throughout Malesia (Van Ooststroom & Hoogland 1953).

**Habitat & Ecology** — In moist, marshy or inundated localities, in shallow pools, ditches, wet rice-fields, forming dense masses; also along waysides, from sea level to 1 000 m; wild and cultivated; the species is easily propagated by cuttings (Van Ooststroom & Hoogland 1953).

**Vernacular names** — Canco (Tetum?); kangkung (Indonesian).

**Uses** — Used as a laxative, recommended for piles (Burkill, Read, Valkenburgh & Bunyaphatsara in Austin 2007) and said to have a nerve-calming effect (Naples in Austin 2007), among other medicinal uses. It is also an excellent palatable vegetable, especially the young shoots and leaves (Burkill, Heyne in Van Ooststroom & Hoogland 1953), and it is very popular as an addition to other foods at meals (Cornelius et al. in Austin 2007). It is used for forage (Fang & Staples 1995), but in limited quantities, due to its laxative effect on the animals (Austin 2007).

### 4. *Ipomoea batatas* (L.) Lam. — Map 8

*Ipomoea batatas* (L.) Lam. (1792) 465; Span. (1841) 340; Ooststr. (in Ooststr. & Hoogland 1953) 469.

*Convolvulus batatas* L. (1753) 154.

**Distribution** — Throughout the tropical and subtropical regions of both hemispheres (Van Ooststroom & Hoogland 1953).

**Habitat & Ecology** — Cultivated in gardens by the houses; occasionally wild, escaped from cultivation; at low and medium altitudes (Van Ooststroom & Hoogland 1953).

**Vernacular name** — Sekal dila (Timor: unknown dialect).

**Uses** — Used for poulticing (Van Ooststroom & Hoogland 1953). Widely cultivated for its edible tubers, which are an important source of starch (Fang & Staples 1995); the young shoots are also eaten as a salad (Van Ooststroom & Hoogland 1953). The stems and leaves can be used as livestock forage and the tubers are raw material for producing alcohol (Fang & Staples 1995).

### 5. *Ipomoea biflora* (L.) Pers.

*Ipomoea biflora* (L.) Pers. (1805) 183.

*Convolvulus biflorus* L. (1753) 1668.

*Ipomoea plebeia* R.Br. (1810) 484; Ooststr. (in Ooststr. & Hoogland 1953) 463; Kalkman (1955) 216.

**Distribution** — East Africa, India, China, Myanmar, Vietnam, Japan (Ryukyu Islands), North Australia (Fang & Staples 1995). In Malesia: Java, Kangean, Lesser Sunda Islands (Lombok, Sumbawa, Timor), South Celebes, Philippines (Van Ooststroom & Hoogland 1953).

**Habitat & Ecology** — In grasslands, dry thickets, in regions subject to a pronounced dry season, from sea level to 600 m; rare (Van Ooststroom & Hoogland 1953).

**Uses** — The whole plant has several medicinal uses (Fang & Staples 1995).

**Note** — Although Van Ooststroom (Van Ooststroom & Hoogland 1953) preferred to use *I. plebeia* R.Br., Staples & Jarvis (2006) dealt satisfactorily with this nomenclature issue, proposing *I. biflora* (L.) Pers. as the correct name for this species.

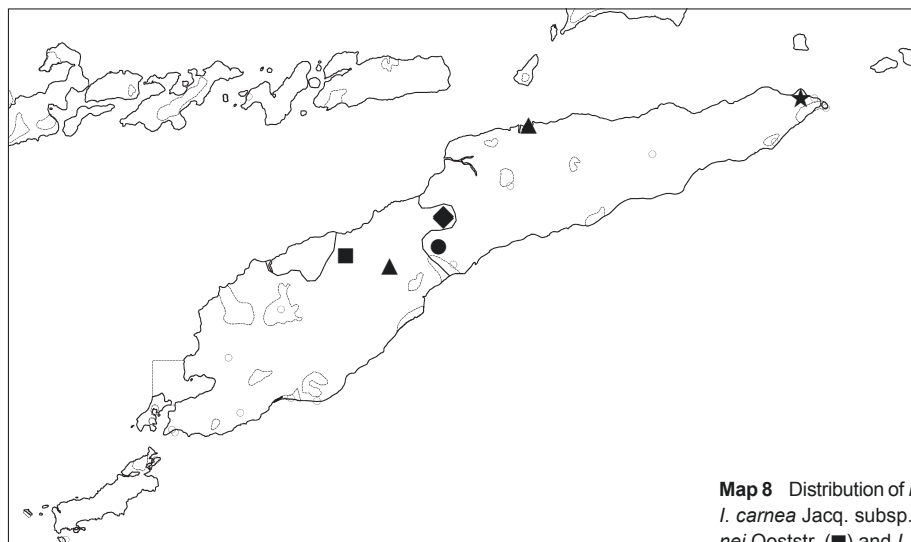
### 6. *Ipomoea cairica* (L.) Sweet — Map 8

*Ipomoea cairica* (L.) Sweet (1827) 287; Ooststr. (in Ooststr. & Hoogland 1953) 478.

*Convolvulus cairicus* L. (1759) 922.

**Distribution** — South America, Africa, Southwest Asia, Sri Lanka, Pakistan, India, Nepal, China, Thailand, Myanmar, Vietnam, Malaysia, Indonesia, Philippines, New Guinea, Pacific Islands, Japan (Ryukyu Islands) (Fang & Staples 1995). Also in East Timor.

**Habitat & Ecology** — In thickets, roadsides, waste places, cultivated areas, sunny meadows in lowlands (Fang & Staples 1995). A specimen from East Timor was found at 400 m.



**Map 8** Distribution of *Ipomoea batatas* (L.) Lam. (●), *I. cairica* (L.) Sweet (★), *I. carnea* Jacq. subsp. *fistulosa* (Mart. ex Choisy) D.F.Austin (▲), *I. decaisnei* Ooststr. (■) and *I. hederifolia* L. (◆).

Uses — The whole plant is used for treating external infections (Fang & Staples 1995). Compounds with antiviral activity (namely anti-HIV) can be extracted from this plant (Mathée et al. 1999).

**7. *Ipomoea carnea* Jacq. subsp. *fistulosa* (Mart. ex Choisy) D.F.Austin — Map 8**

*Ipomoea carnea* Jacq. subsp. *fistulosa* (Mart. ex Choisy) D.F.Austin (1977) 237.

*Ipomoea fistulosa* Mart. ex Choisy (1845) 349.

*Ipomoea crassicaulis* (Benth.) B.L.Rob. (1916) 530; Ooststr. (in Ooststr. & Hoogland 1953) 485.

Distribution — North America, South America, Sri Lanka, Pakistan, India, Nepal, China, Myanmar, Thailand, Cambodia, Indonesia, New Guinea, Pacific Islands, Japan (Ryukyu Islands) (Fang & Staples 1995). Also in East Timor.

Habitat & Ecology — In hydric sites, particularly ditches, lake margins, marshes, river edges and ‘mattorales’ in South America; also in Hawaii and the tropics of the Old World (Austin 1977).

**8. *Ipomoea decaisnei* Ooststr. — Map 8**

*Ipomoea decaisnei* Ooststr. (1940) 503; Ooststr. (in Ooststr. & Hoogland 1953) 466; Kalkman (1955) 216.

*Pharbitis variifolia* Decne. (1834) 390; Span. (1841) 338.

Distribution — Malesia: East Java, Madura, Southwest and Southeast Celebes (Buton Isl.), Lesser Sunda Islands (Lombok, Sumbawa, Timor) (Van Ooststroom & Hoogland 1953).

Habitat & Ecology — In thickets, hedges, waysides, apparently restricted to regions subject to a pronounced dry period, from sea level to 750 m (Van Ooststroom & Hoogland 1953).

Vernacular name — Daun tapahaik (Timor: unknown dialect).

**9. *Ipomoea eriocarpa* R.Br.**

*Ipomoea eriocarpa* R.Br. (1810) 484; Ooststr. (in Ooststr. & Hoogland 1953) 462; Kalkman (1955) 216.

*Ipomoea hispida* (Vahl) Roem. & Schult. (1819) 238.

Distribution — Africa, Sri Lanka, Pakistan, India, Nepal, China, Myanmar, Thailand, Cambodia, Laos, Vietnam, Malaysia, Indonesia, New Guinea, Philippines, North Australia (Fang & Staples 1995).

Habitat & Ecology — In open grasslands, grassy waysides, thickets, hedges, fields and occasionally in secondary forests;

on periodically dry soil; in regions with a fairly pronounced dry season; from sea level to 1 300 m (Van Ooststroom & Hoogland 1953).

**10. *Ipomoea hederifolia* L. — Map 8**

*Ipomoea hederifolia* L. (1759) 925; Ooststr. (1958) 563.

*Ipomoea angulata* Lam. (1792) 464; Ooststr. (in Ooststr. & Hoogland 1953) 481.

Distribution — Native to tropical America, now circumtropical; in Malesia cultivated and run wild (Van Ooststroom & Hoogland 1953).

Habitat & Ecology — Run wild in waste places, fields, grasslands, thickets and thin forests; up to 1 200 m (Van Ooststroom & Hoogland 1953).

Uses — Cultivated in gardens for ornamental purposes (Van Ooststroom & Hoogland 1953).

**11. *Ipomoea mauritiana* Jacq.**

*Ipomoea mauritiana* Jacq. (1791) 216; Ooststr. (1972) 941.

*Ipomoea paniculata* R.Br. (1810) 486, auct. non Burm.f. (1768); Span. (1841) 340.

*Ipomoea digitata* auct. non L. (1759) 924; Fawc. (1885) 511; Ooststr. (in Ooststr. & Hoogland 1953) 483; Kalkman (1955) 216.

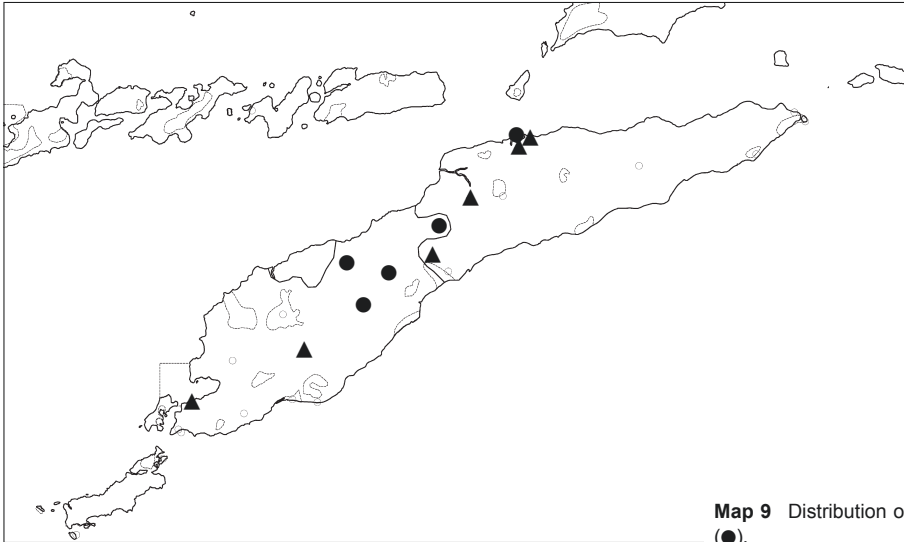
Distribution — Sri Lanka, Myanmar, Thailand, Cambodia, Laos, Vietnam, China, Malaysia, Indonesia, New Guinea, Philippines, Pacific Islands, Japan (Ogasawara and Ryukyu Islands) (Fang & Staples 1995).

Habitat & Ecology — In thickets on the beach, but also in the interior, in waste places, thickets, hedges, savannah-forests, teak-forests, alang-alang fields, and along waysides; also cultivated; from sea level to 700 m (Van Ooststroom & Hoogland 1953).

Vernacular name — Laluli (Timor: unknown dialect) (Van Ooststroom & Hoogland 1953).

Uses — The leaves and roots are used externally for treating tuberculosis, as well as external and breast infections (Fang & Staples 1995). The root alone is pounded and applied for swellings (Peninsular Malaysia); moreover it is said to be cathartic (Van Ooststroom & Hoogland 1953). The plant is also cultivated for ornamental purposes.





**Map 9** Distribution of *Ipomoea nil* (L.) Roth (▲) and *I. sagittifolia* Burm.f. (●).

## 12. *Ipomoea nil* (L.) Roth — Map 9

*Ipomoea nil* (L.) Roth (1797) 36; Ooststr. (in Ooststr. & Hoogland 1953) 465; Kalkman (1955) 216.

*Convolvulus nil* L. (1762) 219.

*Ipomoea setosa* Blume (1826) 714; Span. (1841) 340.

*Pharbitis nil* (L.) Choisy (1834) 439; Decne. (1834) 388; Span. (1841) 338.

*Ipomoea trichocalyx* Steud. (1840) 819; Miq. (1856) 611; Fawc. (1885) 511.

*Ipomoea hederacea* auct. non Jacq. (1787) 124, pl. 36; Fawc. (1885) 511.

**Distribution** — Pantropical; native in America and introduced in Asia in the 16th century (Austin 1986).

**Habitat & Ecology** — In waysides, hedges, thickets and grasslands, from sea level to 1 300 m (Van Ooststroom & Hoogland 1953).

**Vernacular name** — Hiluk talin pana (unknown dialect).

**Uses** — The seeds are said to be purgative. The plant is cultivated in gardens for ornamental purposes (Van Ooststroom & Hoogland 1953). In Timor, used as a remedy for wounds, and in the preparation of black paint (Friedberg 412).

**Note** — A few specimens from Timor had been identified as *I. hederacea* Jacq., but were revised for this study and re-identified as *I. nil*. The two species can be told apart mainly by the shape of the sepals: in *I. hederacea* they constrict abruptly and then taper towards the tip, whereas in *I. nil* they taper gradually (Heine 1963, Acevedo-Rodriguez 2003, Hawthorne & Jongkind 2006). This is not always easily observed, especially in herbarium specimens, which has caused some confusion between the two species.

## 13. *Ipomoea obscura* (L.) Ker Gawl. — Map 10

*Ipomoea obscura* (L.) Ker Gawl. (1817) t. 239; Decne. (1834) 392; Miq. (1856) 611; Fawc. (1885) 511; Ooststr. (in Ooststr. & Hoogland 1953) 471; Kalkman (1955) 216.

*Convolvulus obscurus* L. (1762) 220.

*Ipomoea insuavis* Blume (1826) 716.

**Distribution** — East tropical Africa, Mascarene Islands, tropical Asia, throughout Malesia to North Australia and Fiji (Van Ooststroom & Hoogland 1953).

**Habitat & Ecology** — In grasslands, thickets, hedges, thin forests, waysides, waste ground; occasionally on sandy soil near the sea; from sea level to 1 300 m (Van Ooststroom & Hoogland 1953). Specimens from Timor were collected at 750–760 m.

**Uses** — Leaves, together with those of *Argyreia mollis* (Burm.f.) Choisy, are used against sores (Heynes in Van Ooststroom & Hoogland 1953). Watt (1890) noted that in India, the leaves when toasted, powdered and boiled with a certain portion of *ghi* were considered a valuable application in aphthous infections.

## 14. *Ipomoea ochracea* (Lindl.) G. Don — Map 10

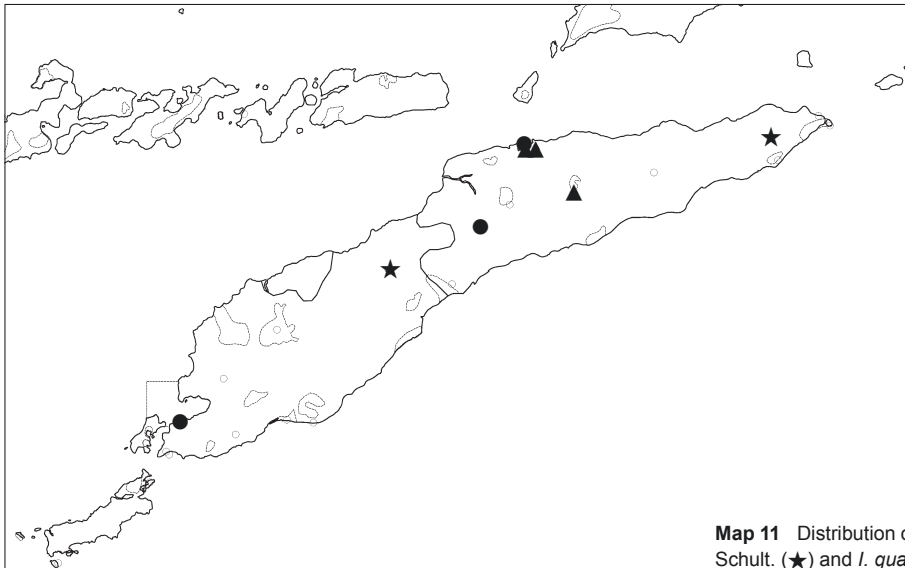
*Ipomoea ochracea* (Lindl.) G. Don (1838) 270; Ooststr. (1972) 941.

*Convolvulus ochraceus* Lindl. (1826) t. 1060.

*Ipomoea ochroleuca* Span. (1841) 340; Ooststr. (in Ooststr. & Hoogland 1953) 472; Kalkman (1955) 216; 'ochracea' Miq. (1856) 614.



**Map 10** Distribution of *Ipomoea obscura* (L.) Ker Gawl. (★), *I. ochracea* (Lindl.) G. Don (●) and *I. pes-caprae* (L.) R.Br. subsp. *brasiliensis* (L.) Ooststr. (■).



**Map 11** Distribution of *Ipomoea pes-tigridis* L. (●), *I. polymorpha* Roem. & Schult. (★) and *I. quamoclit* L. (▲).

Distribution — Tropical Africa, in Malesia: Lesser Sunda Islands (Timor, Alor), North Borneo; New Caledonia (Van Ooststroom 1958).

Habitat & Ecology — In Timor on rocks near the sea (Van Ooststroom 1958).

#### 15. *Ipomoea pes-caprae* (L.) R.Br.

*Ipomoea pes-caprae* (L.) R.Br. (1816) 477; Miq. (1856) 602; Fawc. (1885) 511; Kalkman (1955) 216.

*Convolvulus pes-caprae* L. (1753) 159.

*Ipomoea maritima* (Desr.) R.Br. (1810) 486; Span. (1841) 339.

#### a. subsp. *brasiliensis* (L.) Ooststr. (1940) 533. — Map 10

*Convolvulus brasiliensis* L. (1753) 159.

Distribution — Circumtropical, the most common subspecies throughout Malesia (Van Ooststroom & Hoogland 1953).

Habitat & Ecology — On and immediately behind seashores, occasionally in the interior, along waysides, ditches and canals, from sea level up to 600 m (Van Ooststroom & Hoogland 1953).

Vernacular name — Tai ilaça (Timor: unknown dialect).

Uses — The seeds are said to be a good remedy for stomach-ache and cramp; in East Malaysia the leaves are made into poultices, which are used to ripen boils and applied to swellings, wounds, ulcers and such. The juice of the stems is known to be used in the Island of Nusa Kambangan (South Java) as a medicine against bites and stings of fishes. The species may be useful as a sand-binder (Burkill, Heyne in Van Ooststroom & Hoogland 1953).

#### 16. *Ipomoea pes-tigridis* L. — Map 11

*Ipomoea pes-tigridis* L. (1753) 162; Span. (1841) 340; Ooststr. (in Ooststr. & Hoogland 1953) 467; Kalkman (1955) 216.

Distribution — East tropical Africa, Mascarene Islands, continental tropical Asia, throughout Malesia (Van Ooststroom & Hoogland 1953).

Habitat & Ecology — In grasslands, waste places, fields, thickets, occasionally in teak-forest, also on sandy soil near the sea; from sea level to 1 000 m (Van Ooststroom & Hoogland 1953).

#### 17. *Ipomoea polymorpha* Roem. & Schult. — Map 11

*Ipomoea polymorpha* Roem. & Schult. (1819) 254; Ooststr. (in Ooststr. & Hoogland 1953) 464; Kalkman (1955) 216.

*Ipomoea pumila* Span. (1841) 341; Fawc. (1885) 511. — Type: Timor, s.c. (?) 45 (holo L.).

Distribution — Ethiopia, India (?), Indo-China, and Taiwan to Northeast Australia, in Malesia: East Java, Madura, Lesser Sunda Islands (Sumba, Flores, Timor), Philippines (Luzon), Northeast New Guinea and Thursday Island (Van Ooststroom & Hoogland 1953).

Habitat & Ecology — In grasslands, grassy waysides, fields, sandy plains, dunes; in the lower parts of the islands with a strong dry monsoon; on hard or stony soil, in sunny localities, from sea level to c. 100 m (Van Ooststroom & Hoogland 1953).

#### 18. *Ipomoea purpurea* (L.) Roth

*Ipomoea purpurea* (L.) Roth (1787) 27; Ooststr. (in Ooststr. & Hoogland 1953) 465.

*Convolvulus purpureus* L. (1762) 219.

Distribution — Sri Lanka, Pakistan, Nepal, China, Indonesia, Philippines; native to North and South America, introduced and naturalized worldwide (Fang & Staples 1995).

Habitat & Ecology — Waysides, hedges, fields; from sea level to 2 800 m (Fang & Staples 1995).

#### 19. *Ipomoea quamoclit* L. — Map 11

*Ipomoea quamoclit* L. (1753) 159; Span. (1841) 339; Fawc. (1885) 511; Ooststr. (in Ooststr. & Hoogland 1953) 482; Kalkman (1955) 216.

*Quamoclit vulgaris* Choisy (1834) 434.

Distribution — Circumtropical, in Malesia cultivated and run wild throughout the region (Van Ooststroom & Hoogland 1953).

Habitat & Ecology — Run wild in waste places, hedges, thickets, thin forests and along edges of cane and rice-fields, up to 1 200 m (Van Ooststroom & Hoogland 1953). It is quite common all around Timor, where it has been found in mountain slopes and along roads.

#### 20. *Ipomoea sagittifolia* Burm.f. — Map 9

*Ipomoea sagittifolia* Burm.f. (1768) 50, t. 18, f. 2.

*Convolvulus marginatus* Desr. (1792) 438.

*Ipomoea sepiaria* J.Koenig ex Roxb. (1824) 90; Ooststr. (1972) 941.

*Ipomoea verrucosa* Blume (1826) 718; Span. (1841) 340.

*Ipomoea marginata* (Desr.) Verdc. (1987) 658.

*Ipomoea maxima* auct. non (L.f.) Sweet (1830) 372.

Distribution — Africa, Sri Lanka, ?Pakistan, India, China, Myanmar, Thailand, Laos, Vietnam, Malaysia, Indonesia, New Guinea, North Australia, Pacific Islands (Fang & Staples 1995). Also in East Timor.

Habitat & Ecology — In coastal or saline soils, grasslands, fields and waste areas (Fang & Staples 1995). In Malesia not found on the beaches bordering the Indian Ocean, but apparently mostly confined to the clays of muddy seas (Van Ooststroom & Hoogland 1953). In Timor, up to c. 760 m.

#### 21. *Ipomoea sumatrana* (Miq.) Ooststr.

*Ipomoea sumatrana* (Miq.) Ooststr. (1940) 571; Ooststr. (in Ooststr. & Hoogland 1953) 486; Kalkman (1955) 216.

*Lettsomia sumatrana* Miq. (1861) 560.

*Ipomoea repanda* auct. non Jacq., Fawc. (1885) 511.

Distribution — Myanmar, China, Thailand, Laos, Malaysia, Indonesia (Fang & Staples 1995).

Habitat & Ecology — In thickets, roadsides, forest margins, 100–900 m (Fang & Staples 1995).

Note — Fawcett (1885) reported *I. repanda* Jacq. from Timor, citing a specimen by Wiles & Smith from the BM herbarium. The specimen was examined for this study and matches *I. sumatrana*, as Van Ooststroom (1940, Van Ooststroom & Hoogland 1953) suspected.

#### 22. *Ipomoea trichosperma* Blume — Map 12

*Ipomoea trichosperma* Blume (1826) 710; Malm (1934) 287; Ooststr. (in Ooststr. & Hoogland 1953) 487; Kalkman (1955) 216.

*Ipomoea capillata* Span. (1841) 340; Fawc. (1885) 511.

*Calonyction capillatum* Miq. (1856) 598.

Distribution — Malesia: Java, Celebes (Salajar and Buton Isl.), Lesser Sunda Islands (Sumbawa, Timor, Alor) (Van Ooststroom & Hoogland 1953).

Habitat & Ecology — In thickets, hedges and thin forests; near the beach and in the interior; from sea level to 400 m (Van Ooststroom & Hoogland 1953).

#### 23. *Ipomoea tricolor* Cav. — Map 12

*Ipomoea tricolor* Cav. (1795) 5, t. 208; Ooststr. (in Ooststr. & Hoogland 1953) 478.

Distribution — Mexico, Central America, West Indies, tropical South America, elsewhere cultivated and perhaps occasionally

escaped, in Malesia only known from the Peninsular Malaysia (as a garden escape), and Timor, where it is locally frequent in the North Central portion of the island, at 400 m (Van Ooststroom & Hoogland 1953).

Habitat & Ecology — Small plant, found in roadsides and said to be very frequent in some localities of Timor.

Vernacular name — Non luli (Timor: unknown dialect).

#### 24. *Ipomoea triloba* L. — Map 12

*Ipomoea triloba* L. (1753) 161; Ooststr. (in Ooststr. & Hoogland 1953) 468.

Distribution — Native to tropical America, now a circumtropical weed; throughout Malesia (Van Ooststroom & Hoogland 1953).

Habitat & Ecology — In grasslands, thickets, hedges, waste places, waysides, fields, also in savannah-forests and occasionally on sandy sea-shores, from sea level to 750 m (Van Ooststroom & Hoogland 1953).

Vernacular names — Fehuc-fuic (Tetum), naubia-talin (Mambae).

#### 25. *Ipomoea violacea* L. — Map 12

*Ipomoea violacea* L. (1753) 161.

*Calonyction muticum* Decne. (1834) 390; Span. (1841) 338; Miq. (1856) 597.

*Ipomoea tuba* (Schltdl.) G. Don (1838) 271; Ooststr. (in Ooststr. & Hoogland 1953) 487.

Distribution — North America, South America, Africa, Sri Lanka, Thailand, Malaysia, Indonesia, Philippines, New Guinea, North Australia, Pacific Islands, Japan (Van Ooststroom & Hoogland 1953).

Habitat & Ecology — Beaches, seaside thickets, edges of brackish rivers and lagoons, near sea level to 100 m (Fang & Staples 1995).

Note — A specimen from Timor was found at c. 275 m.

#### Doubtful records

*Ipomoea campanulata* L. (1753) 160; Decne. (1834) 391; Span. (1841) 338; Miq. (1856) 606; Fawc. (1885) 511.

The one collection on which the reports of this taxon are based, Meyer (*s.n.*), has been seen at K, and it has been established that the collection locality is actually 'Timor-laut' (Tanimbar islands). Therefore there seems to be no evidence that the species really occurs in Timor.



Map 12 Distribution of *Ipomoea trichosperma* Blume (●), *I. tricolor* Cav. (★), *I. triloba* L. (▲) and *I. violacea* L. (■).



**Insufficiently known**

*Ipomoea muricata* (L.) Jacq. (1798) 40, t. 23; Miq. (1856) 608.

Miquel lists this species as occurring in Timor but no specimens or other references have been cited or found by the authors that could support this statement. In Miquel’s work, *I. aculeata* is confusingly cited as a synonym and the description used seems a mixed concept of *I. aculeata* and *I. muricata*.

*Ipomoea aculeata* var. *mollissima* is known to exist in Timor, but whether *I. muricata* could actually have been found in the island is yet to be confirmed.

**Unidentified specimens**

Two specimens from Timor remain to be identified at species level – *Kooy 283* (L!) and *Verdial 26* (LISC!) – due to the lack of relevant taxonomical characters. *Kooy 283* was not possible to identify because it lacks leaves and has only dehisced fruits. Without knowing the leaf morphology or details about the corolla or flower buds, we were unable to place this specimen. However, as the sepals are awned, it is possibly one of the following three species with this feature that occur in Timor: *I. alba*, *I. hederifolia* or *I. quamoclit*.

The presence of pseudostipules in *Verdial 26* suggests it could be related to *I. cairica*. The particular shape of the leaves (5-lobed, with a longer and broader central lobe) resembles that of *I. tuberculata* Ker Gawl. However, the leaves are not as deeply lobed and the lobes are somewhat broader than in *I. tuberculata*. Comparison with more taxa is necessary to establish the identity of this specimen.

**9. JACQUEMONTIA** Choisy (1834) 476

**Key to the species of *Jacquemontia***

- 1. Two outer sepals ovate-lanceolate to ovate, attenuate to the base, acuminate at the apex . . . . . 1. *J. paniculata*
- 1. Two outer sepals broadly ovate, cordate or rounded at the base, acute to short-acuminate at the apex 2. *J. zollingeri*

Note — It is rather difficult to tell these two species apart. The specimens studied exhibit reasonably high levels of variation in characters such as the shape of sepals or density of indumentum and, as Van Ooststroom suggests, it might be that both should be considered varieties of the same species. Further studies on the morphological variability of these species are necessary.



**1. Jacquemontia paniculata** (Burm.f.) Hallier f. — Map 13

*Jacquemontia paniculata* (Burm.f.) Hallier f. (1893a) 541.  
*Ipomoea paniculata* Burm.f. (1768) 50, pl. 21, f. 3.

**Key to the varieties of *Jacquemontia paniculata***

- 1. Leaves glabrous, or short-pilose and glabrescent. Stems mostly glabrescent . . . . . a. var. *paniculata*
- 1. Leaves mostly densely tomentose, finally glabrescent. Stems covered with a dense yellowish brown tomentum . . . . . b. var. *tomentosa*

**a. var. paniculata**

*Convolvulus parviflorus* Vahl (1794) 29; Decne. (1834) 392; Span. (1841) 341; Miq. (1856) 622; Fawc. (1885) 511.

Distribution — Tropical East Africa, Madagascar and adjacent islands to SE Asia, tropical Australia, and New Caledonia; throughout Malesia (Van Ooststroom & Hoogland 1953).

Habitat & Ecology — In thickets, secondary forests, teak-forests, grassy places, along fields, hedges, waysides; often on dry-soil; from sea level to c. 600(–880) m (Van Ooststroom & Hoogland 1953).

**b. var. tomentosa** (Warb.) Ooststr.

*Jacquemontia paniculata* var. *tomentosa* (Warb.) Ooststr. (in Ooststr. & Hoogland 1953) 432.

*Convolvulus parviflorus* Vahl var. *tomentosus* Warb. (1894) 207.

Distribution — North Australia and Queensland, in Malesia: Lesser Sunda Islands (Sumba, Timor), East New Guinea, Philippines (Apo Island in Mindoro Strait) (Van Ooststroom & Hoogland 1953).

Habitat & Ecology — In grass-fields, on rocks; from sea level to c. 1 200 m (Van Ooststroom & Hoogland 1953).

**2. Jacquemontia zollingeri** (Choisy) Hallier f.

*Jacquemontia zollingeri* (Choisy) Hallier f. (1893a) 543; Ooststr. (in Ooststr. & Hoogland 1953) 433; Kalkman (1955) 216.

*Convolvulus zollingeri* Choisy in Zoll. (1854) 130, 132.

**Key to the varieties of *Jacquemontia zollingeri***

- 1. Stems, leaves and inflorescences pubescent to tomentose. Peduncles 2–15 mm long. Corolla pale lilac . . . . . a. var. *zollingeri*

**Map 13** Distribution of *Jacquemontia paniculata* (Burm.f.) Hallier f.

1. Stems and leaves sparsely pilose to glabrescent; inflorescences densely tomentose. Peduncles shorter, only to 5 mm long. Corolla white . . . . . b. var. *jonkeri*

**a. var. *zollingeri***

Distribution — Malesia: East Java (Mt Baluran in Besuki), Lesser Sunda Islands (Bali, Sumbawa, Timor) (Van Ooststroom & Hoogland 1953).

Habitat & Ecology — In thickets, from sea level to c. 30 m (Van Ooststroom & Hoogland 1953).

**b. var. *jonkeri* Ooststr.**

*Jacquemontia zollingeri* var. *jonkeri* Ooststr. (1939) 276; Ooststr. (in Ooststr. & Hoogland 1953) 433. — Type: *Jonker* 285 (U), Timor.

Distribution — Timor (Van Ooststroom & Hoogland 1953).

**10. MERREMIA** Dennst. ex Endl. (1841) 1403, *nom. cons.*

**Key to the species of *Merremia***

- 1. Leaves palmately compound, with 5 leaflets, or palmately 5–7-lobed . . . . . 2
- 1. Leaves entire or crenate to shallowly or deeply 3-lobed . . . . . 3
- 2. Leaves palmately compound. Leaflets 5, entire, linear, lanceolate or narrowly oblong. Sepals 7.5–13 mm long, without glandular pellucid dots. Corolla white or pale pink, glabrous outside . . . . . 5. *M. quinata*
- 2. Leaves palmately lobed. Lobes 5–7, broad triangular to lanceolate. Sepals 12–20 mm long, with glandular pellucid dots. Corolla bright yellow, with distinctly 5-nerved midpetaline bands . . . . . 7. *M. vitifolia*
- 3. Peduncles very short or nearly absent. Sepals all more or less hairy on the back and long ciliate at the margins. Leaves reniform to broadly ovate . . . . . 2. *M. emarginata*
- 3. Peduncles 1–10 cm (rarely up to 16 cm). Sepals glabrous or occasionally slightly pilose on the back and along the margins. Leaves not reniform to broadly ovate . . . . . 4
- 4. Corolla with midpetaline bands pilose only at their top, 20–30(–35) mm long. Stems terete or slightly striate . . . . . 6. *M. umbellata* subsp. *orientalis*
- 4. Corolla entirely glabrous outside, up to 20 mm long. Stems slender, smooth or minutely tuberculate . . . . . 5
- 5. Bracts persistent. Corolla white . . . . . 1. *M. dichotoma*
- 5. Bracts caducous. Corolla yellow . . . . . 6

- 6. Corolla up to 12 mm long. Sepals with a distinct mucro, directed outwards . . . . . 4. *M. hederacea*
- 6. Corolla 15–20 mm long. Sepals not or slightly mucronulate, in which case mucro not directed outwards. . . . . 3. *M. gemella*

**1. *Merremia dichotoma* Ooststr. — Map 14**

*Merremia dichotoma* Ooststr. (1939) 311; Ooststr. (in Ooststr. & Hoogland 1953) 443; Kalkman (1955) 216. — Type: *Walsh* 375 (holo BO n.v.; iso BM), Indonesia, Kolbano, 30.iv.1929.

Distribution — Timor (Van Ooststroom & Hoogland 1953).

Habitat & Ecology — Climber. One specimen was collected by the coast (*Walsh* 375), the other at a mountain site (*Kooy* 794).

Vernacular name — Knâtan (Timor: dialect unknown) (Van Ooststroom & Hoogland 1953).

Note — Van Ooststroom (Van Ooststroom & Hoogland 1953) first described *M. dichotoma* as having a white corolla. According to Kooy’s collection notes (*Kooy* 794), the specimen from Timor had a yellow corolla. Since the type specimen *Walsh* 375 does not have any indication about the colour of the corolla, it is possible that Van Ooststroom speculated that it was white, from the analysis of the preserved Walsh’s specimen. Van Ooststroom may have made a wrong assumption or the species may indeed exhibit some variability in corolla colour.

**2. *Merremia emarginata* (Burm.f.) Hallier f. — Map 14**

*Merremia emarginata* (Burm.f.) Hallier f. (1893a) 552; Ooststr. (in Ooststr. & Hoogland 1953) 444; Kalkman (1955) 216.

*Evolvulus emarginatus* Burm.f. (1768) 77.

*Ipomoea reniformis* Choisy (1834) 446; Decne. (1834) 396; Span. (1841) 338; Fawc. (1885) 511.

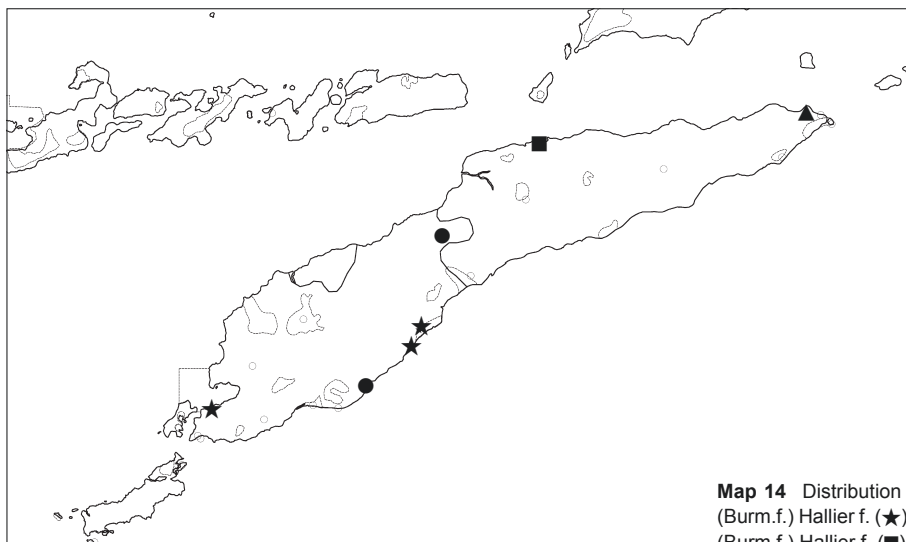
*Lepistemon reniformis* (Roxb.) Hassk. (1848) 524; Miq. (1856) 629.

Distribution — Tropical Africa, tropical Asia, in Malesia: Java, Southeast Borneo, Celebes (Donggala, Pasui), Lesser Sunda Islands (Timor, Sumbawa), and Philippines (Luzon) (Van Ooststroom & Hoogland 1953).

Habitat & Ecology — On rather heavy soils, in fields and open grasslands, along railroads and in waste places; restricted to regions with a rather strong to very strong dry season; from sea level to 200 m (Van Ooststroom & Hoogland 1953).

Uses — In the Philippines the leaves and tops in decoction are sometimes used as a diuretic and in Java for coughs (Van Ooststroom & Hoogland 1953).

Vernacular name — Naof luken (Dawan).



**Map 14** Distribution of *Merremia dichotoma* Ooststr. (●), *M. emarginata* (Burm.f.) Hallier f. (★), *M. gemella* (Burm.f.) Hallier f. (▲) and *M. hederacea* (Burm.f.) Hallier f. (■).

**3. *Merremia gemella*** (Burm.f.) Hallier f. — Map 14

*Merremia gemella* (Burm.f.) Hallier f. (1893a) 552; Ooststr. (in Ooststr. & Hoogland 1953) 441.

*Convolvulus gemellus* Burm.f. (1768) 46.

Distribution — Southeast Asia to tropical Australia, throughout Malesia (Van Ooststroom & Hoogland 1953).

Habitat & Ecology — In thickets, on hedges, in grasslands, in teak-forests, along railroads, on dikes of rice-fields, often on moist soil, from sea level to 250 m (Van Ooststroom & Hoogland 1953). The specimen seen from East Timor was collected at 400 m.

**4. *Merremia hederacea*** (Burm.f.) Hallier f. — Map 14

*Merremia hederacea* Hallier f. (1893b) 118; Ooststr. (in Ooststr. & Hoogland 1953) 441; Kalkman (1955) 216.

*Evolvulus hederaceus* Burm.f. (1768) 77.

*Ipomoea chryseides* Ker Gawl. (1818) t. 270; Decne. (1834) 392; Span. (1841) 339; Miq. (1856) 616; Fawc. (1885) 511.

Distribution — Tropical Africa, Mascarene Islands, tropical Asia from the Himalaya southwards to Sri Lanka and eastwards to Myanmar, Southern China, Indo-China, and Siam (Thailand), to Queensland, and the Carolines (Yap), throughout Malesia, also in Christmas Island (Van Ooststroom & Hoogland 1953).

Habitat & Ecology — In thickets, in open grasslands, and on sand-banks, from sea level to 50 m (Van Ooststroom & Hoogland 1953).

Uses — Used for treating acute tonsillitis (Fang & Staples 1995); a poultice of the leaves, with turmeric and broken rice, is used upon chapped hands and feet. Animals eat the plant (Burkill in Van Ooststroom & Hoogland 1953).

Vernacular name — Ai-talic (Tetum).

**5. *Merremia quinata*** (R.Br.) Ooststr. — Map 15

*Merremia quinata* (R.Br.) Ooststr. (in Ooststr. & Hoogland 1953) 447.

*Ipomoea quinata* R.Br. (1810) 486.

Distribution — Myanmar, Thailand, China, Indonesia, Philippines, New Guinea, North Australia (Fang & Staples 1995). New record for Timor.

Habitat & Ecology — In open mountain slopes (Fang & Staples 1995).

**6. *Merremia umbellata*** (L.) Hallier f.

*Merremia umbellata* (L.) Hallier f. (1893a) 552; Kalkman (1955) 216.

*Convolvulus umbellatus* L. (1753) 155.

*Ipomoea cymosa* Roem. & Schult. (1819) 241; Decne. (1834) 392; Miq. (1856) 613; Span. (1841) 339; Fawc. (1885) 511.

**a. subsp. *orientalis*** (Hallier f.) Ooststr. — Map 15

*Merremia umbellata* subsp. *orientalis* (Hallier f.) Ooststr. (in Ooststr. & Hoogland 1953) 449.

*Merremia umbellata* var. *orientalis* Hallier f. (1895) 132.

Distribution — Tropical East Africa, Seychelles, Sri Lanka, India, Nepal, China, Bangladesh(?), Myanmar, Cambodia, Laos, Vietnam, Malaysia, Indonesia, East Timor, New Guinea, Philippines and North Australia (Van Ooststroom & Hoogland 1953, Fang & Staples 1995).

Habitat & Ecology — In thickets, along edges of forests, in grasslands, along fields, along waysides, from sea level to c. 1 100 m (Van Ooststroom & Hoogland 1953).

Uses — Used in China (Guangxi) for treating infections (Fang & Staples 1995); the pounded leaves may be used as a poultice for burns and scalds or for sores, as in the Moluccas; the young leaves may be mixed with vegetables and eaten (Burkill, Heyne in Van Ooststroom & Hoogland 1953).

**7. *Merremia vitifolia*** (Burm.f.) Hallier f. — Map 15

*Merremia vitifolia* (Burm.f.) Hallier f. (1893a) 552; Ooststr. (in Ooststr. & Hoogland 1953) 448; Kalkman (1955) 216.

*Convolvulus vitifolius* Burm.f. (1768) 45, pl. 18, f. 1.

*Ipomoea vitifolia* (Burm.f.) Sweet (1826) 289; Decne. (1834) 391; Span. (1841) 339; Miq. (1856) 607; Fawc. (1885) 511.

Distribution — India, Sri Lanka, Nepal, Myanmar, Thailand, Laos, Vietnam, Indonesia, Malaysia; throughout Malesia (Van Ooststroom & Hoogland 1953, Fang & Staples 1995).

Habitat & Ecology — In open grasslands, thickets, hedges, along fields, in teak-forests, along edges of secondary forests, on river-banks and waysides; both in regions with a feeble and rather strong dry season; from sea level to c. 900 m (Van Ooststroom & Hoogland 1953). Not very frequent in Timor.

Uses — Used for treating bladder infections, stomach aches (Fang & Staples 1995), for poulticing and for treating high fever, for which an infusion of the plant is drunk (Burkill in Van Ooststroom & Hoogland 1953).

Vernacular name — Tcha-tchumaco (Timor: unknown dialect).



**Map 15** Distribution of *Merremia quinata* (R.Br.) Ooststr. (●), *M. umbellata* (L.) Hallier f. subsp. *orientalis* (Hallier f.) Ooststr. (▲) and *M. vitifolia* (Burm.f.) Hallier f. (★).





Map 16 Distribution of *Operculina turpethum* (L.) Silva Manso.

**11. OPERCULINA** Silva Manso (1836) 49

**Key to the species of *Operculina***

- 1. Stems terete. Corolla with midpetaline bands densely sericeous-pilose outside; pale yellow or rarely white. Seeds with 2 pilose-papillose edges . . . . . 1. *O. riedeliana*
- 1. Stems narrowly 3–5-winged, sulcate or angular. Corolla glabrous or with minute yellowish glands outside; entirely white or white with yellowish base. Seeds glabrous . . . . . 2. *O. turpethum*

**1. *Operculina riedeliana*** (Oliv.) Ooststr.

*Operculina riedeliana* (Oliv.) Ooststr. (1939) 366; Ooststr. (in Ooststr. & Hoogland 1953) 457; Kalkman (1955) 216.  
*Ipomoea riedeliana* Oliv. (1883) t. 1424.  
*Ipomoea petaloidea* auct. non Choisy (1834) 451; Decne. (1834) 64; Span. (1841) 339; Miq. (1856) 606; Fawc. (1885) 511.

Distribution — Andaman Islands, extreme southern Thailand, throughout Malesia and New Guinea (Staples 2007).  
 Habitat & Ecology — In thickets, edges of secondary forests and hedges; at low altitudes (Van Ooststroom & Hoogland 1953).

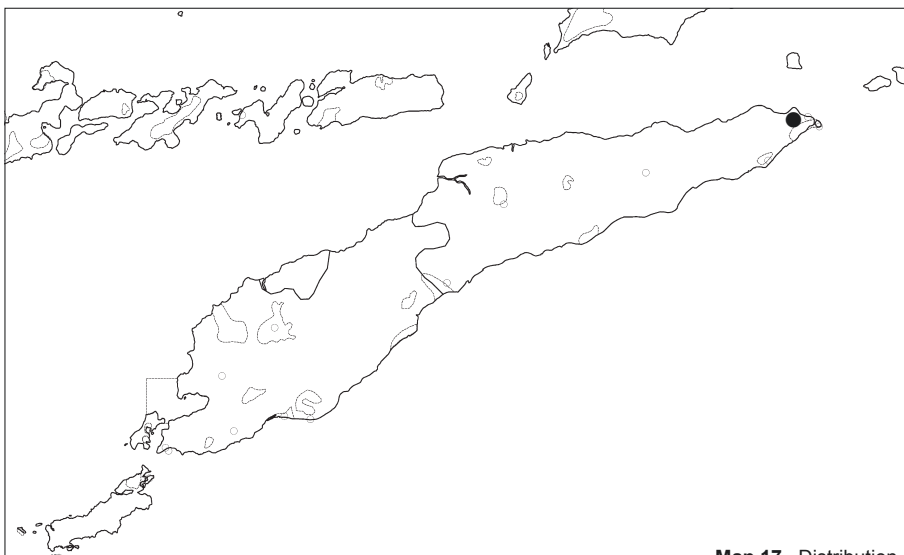
**2. *Operculina turpethum*** (L.) Silva Manso — Map 16

*Operculina turpethum* (L.) Silva Manso (1836) 49; Ooststr. (in Ooststr. & Hoogland 1953) 456; Kalkman (1955) 216.  
*Convolvulus turpethum* L. (1753) 155.  
*Ipomoea turpethum* (L.) R.Br. (1810) 485; Decne. (1834) 390; Span. (1841) 338.

Distribution — Tropical East Africa, Mascarenes, Seychelles; South and Southeast Asia to tropical Australia and Polynesia; throughout Malesia (Van Ooststroom & Hoogland 1953). Introduced and naturalized in the West Indies (Staples & Austin 1981).

Habitat & Ecology — In thin forests, thickets, teak-forests, hedges, along fields, waysides, waste places, occasionally in sugar-plantations; restricted to regions with a medium or strong east monsoon; from sea level to c. 1 300 m (Van Ooststroom & Hoogland 1953). Not very common in Timor.

Uses — Extracts of *O. turpethum* are used for two main purposes: as a purgative to reduce or balance humours and to reduce fevers. Also, intestinal worms of various kinds are expelled by the laxative effects of the medicine made from this plant (Austin 1982). The active principles of the medicine are apparently concentrated in the bark of the roots, of which two types might be produced: white roots that are mild, and black roots that give drastic, often poisonous effects (Watt in Austin



Map 17 Distribution of *Polymeria pusilla* R.Br.

1982). Also, the stems have been reported to be used for tying in the Philippines (Van Ooststroom & Hoogland 1953).

Vernacular names — Lak-laku (Dawan); non-loli (Timor: unknown dialect); tali anduk (Tetum).

**12. POLYMERIA** R.Br. (1810) 488

**1. *Polymeria pusilla*** R.Br. — Map 17

*Polymeria pusilla* R.Br. (1810) 488; Ooststr. (1958) 559.

Distribution — Australia (Queensland), New Caledonia; Timor (Van Ooststroom 1958).

Habitat & Ecology — In pyrogenous grassland on the Fuiloro plateau, at 400 m (Van Ooststroom 1958).

Note — This small prostrate plant shows an interesting pattern of distribution. Although sometimes taken for an Australian endemic (Stefanovic et al. 2003), it was actually collected in Timor as well, and in a rather remote location. It might be that the species occurs in Timor due to the proximity with the Australian coast, and is yet restricted to this rather small distribution range. However, the species may be more widespread: as Heine (1984) suggested, its small habit means that it is not easily recognized in the field.

**13. PORANA** Burm.f. (1768) 51, t. 21\*, f. 1

**1. *Porana volubilis*** Burm.f. — Map 18

*Porana volubilis* Burm.f. (1768) 51, t. 21\*, f. 1; Decne. (1834) 394; Span. (1841) 341; Miq. (1856) 625; Fawc. (1885) 511; Ooststr. (in Ooststr. & Hoogland 1953) 402; Kalkman (1955) 216. — *Porana volubilis* Burm.f. var. *burmanniana* Blume (1826) 723. — Type: *Zippelius 91* (lecto L). *Porana volubilis* Burm.f. var. *microcarpa* Engl. (1866) 472. — Type: *Naumann s.n.* (holo B n.v., presumed destroyed).

Distribution — Southern India, Myanmar, Thailand, Laos, Cambodia, Vietnam, Malaysia, Indonesia, East Timor and the Philippines (Van Ooststroom & Hoogland 1953, Staples 2006).

Habitat & Ecology — Thickets, edges of forests, teak forests, from sea level to c. 200 m, sometimes higher. In Timor, up to 750 m (Van Ooststroom & Hoogland 1953).

Vernacular names — Cidani (Tetum); nuit (or nüif) (Timor: unknown dialect).

Uses — A decoction of the plant is used in stimulating the afterbirth (Van Ooststroom & Hoogland 1953). Both leaves and flowers are edible; the leaves can be eaten to remove an unpleasant taste from the mouth. The plant is cultivated in the gardens for ornamental purposes (Van Ooststroom & Hoogland 1953); the flowers are appreciated for their delicate fragrance (Staples 2006).

**14. STICTOCARDIA** Hallier f. (1893b) 159

Note — There seems to be a remarkable incidence of species from the genus *Stictocardia* in the Lesser Sunda Islands. Out of the 11 species known to occur in tropical Africa and Asia (Austin & Eich 2001), four occur in Malesia (*S. cordatosepala*, *S. discolor*, *S. neglecta*, *S. tiliifolia*), and apart from the widespread *S. tiliifolia*, all are exclusive to the Lesser Sunda Islands, while one species is endemic to Timor (*S. discolor*) (Van Ooststroom & Hoogland 1953). Also, there is a Northeastern Australian endemic — *S. queenslandica* (Domin) R.W. Johnson, which apparently is rather similar to *S. discolor*. Both species differ from *S. tiliifolia* by their shorter sepals and corollas. However, *S. discolor* apparently has more slender peduncles and pedicels than the Australian endemic, and *S. queenslandica* does not have the extraordinary red colouration on the abaxial surface of the leaves that always occurs in *S. discolor* (and occasionally in *S. neglecta*) (Johnson 2004). Overall, it seems that the Australasian region is an important centre of species richness of *Stictocardia*, which would be interesting to investigate in the context of the evolution of the genus.

**Key to the species of *Stictocardia***

- 1. Sepals at anthesis 12 mm or more long. Corolla 8–10 cm long. Leaves up to 20 cm wide. Abaxial surface of the leaves always green . . . . . 3. *S. tiliifolia*
- 1. Sepals at anthesis less than 12 mm long. Corolla less than 8 cm long. Leaves up to 7.5 cm wide. Abaxial surface of the leaves green or reddish . . . . . 2
- 2. Stems, leaves and inflorescences very sparsely pubescent or glabrous. Leaves with long and narrow, obtuse or acutish, mucronulate acumen. Sepals shortly ciliate in the upper part. Abaxial surface of the leaves always reddish 1. *S. discolor*
- 2. Stems leaves and inflorescences densely pubescent to tomentose. Leaves attenuate to slightly acuminate towards the apex. Sepals not ciliate. Abaxial surface of the leaves green or sometimes reddish . . . . . 2. *S. neglecta*

**1. *Stictocardia discolor*** Ooststr. — Map 19

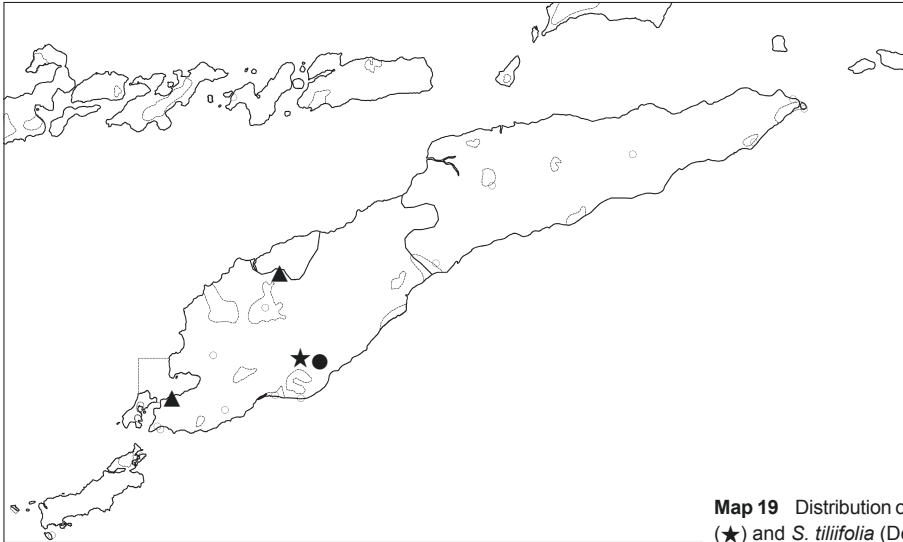
*Stictocardia discolor* Ooststr. (1943) 350; Ooststr. (in Ooststr. & Hoogland 1953) 493; Kalkman (1955) 216. — Type: *Reinwardt 1350* (L!), Timor.

Distribution — Timor (Van Ooststroom & Hoogland 1953). Vernacular name — Lak-laku mè (Dawan).

Note — The red colouration on the lower surface of the leaves sets this species apart from the pantropical *S. tiliifolia*. However, this character may also occur in *S. neglecta* (Van Ooststroom & Hoogland 1953).



**Map 18** Distribution of *Porana volubilis* Burm.f.



**Map 19** Distribution of *Stictocardia discolor* Ooststr. (●), *S. neglecta* Ooststr. (★) and *S. tiliifolia* (Desr.) Hallier f. (▲).

## 2. *Stictocardia neglecta* Ooststr. — Map 19

*Stictocardia neglecta* Ooststr. (1943) 348; Ooststr. (in Ooststr. & Hoogland 1953) 491; Kalkman (1955) 216. — Syntypes: *Walsh* 373 (BM, BO), Indonesia (West Timor), Ofu, c. 305 (900?) m, 2.v.1929; *Teysmann s.n.* (BO), Indonesia (West Timor), Kupang.

Distribution — Malesia: Southwest Celebes, Lesser Sunda Islands (Timor, Wetar) (Van Ooststroom & Hoogland 1953).

Habitat & Ecology — Creeper. In thickets up to c. 900 m (Van Ooststroom & Hoogland 1953). According to Walsh (specimen *Walsh* 373, BM), the plant was common throughout Timor at the date of collection, 1929; sadly, more recent reliable data are not available to inform on the present abundance of the species in the island.

Vernacular names — Lololi; non laku; non loli (Timor: unknown dialect); sekal zon (Bunaq).

## 3. *Stictocardia tiliifolia* (Desr.) Hallier f. — Map 19

*Stictocardia tiliifolia* (Desr.) Hallier f. (1893b) 159 (*'tiliaefolia'*); Ooststr. (in Ooststr. & Hoogland 1953) 491.  
*Convolvulus tiliifolius* Desr. (1792) 544.  
*Ipomoea grandiflora* (L.f.) Lam. (1792) 467; Fawc. (1885) 511.  
*Ipomoea pulchra* Blume (1826) 716; Span. (1841) 340.

Distribution — Circumtropical, throughout Malesia (Van Ooststroom & Hoogland 1953).

Habitat & Ecology — On and behind seashore, sometimes also in the interior; in thickets, hedges and secondary forests; up to c. 900 m (Van Ooststroom & Hoogland 1953).

Vernacular name — Faif foro (Timor: unknown dialect).

## 15. XENOSTEGIA D.F.Austin & Staples (1980) 533

### 1. *Xenostegia tridentata* (L.) D.F.Austin & Staples — Map 20

*Xenostegia tridentata* (L.) D.F.Austin & Staples (1980) 533.  
*Convolvulus tridentatus* L. (1753) 157.  
*Ipomoea angustifolia* Jacq. (1788) 367; Fawc. (1885) 511.  
*Convolvulus hastatus* Desr. in Lam. (1792) 542.  
*Ipomoea filicaulis* Blume (1826) 721; Decne. (1834) 390; Span. (1841) 338; Miq. (1856) 603.  
*Merremia tridentata* (L.) Hallier f. (1893a) 552; Ooststr. (in Ooststr. & Hoogland 1953) 445; Kalkman (1955) 216.  
*Merremia tridentata* (L.) Hallier f. subsp. *hastata* (Desr.) Ooststr. (1939) 317.  
*Merremia tridentata* (L.) Hallier f. subsp. *angustifolia* (Jacq.) Ooststr. (1939) 323.

Distribution — Bangladesh (?), Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, New Guinea, Philippines, Singapore,

Sri Lanka, Thailand, Vietnam; Africa, North Australia (Fang & Staples 1995). Also in East Timor.

Habitat & Ecology — Winding in grass; in sandy places near the coast (Van Ooststroom & Hoogland 1953).

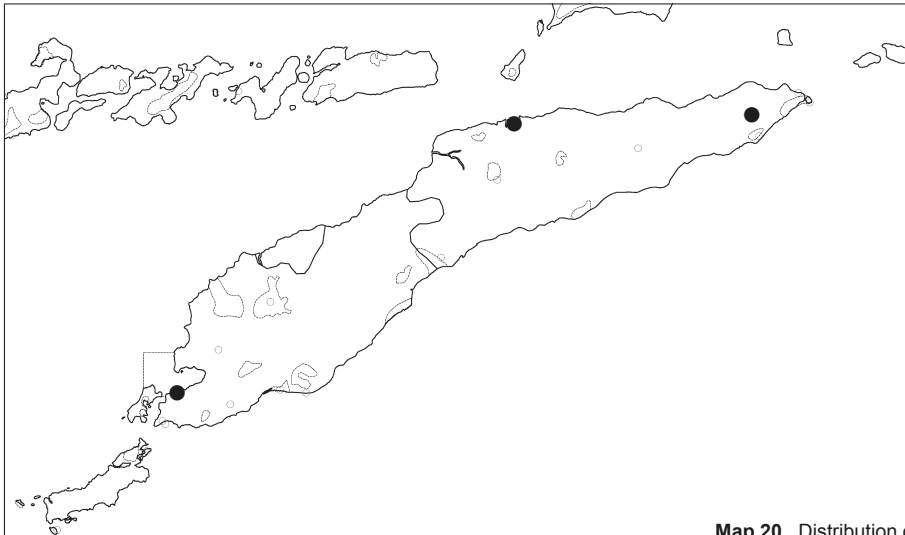
Uses — The leaf is made into poultice and applied to the head in cases of jungle-fever in Peninsular Malaysia (Van Ooststroom & Hoogland 1953).

Note — Van Ooststroom (Van Ooststroom & Hoogland 1953) proposed several subspecies within *Merremia tridentata* (L.) Hallier f. Because of the obvious intergradation between the characters, our view is that there are no adequate differences to recognise the three subspecies and they should be treated as one single taxon (*Xenostegia tridentata*). It is notable that the specimens we have seen from Timor all seem to fit the description of *Merremia tridentata* subsp. *hastata*, which agrees with Van Ooststroom's notes on the distribution of the subspecies. Van Ooststroom does not report subsp. *tridentata* from Timor, and no distribution notes are indicated for subsp. *angustifolia*, but synonyms of subsp. *angustifolia* (*Ipomoea angustifolia* Jacq., *Ipomoea filicaulis* Blume) have been reported to occur in Timor (Decaisne 1834, Spanoghe 1841, Fawcett 1885).

## ETHNOBOTANICAL NOTES

*Convolvulaceae* seem to be widely used in the island of Timor, and a significant number of species was found to have ethnobotanical value not only in Timor but also across its distribution range. Twenty-one taxa of *Convolvulaceae* are known to have medicinal use; seven can be used as food; four are used for ornamental purposes and three have other various applications. *Argyreia paivae*, described in this paper and which appears to be endemic to Timor, is used medicinally for treating gonorrhoea. Apart from the pharmacological interest, it is noteworthy that there is a vernacular name for this species, so the plant is familiar to local people. Such information could be useful for motivating the local communities to get involved in future conservation strategies, focussing on this and other species that are useful to them.

A great part of the listed taxa with known uses has been reported to East Timor, meaning that they might hold potential for sustainable economical use (e.g. in pharmaceutical research or agro-alimentar industry) in alternative to other damaged or depleted natural resources of the territory.



**Map 20** Distribution of *Xenostegia tridentata* (L.) D.F. Austin & Staples.

### CONSERVATION NOTES

There are currently 17 recognized protected areas in East Timor, 16 of which were designated during the United Nations temporary government of the territory, in 2000 (IUCN & UNEP 2007). Most of these areas are little studied and, given that the plant diversity of East Timor has not been accurately assessed yet, the protected areas are probably not sufficient to protect the endemic, endangered and vulnerable species of East Timor.

The Nino Konis Santana National Park was created in 2007 and covers 123 600 ha (Map 21) at the eastern tip of East Timor. It was designated to protect a number of Critically Endangered and Endangered bird species. However, it is a great contribution to the protection of species from other groups, and a sign that Timorese communities and Government are willing to collaborate to protect and manage their natural resources in a sustainable way (Birdlife International 2008).

None of the six species of *Convolvulaceae* currently considered endemic to Timor are endemic to East Timor. Also, considering the scarceness of specimens available from Timor, the validity of the endemic species is likely to need to be re-assessed, as soon as more collections are made in the island and its surroundings.

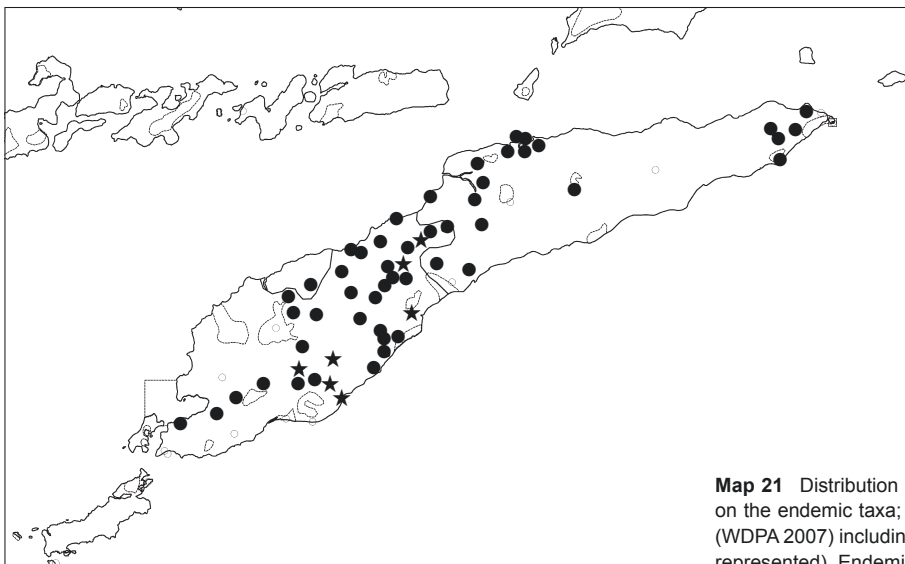
It is noteworthy that most *Convolvulaceae* specimens from Timor were collected outside designated protected areas. This may reflect the limited knowledge of the flora of protected

areas in Timor and we suggest that these sites would be better collected.

However, we would also suggest that the conservation status of sites, such as Tatamailau hillsides, Fuloro plateau or the surroundings of the Lore reserve, where endemic *Convolvulaceae* have been collected, should be the focus of further study as they are likely to have an interesting unique flora.

None of the species of *Convolvulaceae* in Timor are listed in CITES or IUCN as needing special protection measures. However, accurate evaluations on the conservation status of species from the island of Timor have not yet been attempted and in the current study, it was not possible to assess such conservation status because vital information was missing, such as precise collection sites, size of populations or real distribution ranges. Although we have reached no definite conclusion in this study, it is expected that the data provided would be a useful source for further studies on conservation status of *Convolvulaceae* in Timor.

The lack of botanical data has been a great constraint for the establishment of more protected areas and for the assessment of conservation status of species in East Timor. A comprehensive assessment of the botanical resources of the island is required, with greater effort in East Timor. Compiling all the available botanical data and including them in conservation programmes would provide a much more powerful tool in the management of the local natural resources.



**Map 21** Distribution of all *Convolvulaceae* from Timor, with special focus on the endemic taxa; representation of all the designated protected areas (WDPA 2007) including Nino Konis National Park (real limits of the park not represented). Endemic taxa (★), remaining taxa (●).



## CONCLUSION

In Timor, we find a total of 61 different taxa of *Convolvulaceae*. Fifty three species are recognised in 15 different genera. Eight of the species have a circumtropical distribution, whereas six appear to be endemic to the island of Timor. The rest of the species have shown a larger distribution in Malesia, or expanded to tropical Africa and/or America.

Ten nomenclatural changes to Flora Malesiana's taxonomic treatment were adopted in this checklist. A few taxonomic issues remain to be resolved, namely in *Jacquemontia paniculata* and *Xenostegia tridentata*, where further studies should be carried out.

The recent collection efforts in the island (2004 and 2005) resulted in a new species record to East Timor (*Cuscuta campestris*) and to the island. Examination of herbarium material also resulted in another new record to Timor, *Merremia quinata*, and a newly described taxon, *Argyreia paivae*, which is most likely endemic to Timor, and holds potential to be used as a medicinal plant.

The need to assess the botanical resources of the island, with special focus on protected areas and sites where endemics have been reported is highlighted. It is hoped that the compilation of ethnobotanical data in this paper will assist the local population by providing a tool to facilitate the production of non-scientifically oriented publications, such as field guides or ethnobotanical leaflets or books. This paper, together with that of Silveira et al. (2008), provides a starting point for further botanical research in the territory, to establish a more thorough understanding of the country's natural potential.

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## IDENTIFICATION LIST

The numbers between parenthesis after the collector numbers refer to the numerical order used in the taxonomic treatment. The first digit corresponds to the genus number, the following digit(s) to the species number within the genus and the last digit (a, b or c) to the infraspecific name number. A ? means that identification to the species level was not possible. The letter (T) indicates a type specimen.

e.g.: 1.1 = *Argyreia paivae*; 6.1b = *Evolvulus alsinoides* var. *decumbens*.

Note: Flora Malesiana's Cyclopedia of Collectors (Van Steenis 1950) has been followed whenever the collectors were cited in this compilation. For those names that could not be found in this Cyclopedia of Collectors, surname and initials were included. Exception was made for Silva and José Gomes da Silva, where the opposite was applied, because no initials were available for the specimen collected by the first, and only Silva was used for the second in the mentioned compilation.

Bloembergen 3435 (8.1a).

R. Cinatti 29 (8.18); 107 (8.17); 131 (8.24); 165 (11.2); 168 (8.20); 171 (8.13); 194 (13.1); 243 (8.7); 273 (10.4); 295 (10.7); 332 (10.4); 339 (2.1); 366 (6.1a); 369 (9.1a).

Flood s.n. (8.15) – Forbes 3754 (15.1); 3773 (8.2); 3776 (8.13); 3871 (8.20); 4004 (8.14); 4104 (4.1); 4105 (8.13); 4108 (8.13) – C. Friedberg 49 (8.4); 67 (8.4); 144[0?] (14.2); 257a (T) (1.1); 412 (8.13).

Gaudichaud-Beaupré 139 (7.1).

Jaag 75 (8.20); 89 (15.1) – Jonker 273 (1.3); 285 (T) (9.2b); 290 (14.2).

C.W. Kooy 71 (9.1a); 85 (8.24); 10[8] (8.11); 110 (11.2); 152 (6.1b); 241 (7.1); 242 (8.14); 244 (8.23); 249 (8.23); 257 (8.7); 260 (11.2); 263 (11.2); 276 (8.18); 277 (10.7); 283 (8.7); 292 (14.1); 293 (8.1a); 295 (10.5); 362 (3.2); 378 (8.16); 398 (8.11); 455 (6.1a); 481 (11.2); 523 (1.2); 642 (8.1a); 706 (1.1); 727 (3.2); 734 (13.1); 738 (10.2); 793 (8.1a); 794 (10.1); 884 (13.1); 896 (10.5); 903 (3.3); 905 (1.1); 936 (8.8); 981 (10.7); 982 (10.6a); 1252 (8.22); 1294 (9.1a); 1295 (9.1a); 1310 (8.16); 1318 (13.1); 1320 (10.2); 1330 (8.22); 1337 (13.1); 1395 (14.3).

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Reinwardt 36 (8.5); 12(?) (1.2); 1300 (15.1); 1332 (8.5); 1350 (T) (14.1); 1351 (T) (1.2).  
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 Teysmann 441 (13.1).  
 Van Steenis 17985 (8.11); 18107 (10.3); 18124 (12.1); 18125 (8.6); 18132 (8.11); 18216 (15.1) – Verdial 14 V. (8.14); 15 (7.1); 21 V. (11.2); 26 V. (8.?) ; 74 (10.7) – Voogd 1758 (4.1) – Vriese s.n. (8.18).

Wallich s.n. (10.6) – Walsh-Held 11 (8.14); 48 (6.1a); 65 (8.13); 107 (14.2); 117 (9.1a); 126 (8.11); 153 (1.2); 250 (8.1a); 266 (8.15); 303 (13.1); 310 (8.16); 319 (4.1); 364 (8.16); 373 (T) (14.2); 375 (T) (10.1); 376 (9.1a); 388 (T) (1.3); 389 (7.1); 399 (8.23); 414 (11.2); 422 (8.10); 430 (8.25); 441 (13.1); 478 (10.7).  
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